

Science educational and recreational benefits of the Bioresources Nature Park at Nilambur, Kerala, India

Throughout the tropics, growing human population, overexploitation and endangerment of biological resources are leading to habitat loss of flora and fauna, and in turn loss of biodiversity^{1,2}. In this context, the need for intensive *in situ* conservation measures, both at regional and global scale, has been stressed³. However, due to various anthropogenic activities, such measures alone may not be always effective and feasible. Hence, apart from *in situ* conservation, *ex situ* conservation and mass propagation of plants are important not only to conserve but also to sustainably utilize these resources. In India, several large- and small-scale botanical gardens have been established for *ex situ* conservation. Several of these botanical gardens have also become popular travel destinations and entertainment sites for local people. In recent years, the Botanic Gardens Conservation Secretariat (BGCS) has identified that botanical gardens need to play three major roles, namely public education, *ex situ* conservation and scientific research in order to facilitate plant conservation and sustainability⁴. In several countries, as in ours, awareness among people on the richness of bioresources and their ecological and socio-economic importance is generally poor⁵. Thus, to serve multifold objectives of *ex situ* conservation of various groups of plants and promotion of nature education and ecotourism, different approaches are needed.

In this direction, KSCSTE-Kerala Forest Research Institute (KFRI), Peechi has established a Bioresources Nature Park (BNP) (Figure 1), in its Sub Centre campus (76°15'28"E long. and 11°18'14"N lat.) at Nilambur, Malappuram district, Kerala to assemble a live collection of different taxonomic groups of plants and offer nature education. While numerous studies have been conducted to explore the educational and recreational benefits of museums, zoos and other learning institutions, such studies are lacking in botanical gardens^{6,7}. Thus, in the present study, the following two hypotheses have been established: (i) the BNP can improve visitor's experience in relation to knowledge acquirement, and (ii) educational and entertainment functions of the BNP are closely knitted together and

therefore enhance the visitor's satisfaction. Here we test these two hypotheses using an experimental study.

In the study location (BNP), besides conservation themes for lower groups of plants such as algae, bryophytes and pteridophytes, plants generally found in specialized ecological niche such as xerophytes (cacti and succulents) and hydrophytes (aquatic plants), beneficial plants (e.g. medicinal plants) and ornamental plants (e.g. orchids) are also seen. A Taxonomic Garden is also situated in the BNP. The on-site survey carried out at the entrance of the BNP used a two-page questionnaire (in Malayalam and English), which included questions regarding: (a) main objective of the visit, (b) experience during the visit, (c) degree of satisfaction with the visit, and (d) general opinion and suggestions of the respondents. It was ensured that the respondents had finished touring the BNP before being randomly invited to complete the questionnaire. In total, 556 qualified questionnaires were obtained. The Likert five-point scale with the choices 'definitely not, probably not, uncertain, probably yes and definitely yes', of scores 1, 2, 3, 4 and 5 respectively, was distributed to examine the degree of satisfaction: 'willing to revisit the BNP' and 'willing to recommend the BNP to friends and colleagues'. The backward conditional linear regression analysis was performed to assess the influence of visit

to all theme areas in the BNP on the travel experiences (feeling relaxed, improving friendship, getting close to nature, gaining botanical knowledge, seeing diverse types of plants, gaining knowledge on gardening and plant propagation, gaining knowledge on environment protection, enjoying beautiful garden views, and learning about various uses of plants) and regression analysis was performed to test the effect the visitor's demographic characteristics on the visit to theme areas in the BNP using SPSS version 10.0 at a significant level of 0.5.

Among the 556 respondents, 309 were first-time visitors, 115 were second-time visitors and 132 people visited the BNP three times or more. The fact that about 90% of the respondents were willing to revisit (495 respondents) and recommend the BNP to their friends and colleagues (510 respondents) reflected that the BNP has become the most popular travel destination and public nature education site for local people. The visitors' satisfaction with the BNP is also influenced by whether they visit all theme areas or just walk around the park. Thus, a significant difference between visitors to the theme areas and those who did not was recorded for both the statements related to satisfaction, namely willing to revisit the BNP ($P = 0.045$) and willing to recommend the BNP to their friends and colleagues ($P = 0.025$). It was found that a



Figure 1. Bioresources Nature Park, Kerala Forest Research Institute Sub Centre, Nilambur.

few respondents were not willing to revisit (18 respondents) or recommend the BNP to their friends and colleagues (19 respondents), perhaps due to lack of certain facilities like restrooms, dining halls and sitting spaces. Also, the travel motivation of some visitors is solely to enjoy the BNP as a picnic spot. However, the objective of the BNP is to serve as a nature education centre, and therefore it may not be attractive to such visitors.

A majority, i.e. 43% of the total respondents spent 1–2 h in the BNP, while 30% of the total respondents spent 2–3 h. Some of them stated that the BNP is a compact and well-planned garden. Thus, within a short period, a large number of plants in thematic areas can be seen which can enable visitors to gain significantly more knowledge about biodiversity. At the same time, some visitors were not able to spend much time in the BNP. Some visitors primarily came to gain access to nature (393 respondents) and enjoy the scenery of the garden (409 respondents). However, after the visit they felt significantly higher satisfaction than expected as they gained additional educational experience like exposure to plant diversity (408 respondents), gardening and plant propagation (372 respondents).

Responses to benefits accrued by the visitors to the BNP were compared using backward linear regression between those who visited different theme areas and those who just walked around the BNP. Visitors to different theme areas

mentioned that they gained more knowledge on plants ($P = 0.04$), and on plant propagation and gardening ($P = 0.02$). The study also indicated that compared to visitors who come from other places, those from in and around Nilambur gained more experiences, e.g. enjoyed the beautiful garden ($P = 0.03$) and felt relaxed ($P = 0.045$). The respondents also stated that the theme areas and biodiversity knowledge dissemination in the BNP are not conflicting with its entertainment aspects. On the other hand, the educational and entertainment aspects of the BNP are closely linked together and therefore enhance the visitors' satisfaction.

This study presents a comprehensive analysis on the role of the BNP in offering nature education and recreation to the visitors. The study results suggest the positive feelings about nature education attempts and amenities provided in the BNP. However, sustained efforts are needed in the BNP for further improvement of its educational role and attractiveness to visitors.

1. May, R. M., *Nature*, 1975, **257**, 737–738.
2. Nayar, M. P., In *Biodiversity and Tropical Forests: The Kerala Scenario* (eds Pushpangadan P. and Nair, K. S. S.), The State Committee on Science, Technology and Environment, Thiruvananthapuram, 1997, pp. 7–80.
3. CBD Secretariat, Global Strategy for Plant Conservation, Report, Montreal, Canada, 2002.

4. Jackson, P. W. and Sutherland, L., *International Agenda for Botanic Gardens in Conservation*, Botanic Gardens Conservation International, London, UK, 2000.
5. Kalam, A. P. J. and Rajan, Y. S., *India 2020: A Vision for the New Millennium*, Penguin Books India Ltd, New Delhi, 1998.
6. Ballantyne, R., Packer, J. and Hughes, K., *Tourman*, 2008, **29**, 439–444.
7. He, H. and Chen, J., *Biodivers. Sci.*, 2011, **19**, 589–596.

ACKNOWLEDGEMENTS. We thank Dr Syam Viswanath, Director, Kerala Forest Research Institute, Peechi for his encouragement. We also thank the following agencies for providing grants for establishment of the Bioresources Nature Park – Department of Biotechnology, Ministry of Environment, Forest and Climate Change (GoI), National Medicinal Plants Board, Kerala State Planning Board, Kerala State Medicinal Plants Board, Kerala State Council for Science, Technology and Environment, and Kerala State Tourism Department.

Received 13 April 2019; revised accepted 27 May 2019

U. M. CHANDRASHEKARA*
P. K. RESHMA

*Kerala Forest Research Institute Sub
Centre, Nilambur,
Chandakkunnu 679 342, India*
*For correspondence.
e-mail: umchandra@rediffmail.com