Conservation and education programmes on plants at Coimbatore Zoological Park Botanical Garden, Coimbatore, Tamil Nadu, India

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Introduction

The Coimbatore Zoological Park Society (CZP) was established in 1986 and is located at Anaikatty (1106' N, 76045'E), 30 km west of Coimbatore, South India occupying an area of 100 hectares at an altitude of 650 meters above mean sea level. The objectives of the CZP, stem from their members scientific and ethical concerns & interests. Originally, the Society had planned a typical zoological park, but soon thereafter, Central Zoo Authority (CZA) members and advisors perceived that the social and educational requirements of the community had evolved, and required a more relevant facility. Accordingly, the scope and direction of the project is now envisioned as a holistic environmental complex the Nilgiri Biosphere Conservation Park (NBCP) was born. The CZP botanical garden project started in September 1992, with an ambitious and detailed concept plan for collection of appropriate plants, preparation of the site and recreating the different vegetation types, which are found in the Nilgiri Biosphere Reserve (NBR) which covers 5520 sq.km in the Western Ghats, and also it is one of the two designated biodiversity hotspots of India. The botanical garden will be a true replica of the NBR, focusing on the conservation and education of its flora and fauna (Ashraf, 2000 and Walker et al, 2004). This botanical garden is a place for the purpose of scientific, research, conservation, display, education and interpretation center for the Nilgiri Biosphere Reserve and thus it fits well with the definition of International Agenda for Botanic Gardens Conservation (Wyse Jackson, 1999). When the project is complete it is expected to be a role model in the conservation of endemic and endangered flora and fauna of the NBR.

Botanical Gardens in India and Conservation Initiatives

At present there are 150 botanic gardens in India. The size and activity of the gardens varies greatly. Many of the botanic gardens were established for the purpose of introducing and acclimatizing economically important plants. Most of the botanical gardens in India serve to provide recreation to local communities and visitors and are valued more for their aesthetic qualities than for the role that they play in botanic education. Under the BGCI a networking was established in 2003 by the National Botanical Research Institute (NBRI) Lucknow, for promoting plants conservation initiatives and build the capacity of Indian Botanic Garden and associated organizations.

At CZP botanical garden activities such as research, conservation and projects on education are ongoing activities and are undertaken in collaboration with local, national as well as international institutes like Forest Department, Bharathiyar University and its affiliated colleges Center for Environment Education (CEE) and Zoo Outreach Organization (ZOO). The CZP botanical garden is trying to achieve the International strategies for biodiversity conservation and sustainable living (CBD Agenda 21, International Agenda for Conservation in Botanic Gardens). This also aims at

the Global Strategy for Plants Conservation (GSPC) target for the year 2010 that includes: Understanding and documenting plant diversity, conservation of plants, sustainable use of plants, promoting education and awareness about plant conservation.

The 2005 edition of the World Zoo and Aquarium Conservation Strategy has its theme the concept of "integrated conservation". The CZP botanical garden will be the embodiment of integrated conservation, and it is evident from the fact that the Botanic Garden has 534 species of plants of the NBR, of which 40 of them are endemic and 10 threatened with extinction in the wild.

About CZP Botanical Garden

The CZP Botanical Garden is situated on the eastern slopes of the Nilgiri hills, surrounded by the Nilgiri Biosphere Reserve, Western Ghats, Southern India. The NBR, rich in endemism, is perhaps the most widely known mountain part of the Western Ghats. South Indian forest types in the NBR constitutes eight thematic vegetation zones: Evergreen Zone, Semi-evergreen Zones, Moist Deciduous Zone, Dry Deciduous Zone (with three belts of moist teak Forest, Bamboo Brakes) Mixed Deciduous Forest, Rain Shadow Zone, Montane Shola Zone and Thorn Forest Zone. The CZP botanical garden is recreating the NBR, with the native plants. In future the animals, native to the NBR, will be exhibited into the appropriate zone.

Since inception, CZP Botanical garden has been planting rare and endemic trees of NBR The CZP botanical garden as of December 2005, has 534 species of 2,00,020 plants, of these 370 consists of 20,000 seedlings that are well established in the field. The Botanical garden has more plants indigenous to the Nilgiri Biosphere Reserve than any other plant conservation centre in this region (Walker *et al*, 2004). This has tremendous educational value for the forestry personnel, researcher, teachers, school and college students. Collection of plants from various Research Institutes, Forest Departments and NGO's has helped us to maintain more such indigenous plants to the NBR than any other plant conservation organization in the country.

As of now the garden is used to interpret the conservation issues to the public, about plants and animals. The CZP with the collaborating institutes has organized a series of awareness programmes involving a broad group of audience, both in the garden as well as in educational institutes at the vicinity of the site as well as in the city.

Activities of the CZP Botanical Garden

Conservation efforts

Conservation education workshops, one on Botanical education and the other on invertebrates and amphibians conservation, were organized in 1995. The Botanic Education workshop was aimed to bring together zoos, botanical gardens, forest department, research institutions and NGOs under a common forum so that they can collectively benefit and work on matters concerning plant diversity. The workshop was organized by ZOO, BGCI in collaboration with CZP and British High Commission. With the support from Durrell Wildlife Conservation Trust, Conservation education of the invertebrates and amphibians of the Anaikatty region has been undertaken in 1997. Through this project we could able to motivate the visitors about the need for conservation of local fauna. The inventory survey of fauna and flora was done during 1992-1995, and a research project on the pests and diseases of Forest Plantations in collaboration with the Bharathiyar University, Coimbatore was carried out in 1998. The study investigated the prevalence and intensity of pests and diseases of plants at the zoo. The findings were helpful in

formulating appropriate pest and disease control measures. The project site supports 110 species of birds, 18 species of reptiles, 24 species of amphibian's 360 species of invertebrates, 12 species of mammals and 60 species of plants. Almost after 10 years we could able to see some changes in faunal composition of the site. The increase in number of bird species, butterflies and invertebrates were documented. Elephants visit during summer in search of fodder plants and water was very well documented.

Plant Record keeping system

Management and exchange of information pertaining to conservation collection and related programmes are a vital necessity for botanic gardens and it provides an opportunity to demonstrate the complex interrelationship between plants and the environment. Regular botanical research is conducted in collaboration with Botanical Survey of India, Southern Circle, which includes systematic collection, protection, propagation, and planting to recreate the different forest types. Documentation and management to cope up with the enormous quantity of data generated by day-to-day botanic activities records is maintained in the ENTADA software, which is named after India longest climber *Entada rheedi*. This data would be later fed into the BG recorder. Germination studies have shown that 40 species of rainforest endemics and endangered species have propagated successfully, many of which for the first time in *ex-situ* condition. Records are maintained on all parameters of the germination process. Seeds are subjected to various methods of treatment for studying their germination success. Sometimes, the germination success of seeds collected from wild civet scats, elephant dung and hornbill droppings are investigated and compared with that of untreated seeds.

Awareness programme

The CZP botanic gardens act as a resource center for learning various environmental related issues and biodiversity conservation. Mostly students and teachers are making use of it for their curriculum and nature education trips. In June 1998, the first ever -botanic education tour to Tropical Rainforest ecosystem was conducted, and the beneficiaries were 40 school students from Tirupur, sponsored by CEE.

From 1998 to 2005 the plantation attracted 250 in-service Range Officer trainees from State Forest Service College, Coimbatore. Their visit was to know more about plant identification, propagation techniques and conservation measures.

Last seven years we have been conducting wildlife quiz contest emphasizing the theme of biodiversity conservation for the colleges in and around Coimbatore city. About 3000 students of 30 colleges were participated in this and greatly benefited from it.

During February 2003, ZOO and Wildlife Conservation Society in collaboration with CZP organized Teachers for Tigers workshop. Forty teachers from various schools took part in the workshop. As part of the workshop one-day field trip was organized to CZP botanical garden. This was mainly to show them the various vegetation types recreated and its importance in the forest ecosystem.

BGCI Project

In recognition of plants conservation efforts of CZP, a grant has been awarded by Botanical

Garden Conservation International (BGCI) Investing in Nature India, as part of the National Plant Conservation programme through the National Botanical Research Institute (NBRI) Lucknow, is a National Coordinating Institute for India. The project began in February, 2004 for establishing of arboretum for 100 Endemic and Endangered plants of the NBR, standardization of the nursery techniques for propagation of endemic and endangered taxon, field demonstration about the relationship that plants have developed with their environment and functioning as an interpretation center for plant identification, conservation and utilitarian values and potentials.

Achievement of BGCI Project

(1) Establishment of arboretum for 77 species of NBR plants at the CZP botanical garden. This will serve as gene pool for the RET species of the NBR.

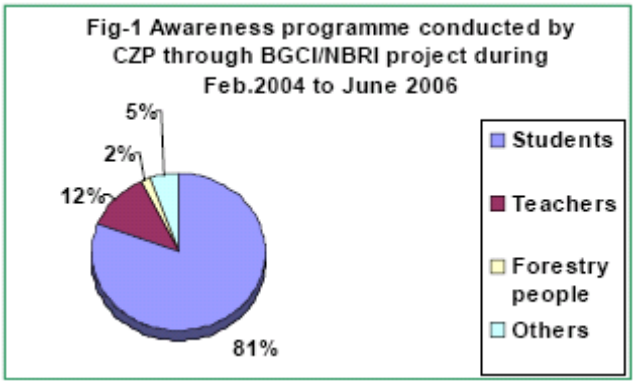
(2) Standardization of the nursery techniques for 22 species was studied in depth.

(3) Establishment of an interpretation center at CZP botanical garden and field demo on adaptive modification in plants for visitors

The CZP botanical garden has been encouraging students from National Service Scheme and Nature Clubs of various institutions to plant seedlings at the site, so that they develop a personal attachment towards environmental concerns. Visitors were explained about the need for biodiversity conservation, endemic and endangered plants and animals of the NBR and the causes for its decline. Education and raising public awareness was recognized as a key area to ensure the conservation of biodiversity for the future- and in this regard botanical gardens have a crucial role to play.

Plants conservation education programme for school students

The BGCI project envisioned exposing more students and public to botanical diversity of the NBR, and providing them hands-on experience in plant propagation methods. Visitors are explained about bio-geographic zones of NBR, endemic plants, the plant - animal interaction and seed dispersal in a forest. Nature trails around the hillocks are organized as part of the visit. During the trail the adaptive modification of leaves, stem of different tree species were Plants conservation education programme for school students shown to them. The educational material sponsored by ZOO/BGCI/Chester Zoo was made our task easy to brief them. Tree bark posters and booklet pertaining to five different kinds of trees such as coconut, rattan, cactus, birch and pine are used during the programme to help the participants to learn more about plants. Bark posters which have been designed to be wrapped around man –made objects to make them look like plants, Based on the materials, games such as adaptive modification of trees, role in the ecosystem and its uses to mankind were explained. Student's aptitudes were assessed through the quiz competition after the nature trail. At the end students were encouraged to plant tree which would in turn give them a sense of personal attachment, translating to plant conservation. Through this programme a total of 3200 people were trained during the project period (Fig.1).



The Herbal Garden developed by CZP at a local school was a successful effort to promote the medicinal plants conservation among students. This resulted in making home gardens by the students. With the support from ZOO "Plants for Life" events was organized on selected schools during special occasions such World Environment Day, World Earth Day etc., We were able to visit 5 institutions to deliver special talks, organized quiz and games related to plants conservation.


Herbal Garden developed by CZP Botanical Garden at local school

Local support

Success of any conservation project lie with the support we receive from local and public. In recognition of our plant conservation work, the local corporate sector has come forward to support our plants conservation initiatives. Schools, colleges and NGOs extending their support by bringing students to our botanical garden for nature education, trek and curriculum based education. In the light of the above CZP garden fulfilling GSPC Target 14. Visitors to the botanic gardens are learning not only about plants also about the biodiversity of garden, and conservation related issues. So far 22 institutions visited the Botanical Garden, during the BGCI project period, among this 12 schools have started eco clubs after their visit to the garden.

Networking

As per the GSPC Target 16, networking with the botanical gardens for plants conservation is vital. We were able to establish network between 12 gardens in South India, we visit these gardens to know each other's work, sharing of information and exchange of plant materials.

Future Plan

Conservation of endemic and threatened plants will be regular feature of CZP botanical garden supported by research and education. The CZP botanical garden has played an important role in implementing the international strategies. In the coming years the garden will serve as an educational, recreation spot with environmental education as the central theme.

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