

# DARWIN INITIATIVE FOR THE SURVIVAL OF SPECIES

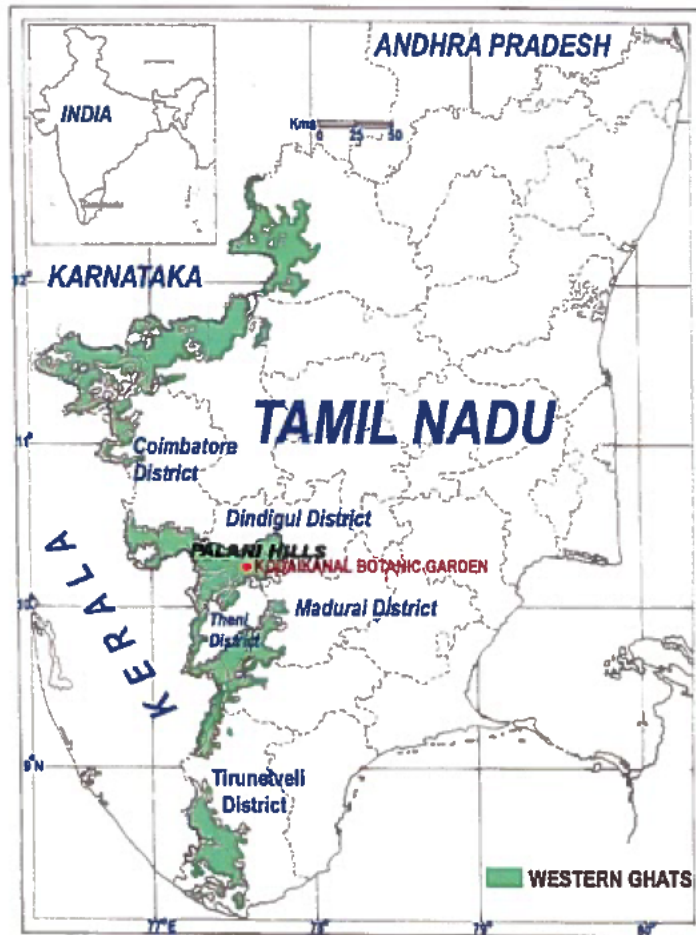
## Final Report

### 1. Darwin Project Information

Project title	People and Plants – Training Darwin Mentors
Country	India
Contractor	Botanic Gardens Conservation International, UK
Project Reference No.	162/10/02
Grant Value	£58, 823
Starting/Finishing dates	1 April 2001 – 27 November 2003

### 2. Project Background

The Darwin project 'People and Plants – Training Darwin Mentors', run by the Kodaikanal Botanic Garden, was located in the Palni Hills of the Western Ghats of India. The Western Ghats are a home to at least 4000 higher plant species, of which about 1500 are endemic. This represents nearly 75% of the total number of species endemic to the whole of Peninsular India. The Palni Hills, comprising largely of unique shola forests and grasslands, have come under threat from increased urbanization, tourism and demand for fuelwood and fodder as well as from commercial plantations. Recently, the Government of India has recognised the importance of the Palni hills for conservation and in principle has accepted the case for the establishment of a National Park. This Darwin project was designed to raise awareness of the environmental issues surrounding the conservation of the Palni Hills and thereby support the conservation priorities of India.



Map of Tamil Nadu showing the location of Kodaikanal Botanic Garden and the Palni Hills where the Darwin project was located.

Despite recognition of the importance of the biodiversity for the livelihood of the communities around of the Western Ghats and the Palni Hills region, awareness of the importance and value of the native flora and natural vegetation is still limited at the local level. Father Manickam, Darwin Project Coordinator in India, has been working at the Sacred Heart College in Shembaganur for over 15 years and through his work is very aware of the needs of the community. He is also the Director of the Kodaikanal Botanic Garden whose major focus is on the conservation and sustainable utilization of tropical and subtropical plant resources of the Western Ghats.

For many years the Sacred Heart College has been running an environmental awareness programme for students, farmers and environmental enthusiasts (over the age of 16). Knowing about this course, many teachers also expressed their interest to the College about learning how to teach children to become more environmentally aware. For this reason, and the pressing conservation priorities of the region, the Darwin project was formulated.

As will be evident from reading this report, the Kodaikanal Botanic Garden and the Sacred Heart College were and continue to be completely committed to the project. Dr Seeni, Project Officer, and Fr. Manickam have devoted large amounts of time and energy to the project enabling many innovative projects to be realised. Facilities, including class rooms,

auditorium, museum and garden were also made available to the project free of charge at the KBG, Sacred Heart College and St. Xavier's College campus at Palayamkottai.

### 3. Project Summary

The purpose of the project was for local school teachers and children to become aware of the importance of their native flora and forests and to understand the necessity of using plants sustainably. The project aimed to develop the capacity of teachers to teach environmental education and use the Kodaikanal Botanic Garden as an environmental education teaching resource. At the commencement of the Darwin project, in April 2001, an MOU was drawn up between the Kodaikanal Botanic Garden and BGCI. A project committee was set up and in May, Dr Seeni, Deputy Director of the Tropical Botanic Garden and Research Institute in Kerala, was appointed as the Darwin Project Officer.

The outputs of the project are outlined in the logical framework (Appendix I). They were designed within a timetable for the project and were as follows:

- **Training in strategic planning.** Eight people attended a strategy workshop in July 2001. Lucy Sutherland, BGCI Education Officer, facilitated the workshop which resulted in the development of an education and interpretation strategy (Addendum I).
- **Production of an education and interpretation strategy.** A draft strategy was distributed to a number of people and organisations for comment including Drs T.K. Abraham and G. Bhadrans Nair, Deputy Directors of the Tropical Botanic Gardens and Research Institute in Kerala and the Gurukula Botanical Sanctuary.
- **Two week training in the UK for the Darwin Project Officer.** In September 2001, Dr. S. Seeni, Darwin Project Officer visited the UK for a two-week study trip. Dr. Seeni visited six botanic gardens and two non-governmental organizations where he observed school groups participating in education programmes. He discussed the programmes in detail with education staff and spent time looking through educational resources as well as touring the gardens. Each botanic garden provided Dr. Seeni with resource materials and education information that could be adapted for use in India.
- **Production of an information leaflet about the project.** 1000 copies of the leaflet were produced in English and Tamil and widely distributed to school teachers, Area Elementary Education Officers (AEEOs), District Elementary Education Officers (DEEOs) and the Director of Elementary Education (Addendum II)
- **Production of a training course handbook.** During Dr Seeni's stay in the UK, he worked with Lucy Sutherland and Julia Willison to produce a course handbook for the training courses which were to run in 2002. The handbook was translated into Tamil during November and printed in January 2002. (Addendum III(a) and III(b))
- **Production of an interpretation leaflet.** A leaflet about local medicinal plants and their uses was produced in Tamil and distributed in January 2002 to teachers participating in the project and AEEOs and DEEOs. (Addendum IV)

- **Training of teachers in environmental education.** In March 2002, eight three-day training courses were run on environmental education for teachers at the Kodaikanal Botanic Garden. The courses were designed specifically for primary teachers. In total 180 teachers participated. The target number of teachers for the project was 200 however, given the restraints on recruitment, the project committee was delighted to receive such a high number of teachers on the courses. Detailed information is provided in the next section.
- **Resource and evaluation workshops.** A second series of workshops was held August 2002, December 2002 and February 2003 to assess the success of the EE training in March and to evaluate the contents of a teachers' resource book on medicinal plants. The target number of teachers for the workshops was 200 however this was surpassed with 292 teachers turning up. The teachers contributed significantly to the development of the book, supplying songs and stories.
- **Environmental education network.** In August 2002, Darwin mentors from the Tenkasi union organized a meeting and decided to register a Darwin Environmental Education and Development Society. DEEDS objectives are to network the school groups in all five districts and to organise model genetic gardens of medicinal plants for demonstration and training purposes and to promote organic farming. Darwin mentors from Vadipatti Union in Madurai district have also formed DEEDS with similar objectives and mentors from Palni, Natham, Udamalpet and Reddiar Chatruam unions are also keen to support this idea.
- **Production of a teachers' pack on medicinal plants and poster.** The book and poster was launched during the project closing ceremony on 27 November 2003. The book contains a range of activities that look at identifying medicinal plants, their uses, developing a school medicinal plant garden (seed collection, garden design, soil preparation and aftercare, watering), preparing simple herbal medicines, growing medicinal plants, setting up a school composting area and developing seed banks. The resource book also includes activities to understand the trade in medicinal plants and plant conservation. (Addendum V).

The project has mainly progressed according to the baseline timetable. However there have been a few anomalies. Dr Seeni was due to visit the UK in June 2001 but, after consulting various UK botanic garden educators, it was more convenient for them if he postponed his visit until September. The production of the interpretation leaflet was planned for September 2001, however due to a longer than expected time in the consultation phase, the leaflet it was not printed until January 2002. The final workshop for launching the teachers' handbook and poster was scheduled for March 2003, but due to Dr Seeni's father-in-law dying unexpectedly the workshop was postponed until August. Unfortunately this date also had to be postponed because Dr Seeni's sabbatical had ended and he had to restart his job at TBGRI, leaving him no time to complete the evaluation of the project. Dr Seeni subsequently took a month's leave to do this and requested that the workshop be set following his evaluation. The earliest time a staff member from BGC I could attend the ceremony was November 2003. The Darwin Secretariat was kept aware of these problems and approved the date for the final workshop. The milestones for the project as against the time scale and as included in the original proposal are attached (Appendix II).

The project addressed the following articles of the Convention on Biological Diversity (CBD). Article 10, Article 12 and Article 13 (Appendix III).

The project has been very successful in meeting its objectives. The training courses have been a source of inspiration to many teachers who have gone on to accomplish significant projects in their schools and neighbourhoods. Most of the trained teachers briefed their school heads and area education officers and four AEEOs requested support from the project to extend the environmental education training to other teachers using the expertise of the trained teachers. Many other training courses took place with teachers requesting saplings and herbs for their gardens. Several organizations, including the Tropical Botanic Garden and Research Institute and two nurseries in Kerala provided supplies for the gardens free of charge. One trained teacher worked with a local club and community to plant more than 200 tree saplings. Further details about the accomplishments of the teachers are included in the section Project Impact.

#### **4. Scientific, Training and Technical Components and Assessment**

##### **Strategy training workshop**

In July 2001, Lucy Sutherland ran a three-day training workshop on strategy development. Eight people attended including A.Alexander from the Genetic Garden, Inba Seva Sangam, Karur and teachers from selected primary and middle schools in Tirunelveli, Theni and Kodaikanal regions. The selection criteria involved selecting teachers, interested in the project, from both primary and secondary from different areas of the Western Ghats. This was to ensure a greater understanding of environmental issues in the region. The workshop involved a combination of lectures and discussion groups.

The strategy addressed the broad environmental education learning outcomes for Kodaikanal Botanic Garden. These were divided into three areas: knowledge, skill and ethics.

**Knowledge** – While taking part in the Kodaikanal environmental education programme, children will do activities that highlight that:

- The earth has finite resources
- humans impact on plants and the environment
- plants are important for sustaining all life on earth

**Skills** - After taking part in the Kodaikanal environmental education programme, children will have the ability to:

- seek out information from a variety of sources
- frame appropriate questions to guide relevant study and research
- define fundamental concepts (e.g. environment)
- develop hypotheses based on balanced information
- communicate information
- envision sustainable futures

**Ethics:** After taking part in the Kodaikanal environmental education programme, children will develop:

- an appreciation of the fragility and beauty of plants and interdependence of all life forms
- an awareness of the dependence of human life on plants
- an appreciation of the power of human beings to modify the environment
- a recognition of the interdependency of human community
- a personal acceptance of a sustainable life style and a commitment to participate in change

Also addressed were the environmental and social issues relating to the environment in Tamil Nadu, the facilities and resources required and the funding, marketing and promotion of the project through press releases and publication of pamphlets. The partnerships required for the project were also identified. Teachers compared the learning outcomes of the KBG against their present school curriculum and their experience over the years. The workshop also identified the school groups from five districts who they would invite to participate.

A draft strategy was produced and distributed to a number of people and organisations for comment including the teachers present at the workshop and Drs T.K. Abraham and G. Bhadrans Nair, Deputy Directors of the Tropical Botanic Gardens and Research Institute in Kerala and the Gurukula Botanical Sanctuary.

#### **Two week training in the UK**

In September 2001, Dr. S. Seeni visited the UK for a two-week study trip. During this time he visited the education departments and staff of Royal Botanic Gardens, Kew, Chelsea Physic Garden, Wakehurst Place, University of Oxford Botanic Garden, Birmingham Botanical Gardens and Glasshouses and Royal Botanic Gardens, Edinburgh. The gardens were chosen to demonstrate a range of teaching methodologies and approaches to education. For example, the focus of Chelsea Physic Garden's education programme is on school children while the focus of the University of Oxford Botanic Garden's education programme is on teenagers. Dr Seeni spent time observing education officers teaching, talking to them and gathering information about the types of programmes they run, the resources they use and the logistics of the programmes. Each botanic garden provided Dr Seeni with resource material which he could use and adapt in India. During his stay in the UK, Dr Seeni also worked with BGCI education staff to develop the training course handbook and interpretation leaflet about the project.

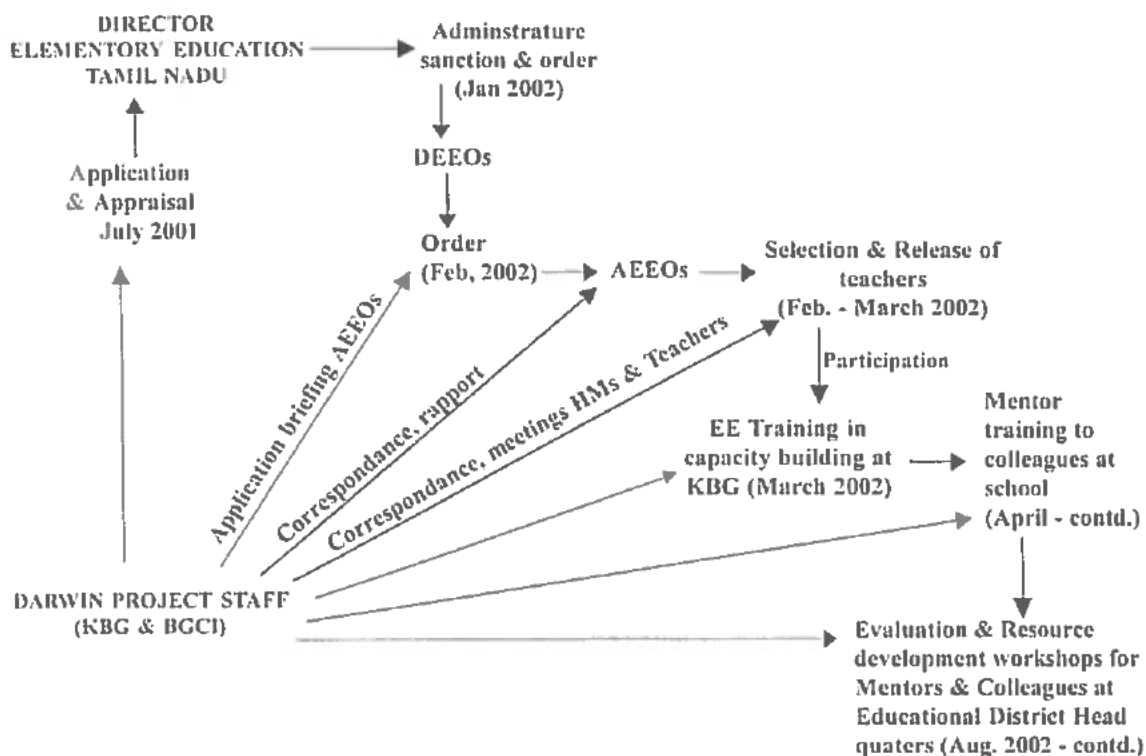
#### **Environmental education training workshops**

In March 2002, eight three-day training courses were run on environmental education for primary teachers at the Kodaikanal Botanic Garden.

In the six months prior to the workshop, Dr Seeni and Fr. Manickam traveled to schools to raise awareness about the project and gather interest in the training courses. Initially, the Christian schools were approached (Appendix IV) and while permission to visit schools in Tirunelveli and Madurai district was readily granted, the response of the teachers during the visits was highly discouraging. Female teachers in particular showed little interest in the training, mainly because they would be separated from their families during the training period. Advertisements in the local newspapers for prospective trainees also evoked a poor response. Teachers were appreciative of the information presented in A4 pamphlet on the

Darwin project and another leaflet in Tamil on the environmental problems of the local communities, however they were only willing to attend the training provided the education authorities would grant official duty leave. The project's aim was to train 200 teachers but less than 20 applied. The attempt to select teachers without involving the official bureaucracy of the State Governments' Elementary Education Department had failed and it was evident that permission would need to be sought from the education authorities if the project was to succeed. The following diagram illustrates how the education authority was involved in the project.

*Lesson!*



During August August 2001 to January 2002, Dr Seeni undertook five trips to Chennai to the state education department and held meetings with Assistant Elementary Educational Officers (AEEOs) from the following districts surrounding the Western Ghats:

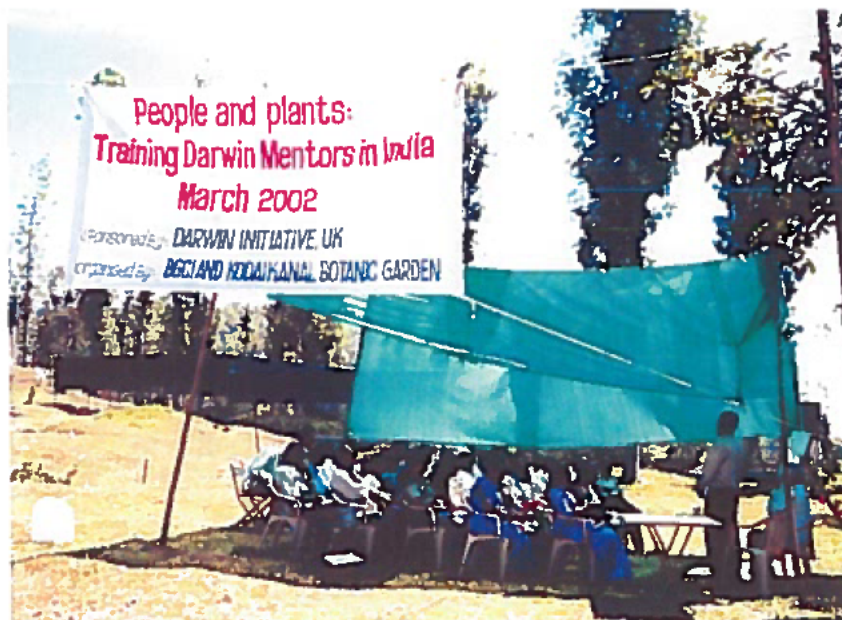
- Tirunelveli district : Vallioor, Kalakad, Cheranmahadevi, Tenkasi, Shencottah
- Madurai District : Vadippatti, Alanganalloor, Tirupparankunram
- Dindigul District : Nilakkottai, Batlagundu, Dindigul (rural)
- Theni District : Theni (rural), Uthamapalayam, Cumbum, Chinnamanoor, Mayiladumbarai

The AEEOs were asked to select 25 teachers from their area and then advise the project committee of who the teachers were. Several AEEOs gave their teachers three to four weeks notice, however some AEEOs advised their teachers just 24 hours before the training course.

The aim of the project was to train 200 teachers. In total 180 teachers received training – 124 men and 56 women (see table below). 24 of the participants were head teachers.

District	Date	Gents	Ladies	Total
1. Tirunelveli	4-6, March 2002	17	9	26
2. Theni	7-9, March 2002	18	-	18
3. Theni	11-13, March 2002	15	5	20
4. Dindigul	14-16, March 2002	24	2	26
5. Dindigul	18-20, March 2002	20	8	28
6. Coimbatore + Dindigul	21-23, March 2002	11	20	31
7. Madurai + Dindigul	25-27, March 2002	18	7	25
8. Kodaikanal	28-30, March 2002	1	5	6
<b>Total</b>		<b>124</b>	<b>56</b>	<b>180</b>

Number of teachers from different districts of Tamil Nadu participating in the Darwin Capacity building Training courses conducted at Sacred Heart College, Kodaikanal Botanic Garden, Kodaikanal in March 2002.



Dr Seeni addresses the teachers during one of the opening sessions

Approximately 25 teachers participated in each of the eight three-day courses held at the Sacred Heart College and Kodaikanal Botanic Garden. Because the final course fell in Holy Week only six teachers attended the final course.



The course was taught by Lucy Sutherland and Dr Seeni and included a mixture of lectures, practical group activities, visits to disturbed and undisturbed Shola forests, a walk through the aboriginal trail within KBG and demonstrations of plant propagation and garden design.

Each participant was provided with:

1. The Teachers Handbook on Environmental Education (English and Tamil versions)
2. An A4 pamphlet on Darwin Environmental Education Project distributed to various schools teachers, AEEOs, DEEOs and the Director of Elementary Education.
3. An interpretive leaflet on Tribal Trail in Kodaikanal Botanic Garden



Propagation demonstration during the training course

Teachers in India are accustomed to a didactic learning approach and so it was hoped that by providing opportunities for them to experience activities first hand they would be confident in carrying out the activities with their pupils. Environmental education was not a core subject of the Indian National Curriculum and so course activities were designed to fit into other curriculum areas, for example, Tamil, English, Moral Instruction, Social Sciences, Mathematics and Science. At the closing ceremony of each course teachers were awarded with a certificate of participation.

The local press including the national daily Hindu gave wide coverage to this training programme.

### Follow up training workshops– the multiplier effect

During the final week of Lucy Sutherland's stay in India, following the environmental education training workshops, she visited seven of the teachers from the first training group from Tenkasi and Shencottah unions. Lucy found that already a herbal garden had been established in one school and an ornamental garden in another. The teachers were also in the process of organising secondary level EE training course for 50 other teachers in May. This was the first example of the multiplier effect.

Darwin mentors were responsible for organizing their own secondary-level training. To facilitate this process, Dr Seeni had written to all AEEOs requesting that they encourage the Darwin mentors to organise training programmes. He also followed this up with personal phone calls. Many of the AEEOs issued orders (Appendix V) releasing the teachers for the training. At least nine AEEOs requested support from the project to extend the environmental education training to other teachers using the expertise of the Darwin mentors.

While there was no specified format for the secondary level training, all the Darwin mentors used the information, techniques and skills they had learnt during the training workshops. Many of them organized school visits to KBG and natural forest segments, ran creative environmental activities and games, gave information on establishing school gardens and organized environmental seminars.

These secondary level workshops continued through the rest of 2002 and up to January 2003 by which time 132 out of the total 180 mentors had offered training to 984 other teachers. In total 1164 teachers (180 + 984) benefited from the capacity workshops at primary and secondary levels (see table below).

S.No.	Educational District / Educational Sub District / Union	Venue	Date	Number of Mentors / teachers attended
1.	Tenkasi	Courtallam	17 & 18.4.2002	9 + 48
2.	Madurai - Thirupparankundram	Viraganoor dam	21.6.2002	5 + 23
3.	Palani	Sengunthar School, Palani	7.7.2002	6 + 150
4.	Vadipatti	Panchayat Primary School, Vadipatti	19.7.2002	8 + 39
5.	Dindigul, Natham	P.U. Primary School, Velayuthampatty	19.7.2002	5 + 23
6.	Vasudevanallur	Jawahar Middle School, Vasudevanallur	23.07.2002	1 + 16
7.	Dindigul, Sanarpatti	N.M. School, Mettupatty	2 & 3.8.2002	4 + 25
8.	Coimbatore (Udumalpet)	Municipal Middle School, Udumalpet	27.8.2002	5 + 27
9.	Reddiyarchatram	T. Pannaipatti	18.09.2002	5 + 32
10.	Shencottah	Govt. Middle School, Shencottah	11.10.2002	5 + 25
11.	Nilakottai	P.U. School Uchanampathi	22 & 23.11.2002	8 + 63
12.	Aundipatti	P.U. Middle School, Aundipatti	25.11.2002	2 + 21
13.	Cheranmadevi	Cheranmadevi (R.C. Middle School)	27.11.2002	5 + 28

14.	Kodaikanal	Sacred Heart College, Shenbaganoor	27 & 28.11.2002	2 + 24
15.	Pollachi	VRI School, Pollachi	28.11.2002	4 + 35
16.	Kalakad	Hindu Middle School, Tirukurungudi	28.11.2002	3 + 29
17.	Batlagundu	Batlagundu	13.12.2002	4 + 27
18.	Alanganallur (Madurai)	Balamedu	13.12.2002	5 + 27
19.	Chinnamanur	Chinnamanur	14.12.2002	5 + 30
20.	Theni (Myladumparai)	Myladumparai	20.12.2002	5 + 51
21.	Kuziliumparai	Kuziliumparai	21.12.2002	5 + 26
22.	Dindigul	Dindigul (Anguvilas School)	21.12.2002	5 + 40
23.	Vadamadurai	Vadamadurai	23.12.2002	4 + 33
24.	Vedasandur	Vedasandur	23.12.2002	4 + 22
25.	Uthamapalayam	Uthamapalayam	24.12.2002	5 + 36
26.	Periyakulam	Edward Memorial Middle School.	9.1.2003	9 + 54
27.	Palni - rural	Sri Renugadevi Middle School	23.1.2003	4 + 30
			Total	132 + 984

Secondary Level Teacher Training held at various unions

### Resource and Evaluation workshops

The environmental education training workshops held in March, and the subsequent follow on training workshops in various schools, were evaluated through a series of two-day workshops run in August 2002, December 2002 and February 2003. In total 11 workshops were run. It was decided to hold the workshops at the teachers' schools in order to involve as many teachers as possible, in particular women teachers. During the first day teachers were invited to share their experiences of the follow-up work they had done with their pupils. They were also asked to discuss and complete a questionnaire (Appendix VI and Addendum VI). During the second day, teachers worked in groups of four to evaluate the draft contents of the teachers' resource pack on medicinal plants. The objective was to ensure that the book would be relevant to primary and middle school teaching. The target number of teachers for the workshops was 200 however this was surpassed with 292 teachers turning up.

S.No.	Educational District / Educational Sub District	Workshop Venue	Date	Number of mentors and trainees participated
1.	Dindigul	Beschi College, Dindigul	Aug. 21, 22 2002	28
2.	Dindigul - Palani	Beschi College, Dindigul	Aug. 23, 24	15
3.	Madurai - Tirupparankundaram	St. Mary's, Madurai	Aug. 26, 27 2002	32
4.	Madurai - Vadipatti	St. Mary's, Madurai	Aug. 28, 29 2002	27
5.	Tirunelveli - Tenkasi	Panchayat Elementary School, Courtallam	Dec. 11, 12 2002	33
6.	Tirunelveli - Kalakad & Cheranmahadevi	St. Xavier's College	Dec. 16, 2002	28
7.	Tirunelveli - Shencottai &	Govt. Middle	Dec. 13, 14	33

	Vasudevanallur	School Shencottai	2002	
8.	Theni	RC Middle School Theni	Feb. 5, 2003	19
9.	Dindigul Town	Beschi College	Feb. 7 & 8, 2003	17
10.	Dindigul - Kodaikanal	Sacred Heart College, Shembaganur	Feb. 13, 2003	33
11.	Coimbatore	Municipal Middle School, Udumalpet.	Feb. 17, 18, 2003	27
<b>Total</b>				<b>292</b>

Resource and Evaluation Workshops organised during 2002 – 2003

The results of the workshops revealed that the impact of the EE training was considerable. Teachers reported on an increase in maintenance of cleanliness in the classrooms and school premises, planting activities within the school campuses, the transfer of recently acquired knowledge to their students, the acquisition of new knowledge about local plant resources and the organization of exhibitions on native plant species of medicinal and economic importance. In several cases, teachers talked about learning being a two way process, in that they discovered new uses of local plants through the help of children and their parents.



Ms. K. Chandramani from Panchayat Middle School, Samathuvapuram, Palappanpatti, trained by the Darwin mentors during the secondary-level training, helped organize a Science Exhibition with a display on Biodiversity at Bodipatti, 12.1.2002

## 5. Project Impacts

This Darwin Project is the first of its kind in southern India to provide training on environmental education for elementary school teachers and children. There is a great deal of evidence that the project achievements have led to the accomplishment of the project purpose and there are many examples of unexpected impacts.

A major achievement of the project is reaching the poorest children who attend public schools, government schools, government aided schools and Panchayat (village level) schools with environmental education. In so doing the project has generated awareness at grassroots level of the value and importance of local biodiversity.

The support for implementation of the project from the State Government's Elementary Education Department was unprecedented. Most DEEOs and AEOs enthusiastically participated in the project by issuing official orders for secondary level training and inaugurating and attending various events and activities. As a result, the authorities and teachers have realized that it is possible to sensitize local communities about their local biodiversity - even in remote areas of India. More importantly they have realized that involving the public education system is crucial to this mission.

At the start of the project, it was evident that teachers did not include environmental education in their teaching. Certainly information in the school curriculum about biodiversity is sketchy. During the teacher training workshops, however the project has been extremely well received and teachers have displayed a clear interest in their environment and an awareness of the factors adversely affecting it. Environmental education is not a compulsory subject in the curriculum and so it has been very much up to individual teachers whether or not they include it in their teaching. As such, the project does not have any control over whether environmental education is taught. The system for assessing the inclusion of environmental education into the curriculum has been through feedback from the resource and evaluation workshops (see samples of evaluation sheets in Addendum VI), letters, phone calls and visits from the Project Officer to selected schools.

To date there have been 27 secondary level teacher training courses reaching over 900 teachers. An impact of these courses has been the increase in motivation, commitment and ability of the teachers to teach environmental education.



Mrs. V. Sivakami, teacher from Jawahar Middle School at Vasudevanalloor, Tirunelveli District, organised training for 15 of her colleague.

The courses have also increased awareness in the wider community. For example lectures and activities have been organized by officials of the State Forest Department and Municipalities, local vaidyas (physicians of Ayurvedic medicine) and poets. The DEEOs and AEEOs participated in all events and the expenses for organizing the training, including refreshments, were met from contributions of local individuals, businessmen and NGOs. Several courses included artistic performances with music and dance to which local villagers were invited. Plants were distributed during most of the secondary level training programmes and also provided to schools free of charge through the State Forest Department.

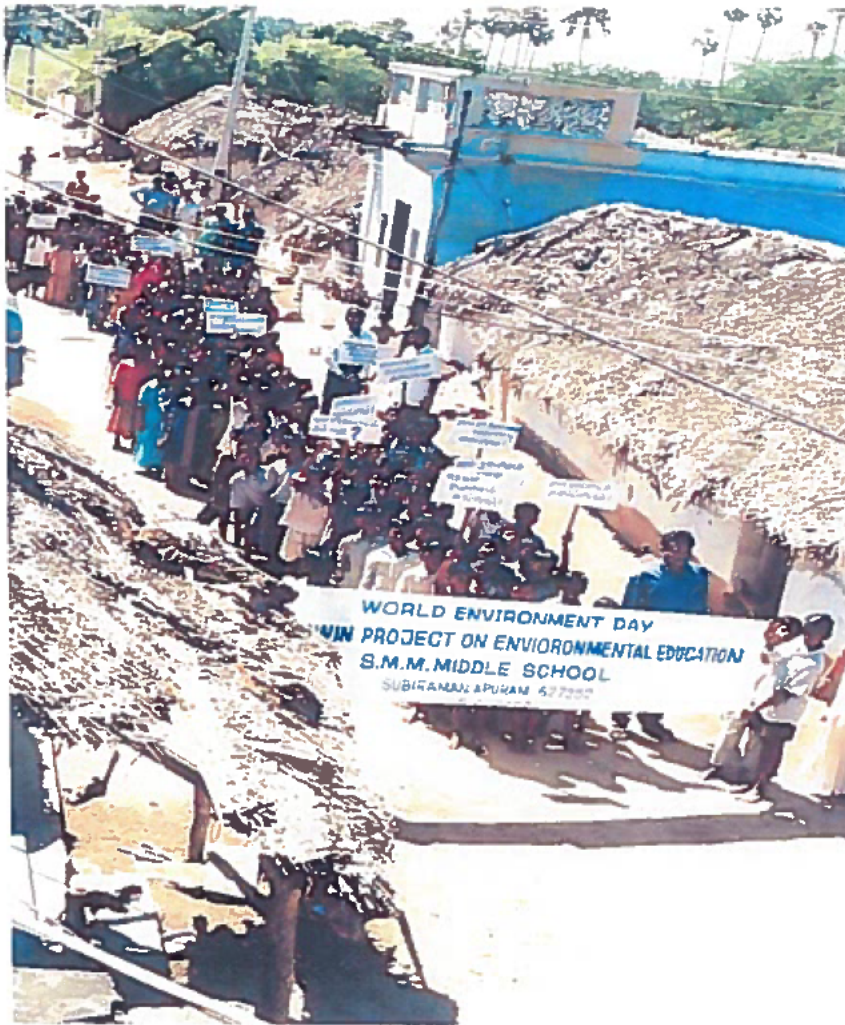
During the resource and evaluation workshops all 292 teachers reported that they had incorporated environmental education into their teaching. They reported that the children participated in a whole range of environmental activities, including:

- games
- planting activities (44 school gardens have been established)
- campaigns against deforestation and the use of plastics
- celebration of World Government Day and Ozone Day
- development of rain water harvesting structures
- digging pits for degradable and non-degradable wastes (often with voluntary assistance from the villagers)
- making compost
- dance and drama
- morning prayers
- drawing and oratory competitions (focusing on the environment)
- visits to forest segments
- setting up school Enviro clubs

Several activities also involved the children's parents, for example parents collected medicinal plants for growing at home and shared their knowledge about the traditional use of the plants. Such activities indicate an increase in environmental awareness at many levels – teachers, students, parents and local communities.

#### **Unexpected impacts**

- Mr. Chellappa, Headmaster and Manager of a Hindu Middle School at Thirukkurugudi in Tirunelveli district provided one plant to each house in his village. The students from his school took on the responsibility of watering and caring for plants. It is believed that this has motivated the local community to green vacant areas in their village.
- In the same village, the local Primary Health Centre established a Herbal Farm with plants supplied from Darwin project funds. Other Siddha practitioners in the area have also requested plant species from the project.
- Mrs. Sivakami of S.M.M. Middle School in Vasudevanalloor union organised an Environmental Campaign on World Environment Day, June 5, 2002. School children walked in procession through the streets of the village carrying placards and calling out slogans.



Children from S.M.M. Middle School in Vasudevanalloor union process through the streets on World Environment Day

- Mrs. Santhakala, along with other mentors from Palni town successfully influenced the AEEOs, Municipal authorities and Devaswom Board officials to organise meetings, debates and cultural events about the need to curb the use of plastics. As a result, plastics are now banned in this pilgrimage town and shop owners pack the products they sell in used newspaper. Also in Palni town, in response to repeated appeals, the municipal authorities have arranged for trucks to remove rubbish from all schools on a daily basis.
- Mr. Veerapathra Babu of Chanarpatti union, on 14<sup>th</sup> August 2002, organised an afforestation programme in association with Malappuram Cricket Club. The Panchayat President, Mrs. Dhanajayarani, school students and village communities participated and 225 tree saplings were planted in the barren lands of Guziliamparai village. Regular maintenance is being carried out by his students and on this occasion the Panchayat President donated Rs.1000 towards providing an irrigation facility for the planted area.



Afforestation project in Guziliamparai village

Mr. Babu is extremely keen to continue afforesting other parts of the union with saplings provided free of charge by the State Forest Department and the Palni Hills Conservation Council. He also organised another function in which two tree saplings were supplied to each school in the union. As well as developing a herbal garden in the school in which he works, he has prepared a book on EE with details of water harvesting, organic farming, ozone generation and environmental games for distribution to other schools.

- Mr. Dhanapal of the Panchayat Primary School at Gurusnapatti in the Reddiar Chatram union, Dindigul district, with the help of his fellow teachers and students, has planted 30 saplings of goosberry, pongamia and neem in the school yard. Fencing has been provided with assistance from the local AEOs and youth club. Mr. Dhanapal is optimistic that, with the support of the community, in 2-3 years time the entire village will be 'greener' and school children and villagers will be able to escape from the scorching sun in the summer.
- Darwin mentors from Tenkasi union organised a meeting on 15<sup>th</sup> August 2002, at Kattu Bava School, Tenkasi where a unanimous decision was taken to register a Darwin Environmental Education and Development Society (DEEDS). The objectives were to:
  - network school groups in all the five districts
  - organise model medicinal plant gardens for demonstration and training
  - promote organic farming and natural health.



Darwin mentors and their colleagues from Vadipatti Union in Madurai district have also formed DEEDS with similar objectives and mentors from Palni, Natham, Udamalpet and Reddiar Chatram unions have lent their support to this idea. The aim is to establish DEEDS in their own unions before networking the DEEDS of the unions in different districts.

- Two mentors from Periyakulam, Mr Damodaran and Mr Sankaranarayanan have been selected for a National Award and State Award respectively for their excellence in teaching and participation in the Darwin training. Mr. Sankaranarayanan has formed an Eco-club in his Triumph School for students who participate in activities such as health and hygiene, cleanliness of the school campus, composting, planting, collection of newspaper cuttings on environmental matters, putting up stalls on environmental issues in Science Exhibitions, participation in oratory and essay writing competitions, campaign against use of plastics and deforestation etc. Mr. Damodaran has organised a collection of more than 40 medicinal and aromatic plants at home which are watered regularly by his students. Along with a prayer every morning, an environmental message is read out by a student in his school.

The project has certainly made a significant impact on achieving its goal which was:

For local school teachers and children to become aware of the importance of their native flora and forests and to understand the necessity of using plants sustainably, with the ultimate aim of creating and strengthening grass roots support for biodiversity conservation efforts in Tamil Nadu and to safeguard the remarkable and diverse flora and vegetation of this Indian state

The project trained 1,164 teachers. These teachers could potentially educate over 40,000 children in one year (assuming 35 children per class, although classes in India can be up to 50 children). Even if only half the number of teachers incorporate environmental education in their teaching over 20,000 children in one year will have been reached through this project. Once teachers are trained they usually continue to use their acquired knowledge and skills in subsequent years, making the reach of the project even greater. These figures do not take into account further training courses or other activities developed by the enthusiasm and commitment of the teachers.

The project has helped India meet its obligations under the Convention of Biological Diversity through

- Article 10 – sustainable use of components of biological diversity. The project has encouraged the customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements
- Article 12 – research and training. The project has established an education training programme for teachers that will enable students and their parents to sustainably use biological diversity.
- Article 13 – public education and awareness. The project has promoted and encouraged the understanding of the importance of the conservation of biological

diversity and has cooperated with BGCI (an international organization) to develop education programmes.

- Article 17 – exchange of information. Information about the project has been published in international and national journals.

Through the setting up of the DEEDS, there is continued commitment by teachers to include environmental education in their teaching. In recent months, the Supreme Court of India has issued an order to include EE as a core subject in school and college curricula. This project will have contributed significantly to the effective delivery of EE by teachers.

The impact of the project in terms of collaboration between UK and KBG has been extremely positive. Many teachers expressed a curiosity about the involvement of a foreign partner in a remote area of India, and this gave them a sense of pride in their country's biodiversity. The excellent communication between partners has led to a deeper understanding of both cultures and the constraints under which we operate and through this effective partnership exciting projects have advanced. The fact that the project has the backing of an international organization, funded by the UK government, has also given the project authority. This has helped enormously in setting up the project, bringing the various AEEOs and DEEOs on-side and encouraging other partners to participate.

In terms of social impact, students have experienced new methods of teaching which are more participatory and creative. The training courses encouraged teachers to see students as active partners in learning rather than recipients of information. Anecdotal evidence suggests that this has been a success, with several teachers and students enjoying this style of teaching. The training has also empowered several teachers to step into leadership roles within their community and develop projects for the benefit of the environment. And there is strong evidence that local communities are more aware of their impact on the environment, for example the greening of several villages and the banning of plastics in Palni town.

## **6. Project Outputs**

The outputs of the project are summarised in Appendix VII. All the outputs originally included in the proposal were achieved though minor differences in the schedule were experienced. For example, Dr Seeni was due to visit the UK in June but, after consulting various UK botanic garden educators, it was more convenient for them if he postponed his visit until September. The production of the interpretation leaflet was planned for September 2001, however due to a longer than expected time in the consultation phase, the leaflet it was not printed until January 2002. The secondary level training of the teachers and evaluation workshop took place from May 2002 to early 2003 owing to teachers' strikes and the delay in official orders releasing the teachers. However, there were additional outputs such as an A4 leaflet describing the environmental problems of India and the approach of Darwin project in EE, the publication of a Newsletter, formation of DEEDS and establishment of 44 school herbal gardens with planting materials mainly supplied from the project funds. Publications and other materials that can be publicly assessed are presented in Appendix VIII.

Information about the project and its outcomes has been disseminated in a variety of ways:

- Press releases were sent to the media for all training courses and coverage was obtained in the local and national press as well as the radio and television (Appendix IX a-e).
- Articles about the project have appeared in national and international journals (Addendum VII a,b,c)
- Papers have been given by the Project Officer locally and at two international congresses – one in Australia and one in Spain. The papers will appear in the proceedings of the congresses.
- Newsletter of the Darwin project has been published and disseminated to all Darwin mentors (Appendix X)

KBG will continue to encourage teachers and students to visit the botanic garden and to promote EE through the DEEDS. BGCI/Investing in Nature project is producing a set of environmental education guidelines for Indian botanic gardens. A case study on the project will be included in the guidelines. IUCN-CEC (Commission on Education and Communication) is publishing a book on Managing Change for Conservation and Sustainable Development. BGCI is submitting a case study on the project for publication in this book which will be sent to IUCN-CEC members worldwide.

## 7. Project Expenditure

	2001/2002 (£)	2002/2003 (£)
Salaries		
a) BGCI		
b) KBG		
Rents, rates, heating, lighting, cleaning or overheads		
Office costs eg. postage, telephone and stationery		
Travel and subsistence		
Printing		
Conferences, seminars etc		
Capital items/equipment (please specify) second hand jeep		
Other (please specify)		
Translations		
Sub-total		
Total of spend		

## 8. Project Operation and Partnerships

The project involved over 15 local partners. In the initial stages of planning, BGCI worked with just two partners. Due to limited time and resources it was not possible at this stage to involve the DEEOs.

The main local partners for the project were Kodaikanal Botanic Garden and Sacred Heart College. KBG is a recently established botanic garden with a major focus on the conservation and sustainable utilization of tropical and subtropical plant resources of the Western Ghats. It is also a venue for school groups to observe and study plants from the

Palni hills. The Sacred Heart College has its own collections of orchids, ferns and other plant species from around the world. Together with the Anglade Institute of Natural History and Biological Museum, it has been teaching biodiversity to senior students and the public for almost 15 years. The Anglade Institute of the college has also published the flora and fauna of the Palni Hills.

Staff at KBG and Sacred Heart College were central to the planning of the project. KBG was the venue for the teacher outreach programmes, providing tours of the medicinal plant and fern collections and the degraded forests that form part of the garden. An ethnobotanical trail was also developed for the project to demonstrate the naturally occurring economic plant species used by the tribals of the Palni hills.

The Sacred Heart College was the venue for the strategy and environmental education training workshops, one evaluation and resource development workshop and two secondary-level training programmes. The Rector and senior priests of this college helped obtain the necessary permission from the local Divisional Forest Officer for the teachers to visit shola and degraded forest segments of Palni hills. They also participated in project related functions organised at the college. The St. Xavier's College, Palayamkottai which controls the affairs of the garden supported the project by providing administrative and secretarial assistance.

Officials of the Elementary Education Department particularly the Assistant Elementary Education Officers became major partners in mobilising and releasing the teachers for training. Several NGOs including Literates Welfare Society and Theni and Palni Hills Conservation Council, Kodaikanal, collaborated with the District Elementary Education Officer to select teachers for the training. Staff were also released from their work to talk about the endemic flora of the Palni Hills and demonstrate the propagation systems suitable for tree species.

The State Forest Department was a dependable partner as it granted permission for the teachers to visit the forests. It also supplied planting materials for school gardens free of charge. Many other smaller partners such as NGOs, sports authorities, local businessmen, panchayat and municipal authorities contributed to the implementation of the project by donating their services or providing sponsorship for the secondary level training in the village schools. In exceptional cases as in Nilakkottai and Pannaipatti unions, the villagers themselves supported teachers to organise the school events. Although the training programmes were of a similar model, the means to complete them varied according to the local situation..

This Darwin project was innovative and no other project like it exists in southern India. The Gurukula Botanical Sanctuary in Kerala offers a three to seven day programme for school children, focusing on learning through experience. Contact was made with the Sanctuary for advice on the interpretation strategy. The Tropical Botanical Research Institute, also in Kerala, runs a community outreach programme focusing on growing local food. The Institute generously provided plants for the school gardens.

Ten international partners participated in the project. The main international partner was Botanic Gardens Conservation International. During Dr Seeni's two week study visit to the UK, he visited six botanic gardens (Royal Botanic Gardens, Kew, Chelsea Physic Garden,

Birmingham Botanical Gardens and Glasshouses, Leicester Botanic Garden, University of Oxford Botanic Garden and Wakehurst Place) who provided educational material for use in the project. The draft teaching resource book on medicinal plants was reviewed by educators working at the National Museums of Kenya, National Botanical Institute, South Africa and the Birmingham Botanical Gardens and Glasshouses, UK.

Following completion of the Darwin project, KBG has continued to provide advice and plants to schools setting up school gardens. KBG is also in contact with the various DEEDS who are continuing to strengthen their networks and support the development of new environmental education programmes and training in schools.

## **9. Monitoring and Evaluation, Lessons learning**

A strategy for monitoring and evaluation was in place at the launch of the project. The project outputs were clearly defined and scheduled within a timetable. These were used as indicators of the success of the project. BGCI's regular email contact with Dr Seeni, the six monthly reports from KBG and the visits to India by Lucy Sutherland, made it possible for BGCI to monitor the progress and success of the project. Dr Seeni also completed a self evaluation of the progress and achievements made under the project (Addendum VIII)

To ensure the training met the needs of the teachers, Dr Seeni carried out a survey during his initial visits to schools and discussions with teachers (Appendix XI). The environmental education training workshops were evaluated through questionnaires immediately following each workshop and through discussion and feedback at the resource and evaluation workshops. It was clear that the training had had a significant impact on schools. Teachers reported on:

- An increase in maintenance of cleanliness in the classrooms and school premises
- Planting activity within and outside the school campus
- A transfer of their newly acquired knowledge to students
- A generation of new knowledge about local plant resources
- Participation of students in local seminars about environmental issues and
- Newly developed exhibitions of native plants

Quantitative records were kept on:

- Teachers attending the environmental training workshops
- Secondary-level training workshops
- Teachers attending the secondary-level training workshops
- Teachers attending the resource and evaluation workshops
- Schools setting up gardens
- Schools visiting KBG
- DEEDS being created

Qualitative records were kept on

- Evaluation workshops
- Conversations with teachers
- Conversations with project partners (DEEOs, Forestry Department, etc)

- Environmental education activities developed by the schools

The significant increase in activity by teachers and students in environmental activities was a strong indicator that the project was achieving its purpose – for local school teachers and children to become aware of the importance of their native flora and forests and to understand the necessity of using plants sustainably.

There has been no formal external evaluation of the project. However, following the closing ceremony, Mr Mark Richardson, BGCI's Director of Asia Programmes and Dr Sugharson Kumar, Director of Lucknow Botanic Garden and the National Botanical Research Institute, visited selected schools and looked through the project files. Both were more than satisfied with the achievements of the project.

The key lessons drawn from the experience of this project are:

- a) The involvement of the education authorities in the development and implementation of the project was vital for the project's success. This proved to be challenging and time consuming but meant that the project reached the poorest students in the region, helping to generate environmental awareness and action at a truly grassroots level. Permission by the AEEOs, DEEOs was crucial for mobilizing activity at school level.
- b) The main target group for the Darwin Project was primary teachers. An oversight on our part, when we wrote the project, was that most primary teachers are women. As head of their households, it was problematic for them to leave their homes to attend a three-day course. This resulted in more men attending the environmental training courses than women. However, at the two-day evaluation and resource workshops more women than men attended. Suggesting that future workshops targeted at women should not be more than two days in length.
- c) Regular contact with teachers is essential to encourage follow-up in their schools. Teachers are currently very busy with the implementation of a new education policy (Sarva Shikshaw Abayan) and needed moral and material support to develop new activities.
- d) The project would have benefited from employing another project officer. As the project grew, through the secondary-level training, Dr Seeni's work also grew. Another person would have been useful to help coordinate the work of the teachers, visit schools and collect more data for evaluation.
- e) A budget should have been included in the original proposal for an external evaluator. An external evaluator would have cast an objective look over the project and this could have been useful for future fund raising and project development.
- f) The two year period was not sufficient to fully realise the benefits of the project particularly at community level. It would have been excellent to have extended the programme to villagers who play a significant role in the conservation and utilization of the Western Ghats resources.

## 10. Darwin Identity

Throughout the project it was very clear that this was a Darwin Initiative project (Appendix XII and Addendum IX a,b)). Information about the project was disseminated through the national and local media and the Darwin name and/or logo was

- screened onto the Jeep, which toured the area extensively
- included on all material produced by the project – pamphlets, posters, training manual, medicinal plants resource book, certificates
- included in articles that appeared in national and international journals
- displayed during talks at international congresses
- included on the signs for all 44 school gardens and planting areas in five districts of Tamil Nadu

Probably the best testimony to the identity and promotion of the Darwin Initiative is the Darwin Environmental Education and Development Societies, formed by the teachers themselves in remote areas of India.

Through the implementation of this project large numbers of individuals and organizations now identify Darwin projects with biodiversity conservation - District Elementary Education Offices, teachers, students, local communities, Forestry Departments, Research institutions dealing with environmental issues, University Departments of Botany in Tamil Nadu and botanic gardens in India and elsewhere in the world.

There was no doubt that this was a distinct project with a clear identity.

## 11. Leverage

The project has attracted a great deal of additional funding throughout its lifetime. Most of this has been in-kind donations and has included plants, refreshments, venues for workshops, time for setting up and tidying up and banners and signs for gardens. A great deal of time and money in-kind (telephone calls, participation in workshops, postage, etc) was also invested by the DEEOs and AEOs which enabled the successful fruition of the project.

BGCI is working with KBG to secure future funding. In 2003, BGCI initiated an Investing in Nature programme in India supported by HSBC. An activity of this programme is to award small grants (of up to £10,000) to educational projects. Fr. Manickam is putting together a proposal for consideration by the Investing in Nature programme committee, based in India. BGCI's Education Department is supporting this application.

Fr. Manickam is also in touch with the Department of Environment, Government of Tamil Nadu for the same purpose. Dr. Seeni has met Dr. Duraisamy, Additional Director, MoE and discussed with him the need for funding similar EE projects. Dr. Duraisamy has invited Dr Seeni to submit a project proposal for consideration in the year 2004 - 2005.

KBG is a fairly new, developing garden with meagre resources. Not being state funded, it has to raise funds for development and maintenance through writing to donors and the Government. The impact of this Darwin project has been significant in affecting the mindset

of donors about the way in which they view the capability of KBG to manage large projects. KBG is now more confident about future funding for the garden and environmental education projects.

## **12. Sustainability and Legacy**

The fact that over 1,000 teachers received training in environmental education is a major achievement of this project. This is the first time teachers have ever received such training and it is likely that they will continue use the information skills learnt in their teaching for many years to come. The published training manual and teachers' resource book on medicinal plants will be used by the teachers and DEEDS in future training and there is a strong commitment by the schools to continuing the school gardens and Ecoclubs. The establishment of the DEEDS is probably the most important enduring achievement of the project as they will carry on with the project activities and continue to publish and circulate the Newsletter (Voice of Darwin Mentors).

Dr Seeni's sabbatical to the project ended in July 2003 and he is once again working at TBGRI, Palode, Kerala. Fr. Manickam has remained at the Kodaikanal Botanic Garden. Nevertheless, the partnerships between the Project Coordinator, Project Officer and teachers are continuing despite the 'official' ending of the project. An unwritten understanding exists for mutual benefit and to the advantage of the teachers and children. It is therefore likely that the project will continue, at a low level, for at least another two years. The Jeep, the telephone and some furniture purchased with project funds, will be used by Dr. S. Seeni during weekends in the office and during his visits to the teacher groups and schools.

This Darwin project has clearly demonstrated the value of environmental education in raising public awareness about local biodiversity. The projects' conclusions and outputs are continuing to be widely applied through the varied activities of the DEEDS. The results of this project will provide a framework for planning and implementing future EE programmes in other areas of India. The Department of Environment, Government of Tamil Nadu, has expressed an interest in extending the programme and the excellent relationship that has developed between Dr Seeni and the education officials should help facilitate the development of future activities. Certainly pre-project visits to the relevant education departments need to be factored in to future projects.

The legacy of this project is well rooted. Had it run for longer and with more staff input, perhaps it could have been improved. As mentioned above, additional funds are being sought to continue the project.

## **13. Post-Project Follow up Activities**

The funding of a Project Officer and related activities for another 18 months would significantly help to embed the results of this Darwin project. The Project Officer would:

- Organise further teacher training courses and support the establishment of further DEEDS



- Network DEEDS through dissemination of information and an annual conference
- Support the local government to introduce EE into the school curriculum, given the recent order of the Supreme Court of India
- Support the establishment of more school gardens
- Publish a booklet on school herbal gardens and distribute it to all schools
- Publish a book of poems and articles written by Darwin mentors and students in appreciation of the region's biodiversity
- Set up a 'BioFriend' scheme to motivate greater numbers of students to become environmentally aware.
- Organise student and teacher visits to KBG to enhance their understanding of biodiversity education.
- Organise village-level community participatory meetings to advise them about deforestation, sustainable use of forest resources, harvesting rain water, planting on fallow lands and documenting local plant use knowledge.
- Encourage panchayat-mediated links between teachers, students and parents to identify specific environmental problems and explore remedial solutions.

The request for post-project follow up has come from the project partners in India. The fact that many of the project outputs are continuing to flourish demonstrates a strong commitment by KBG, the teachers, students and education authorities to the purpose of the project. Dr Seeni, although now employed back at TBGRI, has continued to work on the project during his weekends – clearly demonstrating his commitment to the project. The excellent relationships he has developed with education officials will no doubt enhance the capacity of all partners to embed the results of this project.

#### **14. Value for Money**

The cost of this two year project was £58, 823. During this time 1,164 teachers received training in environmental education. If we include all project expenses within the training component of the project, then the cost of training per teacher is £50.53. In the UK the cost of one week's training is often in the region of £200. As stated earlier, collectively, these teachers could potentially educate over 40,000 children in one year. In terms of finance, the cost per child to receive environmental education is £1.47. This is less than a price of a child's comic in the UK. If the teachers continue to use their newly acquired skills and information for years to come then the cost per child significantly reduces. For example if we assume that all teachers continue to deliver environmental education to the same numbers of children during the second year, then the cost per child to receive environmental education reduces to £0.73 and during the third year to £0.49. If only half the numbers of teachers taught environmental education, training costs would still be very low.

The significant focus of this project has been teacher training, however there have been many other tangible benefits – creation of 44 school gardens, establishment of two DEEDS, production of teaching resources including the training manual and teachers' handbook on medicinal plants. Other less tangible benefits, but no less significant, include increased environmental awareness, active participation in resolving environmental issues, strong partner relationships and commitment to the future of the project.

Considering the cost of the project in relation to its benefits, evidence suggests that this project has been EXCELLENT value for money.

**Julia Willison**

Project

Date: 15.05.2004

**Dr. S. Seeni**

Project officer

Date: 15.05.2004

**Dr. V.S. Manickam, S.J.**

India Coordinator

Date: 15.05.2004