

**Orchids of Lower Gori Valley, Western Himalaya:
A Community Based Conservation Approach**

**Final Report
2004**



**Submitted
To
San Diego County Orchid Society, USA**

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SAN DIEGO COUNTY ORCHID SOCIETY



SDCOS



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Wildlife Institute of India**

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Back cover page photo: Community gathering

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PREFACE

The Western Himalaya forms one of the important botanical regions in India. Despite a long history of botanical explorations there are several valleys in this region which remain under-explored. Gori Valley in eastern flank of Uttaranchal state, adjacent to Nepal border, is one such valley which has remained little known among the botanists due to remoteness. This valley supports as many as 121 species of orchids out of 239 species reported from Western Himalaya. Hence it can be regarded as one of the orchid hotspots in the Western Himalaya. In recent years destruction of natural habitats due to developmental activities such as road construction and power projects coupled with rising population, the orchid population dwindling very fast. Several botanists and conservationists have recommended that this valley should be declared as Orchid Sanctuary. However, the government of Uttaranchal is unlikely to declare this area as sanctuary due to heavy use by local communities. Therefore, only way to protect the riverine forests and orchids in the valley is through the community participation and awareness generation. Any conservation and restoration program for nature protection is successful only if the local communities are taken in to confidence as they are the key stake holders. Keeping this in view a community based conservation program was initiated in the Gori Valley which was funded by San Diego County Orchid Society, USA. This report deals with the activities and major achievements of this project.

SUMMARY

Gori Valley lies in the eastern part of Kumaon Himalaya (29° 5'-30° 10'N latitudes and 79° 45'- 81°5'E longitudes) that forms a part of Uttaranchal, a newly established state of India. This valley is extremely rich in orchids and can be regarded as one of the orchid hotspot in the Western Himalaya. As part of this project a systematic survey of orchids was carried out in this valley during February to July 2004. The prime objectives of the project were survey, assessment of threats, awareness and community involvement in orchid conservation. Secondary information was gathered on orchids from this area based on published literature and herbaria. 50 species of orchids were collected during the field work. *Nervilia mackinnonii* (Duthie)Schltr. and *Malaxis purpurea* (Lindl.) O.Kze. were collected for the first time in the valley. A total of 54 host species and their local uses were documented. It was found that 42% of the host species are used as fodder, 46% as timber and 11% as fuel wood. Interestingly, *Bauhinia vahlii*, a woody climber, and *Phoenix humilis*, a palm also supported several epiphytic orchids. Based on the questionnaire survey among the villagers it was found that only 10% of the local people knew about the orchids in the name of "*Bhalu Ka kela*" that means Bear's banana or "*Harjojan*" (bone jointer). At several localities orchids were found lying on the ground especially under lopped and partly cut trees. In order to rehabilitate such orchids a temporary restoration house was constructed. A total of 40 orchid species which had been detached from the hosts were collected and planted at the restoration house and about 120 individuals were relocated in the valley at the suitable sites, close to their place of collection. For awareness generation among the local people I used posters, pamphlets, brochures and drawings. A series of orientation talks were arranged for the villagers, school children and students. During these lectures and meetings a total of 470 children participated and showed immense interest on orchids. A series workshops were also organized at different villages for the local people.

1. Introduction

Orchidaceae is one of the largest families of flowering plants exhibiting amazing diversity in size, shape, structure, number, density, colour and fragrance of flower. Orchids have fascinated people ever since their discovery by the Greek philosopher, Theophrastus, (370-285 B.C.) who, in his '*Enquiry into plants*', first referred the group of plants having paired, testiculate tubers as 'Orchis'. In the Indian Vedic scriptures there is a mention of the plants under the name '*Vanda*', which has been adapted as a generic name in one of the most beautiful group of orchids. The orchidaceae is cosmopolitan family distributed throughout the world, barring a few isolated islands and frozen continent of the Antarctica, and grow in almost all kinds of habitats except the aquatic and marine ecosystem.

In India orchids are represented by 1129 species and 184 genera. About 60% of Indian species of orchids are epiphytic, while the rest are terrestrial. The orchids are partiality distributed in moist and sub-humid zones of India. The orchids show maximum diversity in the eastern Himalaya, including the North-Eastern region, Western Ghats, eastern Himalaya and eastern part of Western Himalaya (Kumaun Himalaya). In spite of the great orchid diversity in the country a number of orchids are rare and threatened due to over-exploitation and habitat destruction. The commercial exploitation of ornamental orchids over several decades has considerably depleted their natural populations in wild. A number of species are listed in the IUCN Red data Book as well as The Red data Book of Indian plants.

Orchids are of immense conservation significance owing to their unique place in plant kingdom, their co-evolution with fungal partners (mycorrhizae), pollinators and as indicators of environmental health. Very few attempts have been made to involve local people in the conservation of this group in India. Gori Valley in eastern part of Uttaranchal has been recognized as one of the orchid hotspots in Western Himalaya, offers an excellent opportunity to work with the local communities towards orchid conservation.

2. About the project

On the one hand some of the South-east Asian Countries, especially Thailand, and several private orchid growers in north east and south India are earning enormous revenue by selling commercial orchids, the local communities in Gori Valley of eastern Uttaranchal continue to exploit their forests which harbour a large number of beautiful orchids. A number of orchid species found in this area are rare and threatened because of destruction of natural habitats. The developmental activities, such as road construction and power projects coupled with rising population have put enormous pressure on the species and habitats. Major pressures like lopping of host trees for fuel wood and fodder by the local community of the valley has posed tremendous pressure on orchid habitats. Therefore it is felt local people must be oriented towards value of the orchids in order to safeguard the future of orchids. The main aim of the project has been to involve the school children and women in the conservation program. Keeping this in view a short-term project was launched in this valley with financial assistance from San Diego County Orchid Society, USA.

3. Project goals

The main goals of the project were:

- Inventory and documentation of orchids and their hosts.
- Assessment of threats to orchids in Gori Valley.
- Restoration and relocation of orchids
- Creation of awareness among locals on the importance of orchids
- Community involvement in orchid restoration and conservation
- To develop an *in-situ* orchid conservation plan for Gori Valley.

4. Project site location

The Gori valley is located in the eastern Kumaun Himalaya (29° 5'-30° 10'N latitudes and 79° 45' - 81°5'E longitudes) and forms part of Uttaranchal, a newly created state of India. The valley is bounded in the north by the Tibetan plateau and in the south-east by the kingdom of Nepal which is separated by river Kali. The Panchachuli group of peaks forms the north-eastern boundary. The upper part of the study area falls under Askote musk deer sanctuary (Fig. - 1).

The valley represents three geological sub-divisions i.e., Lesser, Greater and Trans Himalaya. The steep valleys with vertical concave wall are formed by the river crossing this valley. The total catchments area of Gori valley is 2230 sq. km. However this project was carried out in the lower part of the Gori Valley covering about 32 km stretch of riverine forest and adjoining areas an altitudinal range between 600-2000 m. The river Gori Ganga runs through the entire length of the valley which originates at Milam glacier (3600 m).

The vegetation in the area is mainly sub-tropical and temperate broadleaf (deciduous and semi-evergreen) and conifer types. Sal (*Shorea robusta*) is quite common at lower elevations (<800 m asl). Other tree species are *Acacia catechu*, *Aegle marmelos*, *Albizia chinensis*, *A. lebeck*, *Alnus nepalensis*, *Bauhinia retusa*, *B. variegata*, *Bombax ceiba*, *Erythrina suberosa*, *Ficus religiosa*, *Grewia oppositifloia*, *Lannea cormondelica*, *Litsea monopetala*, *Marcanga pustulata*, *Mallotus philippensis*, *Mangifera indica*, *Sapium insigne*, *Syzigium cumini*, *Terminala alata* etc. Towards higher altitudes pure patches of *Pinus roxburghii* and oaks (*Quercus glauca* and *Q. leucotrichophora*) can be seen. The common shrubs are *Adhatoda zeylanica*, *Berberis lyceum*, *B. asiatica*, *Callicarpa arborea*, *Calotropis procera*, *Casearia tomentosa*, *Maesa indica*, *Murraya koenigii*, *Lantana camara*, *Rubus ellipticus*, and *Woodfordia fruticosa*. The herbaceous vegetation in the region is represented by *Achyranthes aspera*, *Alysicarpus* spp., *Amaranthus spinosus*, *Argemone mexicana*, *Cordispermum halicacabum*, *Chenopodium album*, *Rumex hastatus* and various others. Common ferns are *Ampelopteris prolifera*, *Athyrium pectinatum*, *Asplenium dalhousiae*, *Diplazium esculentum*, *Nephrolepis cordifolia*, *Pteris vittata*, and species of *Polystachum*, *Equisetum*, *Selaginella* and *Hypodematum* (Plate-1).

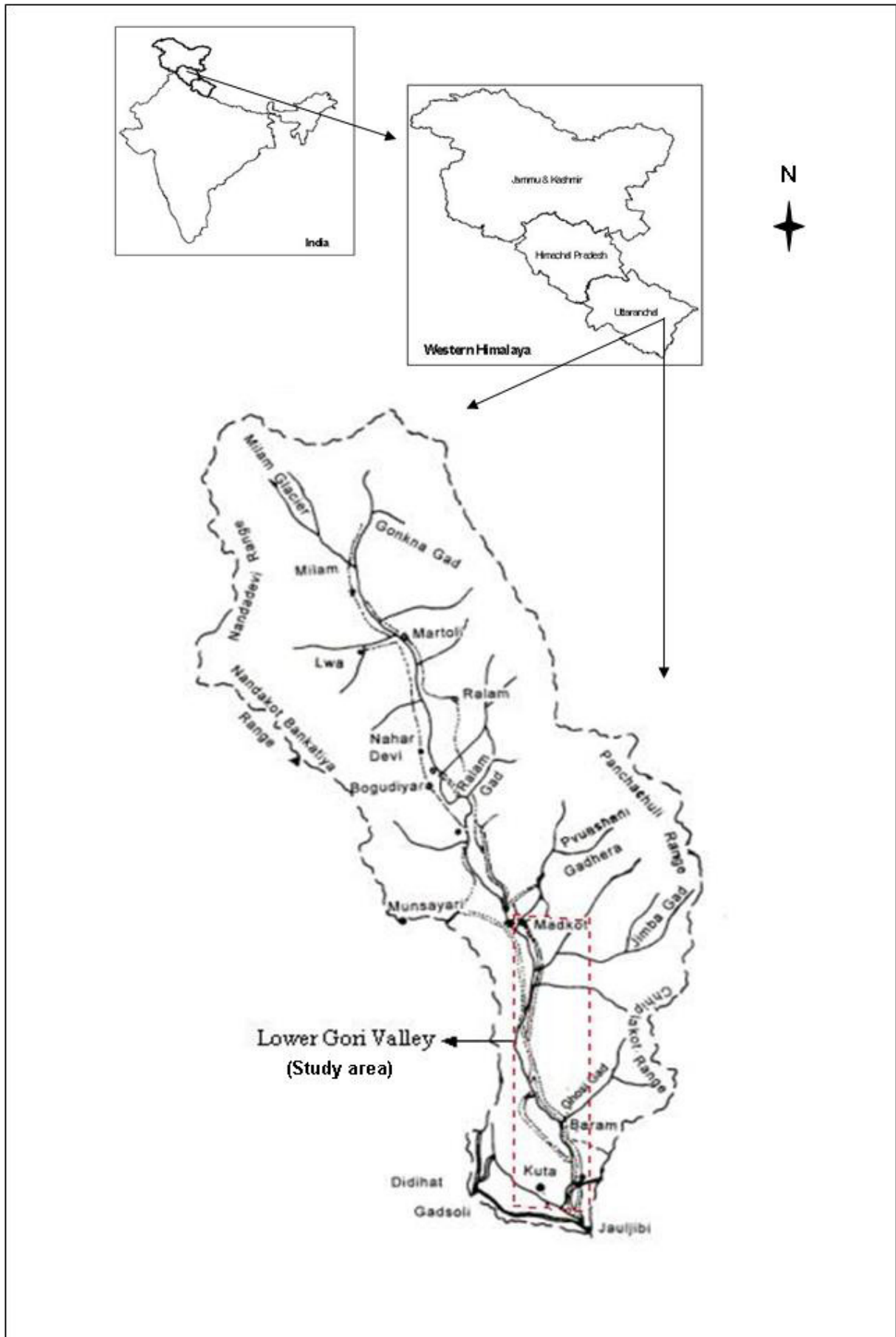


Fig.- 1 Map of Gori Valley

5. Socio-economic scenario

There are 171 revenue villages within the whole upper and lower Gori valley, with population of 43,542 individuals (FES, 2003). The valley is a remote part of the newly created state of Uttaranchal. Most of the villages are situated very far from the main towns and these areas are so remote and underdeveloped that it takes days together to reach those distant spots. Permanent human habitations occupy the lower valley and seasonally some people migrate to the alpine valleys for six months. Among the people who inhabit the valley are *Rajputs* (agriculturists), the *Shaukha* or *Bhotia* (mostly traders), and the schedule castes or *Shilpkar* (domestic labourers).

The economy of the people largely depends on agriculture and animal husbandry. The livelihood of the people of Gori valley is largely conditioned by the topography of the terrain and harsh climatic conditions. The cropping choice is restricted by the availability of water to irrigation and crucial technological inputs. The major agricultural crops of the valley are Paddy, wheat, maize, millets, pulse, oil seeds, barely and buck wheat that are grown in different seasons. There are two distinct seasons for agriculture i.e. summer and winter. Crops grown in summer are paddy, potatoes, millets, soyaben and a variety of vegetables. In winter, wheat, barely, mustard and peas are grown. The principle livestock in the valley are cows, buffaloes, sheep and goats. All livestock populations need a proper check and management of livestock in the areas is of prime consideration in order to reduce pressure on the natural habitats representing the orchid wealth in the valley (Plate-2).

6. Methodology

The proposed project was for a period of one year duration of which the first six months was utilized for extensive field based survey, the next four month for awareness creation and community based conservation initiatives and the last two months were utilized for data compilation and report writing.

6.1 Field Surveys: Systematic survey was conducted from February to July 2004, which covers three seasons, viz., winter, summer and early monsoon. Prior to the actual field work, secondary information was gathered on orchids from this area based on published literature and herbaria. Systematic survey for orchids, status of forest and threats of any species of orchids was identified with the help of manuals and methodology as suggested by Deva and Naithani (1986). Unidentified specimens were preserved following standard methods suggested by Jain & Rao (1976). Herbaria of Botanical Survey of India (BSD), Forest Research Institute (DD), Wildlife Institute of India (WII), Kumaun University and Garhwal University were consulted for further confirmation and accurate identification of orchid species.

6.2 Assessment of threats to orchids: Systematic survey of economic importance of orchids as well as host species was conducted. Excessive pressure on these species, if any, was recorded.

6.3 Generation of awareness on orchids: Simple posters and brochures on orchids in local language (Hindi) were prepared for the use of school teachers, schools and local communities. During this period, community groups were formed in selected villages, which consisted of 10-15 youths in different villages and they were trained for campaigning. These groups were oriented towards importance of orchids before the campaigning actually began. Subsequently several small workshops were conducted which included slide shows and poster exhibitions at Primary and Senior Schools.

6.4 *In situ* conservation of orchids: As a follow up of the conservation programme, local communities were involved in *in situ* restoration of Orchids in their localities. For this, local communities were trained as to how to restore the Orchids which falls or detached from host plant due to natural or anthropogenic pressures.

7. Activities undertaken during the project period

7.1 Field Survey

Prior to the execution of project a pilot survey was conducted in the Gori valley during February 2004. A temporary base camp was established there for conducting all the activities. An extensive field survey was conducted during February – July 2004, in the different regions of the valley. Systematic survey of orchids was conducted following standard protocols. Different trails were traversed for orchid survey. A total of approximately 800 kms was traversed on foot in the various localities in the valley. 50 species of orchids were collected. These belong to 5 terrestrial, 30 epiphytic and 15 epiphytic and lithophytic species (Appendix - II) (Plate-3-6). A total of 54 host species have been identified (Appendix - III) (Plate-7-8). Out of these host species 9 had maximum epiphytic orchids. The host plants include 49 species of trees, 4 species of shrubs, one palm (*Phoenix humilis*), and one woody climber (*Bauchina vahlii*). Since the project was for a short duration no extensive surveys could be undertaken. Additional surveys could have yielded more species. *Nervilia mackinnonii* (Duthie) Schltr. and *Malaxis purpurea* (Lindl.) O.Kze. were collected for the first time from this valley. The orchid species were identified with the help of orchid flora (Deva & Naithani 1986) and few regional floras. The voucher specimens are preserved using standard methods (Jain & Rao 1976).

7.3 Assessment of threats to orchids in Gori valley

The threats to the orchids observed during the survey were recorded based on the parameters such as vulnerability of host, use of orchids, and other developmental works. It was found that, 42% of the host species are used as fodder, 46% as timber and 11% as fuel wood. On species of orchid, *Pholidata articulata* Lindl. was largely used as goat fodder which has resulted in the depletion of its population from the valley (Plate-9-10).

7.4 Questionnaire survey

A questionnaire survey was conducted simultaneously for knowing the attitude and awareness of local people about orchids. A simple questionnaire was prepared and conducted in the beginning as well as after the field work during the workshops and village level meetings (Appendix- I). A total of 340 individuals were interviewed. These belonged to three different age groups (below 20 years 65, 20-40 years - 213 and above 40 years - 62 individuals). The questionnaire survey revealed that only 23 people knew about the orchids

and they called these as “*Bhalu Ka Kela*” that means Bear’s banana or “*Harjojan*’ meaning bone jointer.

7.5 Restoration and relocation of orchids

For keeping orchids a restoration house was made near the base camp. The restoration house was made using fallen logs covered with plastic sheets and jute bags. A small water sink was made inside the house for water to keep the house moist. During the field survey wherever detached orchids were encountered, they were brought to the restoration house with the help of local people and the field assistants. One assistant was specifically trained for handling these orchids and was appointed in the restoration house so as to maintain these live specimens. Few interesting orchids which needed further investigation for identification were also brought to the restoration house. A total of 40 species were maintained in live condition in the restoration house and about 120 individuals were relocated in the valley in the suitable host and habit, preferably nearby places from where they were brought. The restoration house was also used for community training programs such as to let the locals identify what plants exactly we were dealing with. Several keen and enthusiastic persons visited the restoration house. Many of them also brought the fallen and detached specimens to the rehabilitation centre on voluntary basis. Names of those people and orchids have also been entered in a register at the centre which was used for further conservation campaign. It was nice to know that the local people were quite receptive about the simple conservation work and awareness was increasing day by day (Plate-11).

8. Creation of awareness among locals on the importance of orchids

Following methods were implied:

8.1 Awareness materials

For generation of awareness among the locals following methods were developed i.e. posters, pamphlets, brochures, drawings and banners were prepared by the project undertakers as well as by the individuals of the local school students and teachers (Plate-12-13).

8.2 Awareness among school children

Simple talks were organized by us at a total of 6 governments recognized as well as private primary schools and middle level schools. During these meetings poster on orchids were displayed. Some drawing competitions were organized for the students of those schools and meritorious students were awarded. During these lectures and meetings a total of 470 children participated and showed their immense interest on orchids. Out of 470 children, 70 were of 1st standard, 130 were of 2nd-3rd standard, 120 were of 4th – 5th standard and 150 were of middle level school. It has also been assured to us by the principals of individual schools that they will organize such talks and meetings every year so as to continue this awareness program (Plate-14).

8.3 Village level workshop

Initially the village Heads were contacted for organizing the workshops. Subsequently 13 enthusiastic volunteers came forward to organizing the workshops and awareness campaigns. Those were given the awareness materials and brochures for distribution in there respective villages. Apart from these, creation of restoration house was also apart of raising awareness among the locals as it was visited by the locals very frequently (Plate-15).

8.4 *Ad-libitum* approach:

During regular field visits in the project area several local people were contacted and discussions on the forests and orchids were held. At village shops brochures on orchid conservation were kept for distribution among the villagers.

9. Evaluation of the project:

1. In this study the extensive field survey has resulted in the collection of more than 50 species of orchids from the Gori valley. 17 species are categorized as rare in this valley. Two species were collected for the first time from the valley. Earlier reports of these species were from the Defidhura and Garhwal region.
2. The distribution of possible host species across various forest types, and different locations has been documented. Frequency of occurrence of orchids on the host species has been analyzed.
3. 40 species were maintained in live condition in the restoration house and about 120 individuals were relocated in the valley in the suitable host and habitat, preferably nearby places from where they were brought. The response of local people has been overwhelming.
4. Total 470 school children were taught about the importance and significance of orchids and 13 enthusiastic persons were trained on the technique of rehabilitating epiphytic orchids.
5. The awareness campaign can be rated as highly successful as indicated by more number of people coming forward to rehabilitation centre. Towards the end of programme 305 villagers in the valley were randomly interviewed about the orchids. Of these, about 45% people replied that orchids were valuable plants and they must protect them wherever they are.

10. Recommendations

Based on the experiences gained while executing this project, following recommendations are given for the conservation of orchids in the Gori valley:

1. Three villages in the Gori Valley viz., Lumti, Baram and Bans Bagar need further conservation awareness campaign and identification of volunteers for conservation of orchid rich patches.
2. The Uttaranchal Government needs to establish an Orchidarium in the valley for the propagation and relocation of rare and threatened orchids in the suitable habitats. The orchidarium should also include an interpretation centre so as to spread further awareness among the locals.
3. The plantation of the popular host species should be practiced in the valley which would help in rehabilitation of epiphytic orchids.
4. To reduce pressure on orchid habitat, subsidy should be given for kerosene and LPG so that the local community would be able to purchase alternate fuel and the pressure on host trees would reduce.
5. The Village Forest Committees (*Van Panchayats*) need to evolve rules pertaining to protection of orchid hosts and habitats.

11. Future plan

In the next phase of the project the following work will be undertaken, if further sponsorship is provided by the funding agency.

1. A comprehensive account of the orchids of the valley will be brought out in the form of a book or booklet.
2. The documentary films in local language would be prepared and properly displayed in the villages throughout the valley for awakening the interest in locals about the importance of orchids and their conservation.
3. More such awareness campaigning program will be carried out in Gori valley and we will try to extend this program with the help of volunteers.

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DATA SHEET

San Diego County Orchid Society
Orchid Conservation project, Gori valley

Sl.No.....

Date.....

Locality.....

S.N.	Name of species	Habit				Fl/Nf	Name of host	Uses			Remark
		T	E	E&L	S			F	Fu	T	

QUESTIONNAIRE

San Diego County Orchid Society
Orchid Conservation project, Gori valley

Sl.No.....

Date.....

Name of village.....

Name of the person.....

Age.....

Sex.....

1. Do you know orchid? YES/NO
2. If 'yes' what do you call it locally?
3. Where did you see orchids? Tree/Ground
4. Are you interested in conservation of orchids in your area?

**Appendix -II List of orchid species (herbarium) collected from the project area.
Specimens are housed in WII Herbarium.**

S.N.	Species	Habit	Status
1	<i>Acampe papillosa</i> (Griff.) Panigrahi	E	Common
2	<i>Aerides multiflora</i> Roxb.	E&L	Common
3	<i>Aerides odorata</i> Lour.	E&L	Common
4	<i>Ascocentrum ampullaceum</i> (Roxb.) Schltr	E	Rare
5	<i>Bulbophyllum affine</i> Lindl.	E	Common
6	<i>Bulbophyllum careyanum</i> (Hook.) Spreng.	E	Common
7	<i>Bulbophyllum reptans</i> (Lindl.) Lindl.	E	Rare
8	<i>Bulbophyllum secundum</i> Hook.f.,	E	Rare
9	<i>Bulbophyllum triste</i> Rchb.f.	E	Common
10	<i>Coelogyne cristata</i> Lindl.	E&L	Common
11	<i>Coelogyne ovalis</i> Lindl.*	E&L	Common
12	<i>Coelogyne stricta</i> (D.Don)Schltr.	E	Common
13	<i>Cymbidium</i> spp*	E	Rare
14	<i>Cymbidium</i> spp*	E	Rare
15	<i>Dendrobium amoenum</i> Wall.ex Lindl.	E&L	Common
16	<i>Dendrobium bicameratum</i> Lindl.	E	Common
17	<i>Dendrobium chrysanthum</i> Wall. Ex. Lindl.	E	Common
18	<i>Dendrobium chryseum</i> Rolfe.	E	Common
19	<i>Dendrobium monticola</i> Hunt and Summerh.	E&L	Common
20	<i>Dendrobium normale</i> Falc.	E	Rare
21	<i>Dendrobium primulinum</i> Lindl.*	E	Rare
22	<i>Eria pubscena</i> (Hook.) Lindl.ex Steud	E	Common
23	<i>Eria spicata</i> (D.Don) Hand.-Mazz.*	E&L	Common
24	<i>Flickingeria hesperis</i> Seid.*	E	Rare
25	<i>Gasrtorchilus acutifolius</i> (Lindl.) Kze.	E	Rare
26	<i>Gasrtorchilus calceolaris</i> (Buch.-Ham. Ex sm.) D.Don*	E	Common
27	<i>Gasrtorchilus inconspicum</i> (Hook.f.) Kze.	E	Common
28	<i>Goodyera procera</i> (Ker.-Gawl.) Hook.	T	Common
29	<i>Kingidium taenialis</i> (Lindl.) Hunt	E	Rare
30	<i>Liparis caespitosa</i> (Thou.) Lindl.	E	Common
31	<i>Luisia zelyanica</i> Lindl.	E&L	Common
32	<i>Malaxis acuminata</i> D.Don	T	Rare
33	<i>Malaxis purpurea</i> (Lindl.) O.Kze.	T	Rare
34	<i>Nervilia mackinnonii</i> (Duthie) Schltr.	T	Rare
35	<i>Nervilia</i> spp*	T	Rare
36	<i>Oberonia acaulis</i> Griff.	E&L	Common
37	<i>Oberonia ensiformis</i> (J. E. Sm.) Lindl.	E	Common
38	<i>Oberonia falconeri</i> Hook.f.*	E	Common
39	<i>Oberonia pachyrachis</i> Rchb.f.	E&L	Common
40	<i>Oberonia prainiana</i> King and Pantl	E	Rare
41	<i>Ornithochilus difformis</i> (Wall.ex Lindl.)Schltr.	E	Rare
42	<i>Pholidata articulata</i> Lindl.	E&L	Common
43	<i>Pholidata imbricata</i> (Roxb.) Lindl.	E&L	Common
44	<i>Pteroceras suveolens</i> (Roxb.)Holtt.	E	Common
45	<i>Rhynchostylis retusa</i> (Lindl.) Bi.	E&L	Common
46	<i>Smithandia micrantha</i> (Lindl.) Holtt.	E	Common
47	<i>Thunia alba</i> (Lindl.)Rchb.f.	E&L	Common
48	<i>Vanda cristata</i> Lindl.	E	Common
49	<i>Vanda testacea</i> (Lindl.) Rchb.f.	E	Common
50	<i>Vandopsis undulata</i> (Lindl.) J.J.Smith.*	E&L	Rare

* Species not reported in flowering. E- Epiphytic, E&L- Lithophytic, T- Terrestrial.

Appendix - III List of common orchid host species in the project area

S.N.	Host species	Family	Habit	Fodder	Fuel	Timber
1	<i>Acacia catechu</i> (L.f.) Willd	Mimosaceae	T	-	+	+
2	<i>Acer oblongum</i> Wall	Aceraceae	T	-	-	+
3	<i>Albizia julibrissin</i> Durazz	Mimosaceae	T	+	+	-
4	<i>Alnus nepalensis</i> D.Don	Betulaceae	T	-	+	-
5	<i>Bauhinia vahlii</i> Wt & Arn	Caesalpiniaceae	WC	+	-	-
6	<i>Bauhinia purpurea</i> Linn	Caesalpiniaceae	T	+	-	-
7	<i>Berberis asiatica</i> Roxb. Ex BC.	Berberidaceae	S	-	-	-
8	<i>Boehmeria rugulosa</i> , Wedd.	Urticaceae	T	+	+	-
9	<i>Bombax ceiba</i> L.	Bombacaceae	T	-	-	-
10	<i>Callicarpa arborea</i> , Roxb	Verbenaceae	S	-	-	-
11	<i>Casearia graveolens</i> , Dalz	Caryophyllaceae	T	+	+	-
12	<i>Castanopsis tribuloides</i> , A.Ac	Fagaceae	T	-	-	-
13	<i>Celtis australis</i> , Linn	Celastraceae	T	-	-	-
14	<i>Cordia dichotoma</i> Forsterf .f.	Convolvulaceae	T	-	-	-
15	<i>Dalbergia sericea</i> G.Don	Fabaceae	T	-	+	-
16	<i>Dalbergia sissoo</i> Roxb.ex DC*	Fabaceae	T	+	+	+
17	<i>Diploknema butyracea</i> (Roxb.) Lam	Sapotaceae	T	+	+	-
18	<i>Embilca officinalis</i> Gaertn.	Euphorbiaceae	T	+	-	-
19	<i>Engelhadrtia spicata</i> Blume.*	Juglandaceae	T	-	+	-
20	<i>Eurea acuminata</i> DC	Euphorbiaceae	T	-	-	-
21	<i>Ficus arnottiana</i> (Miq.) Miq.	Moraceae	S	-	-	-
22	<i>Ficus auriculata</i> Lour.	Moraceae	T	+	-	-
23	<i>Ficus benghalensis</i> L.	Moraceae	T	-	-	-
24	<i>Ficus neriifolia</i> (Wall.ex Miq)	Moraceae	T	+	-	-
25	<i>Ficus palmata</i> Forssk.	Moraceae	T	+	+	-
26	<i>Gardenia turgida</i> Roxb.	Rubiaceae	T	-	-	-
27	<i>Glochidion velutinum</i> Wight.	Euphorbiaceae	T	+	+	-
28	<i>Lannea coromondelica</i> (Hoult.) Merr.	Anacardiceae	T	-	-	-
29	<i>Litsea monopetala</i> (Roxb) Pers.	Lauraceae	T	-	-	-
30	<i>Lyonia ovalifolia</i> (Wallich) Drade	Ericaceae	T	+	+	-
31	<i>Machilus sericea</i> (Nees) Blume.	Lauraceae	T	-	+	-
32	<i>Macaranga pustulata</i> King ex Hook.f.	Euphorbiaceae	T	-	+	-
33	<i>Maesa montana</i> A.DC.	Myrsinaceae	T	-	-	-
34	<i>Mallotus philippensis</i> (Lam.)Muell.Arg*	Euphorbiaceae	T	+	+	-
35	<i>Mangifera indica</i> L.*	Anacardiceae	T	-	+	-
36	<i>Persea odoratissima</i> (Nees) Kosterm	Lauraceae	T	-	-	-
37	<i>Phoenix humilis</i> Royal ex Becc. & Hook.f.	Arecaceae	P	+	-	-
38	<i>Pinus roxburghii</i> Sargent	Pinaceae	T	-	+	+
39	<i>Pistacia khinjuk</i> Stocks in Hook.	Anacardiceae	T	-	-	-
40	<i>Prunus cerasoides</i> D.Don	Rosaceae	T	+	+	-
41	<i>Pyracantha crenulata</i> (D.Don) M.Roem	Rosaceae	S	+	-	-
42	<i>Pyrus pashia</i> Buch.-Ham.ex D.Don	Rosaceae	T	+	-	-

43	<i>Quercus glauca</i> Thumb	Fageaceae	T	+	+	-
44	<i>Quercus leucotrichophora</i> A.Camus	Fageaceae	T	+	+	-
45	<i>Rhamnus virgatus</i> Roxb.	Rhamnaceae	T	-	-	-
46	<i>Rhododendron arboreum</i> Sm.exot. Bot.	Ericaceae	T	-	+	-
47	<i>Sapium insigne</i> (Royal) Benth.ex Hook.f.*	Euphorbiaceae	T	+	-	-
48	<i>Shorea robusta</i> Roxb.ex gaertn.f.*	Dipterocarpaceae	T	+	-	+
49	<i>Symplocos cochinchiensia</i> (Lour.)S.	Styraceae	T	-	-	-
50	<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae	T	-	+	-
51	<i>Terminalia chebula</i> Retz.	Combretaceae	T	+	+	-
52	<i>Toona serrata</i> (Royal) M.Roemar*	Meliaceae	T	-	+	+
53	<i>Wendlandia heynei</i> (Roemer&Schulter)	Rubiaceae	T	-	-	-
54	<i>Woodfordia fruticosa</i> (L.) Kurz	Lythraceae	T	-	+	-

* Popular host, T- Tree, S- Shrub, P- Palm and WC- Woody climber



A view of sal (*Shorea robusta*) forest in the project area



Chir pine (*Pinus roxburghii*) dominates the lower hill slopes



Riverine / Valley forests are rich in epiphytic orchids

Vegetation types



Panoramic view of village Gori valley



A village community settlement



Women collecting fodder



A villager ploughing fields



A typical village setting and crop fields



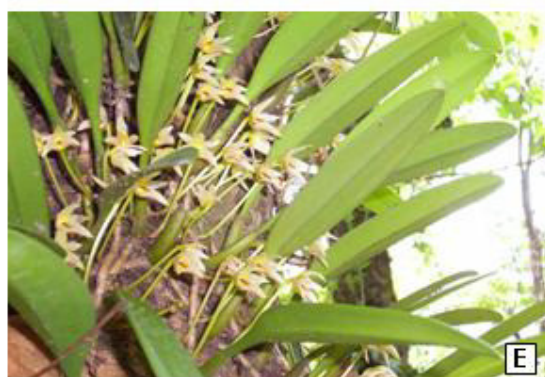
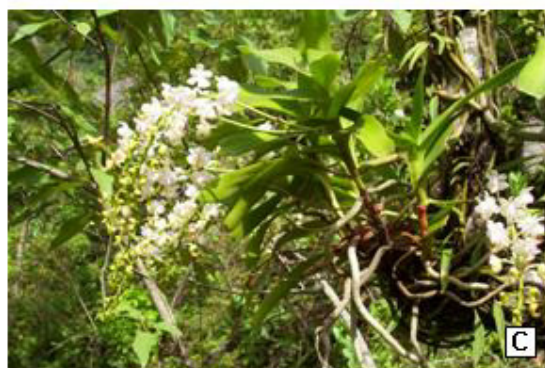
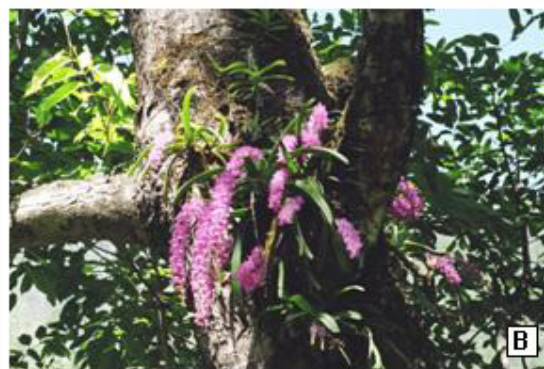
A traditional water mill



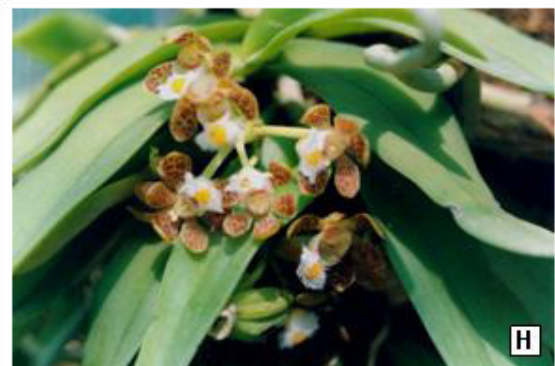
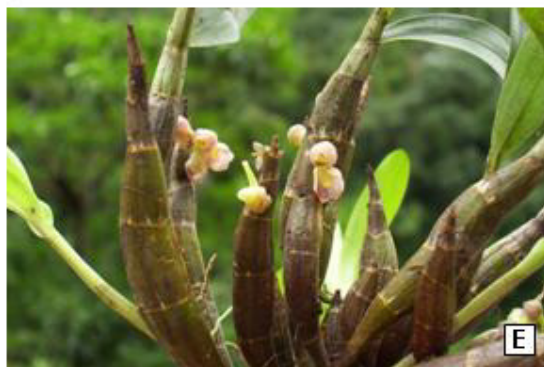
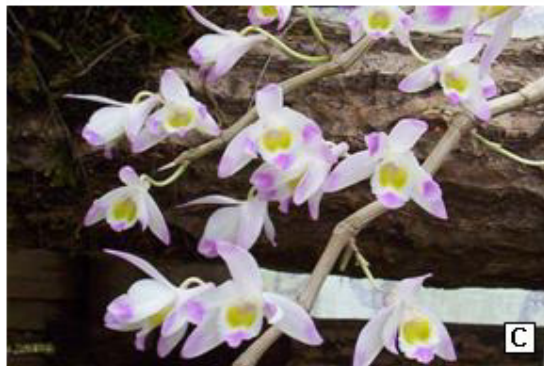
A ropeway used for river crossing



A few families subsist by weaving carpets



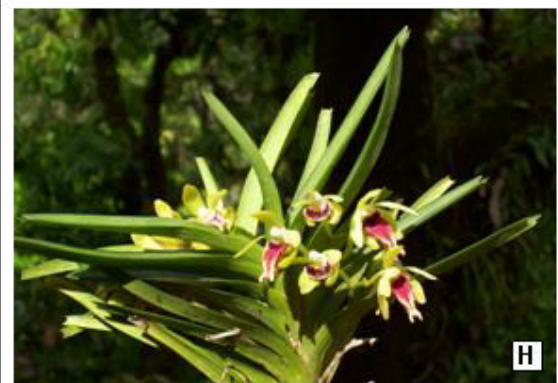
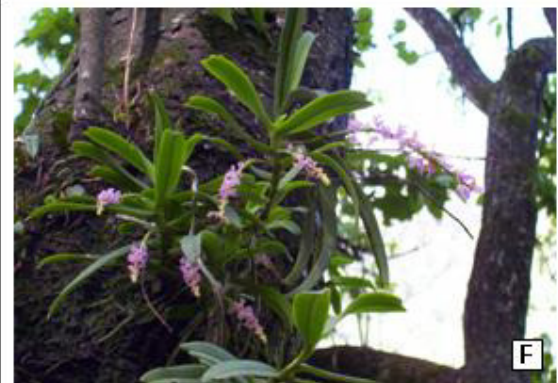
A. *Acampe papillosa* B. *Aerides multiflora* C. *Aerides odorata* D. *Ascozentrum ampullaceum*
E. *Bulbophyllum affine* F. *Bulbophyllum triste* G. *B. secundum* H. *B. careyanum*



A. *Coelogyne cristata* B. *Coelogyne stricta* C. *Dendrobium amoenum* D. *D. chrysanthum*
E. *D. bicameratum* F. *D. normale* G. *Eria pubescens* H. *Gasstrochilus acutifolius*



A. *Goodyera procera* B. *Kingidium taenialis* C. *Liparis caespitosa* D. *Luisia zeylanica* E. *Malaxis acuminata* F. *M. purpurea*



A. *Nervilia mackinnonii* B. *Oberonia acaulis* C. *Ornithochilus difformis* D. *Pholidata imbricata*
E. *Rhynchostylis retusa* F. *Smithandia micrantha* G. *Thunia alba* H. *Vanda cristata*



Bulbophyllum triste loaded on a dead log



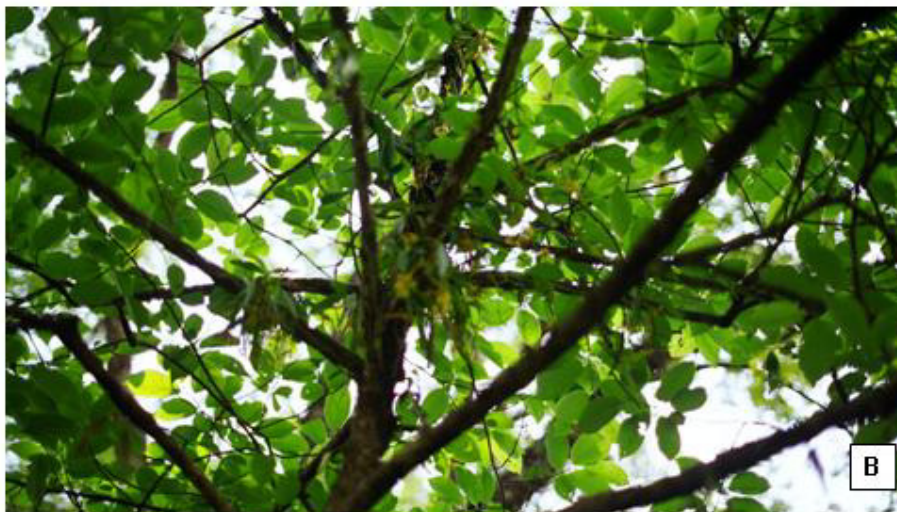
Host *Phoenix humilis* loaded with *Bulbophyllum careyanum*



C & D Dead host of *Toona serrata*



Toona serrata loaded with epiphytic orchids



Pteroceras suveolens on host *Pistacia khinjuk*



Rhynchostylis retusa hanging on host *Mallotus philippensis*



A & B: *Engelhardtia spicata* is one of the favorable host trees cut by the villagers for fuel wood



Host *Quercus leucotrichophora* damaged by fire



A & B: *Pinus roxburghii* (one of the important host trees damaged by fire)



***Lopping of Engelhardtia spicata* for fuelwood**



Detached orchids collected from different locations



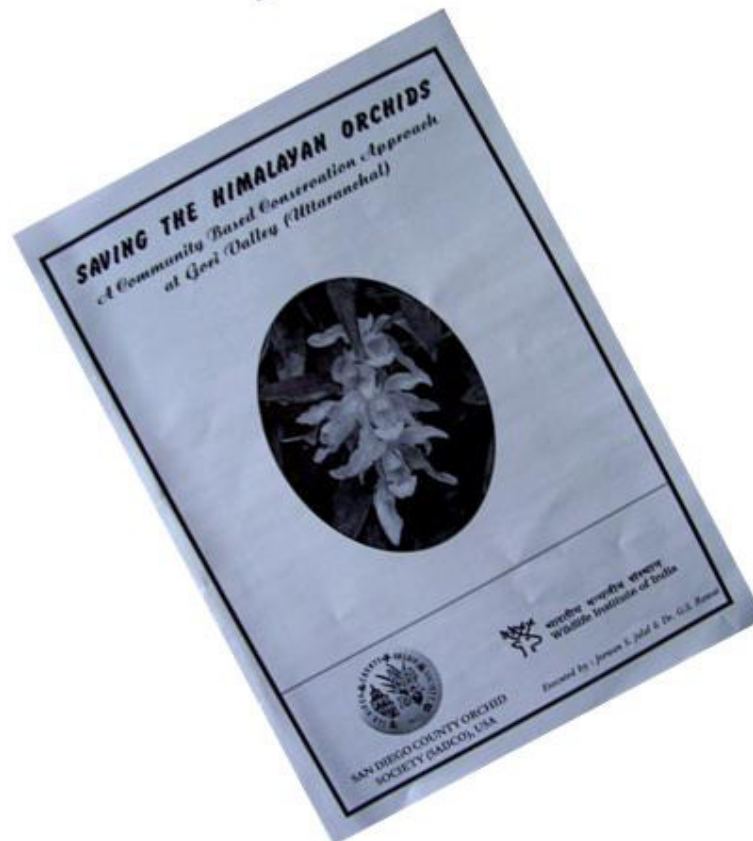
Rehabilitation of collected orchids



Orchid Rehabilitation Centre



An inside view of rehabilitation centre



PAMPHLETS USED IN AWARENESS PROGRAMME



POSTERS USED IN AWARENESS PROGRAMME



Poster presentation: creating orchid awareness among school children



School children learn more about orchids



A local conservation enthusiast interacts with the villagers



The author among the villagers



The village headman talking about the importance of forests and orchids



School children and the villagers during one of the meetings

About the Investigator

Jeewan Singh Jalal, Investigator of this project is pursuing doctoral work on the “Systematics, Phytogeography and Habitat Ecology of Orchids in Uttaranchal” under the joint supervision of Dr. Y. P. S. Pangtey (Kumaun University, Nainital) and Dr. G. S. Rawat (Wildlife Institute of India, Dehra Dun) since 2002. He has Masters degree in Botany with specialization in plant taxonomy. Graduated in Botany from Kumaun University with first class. Mr. Jalal is currently working in All India Coordinated Research Project on Taxonomy of Orchids, sponsored by Ministry of Environment & Forests, Government of India. He holds a vision for conserving rare and threatened orchid species and their habitats in India involving various government and non-government organizations.



About the advisor

Dr. G. S. Rawat, Fellow of National Academy of Sciences, India, is working as Professor and Head of Habitat Ecology Department at the Wildlife Institute of India, Dehra Dun. He is well-known Plant Ecologist in the country and member of IUCN Orchid and Medicinal Plant Specialist Groups. During 1980-84 he was awarded UGC fellowship to work on the Plant Systematics and Ethnobotany in the Alpine Region of Kumaun Himalaya for his Ph.D. degree. Subsequently, he worked in Botanical Survey of India, Dehra Dun, Kumaun University, Nainital and High Altitude Plant Physiology Research Centre (Garhwal University), Srinagar in various capacities. After joining W.I.I., he was trained in Habitat Evaluation Procedures at Colorado State University, Fort Collins, USA and in Alpine Plant Ecology at Institute for Arctic and Alpine Research, University of Colorado at Boulder, USA. He has traveled extensively in the Himalayan region for the floral and faunal surveys. He has published over 100 research papers and several popular articles. He worked as a part time consultant with WWF-Bhutan Programme and assisted Nature Conservation Section of Forestry Services Division (Royal Government of Bhutan) in biological surveys.



