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An assessment of biodiversity in Panch Pokhari of Sindhupalchok District of Central Nepal Emphasizing Conservation Needs

A Mid Term Report

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Summary

The first phase of field study on An Assessment of Biodiversity in Panch Pokhari of Sindhupalchok District of Central Nepal Emphasizing Conservation Needs (Ref. 10.09.07) was conducted in April 26 to May 7 of 2008. This study which covered the altitudinal range of 1300 m to 4300 m in Sindhupalchok district of central Nepal was quite fruitful to come up with a list of 110 species of higher plants, 10 species of lichens, 32 species of bryophytes, 11 species of pteridophytes, 26 species of butterflies, 22 species of birds, and 20 species of mammals.

A prospect to develop Panch Pokhari (4200 m) as an Eco-tourism destination was also studied which revealed the requirements of some physical constructions and effective management plan for this purpose. The current conservation issue was also considered in this study.

The second or final phase of field study has been scheduled at the end of August 2008. The month of August has warm and humid climatical condition, so many additions to the list of flora and fauna can be expected during this period. An extensive study for the development of eco-tourism in Panch Pokhari will also continue in the final phase of study besides running two days of Conservation Education Program to the local inhabitants of this area.

This midterm report based on field study from April 26 to May 7 of 2008 includes all the details of the existing biodiversity and possibility to promote tourism from Dhap (1300 m) to Panch Pokhari region (4200 m).

Background

This study on the biodiversity of Panch Pokhari of central Nepal comprised a team of biologists which included Nirmala Pradhan (Co-ordinator, Lower Plant Systematic), Mr. Bhैया Khanal, (Animal Ecologist), Dr. Mohan Siwakoti, (Plant Systematic) Mr. Binod Thapa (Assistant Zoologist) and Ms Jyotsna Lamichane (Assistant Zoologist). Panch Pokhari, which is located in northern Sindhupalchok district, is a sacred site where hundreds of people visit annually during Janaipurnia festival held generally in the mid of August. It is also a pristine site for biodiversity where least study has been undertaken previously.

Panch Pokhari lies at 27° 36' N to 28 ° 13' N and 85 ° 2' to 86 ° 06' E. Population density increases gradually below Panch Pokhari to the southern parts where fertile land can be found. Various areas lying at 2135 to 4300 m display good pasture lands influenced basically by the Himalayan climatic type. The heavy snow of winter is melted in summer which eventually is turned into the Panch Pokhari Lake (Five ponds). Heavy snow falls for six months every year hinders the growth of vegetations in this place. Below 4000 m many good pasture lands and coniferous trees are commonly observed. When snow melts in May, the livestock owners transfer their livestock to the high-altitude meadows mainly for grazing purpose; they stay there till October before the start of cold and harsh weather characteristics of Himalayan climatic type.

Study Route in Panch Pokhari and Periphery Areas

April 26, 2008	Kathmandu -----Bus----- Dhap
April 27, 2008	Dhap (1300 m) to Bhotang (1600 m)
April 28, 2008	Bhotang to Chitre (3000 m)
April 29, 2008	Chitre and associated areas (3000 m to 3400 m)
April 30, 2008	Chitre to Nasim (3500 3800 m)
May 1, 2008	Nasim and associated areas (3900 m)
May 2, 2008	Nasim Pati to Panch Pokhari (4300 m)
May 3, 2008	Panch Pokhari to Nasim Pati
May 4, 2008	Nashim Pati to Chitre
May 5, 2008	Chitre to Dukhan (2200 m)
May 6. 2008	Dukhan to Bhotang
May 7, 2008	Bhotang to Dhap to Kathmandu



Studied Route to Panch Pokhari

Agriculture

This area is very poor for agricultural land. Potatoes, wheat and maize grow well upto Botang village (1600 m). After 2200 m of elevations no villages or human settlements can be found except some Goths (sheds for livestock) where livestock grazers grow some green vegetables around their places. They are the seasonal migrants to the Himalayan meadows mainly for livestock grazing purpose and stay there from April end to the start of October till the cold and harsh weather commence in higher elevations.

Potato is the main cash crop of high productivity in this place and has good market even to Kathmandu city. Other vegetables grown in this village include Soybeans, different beans and tomatoes which grow mainly in rainy time. They also use wild edible

mushroom for their food. Among fruits, apple and berries grow well. The good quality apple grown here has wide market which also reaches to the market in Kathmandu.

About 1000 individuals of cows and 121 buffaloes are reared in nearby villages of Panch Pokhari. Domesticated Yaks can also be seen at Nasim (3500 m). The village peoples complain that the wild beasts like bears and leopards are the main predators of their livestock usually during rainy season.

The dry and stored grains of maize, barley, millet, etc are grounded up into flour by the use of locally made water turbine. About two such turbines were noticed at different places up to Dokung village. This is basically established in that part of the stream where water current is noticed high.

Small Business

The small or domestic business is very poorly developed in this region. They usually prepare some personal items mainly with soft bamboos. Such items include varieties of attractive baskets and important storing stuffs. Few women at Dokung village (2200 m) weave woollen clothes and carpets using traditional weaving machines made up of wood.

Some village peoples are also engaged with the trade of forest products like lichens used mainly for making dyes and other stuffs. This was noticed at Tipeni (way to Dhaap) where tons of such lichens were made ready to dispatch. At higher elevation of Panch Pokhari, the local people collect various medicinal herbs for trading purpose. *Cordicep sinensis*, a well known highly prized medically valued herb is collected widely in this part during May and June. This is the symbiotic product of fungus and caterpillar of a moth called *Hepialus chinensis*. The moth dies after the fungus grows upon it. This is called *Yarsa Gumba* in Nepali. This has been said to be of high aphrodisiac value and has greater market demand.

Religious Festivals

Janai Purnima Festival: This festival is observed in the mid of August annually when devotees from countrywide reach to Panch Pokhari to take their holy bath which is said to carry significant mythological belief. About two thousand peoples are estimated visiting this place annually.

Dasahara: This festival is observed in March/ April and lasts for a month. During this time, many devotees visit to Panch Pokhari Lake to worship god Shiva and to take holy bath there. They also pay visit to a locality at Chitre where a small fountain of sour water (water with high rate of basic elements) is located. They believe, this water may cure their contaminated diseases if drunk once in their lifetime. About 1000 – 1500 peoples are expected to visit this place annually.

Objectives

This study program has the following objectives

1. To document the existing biodiversity in Panch Pokhari and adjoining areas.
2. To assess the local /national status of every observed species of biodiversity found in this part.
3. To study the prospects of promoting ecotourism in this part.
4. To make people's participation in conservation through conservation education program.

Methodology

This is the first phase study of our entire project work. The significant components of biodiversity were recorded with photographs. The unidentifiable invertebrate specimens in the field were collected and the process of identification is still underway. Other components of biodiversity were studied with the help of field guides. The lichens and bryophyte specimens were collected using pocketknife and placed safely in paper packets. The magnifying lens (5X-20X) is used for field identification. Various relevant literatures (Gangulee, 1969-1980; Chopra, 1975; Eddy, 1996; Allen, 2002; Long, 2006) are consulted for Identification and this process is still underway.

Several angiosperm and gymnosperm plants were collected as voucher specimens with the record of their important field characters. The collected specimens were taken to Kathmandu for identification. Attempt was made to identify these plants in the field by using personal expertise and literatures (Anonyms, 1976; Polunin and Stainton, 1984; Stainton, 1988; Thapa, 2002). Nomenclature follows Press *et al.*, 2000.

Field observation and interaction with local peoples were made to know about species abundance, local names (especially Tamang names) and local uses of the plants. This study was found little earlier to collect the sub alpine and alpine species so the names of only known plants were recorded.

Those species of butterflies which were not readily identifiable in the field were collected with the help of butterfly net. Relevant literatures (Smith, 1989, Khanal and Smith, 1997) were consulted for identification. Binocular was used to study birds and field guide (Fleming *et al*, 1976) was used for identification. The mammals were identified in the field with the help of relevant book of Prater (1965). Local people were also interviewed to obtain indirect information about existing mammals of their area.

This first phase of field study was initiated in April 26 to May 7 of 2008. Identification work is still continuing so a complete list of flora and fauna (including this study) will be incorporated in our final report with the outcome data of the final phase scheduled in August end, 2008. Report writing and submission of final report to the Rufford Small Grant will be done in October 2008.

Significance of this Study

Nepal Government's plan to promote tourism in this place though can be helpful to uplift the financial status of many village people, may still leave equal impact upon significant forest resources of this place. So, this study to document existing biodiversity of Panch Pokhari and peripheral areas has been felt essential before any damage occurs here.

Conservation Education is believed to bring about conservation awareness among the local peoples. Once baseline data is completely documented, the future follow up process can be made easy by monitoring the degree of habitat alteration from the period of baseline study (this work). If any impact is found in future, the village communities and government organizations will be reported to add effectiveness in their conservation policies.

Our main target is to develop this place as an excellent conservation area of the country. The effectiveness in current conservation action and favourable tourism schemes of this place may raise the socio-economical status of the peoples besides generating good revenues to Nepalese Government,

Current Study and Future Plan

One of the main aspects of the first phase study was to conduct the biodiversity survey from Dhap (1300 m) to Panch Pokhari region (4200 m). This survey will get its further continuity in our second or final phase of study scheduled at the end of August 2008. The species diversity both of floral and faunal components may increase in August as it

is warm and humid season compared to drought April when this study was completed. The biodiversity survey was accompanied by the study of prevailing deforestation, habitat alteration and status categorization of every biological species observed in the field.

The second phase of field study is planned at the end of August 2008. This phase includes two days of Conservation Education implemented basically to the inhabitants of this part. This study also includes the biodiversity documentation and status categorization of every added species during this phase. The local inhabitants were found completely unaware of conservation values of the existing biodiversity of their area.

Poaching

No check posts of the Department of National Parks or Forest Division are established here so far. Poachers in this part generally kill musk deers for musk pods. They also kill bears at the Larke Kholo area especially for liver, biles and other parts. They hunt deer illegally for meat and skin. Red Panda has also been noticed killed by the poachers for its beautiful fur. They use various local traps and guns for this purpose.

Women of Botang are doing appreciable effort to develop their beautiful village as an excellent example of tourism and conservation model. They actively are engaged to teach others to conserve forests of their area. Their knowledge on forest resources is very low so the proposed conservation education in our final phase of field study can be expected to familiarize them with significant value of forest and its valuable resources. There are only 3 girls in this village who have passed 10th grade of schooling so far (*pers.com*, Heera Lama).

Our final report which will be submitted in October will include details of every aspect including the current conservation issues in this place.

Result

A. Flora

More than 110 species of flowering plants have been recorded in this study conducted in the month of April. Further, details will be resulted in the second or final phase of field study planned at the end of August 2008.

The sub tropical vegetation occurs at 1000 to 2000m of elevations basically at the lower belt of the Himalayas. A patch of oak forest (*Quercus lanata*) was observed near the Bhotang village which was conserved by the local peoples to enhance the beauty of the village. A lower temperate Oak- Rhododendron forest constituted by *Quercus lanata* and *Rhododendron arboreum* were noticed below the Dokung (2200 m) at the dry rocky slope of Hangar Khola, the moist area in this place is dominated by *Alnus nepalensis* associated with *Lyonia ovalifolia*, *Rubus ellipticus*, *Oxyspora paniculata*, etc.

The temperate vegetation normally occurs at 2000 to 3000m. The temperate vegetation was noticed widely above and around Dokhang (2200 m) settlement. The common tree species from Dokhang to Chitre Khola (3000 m) are *Rhododendron arboreum*, several species of laurels (*Persea duthiei*, *Lindera sp.*, *Neolitsea sp.*, *Phoebe sp.*), *Symplocos ramosissima*, *Ilex dipyrena*, *Quercus semecarpifolia*, *Pyrus pashia*, *Berberis aristata*, etc. The ground floor is covered by *Duchesnea indica*, *Fragaria nubicola*, *Hemigraphis heterophylla*, *Vaccinum nummularia*, *Poa spp* etc.

The sub alpine zone lies at the main Himalayan range between 3000 to 4000 m. The floral diversity above Deurali to Nasim (3800m) is absolutely the sub alpine type. The dense forest of Rhododendron (*R. campanulatum*) is quite dominant in the area associated with some stands of *Abies spectabilis*, *Betula utilis*, *Juniperus recurva*, etc.

The alpine zone lies above 4000 m of elevation. The area between Lauribina (4000 m) to Panch Pokhari (4200 m) is covered with lustrous green meadows interspersed by rocky slopes. *Rhododendron lepidotum*, *R. anthopogon*, *R. setosum*, *Juniperus recurva* and *J. indica* can be seen in alpine meadow which is covered by a number of dried herbs belonging to Poaceae, Cyperaceae, Rosaceae, Primulaceae etc.

A list of reported flora in this first phase of study is provided in tabulated form (Annex 4)

Lichens of Panch PokhariLichens are formed basically by the combination of the fungal partner which lives symbiotically with an algal one. About 352 species of lichens have been reported in Nepal so far. These were collected at various areas of east Nepal (Sharma, 1999). They can grow on any substrate that occasionally receive light, humidity and a little dust and also grow on tree barks but do not penetrate the bark or parasitize the host in any way.

The lichen diversity is very rich at the elevations of 1500-3500 m, where trees like Pine, *Quercus*, *Rhododendron*, *Cedrus*, *Cupressus*, *Picea*, *Juglans*, etc are prevalent. Lichens prefer to grow on the barks of these trees. The rough barks provide better

foothold for the growth of various lichen species. Bioclimatic condition plays an important role in producing fruiting bodies in the lichens which is evidently found in the lichens of the sub alpine region (Sharma, 1999).

Lichens are used as textile dyes, perfumes, medicine and ornaments (Richardson, 1975).

Some of the Lichens recorded from Panch Pokhari are shown in Table 1.

Bryophytes

Nepal represents 1150 species of Bryofloral species (Pradhan and Shrestha, 2008) of which Panch Pokhari and peripheral areas are expected to represent more than 100 species. In this first phase of study, a greater diversity of this plant has been noticed in the temperate to sub alpine regions mainly at 3000-4200 m of elevation.

More than 200 specimens were collected during the first phase of field study. These were divided taxonomically into 32 species under 26 genera and 19 families. The process of identification is still underway.

Rare species recorded in this study includes *Anthoceros punctatus* L., *Reboulia hemispherica*, *Breutelia aristifolia*, *Pohloa elongata*, *Fissidens grandiflorons*, *Frullania muscicola*, *Funaria hygrometrica*, *Leucobryum* sp., *Metzgeria conjugate* etc. Likewise, the common species reported in this study includes *Dicranum himalayanum*, *Heterocyphus* sp., *Marchantia polymorpha*, *Polytrichum commune*, *Thuidium haplohymenium*, *Asterella wallichiana*, *Plagiochasma appendiculatum*, *Bryum argenteum*, *Rhodobryum giganteum*, *Fissidens taxifolius*.etc. Species like *Conocephalum conicum*, *Marchantia emarginata*, *Plagiochila ferruginous* and *Pogonatum microstomum* were collected from many localities at 1700-3800 m. Among the study sites Tangu Khola, Chitre, Chhare Kharka and Hinger Khola were noticed to be the potential areas for bryofloral diversity.

The second phase study planned at the end of August may be fruitful to come up with sporophytic generations of many species.

A list of species of bryophytes of the first phase of study is provided in the Annex

Pteridophytes

Ferns occupy an intermediate position between the mosses and the higher plants. They have ability to absorb water and nutrients by the roots and transport it into the stem of the plant. Ferns can be seen all the year round, their fruiting start mainly in September to October.

The total record of ferns counts 12000 species worldwide. About 534 species of fern have been reported in Nepal so far (Thapa, 2002).

This study conducted in April was able to bring a list of 11 species of ferns categorized under 9 families. Its collection was made at the elevation of 1300 to 4000 m

B. Fauna

Diverse faunal components are sheltered around Panch Pokhari area. Butterfly diversity is very rich in this part. Oriental components are more common upto 3000 m where prominent species of butterflies like *Précis almanac*, *P. lemonias*, *P. iphita*, *Zizeeria maha*, *Achillides polycctor*, *Atrophaneura polyeuctes* and *Metaporia agathon* are prevalent. Himalayan species found at 3000 m to 4300 m in this region are *Pieris brassicae*, *Vanessa indica*, *Issoria issaea*, *Danaus chryssipus* etc.

April is little earlier for good diversity of insects and butterflies. The actual season for butterflies in higher elevation starts from the end of May. *Parnassius hardwickei* which occurs only at higher elevation was not observed in this study though it has a continuous generation year-round except the month of February (Smith 1989). Rest of *Parnassius* species found in Nepal Himalayas have a single generation so they appear till the end of October only.

At Chitre (3000 m) and Nasim (3500 m), a beautiful bird called Himalayan Tree Pie was commonly observed. Other common birds noticed here are Yellow Billed Chough, Chuckor Partridge, Scaly Breasted Wren Babbler, Himalayan Cuckoo, Large Hawk Cuckoo, Beautiful Rose Finch, Common Rose Finch etc.

Bird's life is very diverse in this region. Various preferred habitats for birds can be found here. Monal and Blood Pheasants were noticed at 3800 m above Nasim. Birds like finches were common at higher elevation; the most common was the Flower Pecker. Himalayan cuckoos and Large Hawked Cuckoos were frequently observed birds at higher elevation around 3800 m of Nasim area.

Mammalian species carrying high conservation significances are found in this region. Red panda (*Ailurus fulgens*) occur at Chitre (3000 m). Similarly, the mammals occurring around temperate and sub alpine parts are the Langur Monkey, Assamese Monkey, Pikas, Civet Cat, porcupine etc.

The month of April is earlier for reptilian species. Only one species of lizard was observed during the entire trip period. This species is still under identification process.

Tourism

Pilgrimage tourism has good destination at Panch Pokhari. About 2-3 thousand of people visit Panch Pokhari specially to take their holy baths and worship lord Shiva. This takes place usually in March/April and the end of August every year.

The flow of international tourists is very insignificant in this region. This is mainly due to uncomfortable trekking routes, lack of suitable accommodation and unavailability of pertinent food items for visiting tourists. Trained guides and good camping sites are the main problems in this part. The hidden natural and cultural diversity which are still unknown among the circles of national and international tourists is the next cause of its less popularity. Countable tourists visiting this place usually come under package program, so all the required food stuffs and camping equipments are taken with them for the entire trip period.

Due to scenic beauty, incredible landscape, diverse cultural and natural diversity, Panch Pokhari can be expected to attract many tourists of different interests. This all need good management especially in their physical facilities, camping areas, and trained guides. Many other interesting spots like Bhairab Kund which is one of the biggest high-altitude lakes is also located in this region at 4300 m. The next beautiful lake called Suraj Kund lies at the junction of Sindhupalchok, Nuwakot and Rasuwa districts.

Some of the basic requirements to promote tourism in this region are provided below. All the details about it will be studied at the end of August 2008, which is the final phase of study of this project work.

Requirements for Eco-Tourism Promotional Activities

1. Accommodation (Inn)
2. Restaurants/ Hotels at least 2-3.
3. Good Camp sites
4. Regular water supply

5. Trained trekking guides
6. Easy porter accessibility
7. Solar system/ alternative energy resources
8. Development in agriculture, cash crops, grains etc.
9. Good stores where various stuffs are available to buy.
10. Improvement of trekking trails.
11. Specified garbage dumping places.
12. Supply of Kerosene/ LP gas so to leave least impact upon forest resources.
13. Training to village peoples in cooking continental food items.
14. Instruction to be posted at various places do not leave any impact upon forest resources.
15. Informative brochures of the area
16. Police post should be established at different places for security.
17. Management to show traditional dances and live culture of Tamang tribes
18. who are the major tribes of this part?

Conservation Issues

The forest is the major source for timber, firewood, fodder, and grazing land used by the local communities. To fulfil their daily requirements they haphazardly cut down forest trees, for example, the subalpine species of *Abies spectabilis* is heavily cut for the construction houses and cattle sheds in the village, several young trees are also cut for firewood, and a large amount of fire wood is utilized for cooking and warming during winter cold. It was also observed that some patches of forests were cleared up by setting fire so to convert it into the pastureland. During May to mid June the pasture lands of the upper temperate and sub-alpine regions are heavily grazed whereas the alpine meadows are grazed particularly in late June to August.

Being located remotely, this area is receiving heavy impact from livestock grazers who visit here annually in summer and stay till the onset of winter in October. This study reported a high poaching rate in this place, so many of the fauna and flora existing here are remaining under threat category. Nothing can be said about the magnitude of impact until this proposed study is completed.

Floral Diversity

Annex 1

Lichens

S. No.	Latin names	Families	Locality	Elevation m.	Status	Remarks
1	<i>Cetralia crispa</i> Nyl.	Parmeliaceae	Chitre-Daurali	3000-3500	Fairly common	
2	<i>Cetrelia braunsiana</i> (Mule. Arg.) Club. & Club.	Parmeliaceae	Nasim Pati	3800	Rare	
3	<i>Coccocarpia crony</i> (Tuck.) Vain.	Coccocarpiaceae	Bhotang	1600	Common	
4	<i>Coliema rugosum</i> Kremp.	Collemataceae	Bhotang-Dukhan	2100	Fairly common	
5	<i>Heterodermia diedemata</i> (Tayl.) Awas	Physciaceae	Way to Dukhan	1800	Rare	
6	<i>Heterodermia incana</i> (Stirt.) Awas.	Physciaceae	Tangu Khola	2200-2400	Common	
7	<i>Leptogium javanicum</i> Mont.	Collemataceae	Dukhan	2200	Fairly common	
8	<i>Nephroma helveticum</i> Ach.	Peltigeraceae	Way to Dukhan	1800	Fairly common	
9	<i>Ochrolechia</i> sp.	Lecanoraceae	Chitre	3000	Rare	Used in dye
10	<i>Parmelia adducta</i> Nyl	Parmeliaceae	Dukhan-	2000	Fairly common	

Annex 2

Bryophytes

S. No.	Families	Latin names	Localities	Altitudinal Range	Status	Habitat
1	Anthocerotaceae	<i>Anthoceros punctatus</i> L.	Tangu Khola	3500	Rare	Small patch on rock cliffs.
2	Aytoniaceae	<i>Asterella wallichiana</i> (Lehm. & Linderb.) Grolle	Dhap	1350	Common	Dominant on brick walls and rocks
3		<i>Plagiochasma appendiculatum</i> Lehm. & Linderb	Dhaap-Bhotang	1300- 1700	Common	Soil and stone walls
4		<i>Reboulia hemispherica</i> (L.) Raddi	Tangu Khola - Chitre	1800-2000	Rare	Large patch on boulder stone

5	Bartramiaceae	<i>Breutelia aristifolia</i> Zant.	Nasim Pati	3800	Rare	Epiphytic on root bark
6	Bryaceae	<i>Bryum argenteum</i> Hedw.	Bhotang - Dukhan	1600-2100	Common	Rocks, brick walls
7		<i>Pohloa elongata</i> Hedw.	Nasim Pati	3800-3900	Rare	Epiphytic' bark
8		<i>Pohlia leucostoma</i> (Bosch et Lac.) Fleisch.	Dhaap-Dukhan	1200-2200	Common	Epiphytic , tree trunk
9		<i>Rhodobryum giganteum</i> (Schwaegr.) Par.			Common	
10	Dicranaceae	<i>Dicranum himalayanum</i> Mitt.			Fairly common	
11	Fissidentaceae	<i>Fissidens grandiflorons</i> Brid.	Maur Khola	2100-2500	Rare	Soil covered rocks
12		<i>Fissidens taxifolius</i> Hedw.	Dukhan -Chitre	2000-2900	Common	Rocks
13	Frullaniaceae	<i>Frullania muscicola</i> Steph.	Bhotang	1500	Rare	Soil
14	Funariaceae	<i>Funaria hygrometrica</i> Hedw.	Bhotang	1600	Rare	Soil and rocks
15	Geocalycaceae	<i>Heterocyphus</i> sp.	Hinger Khola	3000	Fairly common	Soil
16	Hypnaceae	<i>Hypnum pleumaforme</i> W. Wilson	Nasim pati	3800-4000	Common	Epiphytic, root barks
17	Leucobryaceae	<i>Leucobryum</i> sp.	Top Kharka	3550	Rare	Edge of stones
18	Marchantiaceae	<i>Marchantia emarginata</i> Reinw. et al.	Dukhan	2000	Common	On the edge of brick all.
19		<i>Marchantia polymorpha</i> L.	Bhotang-Dukhan	1300-1900	Fairly common	Soil
20		<i>Conocephalum conicum</i>	Chitre	3000	Most common	Moist soil
21	Metzgeriaceae	<i>Metzgeria conjugata</i> Lindb.	Marj-Shong	2050	Rare	Soil
22	Mniaceae	<i>Mnium punctatum</i> , Hedw.	Nasim	3500-3800	Rare	Epiphyte, Root bark
23		<i>Mnium undulatum</i> Hedw.	Nasim- Panch Pokhari	3500-4000	Rare	Epiphyte, Root bark
24	Plagiochilaceae	<i>Plagiochila ferruginous</i> St.	Nasim	3800	Most Common	Epiphyte, Root bark
25		<i>Plagiochila javanica</i> (Swartz.) Dum.	Nasim	3800	Common	Epiphyte, Root bark
26	Pottiaceae	<i>Barbula convolata</i> Hedw.	Bhotang	1500	Rare	Rocks
27		<i>Hyophila involuta</i> (Hook.) A. Jaeger	Thumli	1750	Rare	Soil covered rocks
28	Polytrichaceae	<i>Pogonatum microphyllum</i> (R.Br.) Brid.	Dukhan	2500	Most common	On soil
29		<i>Polytrichum commune</i> Hedw.	Dukhan -Chitre	2000-2800	Fairly common	Soil
30	Sphagnaceae	<i>Sphagnum cuspidatum</i> C Muell.	Tangu Khola ; Kharka-Chitre	2100- 3000	Common	On rocks
31	Thuidaceae	<i>Thuidium cambifolium</i> (Dozy et Molken) Dozy et Molken	Nasim-Panch Pokhari	3800- 4200	Common	Epiphytic, on bark
32		<i>Thuidium haplohymenium</i> (Harv.) A. Jaeger	Chitre-Nasim	3000-3800	Fairly common	Epiphytic, on bark

Annex 3

Pteridophytes

S. No.	Families	Latin Names	Locality	Alt. range (m)	Status	Habitat
1	Dryopteridaceae	<i>Dryopteris</i> sp	Dukhan	2100 -2500	Common	Terrestrial, on edge of forest floor
2	Equisetaceae	<i>Equisetum diffusum</i> D.Don.	Dhaap- Bhotang	1300-1800	Common	Terrestrial, on open path
3	Lycopodiaceae	<i>Lycopodium clavatum</i> L.	Dhaap- Bhotang	1300-1800	Common	Terrestrial on sandy slopes
4	Oleandraceae	<i>Nephrolepis cordifolia</i> (L.) Presl	Thumli-Chetre	1700-3000	most common	Mountain slopes, dry rocks, tree trunks
5	Ophioglossaceae	<i>Botrychium lunaria</i> (L.) Sw.	Dukhan-Chitre	2500-3000	Rare	Terrestrial mountain slopes
6		<i>Botrychium virginianum</i> (L.) Sw	Chitre – Panch Pokhari	3000- 4000	Rare	Mountain slopes
7	Parkeriaceae	<i>Adiantum philippine</i> L.	Dhaap- Bhotang,	1300-1600	Common	Old stone walls
8	Pteridaceae	<i>Cheilanthes formosana</i> Hayata	Dhaap- Thumli	1300-1800	Common	On stone wall
9		<i>Pteris dactylina</i> Hook.	Chitre-Nasim	2800-3650	Common	Mountain slopes
10	Schizaeaceae	<i>Lygodium japonicum</i> (Thunb.) Sw.	Chitre	3000	Rare	Climbing on open places
11	Selaginellaceae	<i>Selaginella monospora</i> Spring	Thumli	1750	Fairly common	On mossy rocks

Annex 4

Higher Plants

S. No.	Latin names	Local name	Habit/ Habitat	Abundance	Distribution; altitudinal range (m)	Remarks
1	<i>Abies spectabilis</i> (D.Don) Mirb.	Kald (T)	Tree/forest	common	Tangu- Nasim; 2800-4000	Under Govt legal protection; High timber value
2	<i>Acer campbellii</i> Hook. f. &Thoms.	Yali (T)	Tree/ forest	common	Tangu- Maur Khola; 2100-3600	
3	<i>Acer pectinatum</i> Wall. ex Pax	Yali (T)	Tree/forest	occasional	Maur Khola; 2700-3800	
4	<i>Aconogonum campanulatum</i> (Hook.f.) Hara		Herb/moist slope	Occasional	Deurali; 2200-3400	
5	<i>Aconogonum molle</i> (D.Don) Hara	Thotne (N)	Herb/Moist slope	Occasional	Maur Khola; 2500	Stem used as pickle
6	<i>Anaphalis busua</i> (Buch.-Ham.ex D. .Don) DC.	Buki phool (N)/ Tep tep (T)	Herb/ moist slope	Common	Chitre; 1500-2900	
7	<i>Ainsliaea aptera</i> DC.		Herb/ forest	Common	Maurgoth; 1600-3500	
8	<i>Artemisia dubia</i> Wall.ex Besser	Tite pati/ Chhenten (T)	Shrub/waste and crop land	Common	Dukhan; 1200-3400	
9	<i>Anemone obtusiloba</i> D.Don		Herb/grazed land	Common	Tangu; 2300-4200	
10	<i>Arenaria polytrichoides</i> Edgew. ex Edgew. & Hook.f.		Moss like herb/ moist alpine rocks	Common	Panch Pokhari; 4100	
11	<i>Aletris pauciflora</i> (Klotz.) Hand.-Mazz.		Herb/alpine slope	Occasional	Tamkharka; 3000-4300	
12	<i>Alnus nepalensis</i> D.Don	Utis (N); Kaymasin (T)	Tree/wet gullies, stream sides	Commom	Hungar Khola; 500-2600	
13	<i>Berberis mucrifolia</i> Ahrendt	Kerpa (T)	Shrub/shrubberies	common	Nasim; 2100-4500	
14	<i>Berberis aristata</i> DC.	Kerpa (T)	Shrub/forest	common	Chitre; 1800-3000	
15	<i>Berberis hookeri</i> Lem.	Kerpa (T)	Shrub/forest	occasional	Chtre; 2500-3500	
16	<i>Betula utilis</i> D.Don		Tree/ moist forest	occasional	Tamkharka;	

					2700-4300	
17	<i>Boehmeria platyphylla</i> D.Don		Shrub/damp place	occasional	Hangar Khola 1500-2500	
18	<i>Caltha palustris</i> L.		Herb/open slope	occasional	Mayur Khola; 2400-4500	
19	<i>Campanula pallida</i> Wall.		Herb/open slope	common	Chitre; 1000-4500	
20	<i>Clematis montana</i> Buch.-Ham. ex DC.		Woody climber/ forest	common	Chitre; 1800-4000	
21	<i>Corydalis juncea</i> Wall.		Herb/open slope	common	Mayur Khola; 2500-4300	
22	<i>Choeros pondias axillaris</i> (Roxb.) Burt. & Hill	Lapsi (N); Kalong (T)	Tree/cropland	common	Bhotang; 1200-1500	Fruit edible
23	<i>Cassiope fastigiata</i> (Wall.) D.Don		Shrub/alpine meadow	common	Panch Pokhari; 2800-5000	
24	<i>Cynoglossum zeylanicum</i> (Vahl ex Hornem.)Thunb.ex ehm.		Herb/crop land	common	Chitre; 1200-4100	
25	<i>Conyza bonariensis</i> (L.) Cronquist		Herb/ waste and crop lands	common	Dukhan; 1400-2800	
26	<i>Corallodiscus lanuginose</i> (Wall.ex DC.)Burt		Herb/ moist rocks	common	Chitre khola; 1000- 2400	
27	<i>Clinopodium umbrosum</i> (M.Bieb.) K.Koch		Herb/crop land waste place	common	Chitre; 3400	
28	<i>Coelogyne corymbosa</i> Lindl.		Epiphytic herb/forest	occasional	Dukhan Gufa; 2200- 2800	
29	<i>Carex cruciata</i> Wahlenb.		Herb/ forest	common	Chitre; 1500-3400	
30	<i>Carex</i> spp.		Herb/forest	common	Maur Khola; 2500	
31	<i>Chenopodium album</i> L.		Herb/crop land waste place	common	Chitre; 2000-4000	Plants use as vegetable
32	<i>Drymaria cordata</i> (L.) Willd. ex R.&S.	Abijalo (N)	Herb/crop land	common	Chitre; 2200-4300	
33	<i>Delphinium</i> spp.		Herb/sub alpine pasture	occasional	Nasim; ca 3800	
34	<i>Duchesnea indica</i> (Andrew.)Focke	Luven (T)	Herb/open slope	common	Dukhan; 1000-2500	Fruit edible
35	<i>Dichrocephala integrifolia</i>		Herb/crop land	common	Dukhan;	

	(L.f.)Kuntz.		waste land		800-3000	
36	<i>Daphne bholua</i> Buch.-Ham. ex D. Don	Chibu (T)	Shrub/forest	common	Deurali; 2000-2900	
37	<i>Eurya acuminata</i> DC.	Thangar (T)	Tree/forest	common	Dukhan; 1300-2500	
38	<i>Eurya cerasifolia</i> (D.Don) Kobuski		Tree/forest	occasional	Dukhan; 900-2300	
39	<i>Fraxinus floribunda</i> Wall.		Tree/near village	occasional	Chhimdi; 1200-2700	
40	<i>Ficus neriifolia</i> Sm.		Tree/cropland	occasional	Bhotang; ca 1800	fodder
41	<i>Ficus auriculata</i> Lour.		Tree/ cropland	occasional	Bhotang; ca 1500	Fruit edible
42	<i>Ficus semicordata</i> Buch.-Ham. ex Sm.		Tree/ cropland	common	Bhotang; ca 1500	Fruit edible
43	<i>Gaultheria fragrantissima</i> Wall.	Chesum (T)	Shrub/ forest	common	Dukhan; 1200-2600	Ripe fruit eaten
44	<i>Girardinia diversifolia</i> (Link) Friis	Allo (N); Pollo (T)	Herb/stream side	occasional	Hangar Khola 1700-3000	
45	<i>Gentiana capitata</i> Buch.-Ham. ex D. Don		Herb/ pasture	occasional	Chitre; 1500-4200	
46	<i>Gentiana pedicellata</i> (D.Don)Griseb.		Herb/pasture	occasional	Chitre; 750-3800	
47	<i>Holbellia latifolia</i> Wall.	Chhyamba (T)	Climber/forest	occasional	Chitre; 1500-4000	Fruit edible
48	<i>Hemiphragma heterophylla</i> Wall.		Herb/pasture	common	Tangu; 1800-3500	
49	<i>Hypericum japonicum</i> Thunb. ex Murray		Herb/crop land	common	Bhotang; 150-2600	
50	<i>Houttuynia cordata</i> Thunb.		Herb/crop land	occasional	Bhotang; 1500-2400	
51	<i>Ilex diphyrana</i> Wall.		Tree/forest	common	Chitre; 2500-3000	
52	<i>Juniperus indica</i> Bertol.	Mekhlisukpa (T)	Shrub/alpine scrub	common	Nasim; 2800-4500	
53	<i>Juniperus recurva</i> Buch.-Ham. ex D.Don	Mekhlisukpa (T)	Shrub/alpine scrub	common	Nosyam; 2500-4600	
54	<i>Jurinea dolomiaea</i> Boiss.		Herb/alpine slope	occasional	Panch Pokhari; 3000-4300	

55	<i>Juglans regia</i> var. <i>kamaonia</i> C.DC.	Okhar (N); Kadu (T)	Tree/forest, crop land	occasional	Dukhan; 1500-3000	Under Govt. legal protection
56	<i>Lobelia pyramidalis</i> Wall.		Herb/shrubberies	occasional	Dukhan; 1200-2100	
57	<i>Lyonia ovalifolia</i> (Wall.) Drude	Dumsang (T)	Tree/forest	common	Chitre; 1500-3300	
58	<i>Lyonia villosa</i> (Hook.f.) Hand.- Mazz.	Dumsang (T)	Tree/forest	occasional	Tangu; 2700-3800	
59	<i>Lecanthus peduncularis</i> (Royle) Wedd.		Herb/wet place	occasional	Hangar Khola; 1200- 3200	
60	<i>Leucosceptum canum</i> Sm.		Tree/forest	occasional	Chitre; 1000-2800	
61	<i>Myrica esculenta</i> Buch.-Ham. ex D.Don	Kaphal (N); Karsa (T)	Tree/forest	common	Hangar Khola1; 200- 2300	Fruit edible
62	<i>Mahonia napaulensis</i> DC.		Shrub/forest	occasional	Chitre; 2000-2900	
63	<i>Oxyspora paniculata</i> (D.Don) DC.		Shrub/shrubberies	occasional	Hangarkhola1300- 3000	
64	<i>Paris polyphylla</i> Smith		Herb/forest	occasional	Maurkhola; (2000- 3000)	
65	<i>Pieris formosa</i> (Wall.) D.Don	Prot (T)	Tree/forest, shrubberies	common	Tangl; 2000-3300	Plant toxic to cattle
66	<i>Pinus roxburghii</i> Sargent	Thangsing (T)	Tree/shrubberies	occasional	Bhotang; 1100-2100	
67	<i>Pinus wallichiana</i> Jacks.		Tree/shrubberies	occasional	Yarsa; 1800-4100	
68	<i>Piptanthes nepalensis</i> (Hook.) D.Don		Shrub/forest	occasional	Deurali; 2000-3800	
69	<i>Plantago erosa</i> Wall.		Herb/open slope	common	Chitre; 900-4100	
70	<i>Prinsepia utilis</i> Royle		Shrub/shrubberies	common	Dukhan; 1500-2900	
71	<i>Prunus cerasoides</i> D.Don	Paiyu (N); Pyuru (T)	Tree/crop land	common	Dukhan; 1300-2400	Fruit edible
72	<i>Prunus cornuta</i> (Wall. ex Royle) Steud.	Lakhale (T)	Tree/forest	common	Tangu; 2100-3500	
73	<i>Prunus rufa</i> Hook.f.		Tree/forest	occasional	Tangu; 3000-3800	
74	<i>Persea duthiei</i> (King ex		Tree/forest	occasional	Dukhan;	

	Hook.f.) Kosterm.				1000-2900	
75	<i>Pyrus pashia</i> Buch.-Ham. ex D.Don	Pana (T)	Tree/forest	common	Dukhan; 750-2600	Fruit edible
76	<i>Potentilla argrophylla</i> Wall.ex Lehm.		Herb/pasture	common	Nasim; 3900-4600	
77	<i>Potentilla josephiana</i> Ikeda & Ohba		Herb/pasture	common	Nosim; 2400-4150	
78	<i>Primula aureata</i> Fletcher		Herb/rock crevice	occasional	Chhakangko Tersobato; 3600-4300	Endemic
79	<i>Primula denticulata</i> Sm.		Herb/moist place	occasional	Tangu; 1500-4900	
80	<i>Primula gracilipes</i> Craib		Herb/moist area	common	Nasim Pati; 3200-4100	
81	<i>Primula sikkimensis</i> Hook.f.		Herb/open slope	common	Nosyam; 2900-4800	
82	<i>Primula irregularis</i> Craib		Herb/ moist area	occasional	Tangu; 2800-3400	
83	<i>Rhododendron anthopogon</i> D.Don	Barlosukpa (T)	Shrub/ alpine shrubberies	occasional	Panch Pokhari; 3300-5100	
84	<i>Rhododendron arboreum</i> Sm.	Paramindo (T)	Tree/forest	common	Dukhan; 1500-3300	
85	<i>Rhododendron arboreum</i> var. <i>album</i> Wall. (Fl white)		Tree/forest	common	Tangu; 2800-3600	
86	<i>Rhododendron barbatum</i> Wall ex G.Don		Tree/forest	common	Tangu; 2700-3600	
87	<i>Rhododendron campanulatum</i> D.Don	Chimal (N)	Tree/forest & shrubberies	common	Nosyam; 2800-4400	
88	<i>Rhododendron lepidotum</i> Wall ex G.Don	Rasukpa (T)	Shrub/shrubberies	occasional	Nosyam; 2100-4700	
89	<i>Rhododendron setosum</i> D.Don		Shrub/shrubberies	occasional	Panch Pokhari; 3700-5600	
90	<i>Rumex nepalensis</i> Spreng.		Herb/ near cattle shed	common	Chitre; 1200-4200	
91	<i>Rosa sericea</i> Lindl.		Shrub/forest	occasional	Tangu; 2200-4600	
92	<i>Rubus calycinus</i> Wall ex D.Don		Herb/forest	occasional	Tangu; 2200-2800	
93	<i>Rubus ellipticus</i> Sm.	Polang (T)	Shrub/ forest &	common	Dukhan;	Fruit edible

			shrubberies		1700-2300	
94	<i>Rubia manjith</i> Roxb. ex Fleming		Climber/forest	occasional	Dukhan; 1200-2100	
95	<i>Rhus succedanea</i> L.		Tree/forest	occasional	Dukhan; 1300-2400	
96	<i>Saurauia nepaulensis</i> DC.		Tree/crop land	occasional	Dukhan; 600-2100	
97	<i>Sarcococca</i> sp.		Shrub/forest	occasional	Chitre; ca. 2200	
98	<i>Sambucus adnata</i> Wall.ex DC.		Shrub/waste land	common	Chitre; 1500-3700	
99	<i>Schisandra grandiflora</i> (Wall.) Hook.f. & Thoms.		Woody climber/forest	occasional	Chitre; 2100-3300	
100	<i>Sorbus cuspidata</i> (Spach) Hedlund		Tree/forest	occasional	Tangu; 2700-3700	
101	<i>Sporobulus fertilis</i> (Steud.) Clayton		Herb/grazed land	occasional	Chitre; 1000-2400	
102	<i>Taxus wallichiana</i> Zucc.		Tree/forest	occasional	Tangu; 2300-3400	Under Govt. legal protection
103	<i>Tsuga dumosa</i> (D.Don) Eichler		Tree/forest	common	Tangu; 2100-3600	
104	<i>Trifolium repens</i> L.		Herb/pasture	common	Tangu; 1500-2500	
105	<i>Urtica dioica</i> L.	Pollo (T)	Herb/moist land	common	Dukhan; 1000-2500	
106	<i>Viola hamiltoniana</i> D.Don		Herb/moist place	occasional	Dukhan; 1800-2300	
107	<i>Viola hookeri</i> Thomson ex. Hook.f. & Thomson		Herb/moist place	occasional	Tangu; 3000-3300	
108	<i>Viola pilosa</i> Blume		Herb/moist place	common	Chitre; 1200-3000	
109	<i>Vaccinium nummularia</i> Hook.f. & Thomson ex Cl.		Shrub/forest, pasture	common	Nosim; 2400-4000	
110	<i>Zanthoxylum</i> sp.		Tree/forest	occasional	Dukhan; ca. 2500	

Source: Field survey, April-May 2008

Faunal Diversity

Annex 5

Butterflies

S. No.	Family	Scientific Name	Altitude	Status
1.	Lycaenidae	<i>Lampides boeticus</i>	2800 m	Common
2.		<i>Zizeeria maha</i>	1700 m	Common
3.	Nymphalidae	<i>Vanessa cardui</i>	3500 m	Moderately Common
4.	Nymphalidae	<i>Vanessa indica</i>	3200 m	Common
5.	Nymphalidae	<i>Issoria issaea</i>	3900 m	Uncommon
6.	Nymphalidae	<i>Argyneus hyperbius</i>	1700 m	Rare
7.	Nymphalidae	<i>Precis iphita</i>	1900 m	Common
8.	Nymphalidae	<i>Precis lemonias</i>	1600 m	Common
9.	Nymphalidae	<i>Precis almana</i>	1650 m	Common
10.	Nymphalidae	<i>Aglais cashmirensis</i>	3200 m	Common
11.	Papilionidae	<i>Menelaides helenus</i>	1400 m	Common
12.	Papilionidae	<i>Achillides polyctor</i>	1550 m	Common
13.	Papilionidae	<i>Atrophaneura alcinous</i>	1500 m	Rare
14.	Papilionidae	<i>Atrophaneura polyeuctes</i>	1300 m	Common
15.	Pieridae	<i>Pieris brassicae</i>	1300 – 3700 m	Common
16.	Pieridae	<i>Pieris indica</i>	1800 m	Common
17.	Pieridae	<i>Pontia daplidice</i>	1630 m	Uncommon
18.	Pieridae	<i>Appias lyncida</i>	1630 m	Uncommon
19.	Pieridae	<i>Cepora nerissa</i>	1700 m	Uncommon
20.	Pieridae	<i>Metaporia agathon</i>	2200 m	Common
21.	Pieridae	<i>Eurema hecabe</i>	2000 m	Common
22.	Satyridae	<i>Ypthima newara</i>	1400 m	Uncommon
23.	Satyridae	<i>Mycalesis perseus</i>	1400 m	Common
24.	Hesperiidae	<i>Pseudocoladenia dan</i>	1650 m	Common
25.	Hesperiidae	<i>Tagiades litigiosa</i>	1600 m	Common
26.	Danaidae	<i>Danaus chryssipus</i>	1700 m	Common

Annex 6

Birds

S.N.	Scientific Name	Common Name	Altitude	Local Status
1.	<i>Dendrocitta formosae</i>	Himalayan Tree Pie	2600 m	Uncommon
2.	<i>Milvus migrans</i>	Black Kite	3800 m	Common
3.	<i>Garrulax lineatus</i>	Streaked Laughing Thrush	3500 m	Uncommon
4.	<i>Lanius tephronotus</i>	Gray Backed Shrike	3200 m	Rare
5.	<i>Acridotheres tristis</i>	Common Myna	2200 m	Common
6.	<i>Cuculus sparverioides</i>	Large Hawk Cuckoo	2450 m	Common
7.	<i>Cuculus saturatus</i>	Himalayan Cuckoo	3000 m	Common
8.	<i>Pnoepyga albiventer</i>	Scaly Breasted Wren Babbler	3500 m	Moderately common
9.	<i>Gyps himalayansis</i>	Himalayn Griffon	3900 m	Rare
10.	<i>Garrulus glandarius</i>	Eurasian Jay	2200 m	Common
11.	<i>Pyrrhocorax graculus</i>	Yellow Billed Chough	3950 m	Common
12.	<i>Motacilla caspica</i>	Yellow Wagtail	2800 m	Rare
13.	<i>Motacilla alba</i>	Pied Wagtail	2600 m	Common
14.	<i>Alectoris graeca</i>	Chuckor Partridge	3200 m	Uncommon
15.	<i>Ithaginis cruentus</i>	Blood Pheasant	4000 m	Uncommon
16.	<i>Tragopan satyra</i>	Monal Pheasant	3000 m	Rare
17.	<i>Heterophasia capistrata</i>	Black Capped Sibia	2869 m	Uncommon
18.	<i>Phylloscopus inornatus</i>	Plain Leaf Warbler	2400 m	Common
19.	<i>Seicercus burkii</i>	Yellow Eyed Warbler	2200-3200 m	Common
20.	<i>Parus dichrous</i>	Crested Brown Tit	3500 m	Common
21.	<i>Carpodacus pulcherrimus</i>	Common Rose Finch	3500 m	Common
22.	<i>Carpodacus erythrinus</i>	Beautiful Rose Finch	3800 m	Common

Annex 7

Mammals

S.N.	nSScientific Name	Common Name	Altitude	Status
1.	<i>Macaca assamensis</i>	Assamese Monkey	2700 m	Rare
2.	<i>Macaca mulatta</i>	Rhesus Monkey	2200 m	Common
3.	<i>Presbytis entellus</i>	Langur Monkey	3000 m	Common
4.	<i>Martes flavigula</i>	Yellow Throated Marten	2600 m	Uncommon
5.	<i>Petaurista petaurista</i>	Flying Squirrel	2200 m	Rare
6.	<i>Callosciurus pygerythrus</i>	Himalayan Squirrel	3100 m	Moderately Common
7.	<i>Felis bengalensis</i>	Leopard Cat	2100 m	Rare
8.	<i>Mustela siberica</i>	Himalayan Weasel	3700 m	Rare
9.	<i>Ratus ratus</i>	Field rat	1800 m	Common
10.	<i>Moschus moshiferous</i>	Musk Deer	3900 m	Rare
11.	<i>Hystrix indica</i>	Indian Procupine	1800 m	Common
12.	<i>Panthera pardus</i>	Common Leopard	2200 m	Common
13.	<i>Selenarctos thibetanus</i>	Himalayan Bear	3300 m	Common
14.	<i>Sus scrofa</i>	Wild Boar	1900 m	Common
15.	<i>Ailurus fulgens</i>	Red Panda	2800 m	Uncommon
16.	<i>Talpa micrura</i>	Moles	2440 m	Common
17.	<i>Hemitragus tahr</i>	Himalayan tahr	3050 m	Common
18.	<i>Ochotona roylei</i>	Royale's Pika	2900 m -4000 m	Common
19.	<i>Ochotona macrotis</i>	Large Eared Pika	4000 m	Common
20.	<i>Pguma larvata</i>	Himalayan Civet Cat		

Abbreviation:

Govt. Government

N Nepali

m Metre

T Tamang

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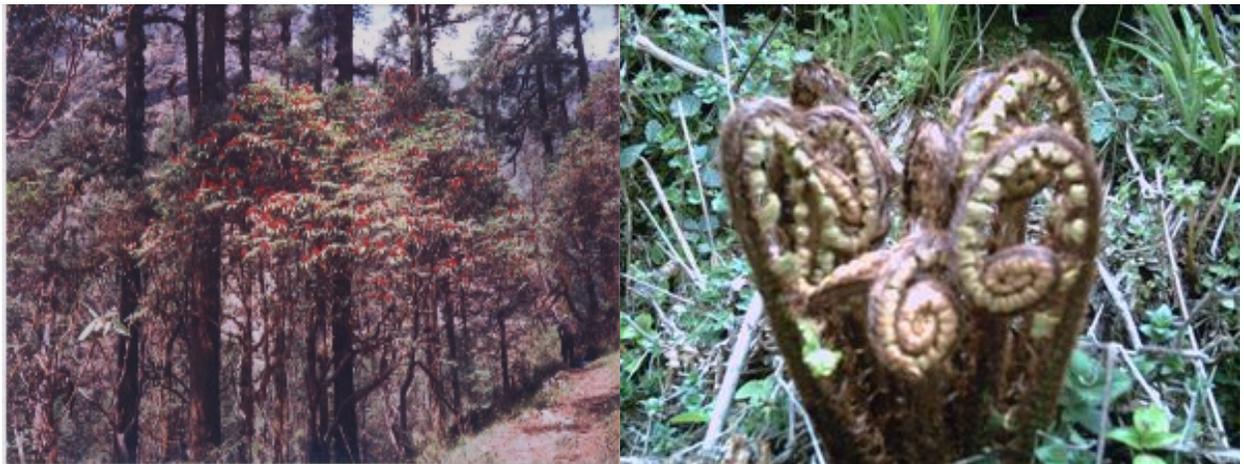
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Left: Berries at Chitre (3000m). Right: High altitude primula flowers at 4000m of Panch Pokhari.



Left: Blooming of Rhododendron flowers. Right: Young fronds of Fern at 3000 m of Chitre.