

Floristic Survey of the Kanchenjunga National Park Area in Sikkim

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Abstract

The Kanchenjunga National Park (KNP) area is quite rich in biodiversity. The richness of the area can be gauged from the fifteen species of Rhododendrons and nine species of Primulas collected during the study in western Sikkim area. Some man-made disturbances such as the deforestation, mountaineering, cattle grazing and traditional medical practices coupled with the fragile nature of the rock-types building the mountain system of KNP are causes of worry.

The Kanchenjunga National Park (KNP) is situated between 27°30'—27°50' N latitude and 88°05'—88°40' E longitude in the state of Sikkim encompassing portions of north and west Sikkim and covering an area of 850 Sq. km. The altitude ranges from 1,829 m to 8,582 m amsl. (1). So far no serious botanical survey or studies has been done involving this region after Hooker (2). This area has been notified as a National Park on 26 August, 1977 and named after the highest peak within its boundary, that is Kanchanjunga (3). The present study was undertaken between 7 and 17 May, 1995. The whole of KNP could not be surveyed due to inaccessibility and logistic reasons. Nevertheless, the present study could be taken as a sample survey so as to understand the ecological significance of the region. For the floristic survey the team had to trek throughout from an altitude of about 1,829 m (Yoksum) to 5,029 m (Dudh Pokhri).

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Geology

The rocks of the KNP region are much folded and faulted and young as their sharp rise proclaims. The rocks are mainly Sikkim-Gneiss and Dahlings which are relatively softer. In the upper reaches Quartzite formation are not uncommon (4). Being a part of the Himalayan which are subjected to tectonic movements in the recent past the natural formation of these hills are unstable. This has a direct impact on the ecology of this region.

Vegetation

The climate of KNP region is peculiar in having tripple extremities that is, extremely high rainfall (380—550 mm) in its lower and middle reaches during the monsoon, high relative humidity throughout and one of the highest snow-fall in the world in its upper reaches (5, 6). Such climatic conditions make it suitable for the growth of different forest

Table 1. Trees of the temperate broad-leaved forest in the lower zone of KNP—their botanical names, vernacular names in Nepali and families.

Botanical name	Vernacular Name (in Nepali)	Family
<i>Alnus nepalensis</i>	Uttis	Betulaceae
<i>Betula cylindrostachys</i>	Saur	Betulaceae
<i>Beilschmiedia sikkimensis</i>	Tarsing	Lauraceae
<i>Brassatopsis mitis</i>	Phutta	Araliaceae
<i>Bucklandia populnea</i>	Peeples	Hamamelidaceae
<i>Castanopsis indica</i>	Kathus	Fagaceae
<i>Castanopsis hystrix</i>	Jat-kattus	Fagaceae
<i>Castanopsis tribuloides</i>	Murray Kattus	Fagaceae
<i>Cinnamomum obtusifolium</i>	Malaygiri	Lauraceae
<i>Daphniphyllum himalayense</i>	Lal chandan	Euphorbiaceae
<i>Elaeocarpus sikkimensis</i>	Bhodrasay	Elaeocarpaceae
<i>Erythrina arboreseens</i>	Phaledo	Papilionaceae
<i>Echinocarpus dasyarpus</i>	Gobray	Elaeocarpaceae
<i>Evodia fraxinifolia</i>	Khanakpa	Rutaceae
<i>Ficus roxburghii</i>	Newara	Moraceae
<i>Litsaea citrata</i>	Siltimbur	Lauraceae
<i>Leucoseptum canum</i>	Ghurpees	Lamiaceae
<i>Macaranga pustulata</i>	Malata	Euphorbiaceae
<i>Michalia cathartii</i>	Teetay champ	Magnoliaceae
<i>Michalia excelsa</i>	Mithay champ	Magnoliaceae
<i>Machilus edulis</i>	Kaulo	Lauraceae
<i>Magnolia cambellii</i>	Ghogay champ	Magnoliaceae
<i>Oroxylon indicum</i>	Totola	Bignoniaceae
<i>Pentapanax leschenaultii</i>	Chinday	Araliaceae
<i>Prunus nepaulensis</i>	Arupatay	Rosaceae
<i>Quercus lamellosa</i>	Bajranth	Fagaceae
<i>Quercus lineata</i>	Phalant	Fagaceae
<i>Quercus pachyphylla</i>	Sunghray-kattus	Fagaceae
<i>Rhus semialata</i>	Bhakimlo	Anacardiaceae
<i>Saunauria nepalensis</i>	Gegoon	Saurauaceae
<i>Spondias axillaris</i>	Lapsee	Anacardiaceae
<i>Schinus wallichii</i>	Chilaungy	Theaceae
<i>Toona ciliata</i>	Toonee	Meliaceae

types starting from the temperate broad-leaved forest in the lower reaches to the mixed-coniferous forest in the middle and the alpine shrubs in its uppermost regions. For the convenience of present study the vegetation zone of KNP has been divided into three zones the lower zone between 1,829—2,743 m; the middle zone between 2,743—3,962 m; and the

upper zone beyond 3,962 m.

The broad leaved varieties of forest trees which are important both ecologically and economically are found in the lower reaches of KNP (7) with *Quercus* and *Castanopsis* being the most dominant species (Table 1).

Mixed-coniferous forest was observed in the middle zone of KNP. In addition to the

different varieties of shrubs it was enriched with different species of *Rhododendrons*, *Quercus*, and *Castanopsis*. The coniferous trees in this zone was represented by *Abies webbiana*, *Cedrus deodara*, *Picea spinulosa*, *Larix griffithiana*, *Pinus roxburghii*, *Salix sikkimensis*, and *Tsuga dumosa* (8).

In addition to these coniferous trees the middle zone of the KNP is found to contain 11 species of *Rhododendron* (Table 2) of the total of 36 species found in Sikkim (9). For many kilometers the path runs through the woods of *Rhododendron arboreum*, *R. cinnabarium*, *R. falconeri*, *R. barbatum*, *R. campanulatum* and *R. hodgsonii* (8).

Upto an altitude of 3,000 m the species of *R. arboreum*, *R. dalhousie*, *R. cinnabarium*, *R. barbatum*, *R. falconeri*, *R. hodgsonii*, *R. grande* were found to be abundant (9). Above the region of trees is a dense low growth of *Rhododendron campanulatum*, the unfolding leaves of which color the landscape with dark glaucous tint (8).

A myriad of species of shrubs, herbs, and climbers were also found in the areas between Yohsum and Thangsing comprising the lower and middle zone of KNP (Table 3).

Alpine-Vegetation

Upwards of 3,962 m amsl the vegetation is mainly dominated by the dwarf varieties of *Rhododendrons* and *Juniperus* species. Vegetation of this zone consists of least species diversity. In addition to *Salix sikkimensis* the vegetation of this region consists of the following stunted trees/shrubs :

<i>Rhododendron anthopogon</i>	<i>Juniperus communis</i>
<i>R. veccinoides</i>	<i>J. squamata</i>
<i>R. ciliatum</i>	<i>J. recurva</i> and
<i>R. nivale</i>	<i>J. indica</i>

Of these, *Rhododendron nivale* was found to be rare and collected only from one location abo-

Table 2. *Rhododendron* species found in the middle zone (2,743—3,962 m) of KNP during, May, 7—17, 1995, with their flower color and local names.

Species	Color of flower	Local name
<i>R. arboreum</i>	Blood-red	Lali-gurans
<i>R. barbatum</i>	Red	Lal-chimal
<i>R. campanulatum</i>	Rose-purple	Nilo-chimal
<i>R. campylocarpum</i>	Sulpher-yellow	Bango-hale gurans
<i>R. cinnabarium</i>	Orange-red	Sano-chimal
<i>R. dalhousie</i>	Creamy-white	Lahare-chimal
<i>R. falconeri</i>	Creamy-white	Korlinga
<i>R. hodgsonii</i>	Rose-purple	Gulabi-korlinga
<i>R. grande</i>	Creamy-white	Patlay-korlinga
<i>R. thomsonii</i>	Orange-red	Doctor Thom-soko Gurans
<i>R. triflorum</i>	Yellow	Phenlay-chimal

ve Dudhpokhri (5,029 m approximately).

The alpine vegetation is also the abode of a rich flora of Primulas. During the survey nine species of Primulas were collected (10).

These are as follows :

<i>Primula macrophylla</i>	<i>P. calderana</i>
<i>P. sikkimensis</i>	<i>P. reticulata</i>
<i>P. reptans</i>	<i>P. denticulata</i>
<i>P. rotundifolia</i>	<i>P. stuartii</i>
<i>P. irregularis</i>	

Conclusion

The KNP being a component of one of the biodiversity hot-spots in India contains a rich gene-pool. Lacking any proper studies its resources largely remains untapped and undocumented. It is highly undesirable to let the unique vegetation become extinct specially when the Himalayan region contains a high percentage of endemic flora (11). Without making any provisions for preserving the germplasm, human induced developments are going to jeopardize the natural flora. For the conservation of biodiversity the following me-

Table 3. Shrubs (S), herbs (H), climbers (C) found in the lower and middle zone of KNP between 1,829—3,962 m during May 7—17, 1996.

Species	Type	Species	Type
<i>Adhatoda vasika</i>	S	<i>Meconopsis simlicifolia</i>	H
<i>Artemisia vulgaris</i>	S	<i>Myricaria rosea</i>	H
<i>Arisaema</i> sp.	H	<i>Nardostachys jatamansi</i>	H
<i>Aeschynanthus sikkimensis</i>	H	<i>Osbeckia stellata</i>	S
<i>Anaphales triplinervis</i>	H	<i>Picrorhiza kurroa</i>	H
<i>Aconitum ferox</i>	H	<i>Parthenocissus himalayana</i>	C
<i>Aconitum heterophyllum</i>	H	<i>Polygonum molle</i>	H
<i>Astilbe rivularis</i>	S	<i>Potentilla fulgens</i>	H
<i>Berberis angulosa</i>	S	<i>Potentilla microphylla</i>	H
<i>Berberis wallichiana</i>	S	<i>Potentilla coriandrifolia</i>	H
<i>Bergenia ligulata</i>	H	<i>Potentilla pendunculata</i>	H
<i>Clematis</i> sp.	C	<i>Rubus acuminatus</i>	S
<i>Daphne cannabina</i>	S	<i>Rubus ellipticus</i>	S
<i>Drymaria cordata</i>	H	<i>Rubia cordifolia</i>	C
<i>Eupatorium cannabinum</i>	H	<i>Rubia manjith</i>	C
<i>Fragaria rubicola</i>	H	<i>Rheum nobile</i>	H
<i>Gerardiana palmata</i>	H	<i>Silene setisperma</i>	H
<i>Gnaphalium</i> sp.	H	<i>Thysanolaena maxima</i>	H
<i>Lindenbergia</i> sp.	H	<i>Taraxacum officinale</i>	H
<i>Meconopsis horridula</i>	H	<i>Viburnum</i> sp.	S
<i>Meconopsis simlicifolia</i>	H		

asures could be implemented. In-situ conservation: conserving the biodiversity in typical ecosystem areas ensuring maximum safeguard of the niche. Ex-situ conservation: as seed or in-vitro cell-line stored in gene-banks ensuring long term preservation; obviously it will involve survey, collection, storing, evaluation and finally selecting the right genetic traits for breeding. The gene-bank or germplasm collection (seed, clonal or tissue-culture) may not however fulfil the same objectives as can be met through habitat conservation (12).

One of the most destructive activity in the KNP area is the grazing of animals. Numbers of yaks that grazed in this region upto 5,182 m and cattle grazed upto 3,962 m (4). During the survey, permanent goths (cow-sheds) for yaks was found at Zongri (4,023 m), the smallest of which contained ninety yaks. Zongri

is a natural habitat of precious medicinal plants like *Orchis*, *Picrorhiza*, *Nardostachys*, and *Aconitum* which has been completely destroyed by yak-grazing.

Recently with the popularity of Tibetan medicine (13) the practitioners of this system of medicine have multiplied and even new institutes has been opened to teach this practice (14). The Tibetan ethnic medical system largely depends on the plants found on the higher altitudes of the Himalaya. It is of importance to ensure that these institutes have their own herbal garden.

The fragile ecology of KNP requires urgent care and sensitive handling. A systematic approach of documentation, conservation and replenishment of endangered flora of KNP is called for. It is vital to anticipate, prevent and attack the causes of significant reduction

or loss of biological diversity at source (15—17).

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