

D 1013

ACC. NO. 102+

MFN 587



WWF Nepal Program

Report Series, # 14

Report on the Flora and Fauna of the Kanchenjunga Region

Chris Carpenter (Ph.D.)
Ken Bauer, WWF Nepal Program
Ramesh Nepal (M.Sc.)

Wildlands Study Program, San Francisco State University

Spring 1994 5

This paper was written by Chris Carpenter, Ken Bauer, and Rainesh Nepal for WWF Nepal Program. The opinions expressed in this publication are those of the authors and do not necessarily reflect those of WWF. Any inaccuracies in the paper remain the responsibility of the authors.

Edited by Ken Bauer

Published in September 1995 by WWF Nepal Program
Gha 2-332, Lal Durbar, PO Box 7660, Kathmandu-2, Nepal.
Any reproduction in full or in part of this publication must mention the title and credit
the above-mentioned publisher as the copyright owner.

PREFACE

The World Wildlife Fund Nepal Program is pleased to present this series of research reports. Though WWF has been active in Nepal since 1967, there has been a gap in the public's knowledge of WWF's works. These reports help bridge that gap by offering the conservation community access to works funded and/or executed by WWF.

The report series attests to the diversity and complexity of the conservation challenges facing Nepal. Some reports feature scientific research that will enable ecologically sound conservation management of protected areas and endangered species. Other reports represent research in areas that are relatively less known or studied (e.g. the proposed Kanchenjunga Conservation Area or the impact of pesticides in Nepal).

The Wildlands Studies Program, San Francisco State University, has conducted ecological surveys of vegetation and wildlife in eastern Nepal for the past 5 years. These reports detail the community structure of forests and alpine zones in the Kanchenjunga area. Tree, wildlife, and bird species observed are given with altitudinal and habitat distribution. The report includes a description of the group's trail, including natural history highlights, and results of a community survey. The report augments WWF's feasibility study of the proposed Kanchenjunga Conservation Area by providing up-to-date data on this unique and under-studied ecosystem.

WWF thanks the Wildlands Studies Program, Dr. Chris Carpenter and his students for their contributions. WWF welcomes feedback from peers and organizations on this report series.

Mingma Norbu Sherpa
Country Representative
WWF Nepal Program
Kathmandu, Nepal

Acknowledgements

We wish to thank the many individuals whose efforts helped to make the Wildlands Studies Program for spring 1995 successful. Special thanks are in order to Divendra Amatya, Conservation Program Director, WWF Nepal Program and Dr. Nanda P. Joshi, Makalu-Barun Scientific Research Committee for their invaluable advice and support. Robert Zomer's contribution to the teaching and fieldwork and the program was greatly appreciated by all members of the team. We are also very grateful as ever to Laxmi Dewan, Som Poudrel and the staff of Nilgiri Trekking and Mountaineering for making our journey into the Kangchenjunga region smooth, safe and comfortable. We wish to thank as well the many local people who provided advice, information and logistical support during our time in the field.

Team Members

Student Participants:

Gabrielle Antoniades	Meghan McKnight
Yasuko Baba	Diana Popek
Biba Bell	Aaron Roblan
Steve DeBois	Liz Rumsey
Ben Harder	Anthony Shenoda
Nikki Jardin	Steve Slauson
Liz Larson	

Research Assistants from Tribhuvan University, Nepal

Aseshwar Prasad Mahto
Ramesh Nepal

Teaching Assistant

Ford Balantyne

WWF Nepal Representative

Ken Bauer

Wildlands Studies Instructors

Chris Carpenter
Robert Zomer

Nilgiri Trekking and Mountaineering Staff

Laxmi Dewan	- Sirdar/Botanical Consultant
Ratna Magar	- Head Cook
Deepak Gurung	- Guide/Translator/Cultural Liaison
Bonar Singh	- Guide/Translator/Assistant Botanist
Anil Rai	- Guide

Report on the Ecology of the Kangchenjunga Region of Eastern Nepal

Wildlands Studies Program, Spring 1995

Chris Carpenter (Ph.D.)¹, Ramesh Nepal², Ken Bauer³

I. Introduction

During April 13 to May 19, 1995 the Wildlands Studies Program (San Francisco State University, Extended Education) organized an ecological study and research expedition to the Kangchenjunga Region of Eastern Nepal (Sankuwasba and Taplejung Districts). Our team consisted of 13 students from various universities in America, two M.S. candidates in Botany and Wildlife Management from Tribhuvan University in Kathmandu, a teaching assistant from the University of Wisconsin Academic Year in Nepal, a representative of World Wildlife Fund, Nepal, two instructors from San Francisco State University and the staff of Nilgiri Trekking and Mountaineering.

This was Wildlands Studies' second excursion into the Kangchenjunga region. During the fall 1994, team members crossed the Milke Danda and visited the Tamur River Valley and Gansa Khola *en route* to the Kangchenjunga North Base Camp. This season, we visited the Kabeli and Simbuwa Kholas, *en route* to the South Base Camp, as well as some very interesting areas along Deorali Danda and the Valley of the Sambewa Khola. We also returned to the Tamur River Valley and crossed the Milke Danda. The journey began in Basantapur, finished in Tumlingtar, and required 27 days' walking. We also had the opportunity to devote 11 full days to data collection.

Primary projects included a vegetation survey of the region in which trees were measured in 20 by 20 m forest plots in a variety of bioclimatic zones, a survey of epiphyte vegetation and a study of birds. Bird data collected during the spring was compared to data collected in the same region last fall in an effort to acquire some information about local migration patterns. Other projects included a sociological profile of the region with information about wildlife depredation of crops and livestock and a list of rhododendron species seen in this area.

The present report includes contributions by Chris Carpenter, Ramesh Nepal and Ken Bauer. Chris Carpenter provides a brief analysis of the bird survey results, a description of tree species distribution and forest ecology in three ecologically significant locations and a summary of the distribution patterns of 13 rhododendron species we observed in the area. Ramesh Nepal discusses socio-economic issues important to the management of the proposed conservation area and summarizes the group's sightings of mammal species. Ken Bauer has provided a route description with information about campsites, local services and natural history highlights that will be useful to groups planning future excursions into this region. Also included is an

appendix that includes comprehensive lists of birds recorded during the fall 1994 and spring 1995, and tree species which appeared in our forest plots during the spring 1995 study.

II. Bird Surveys

A. Methods

Bird Survey Data was collected in both a dedicated and opportunistic manner. On days devoted to field work, team members would observe birds in a systematic way; while walking along the trail, all observations (by sight or recognizable call) were recorded as well. If a bird "feeding wave" was encountered, observers would pause to record the species present.

The format for bird surveys was to acquire serial lists of 10 species using a method developed by MacKinnon (1981). After recording 10 different species within a single bioclimatic zone (Dobremez and Shakya, 1975) a new list was begun. Thus a single species can appear only once on a single list, but may re-occur on each of several lists. This method provides information about patterns of abundance as well as species richness and thus provides a better estimate of species diversity than simply enumerating the species observed. By plotting the rate at which new species are added as a function of total number of lists acquired, it is possible to estimate the total species richness within the sample area. In this study, sampling was stratified according to bioclimatic zones, with independent series of lists acquired in the tropical (to 1000 masl), subtropical (1000-2000 masl), lower temperate (2000-2600 masl), upper temperate (2600-3200 masl), subalpine (32-4000 masl), and alpine (above 4000 masl).

B. Bird Distribution Patterns: Fall 1994 and Spring 1995

Serial lists of 10 bird species observed in each of six different bioclimatic zones (Dobremez and Shakya, 1975) provide information concerning relative species richness, adjusted for the intensity of sampling performed in each zone (MacKinnon, 1981). Figure 1 shows that during the spring, a remarkable congruence exists among the number of bird species at different elevations ranging from the tropical (to 1000 masl) to the subalpine (3200 to 4000 masl) zones. Only in the alpine zone (above 4000 masl) does the rate of species acquisition with sampling intensity abate significantly. This pattern is in contrast to distribution patterns seen during the fall when a higher proportion of bird species are found at lower elevations, very few lists are compiled from the subalpine zone and no lists are available from the alpine zone. In fact, direct evidence for vertical migration can be seen in Table 1. Here, 11 of 52 bird species (21%) whose distributional data is extensive enough to permit statistical comparison (Mann-Whitney Rank Test or Student's T-Test) show a significant drop in elevation between the fall and the spring nesting season. One possibility to explain the even distribution of bird species across a wide range of elevations is that the number of nesting sites available at a particular elevation depends on a feature of the ecosystem which does not change very much with elevation, at least during the spring. Such a feature may be forest architecture. If this is of principle importance, then one might expect an even distribution of species at a variety of elevations to minimize competition

Figure 1: Bird Species Accumulation Curves for Fall 1994 and Spring 1995

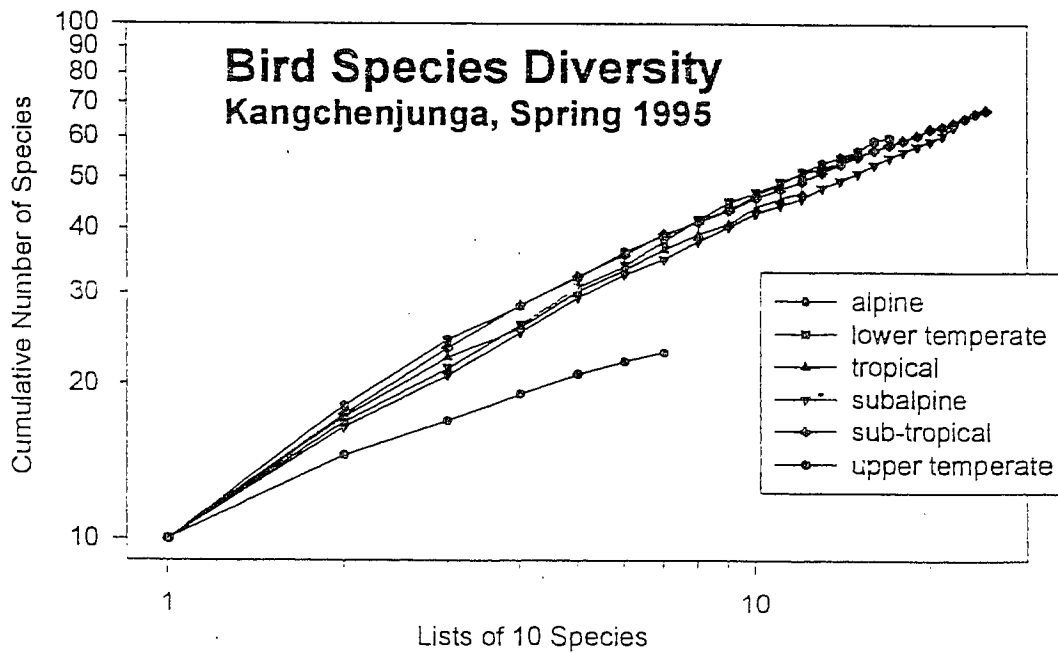
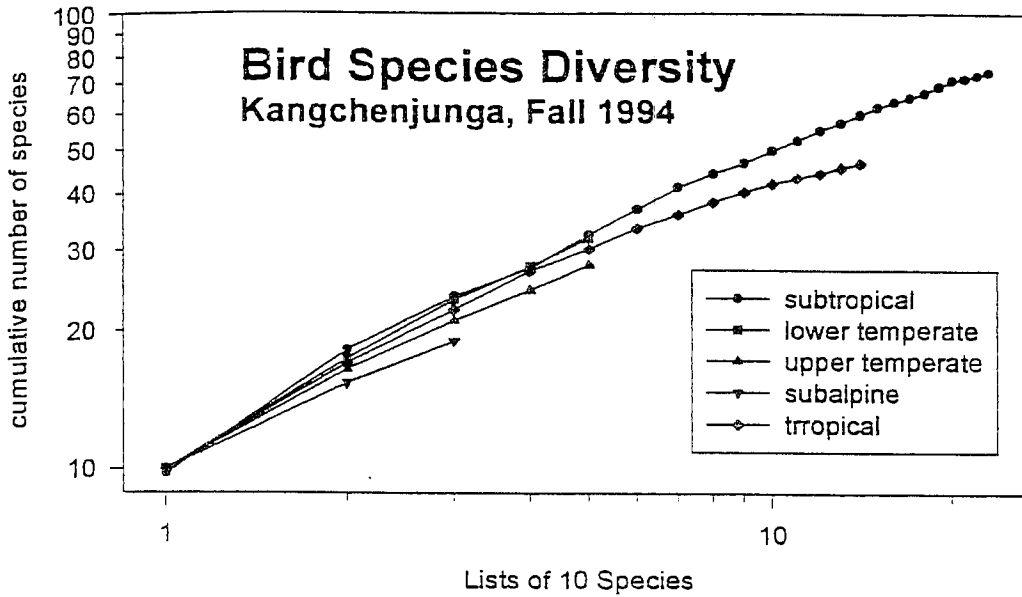


Figure 1. Serial lists of birds observed during spring and fall show that a greater proportion of total species are found at lower elevations during the fall. During the spring, species are more evenly distributed across a broader range of bioclimatic zones, except for the alpine zone.

for resources. During the fall season, cold and limited food availability force populations of a greater number of species into a narrower, lower range of elevations.

Preliminary analysis of vertical migration patterns suggests a few trends. Small, insectivorous(?) passerines such as Yellow-bellied Fantail, Orange-gorgetted Flycatcher, Grey Tit, Grey-headed Flycatcher and Grey-headed Warbler are among those species most likely to migrate downward during the fall season. Three of four riparian species (White-capped River chat, Blue Whistling Thrush and Little Forktail) also migrate vertically. Those riparian species which do not show significant vertical migration are those found at low elevations during the spring and those which visit Nepal as winter migrants and are not present in the spring. Curiously two species, Scarlet Minivet and Tickell's Leaf Warbler were weakly, but significantly, higher during the fall compare to the spring season.

Table 1. Bird species with significant altitudinal differences in distribution between fall 1994 and spring 1995

Species	Fall 94		Spring 95	
	x100 ft		x100 ft	
	(mean)	(sd)	(mean)	(sd)
Grey Tit	32.0	9.0	69.3	19.6
OGFC	69.3	18.8	95.7	10.0
YB Fantail	31.8	9.6	91.6	11.3
Grey-headed FC	28.3	14.5	67.3	17.2
Grey-headed Warbler	36.0	7.4	81.0	10.3
Tickells' LW	97.3	12.7	60.7	16.8
WCRC	38.3	22.9	100.3	27.2
Blue Whistling Thrush	39.3	15.7	61.2	29.1
Scarlet Minivet	41.5	7.3	31.3	7.3
White-crested LT	29.0	15.8	55.3	10.9
Beautiful Niltava	32.3	14.5	80.5	1.5
Little Forktail	33.9	11.4	94.0	1.0
Snow Pigeon	92.3	12.5	142.7	10.6

Table 1

These bird species show a significant difference between their fall 1994 and spring 1995 altitudinal distributions. Out of 180 species recorded during the fall or spring, 51 species were sampled enough for statistical comparison. Of these 2 species, Scarlet Minivet and Tickell's Leaf Warbler, were slightly higher in the fall. The remainder were lower in the fall.

III. Forest Community Structure

A. Methods

Data was collected in 20 by 20 m plots that we established in representative forest stands in a variety of bioclimatic zones. With a single plot, both physical and biological characteristics were recorded. Physical characteristics include location (measured with a Garmin GPS 50 global positioning system), altitude (measured with a Thommen Altimeter), slope (measured with a clinometer) aspect (measured with a compass) and a brief description of soil condition. Biological characteristics include a brief description of ground cover and the kind and degree of human impact as well as a record of all trees greater than 10 cm diameter at breast height (dbh). These records include diameter and species. In all, we gathered data from 38 plots in 9 different locations between the Milke Danda and timberline in the Simbuwa Khola below the South Kangchenjunga Basecamp.

Due to a shortage of time, a detailed analysis of the results of the forest plots has not yet been completed. Here in the appendix we provide a summary of the tree species recorded, their elevation range and the drainages in which they were seen. We also provide a description of the general forest ecology in three ecologically significant locations, the Simbuwa Khola draining the south side of Kangchenjunga, Dupi Danda Ridge above Yamphudin and the Sambewa Khola above Hellok. This description is based on a non-quantitative investigation of stand condition and species composition in forests seen along the trekking route.

B. Simbuwa River Valley

The Simbuwa Khola is the principle drainage from the southern slopes of the Kangchenjunga mountain system. From its origins at the terminus of the Yalung Glacier (4300masl), it flows W.SW. to join the Tamur River below the Village of Hellok at approximately 1600 masl. We followed the Simbuwa Khola along its upper reaches from the Torondon Campsite at 2840 masl to the Yalung Glacier and as we traveled through the river valley, we were able to study the ecological transition of forest types from upper temperate to alpine. After having studied this transition in several other high drainages of Eastern Nepal such as the Isuwa and Barun Rivers in the Makalu - Barun National Park and Conservation Area and the Gunsa River in the proposed Kangchenjunga Conservation Area, it was interesting to note some patterns common to the other valleys and some patterns unique to the Simbuwa Khola. The overall impression is that the Simbuwa River Valley is surprisingly different floristically from the Gunsa Valley to the north.

Forests at the upper elevations of the Simbuwa River Valley are characterized by a three-story architecture. Large, emergent conifers grow through a layer of deciduous broad leaf trees which in turn overgrow a dense lower story of tangled rhododendron trees or large shrubs. The rhododendron, which are evergreen, sometimes co-occur with deciduous woody shrubs. Or the rhododendron may be so large that they are better classified as members of the middle story. Aspect is ecologically significant in this area, with floristic differences among north and south-facing slopes increasing as one gains elevation in the region from 2840 masl to altitudinal timberline at 4000 masl.

Among the upper story, *Tsuga dumosa* (Himalayan hemlock) forms single species stands to a maximum elevation of about 2930 masl where it is replaced by *Abies spectabilis* (silver fir). Between 2870 and 2990 masl, hemlock and fir form ecotonal mixed stands, but at 3,050 masl hemlock has been entirely replaced by silver fir. In the ecotone, dense stands of young fir saplings are often seen colonizing disturbed slopes while the frequency of hemlock regeneration appears to be significantly lower. It may be that here fir has a higher fecundity and is well adapted to colonizing disturbed places (unpredictable in space and time) while hemlock establishes relatively fewer seedlings in locations where individual plants have a higher probability of survival and reproduction. This theory helps to explain why young fir are more abundant and mature fir less abundant than hemlock and is consistent with the observation that a disproportionate number of young fir are to be found in disturbed sites. Hemlock is a very large tree, the most massive in Eastern Nepal, and mature individuals commonly attain a diameter at breast height greater than 2m and a height in excess of 50m. Silver fir are somewhat smaller, commonly exceeding 1m dbh, but seldom exceeding 2m.

At the hemlock-dominated middle elevations, the middle, deciduous tree layer is dominated by *Acer ?campbellii* (maple) with *Viburnum nervosum*, *Mussaenda frondosa* and *Betula utilis* as minor associates. Here some evergreen taxa such as rhododendron (*R. falconeri*, *R. arboreum*) and *Symplocos theifolia* also grow up into the middle layer while the lower woody shrub layer is comprised of *Juniperus recurva* (growing in shrub form) *R. barbatum*, *Rubus sp.*, *Daphne ?paperyca*, and *malingo* bamboo.

By 3,150 masl, the replacement of hemlock by fir is complete and temperate elements such as *Symplocos theifolia* and *R. arboreum* have disappeared from the lower and middle stories while *Acer campbellii* and *Betula utilis* have become relatively more frequent. Other species of rhododendron such as the sub-alpine *R. barbatum*, *R. thomsonii* and *R. hodgsonii* are important in the lower stories here. Disturbed sites may be occupied by dense clumps of *malingo* bamboo or young fir.

From approximately 3140 to 3500 masl, forests of all aspect are composed of emergent fir trees growing through a closed canopy of deciduous *Betula utilis*. On north-facing slopes, dense thickets of *R. hodgsonii* grow among the birch as large shrubs and small trees. On south-facing slopes, however, this important forest component is absent. Instead, *R. barbatum* grows with other woody shrub species such as *J. recurva*, *Rosa sp.*, *Berberis sp.* and *Salix sp.* The tendency for *R. hodgsonii* to occur mainly on south facing slopes has also been noted in the sub alpine elevations of the Barun River Valley in the Makalu region across the Arun River to the west. Throughout these sub alpine elevations (3200 to 4000 masl), foliose lichen (*Usnea sp.*) is abundant, and highly visible.

At 3480 masl, fir forms dense stands on south-facing slopes with *Acer ?campbellii* and *Betula utilis* dominating the middle story over diverse assemblage of woody shrubs such as *Rosa sp.*, *R. thomsonii*, *R. barbatum*, *J. recurva*, *Salix sp.*, *R. hodgsonii*, *R. lepidotum*. North-facing exposures appear less diverse. Here the middle story, dominated by *R. hodgsonii* and *Betula utilis*, is most well-developed with fewer large fir and fewer woody shrubs.

Above 3,500 masl, arboreal *Juniperus recurva* begins to replace fir on south-facing slopes. This species, which grows in shrub form at lower elevations, attains a maximum girth greater than 60 cm dbh. At 3500 to 3660 masl, arboreal juniper may grow together with fir or *Betula utilis* over a lower story of *Rosa sp.* and *R. campylocarpum*. But closer to altitudinal timberline, juniper tends to form on south-facing slopes nearly monospecific stands with very few other woody species. Juniper here shows slow growth with ~20 years required for radial increase of 1 cm, according to growth-ring counts. At these same elevations, north-facing slopes are floristically similar to forest stands seen at lower elevations with dominant fir growing through a dense lower story of *R. hodgsonii* and *Betula utilis* approximately 6 to 8m high. *Juniperus recurva* appears to be virtually absent from the north-facing slopes.

Larix griffithiana (larch) is common in the valley of the Gunsu Khola to the north of Kangchenjunga and extends eastward towards Sikkim, Bhutan and SW China but is otherwise very rare in Nepal. In the Simbuwa River Valley a few *Larix griffithiana* occur on north-facing slopes, at the edge of a landslide and atop ridge flanking the left bank of the Simbuwa Khola at 3540 masl.

In summary, the Simbuwa River Valley possesses superb examples of three upper elevation coniferous forest types found in Eastern Nepal. Hemlock (*Tsuga dumosa*) forests are widespread between 2590 and 3050 masl both along the river and a considerable distance up the sides of the valley. At higher elevations (3050 to 3500 masl), fir (*Abies spectabilis*) is dominant. Throughout both of these forest types, broadleaf trees form a middle story. The most frequent species are maple (*Acer campbellii*) and birch (*Betula utilis*) with associates *Rhododendron arboreum*, *Symplocos* and *Mussaenda* at the lower elevations and *R. hodgsonii* at the upper elevations. A lower story composed of various rhododendron species, *Rosa*, *Salix*, *Berberis* and *Juniperus recurva* (shrub form) occurs in many locations. These same woody shrubs are often seen colonizing the margins of cleared areas as well. At the highest timbered elevations (3500 to 3960 masl) a moist sub-alpine scrub of birch, rhododendron (*R. hodgsonii*, *R. campanulatum*) occurs with fir on north-facing slopes while south-facing slopes are often covered in monospecific stands of arboreal *Juniperus recurva*.

C. Dupi Danda Karka:

The most diverse forest stands encountered in the Kangchenjunga region occur at 2480 masl along Dupi Danda, the saddle that connects Yamphudin with the Omje Khola. In one (20m)² plot of northern aspect, we identified eleven species of tree with diameter at breast height greater than 10 cm. This ecotonal stand included lower temperate tree species such as *Daphniphyllum himalayense*, *Populus ciliata*, *Alnus nepalensis*, *Juglans regia* and *Symplocos dryophylla* as well as upper temperate species such as *Magnolia campbellii*, *Acer pectinatum*, *Prunus ?nepalensis*, *Lyonia ovalifolia*, *Acer pectinatum* and *Mussaenda frondosa*. An adjacent (20m)² stand contained seven species, including two members of the laurel family – *Lindera pulcherrima* and *Litsea salicifolia* – not seen in the first stand.

D. Sambewa River Valley:

The Sambewa Khola flows northward, draining the north side of Deorali Danda before dropping steeply to join the Tamur River near the village of Hellok, just below the confluence of the Simbuwa and Tamur Rivers. In its upper reaches, the Sambewa Khola flows at a relatively gentle gradient, creating a broad valley that contains an excellent example of upper temperate and sub alpine forest types. Along the Deorali Danda at 3,310 masl, sub alpine elements include fir (*Abies spectabilis*), *Sorbus cuspidata* and several species of *Rhododendron* (*R. barbatum*, *R. hodgsonii*, *R. campanulatum* and *R. lindleyi*). 365 m lower, *R. falconeri*, *R. arboreum* co-occur with the same tree species near the lower edge of the sub alpine forest zone.

Descending to 2870 masl, the valley begins to open, with thick forest on the slopes consisting of fir near the lower limit of its range together with upper temperate deciduous taxa such as *Acer* (*A. pectinatum*, *A. sterculiaceum* and *A. campbellii*), *Viburnum nervosum* and several uncommon trees of the araliaceae (ivy) family such as *Gamblea ciliata*, *Schefflera impressa* and *Merriliopanax alpinus*. It was most interesting to observe three species of *Acer* (maple) growing together in the same location. By 2740 masl, hemlock has completely replaced fir and hemlock persists as a dominant forest tree to the edge of the valley above Hellok nearly 300 meters lower. Other important tree species in Sambewa Valley at 2740 m include *Rhododendron arboreum*, *Coelus ?ferox*, *Betula utilis*, *Acer sterculiaceum*, *A. campbellii*, *Magnolia campbellii*, and the smaller trees, *Mussaenda frondosa* and *Symplocos theifolia*. At 2680 masl we observed an atypically low-elevation stand of fir (*Abies spectabilis*) and birch *Betula utilis* (birch). By 2530 masl, the forest has acquired some lauraceous, lower temperate taxa such as *Litsea salicifolia* intermingled with trees typical of the upper temperate and sub-alpine zones such as *Sorbus cuspidata*, *Viburnum nervosum*, *Acer sp.*, *Magnolia campbellii*, *Schefflera impressa* and *Tsuga dumosa* (hemlock). Extensive stands of *malingo* bamboo near the northern rim of the valley above Hellok suggests that fires have occurred here in the recent past. Perhaps fires set on the slopes above Hellok as part of a slash and burn agricultural system have encroached on the northern end of the Sambewa Valley. The overall impression of this drainage, however, is a scenic, nearly pristine forest of late-successional character and high biological diversity. Our brief visit suggested that the large extent and high tree species diversity of forests here provides habitat for many bird species as well.

IV. *Rhododendron* species seen in the Kangchenjunga region

R. anthopogon, common shrub in subalpine and lower alpine zone near terminus of Yalung Glacier and along the lateral moraine which leads to Ramje, 3658 to 4573 masl.

R. arboreum. Tree, abundant in Simbuwa Valley to 3201 masl along and at upper temperate elevations throughout the region. Characteristic large size, large clusters of pink to red flowers, leaves with thin silver or brown indumentum on under surface.

R. barbatum common as a large shrub in understory of fir (*Abies spectabilis*) forests. Red, flaky bark, clusters of crimson blossoms and barb-like hairs on leaf stalks diagnostic.

R. campanulatum, abundant in moist sub-alpine scrub, esp. on n-facing slopes at 3353 -3963 masl in Simbuwa River valley. Leaves with dense, felt-brown indumentum, flowers magenta.

R. campylocarpum, common at 3201 masl in Simbuwa River valley. Leaves, general morphology similar to *R. thomsonii*, flowers yellow.

R. ?cinnabarinum, occasional at 3536 masl. Gray bark, not yet in flower. Also seen along Deorali Danda at Pass between Omje and Simbuwa River valleys.

R. falconeri. Common in Simbuwa River Valley between 2743 and 3048 masl, also seen at similar elevations along Milke Danda between Gupha Pokari and Gorga. Small to medium sized tree with large leaves, large clusters of greenish-white flowers. In fir forest lower story (Simbuwa, Sambewa River valleys) or gregarious on hillsides (Milke Danda).

R. hodgsonii. Large shrub or small tree with distinctive red bark, large leaves, large round clusters of pink flowers. Abundant in middle story of fir forest at 3201 to 3810 masl in Simbuwa Khola and at subalpine elevations along Deorali Danda Ridge, throughout Eastern Nepal fir forest.

R. lindleyi, Terrestrial or more often epiphytic shrub infrequent in upper temperate or subalpine forests of Simbuwa, Sambewa River Valleys. Distinctively paired white blossoms.

R. nivale, seen in the vicinity of Oktang, at highest elevations on lateral moraine of South Kangchenjunga Base camp, above 4725 masl. Small, woody shrub with very small, highly aromatic leaves.

R. ?pumilum. Probably, above 3658 masl. Impossible to confirm because not in flower.

R. setosum. Abundant in alpine zone near Ramje (4420 masl). Low shrub with small aromatic leaves.

R. thomsonii, common at 3201 masl in the Simbuwa River Valley, often together with *R. campylocarpum*, a similar species. Flowers crimson.

Authors' Addresses

¹ Chris Carpenter, Ph.D. Wildlands Studies Program, San Francisco State University, Extended Education. 3 Mosswood Circle, Cazadero, CA 95421. USA

² Ramesh Nepal. PO Box 4817, Kathmandu, Nepal

³ Ken Bauer. WWF Nepal Program. PO Box 7660, Kathmandu, Nepal.

The primary objectives of this report is to summarize available information on the following topics.

- Ethnic group and their occupation.
- Crops, average land size owned by one household, family size and livestock.
- Wild mammals in the region of Kanchanjunga.
- Crop and livestock depredation and action taken to prevent the damage by the wildlife.
- Cheese production.

Ethnic Groups and Occupation

Nine people were interviewed in six different localities and were asked about the topics listed above. All the areas were situated below 10,000 ft in elevation. The six different localities were Gorja, Tendewa, Kande Bhanjyang, Yamphudin, Omje khola and Hellok. In all the areas where interviews were conducted one single ethnic group dominated the population, except in Yamphudin, where a variety of ethnic group co-habitate. In the Kanchanjunga area the limbu who makes up 30% of the population are the most dominant ethnic group. Rai, Sherpa, and Gurung is the second largest ethnic groups, collectively totalling 20% followed by Tamang 5% and other 5%.

The main occupation of the interviewees is farming. In the Kanchanjunga area, the majority of people are engaged in agriculturally based enterprises for their livelihood. Seventy five percent of the people interviewed work on their own land year round. Twenty five percent make their living through animal husbandry. In all the places surveyed, a few people are involved in cardamom supply, cheese supply, opening shop, handicraft and pottering. A porter earns about Nrs 60-70 perday carrying goods from Tumlingtar to the towns in the region.

Agriculture and Household data

The major crops grown in the Kanchanjunga area are wheat, barley, potatoes, maize, millet, buck wheat and mustard which is nominal. Potato is the main crop followed by maize, barley, wheat, millet, and mustard. The method of crop cultivation is primitive, intensive mixed terrace farming. In a few area where there are no terraces people grow their crops in *bari*. The crop pattern systems are both singlecrop and intercrop. Because of altitudinal variation the crop grown also vary from place to place. Almost all vegetables are grown in season. Fruits are not common in these areas. The crops and vegetables are consumed locally. The average land parcel size owned by one household is twenty ropani and the average family size of the interviewees was five people. The average number of combined livestock owned per household is eight. Livestock in these areas consisted of stall feeding water buffalo, cows and goats in lower temperate regions and cow, yackeross, goats and sheep in the temperate regions. Yaks are the main domestic animal for the sub-alpine region and many yak were seen grazing in the alpine zone at Yalang. The goat, sheep, chicken, and pigs are secondary economic sources for the people of these areas who sell them to the trekkers and during festivals period. This allows the people to buy food for themselves.

Cardamom is the main cash crop for this region. In almost all the areas cardamom had been planted 2-5 years ago. In Yamphudin a few people had been selling it for the last three years. And in the Omje Khola area, they have planned to plant cardamom very soon.

Alder and Cardamom groves were seen every where except in Hellok. The Cardamom needs soil with a high moisture content. In addition to providing firewood, alder trees supply the cardamom plants with the necessary shade, nitrogen fixing agent, and leaves for fertilizer. According to the local people the cardamom tree yields a crop after three years and produces a crop every year for next twenty years. The months of October-November are the season for selling cardamom. The larger quantities of cardamom, above ten man (1 mon = 40 Kg), are sold in Ilam and the smaller quantities are sold in the villages. The average cost of 40 Kg of dried cardamom is Nrs 3000 -4000/-. Chureto and Daphnia are two wild plants species which people collect and sell in Basantapur. From Gorja to Mamangkhe people were frequently seen carrying chureto and daphnia. People remove those plants from the jungle, and peel the outer bark of daphnia and lay it out for 4-5 days to dry. The cost of daphnia for 40 Kg is Nrs 560/-

Mammal Sightings

A total of 19 mammals are known to occur these areas. We observed two herds of Blue sheep *Pseudis nayaur* opposite of Kabru peak above the south Kanchanjunga glacier. At 11:30 am on April 30, one group of 4 animals and second group of 32 animals were seen grazing on south - east facing slopes at 15780 ft. The distance was too far for us to determine their sex, but through a telescope we noted many animals bearing horns. One Yellow throated martin *Martes flavigula* was seen at confluence below Hellok at 6:30 am on May 9 at 5000 ft. A pair of Yellow throated martin was observed in terraced farmland above Tembe on May 14 at approximately 6000 ft. In addition to these sightings the scat of several other different mammals was observed. A pile of deer dung was noted at 9240 ft on April 27 at Torongdeen. The dung pile was observed in a mixed hemlok forest with clear understory, on grazed and rocky slopes approximately 100m away from the trail. The scat of a cat was found on April 28 a 20 minute walk down from Yalang at approximately 13000 ft along the trail. The forest cover was low juniper. Black bear scat was observed at 14200 ft on April 29 at Ramze, alpine zone along the trail.

List of Wild Mammals

English name	Local name	Scientific name	People report	Observed scat	elevation animal
Rhesus monkey	Hanuman bandar	<i>Macaca mulatta</i>	*		
Common langur	Dhendu	<i>Presbytis entellus</i>	*		
Pangolin	Sulak	<i>Manis pentadactyla</i>	*		
Grey wolf	Laskar	<i>Canis lupus</i>	*		
Jackal	Syal	<i>Canis aureus</i>	*		
Leopard cat	Chari bagh	<i>Felis bengulensis</i>	*		
Jungie cat	Ban dhade	<i>Felis chaus</i>	*		
Snow leopard	Him chiniwa	<i>Panthera uncia</i>	*	13000 ft	
Leopard	Chutuwa Bagh	<i>Panthera pardus</i>	*	13000 ft	
Black bear	Bhali	<i>Selenarctos thibetanus</i>	*	14200 ft	
Yellow throated martin	Maisapro	<i>Martes flavigula</i>	*		5000 ft
Common mongoose	Nyaurumusa	<i>Herpestes edwardsi</i>	*		
Barking deer	Mirga	<i>Muntiacus muntjak</i>	*	9240 ft	
Goral	Ghoral	<i>Nemorhaedus goral</i>	*		
Serow	Thar	<i>Capricornis sumatraensis</i>	*		
Blue sheep	Bharal	<i>Pseudis nayaur</i>	*		15780 ft
Himalayan tahr	Jharal	<i>Hemitragus jemlahicus</i>	*		
Porcupine	Durnsi	<i>Hystrix indica</i>	*		
Wild yak	Yak	<i>Bos grunniens</i>	*		

Crop and livestock depredation

During the interviews, people were asked about crop damage and livestock depredation by wildlife, and their hunting intensity. The pest animals are common langur, bear, deer, goral and porcupine. Although local people reported abundant pest animals, we sighted very few. After discussion with the interviewees, it seems that the crop damage by the wild animals is not very severe. Yamphudin and upper Hellock are the places where crop damage appears to be most intense, other areas were less heavily impacted. According to the villagers, bear, jackal, leopard and wolf are the main predators. However, few people reported that their livestock had been killed by these predators. Rangalal Ijam, from Gorja (7240 ft) reported that last year a goat and chickens were killed by jackal. From interviewees and other local people it is known that wildlife hunting is common in all the localities. According to the interviewees, people hunt bear for its nails, bone, fur and gall bladder. The organs and tissues use as medicine and ointment. People sell these organs in Kathmandu. The crop damage by the wild animals is not very intense, even though villagers choose to use scarecrows and use men and dogs as guards in their fields.

Cheese production

In the Kanchanjunga area, hundreds of yak and yakcross individuals were seen grazing in several herds at different elevations. These areas obviously produce cheese. Many people were seen driving yak and yakcross herds to high altitude Kharkas. Half an hour walk before Torongdeen, we observed one man making butter from yakcross milk. He said that he makes 1Kg cheese and 1Kg *gheu* from 10 litres of milk and he had eight milk producing yakcross. He sells these products to a mediator, 1Kg *gheu* for Nrs. 80/- and 1Kg cheese (*chhurpi*) for Nrs. 170/-. He said that he doesn't produce equal amounts all year round. Furthermore, the milk production is dependent on the grasses available in the jungle and in Kharkas. Prithevi Gurung is another pastoralist from Yamphudin. He had 36 yak and yakcross altogether and five employed to look after these animals. All who are employed are paid in cash and food. Every year he sells Nrs. 1,50,000/- of cheese and *gheu*. According to him it is a good business but in the winter there are limited grazing areas resulting in lower milk production. Every year during monsoon he takes his animals to upper temperate and alpine zone for grazing. He sells his yak products in Kathmandu where he is one of the biggest suppliers. Chandra Gurung, who is the only resident of Omje khola was asked about tourism in the area. He said that if this area will be protected and tourists come frequently many people will be benefited as local guide, porter etc. People seem to be willing to see the area for tourism development. He said that from Omje khola to Yalang is the area with the highest diversity of species of animals and forest types. If these areas are protected immediately and given attention in a proper way different species of animals present in these areas and forest types will stand forever. He strongly recommends to check the wildlife hunting, slash and burn activity, and implementing a management plan for grazing land.

Ramesh Prasad Nepai

M.Sc. Zoology (Ecology)

Route Description for Wildlands Studies Kanchenjunga Trek, Spring 1995

Prepared by Ken Bauer

Trekking route, campsites, and natural history highlights of the Wildlands Studies program in the Kanchenjunga area are detailed below.

Basantapur. Roadhead. Watch for thieves! Money stolen from group last year. Basantapur is the best place to buy necessities for the last time. Campsite: North of town at top of ridge.

Chauki. Trail: Easy day hike from Basantapur. Campsite: Field just before town. There are lodges in town. Great view of Makalu, Sagarmatha, Lhotse from Chauki. *Rhododendron arboreum* forest here as well.

Gupha Pokhari. Trail: Ascend western side of Milke Danda. At top of ridge, Kanchenjunga is visible for the first time. The Milke Danda has notable rhododendron forests. Gupha Pokhari is the site of a sacred lake and several simple lodges/restaurants. Campsite: If desired, there is a small field just outside of Gupha where pitching tents is possible.

Gorja. Trail: 3 hours hike to small village of Gorja. 1-2 lodges available. Campsite: At a karkha a little above the village of Gorja (where there's a lodge).

Doban. Trail: Easy day downhill to the electrified town of Doban. In Doban, goods like flip-flops, soap, snacks are available. Lodging and food are also available. Doban is a major crossroads and marks the confluence of Majhwa and Tamur Rivers. Campsite: among Acacia trees on a strip of land between the left bank of the Majhwa Khola and the right bank of the Tamur River. Cross Majhwa and Tamur Rivers on large suspension bridges.

Suketar. Trail: Long uphill day via Taplejung. 1500 meters climb. Taplejung has lodges, food, phone facilities, poor road access. Suketar is site of regional airport. Birds observed: barbets in trees at waysides. Campsite: Several lodges available near airport. Campsite also available 15 minutes past airport.

Lalikarkha. Trail: Easy day, finish before lunch. Pass through degraded *Rhododendron* forest immediately out of Suketar, later through oak-laurel forest on south-facing slopes above Lali Karka. Campsite: Pasturage and cooking shelters available at Lali Karka.

Kardaibanjang. Trail: Small, picturesque village on a saddle. Trail passes through irrigated rice paddies (khet), non-irrigated corn/potato fields (bari), and traditional rural villages. Descend to a tributary of Tamur River and up again to reach Kardaibanjang and the crest of the saddle. Campsite: Field at saddle maintained by villagers as picturesque campsite..

Mamankhe. Trail: good view of mountains at beginning of day. Extensive riverine alder forests. 3/4 day hike. Campsite: Open field at Mamankhe school. Public toilets available.

Yamphudin. Trail: There is a suspended bridge that is in serious disrepair, 1 hour before Yamphudin. Avoid bridge by crossing stream during dry season. Pass through extensive alder-cardamon intercropping lands before reaching Yamphudin. Here two small stores cater to trekker's needs. Campsite: Immediately next to river, below village school. Nice site. Natural History Highlights: Some good lower temperate and subtropical forest nearby. Birds: Spotted Forktail, Black Naped Oriole, Sunbirds, Brown Dippper.

Omje Khola. Trail: Moderate day - cross one saddle, the north side of which is muddy and sometimes hard to follow. Good temperate forest in this area with notable east-west aspect slope differences. Production of dried yak cheese (churpi) a main livelihood for herders in this area. Campsite: Small open field in front of local villager's home. Kitchen shelter available, as well as some food goods.

Toranden. Trail: Steady uphill until you reach saddle. Pass through extensive bamboo and then Rhododendron forest *en route* to the saddle. Saddle at 11,000 feet. Trail crosses extensive, sketchy sections of landslide once over the saddle. Natural History Highlights: Pass through extensive fir/hemlock forest with lots of rhododendrons after saddle. Birds: several nice species on saddle, including White-collared Blackbird, Titmice, Little Forktail, Hoary Barwing. Campsite: Small site on West bank of river. First walk above campsite, cross river, then walk 5 minutes down to campsite. The bridge here needs to be made permanent and yak-proof. Good forest around campsite. Forest types at campsite: hemlock, *Rhododendron*, fir.

Yalung. Trail: steady but moderate uphill. Progressive change from temperate hemlock forest to sub-alpine fir and juniper forest. Valley changes from steep, V-shaped river valley to rounded, U-shaped glacial valley. Relatively long hiking day. Natural History Highlights: excellent birding throughout day. Birds observed: Laughing Thrush, Rufous-bellied Bush Robin (rare according to Fleming), Rose-breasted Pipits, Niltavas, Fire-tailed Sunbirds. At higher altitude, White-winged Grosbeaks and Lammergeier. Campsite: karka with small shelter for porters.

Ramje. Trail: Moderate uphill and short day. Pass small glacial lakes as you approach terminal moraine of Yalung Glacier. Campsite: At karka, above which there is no reliable source of water. Short day's hike - establish base camp. 2 hours or less day hike to Oktang mandir with dramatic vista of Kanchenjunga, Yalung glacier, and surrounding peaks. Sketchy trail continues from Oktang over scree slope to advanced base camp. Natural History Highlights: Several great day hikes to higher elevation ridges for dramatic views and wildlife. From Oktang mandir, a herd of 32 Blue sheep (bharal) were seen at 15,700 feet. Above campsite, 30 grandalas and 2 Lammergeier seen at close range. Also, large flocks of Altai Accentors, Snow Pigeons, Rufous-breasted Accentors, and Red and Yellow-billed Choughs.

— Trail Reversed to Yamphudin —

Upper Yamphudin Karka. Trail: steady uphill to karka. Campsite: Not much water in karkha, but this is the last water until next campsite, a full day's hike away.

Sambewa Khola Kharka (upper Hellok). Trail: Hike up to saddle through extensive forests of *Quercus* and *Rhododendron*. Campsite: Small clearing in forest 45 minutes below saddle. Good water and excellent forest. Natural History Highlights: The camp site is located in a cloud forest. Forest is notable for its high tree species diversity and density. Bird species: Gould's Sunbird, Nutcrackers.

Hellok. Trail: Pass through cloud forest, extensive bamboo forest, grazing karkha land and finally to cultivated fields of Hellok village. Total descent: 1500 meters. Natural History Highlights: Pass through exceptionally dense and attractive cloud forest. *En route* to Hellok, very dense bamboo forest. Gushing spring in trailside river bed. Bird species include small groups of White-throated Laughing Thrush. Mammal sighting: Himalayan Yellow-throated Marten seen along Tamur River below Hellok. Campsite: Don't stay in Hellok. Nice campsite below Hellok and confluence of Tamur, Gunsa, and Simbuwa rivers. On opposite bank of river, the trail to Olanchang Gola heads north.

Above Chirwa. Trail: Half-day easy hike along Tamur River. Pass through Chirwa (which means "threading the needle"), an unusual village built among and underneath massive boulders, hence its name. Campsite: Nice campsite along river operated by a local farmer. Small provisions store.

Sinuwa. Trail: Moderate hiking day along Tamur River. Dense alder forest, and some steep sections of trail traverse landslides near river. Campsite: Grassy field between trail and river.

Dhoban. Camp along river, 1 hour above Doban in attractive alder stand. This campsite is just below extensive landslide outwash plain.

Tembe. Trail: Pass through Doban on a long, uphill day. Campsite: Stay in school yard of Limbu village of Tembe. Phone available at school.

Milke Danda or "Jehow Pokhari." Trail: Long uphill day to campsite. Lengthy hike may not be appropriate in winter when sun sets early. Campsite: 1 hour from Gupha Pokhari. Campsite surrounded by dense stands of *Rhododendron arboreum*. Campsite on karka. Locals from below live in small house at karka during warm season - good shelter for porters. Bird species: Rufous-breasted Sap Sucker, Steppe Eagle, Crimson Horned Pheasant and Tawny Wood Owl heard in this area.

Sidi Pokhari. Trail: Long day. Pass through many villages typical of Eastern Nepal. Campsite: Stay in school yard of Sidi Pokhari, a sizable village with many provisions. School may be available for shelter and kitchen.

Tumlingtar. Trail: Long day with steep descent at end of hike. Pass through well-known village of Chainpur. Chainpur is famous for its skilled bronze casting industry. Long hike not recommended in winter - break up into two days. Crossing the Sabwa Khola at the end of the day may require a boat after rainy period. If the river is too high for boat crossing, reliable

bridge is a further 1 1/2 hour walk north in the direction of Khadbari, or south in the direction of confluence with Arun River. Enroute to Khadbari, a large Sal (*Shorea robusta*) stand along the Sabwa Kholā forms an excellent habitat for many bird species. Campsite: Nice site on riverside beach. Site is 1 hour below Tumlingtar airport.

References

- Carpenter, C.C., S. Ghimire and T. Brown. 1994. *Report on the Flora and Fauna of the Kanchenjunga Region: Wildlands Studies*, Autumn 1994. Unpublished report submitted to World Wildlife Fund, Nepal Program.
- Carpenter, C.C. and R. Zomer. 1995. Forest Ecology of Makalu - Barun National Park and Conservation Area, Nepal. *Mountain Research and Development* (In Press).
- Dobremez J.F. and P.R. Shakya. 1975. Carte Ecologique du Nepal VI. Region Biratnagar - Kangchenjunga 1:250,000. *Cahiers Nepalas Documents No 7 CNRS*, Paris.
- MacKinnon, John. 1981. *A National Conservation Plan for Indonesia Vol VIII: National Park Development and General Topics*. National Parks Development Project, UNFAO. Bogor, Indonesia.

Appendix

Tree and Bird Species Recorded in the Kangchenjunga Region

Tree Species Recorded in Forest Plots
Kangchenjunga, Spring 1995

Species	Elevation Range (m)		Location Drainages
	(min)	(max)	
<i>Abies spectabilis</i>	2829	3000	SimK, SamK
<i>Abies campbellii</i>	2287	3000	SimbK, OmjeK
<i>Abies pectinatum</i>	2841	2866	SambK, OmjeK
<i>Abies sterculiaceum</i>	2841	2890	SambK
<i>Alnus nepalensis</i>	1800	2476	OmjeK, KabK
<i>Betula utilis</i>	2817	3774	SimbK, SambK
<i>Cephaelis himalayense</i>	2476	2480	O-K
<i>Engelhardia spicata</i>	1800	1800	KabK
<i>Ferula acuminata</i>	2476	2476	OmjeK
<i>Ficus nerifolia</i> var. <i>nemoralis</i>	2287	2287	SobK
<i>Gamblea ciliata</i> ("panch pati")	2841	2866	SambK
<i>Juglans regia</i>	2476	2476	O-K
<i>Juniperus indica</i>	3800	3920	SimbK
<i>Juniperus recurva</i>	3756	3920	SimbK
<i>Lindera pulcherrima</i>	2395	2476	SobK, O-K
<i>Litsea salicifolia</i>	2287	2480	OmjeK, O-K
<i>Lyonia ovalifolia</i>	2841	3011	SobK, O-K
<i>Magnolia campbellii</i>	2476	2480	O-K
<i>Merrilliopanax alpinus</i>	2866	2866	SambK
<i>Mussaenda frondosa</i>	2280	3011	SimbK, SambK, SurD, O-K, Milke
<i>Persea odoratissima</i>	2287	2479	OmjeK
<i>Populus ciliata</i>	1800	2476	KabK, O-K
<i>Prunus nepalensis</i>	2390	2900	SambK, OmjeK, O-K, SobK
<i>Quercus glauca</i>	2287	2287	OmjeK
<i>Quercus lamellosa</i>	2287	2480	OmjeK, SobK
<i>Quercus lineata</i>	2280	2480	OmjeK, SobK, SurD
<i>Rhododendron arboreum</i>	2890	3011	SambK, Milke
<i>Rhododendron barbatum</i>	2866	2900	SambK
<i>Rhododendron falconeri</i>	2817	2900	SimbK, SambK
<i>Salix</i> sps	3774	3774	SimbK
<i>Schefflera impressa</i>	2287	2287	OmjeK
<i>Sorbus cuspidata</i>	2866	2866	SambK
<i>Sorbus microphylla</i>	2866	2866	SambK
<i>Symplocos dryophila</i>	2287	2480	OmjeK, SobK
<i>Symplocos ramosissima</i>	2395	2480	SobK, O-K
<i>Symplocos theifolia</i>	2280	3000	SimbK, SambK, OmjeK, SobK, O-K, SurD
<i>Tsuga dumosa</i>	2817	3000	SimbK, SambK
<i>Viburnum nervosum</i>	2817	2900	SimbK, SambK
<i>Wendlandia exserta</i>	1800	1800	KabK

Location Key:

1. SimK = Simbuwa Khola, below Kangchenjunga South Base Camp
2. SamK = Sambewa Khola, above Hellock
3. OmjeK = Omje Khola, north of Yamphudin
4. KabK = Kabell Khola near Yamphudin
5. SobK = Sobuwa Khola, drains SE Milke Danda near Gupha Pokari
6. O-K = Omje - Kabeli Divide on Deorali Danda Ridge, north of Yamphudin
7. Milke = Crest of Milke Danda Divide, north of Gupha Pokari
8. SurD = Surke Danda Ridge, east of Taplejung

bird data for Kanchenjunga Region

fall 1994 and Spring 1995

vers. 6-14-95

This list includes bird species recorded in the Tamur River drainage, east of the Danda Ridge, north of Kabeli Khola during fall 1994 and spring 1995.

Records made by Wildlands Studies team members on the basis of sight or call.

<u>Common Name</u>	<u>Genus</u>	<u>species</u>	<u>season</u> (fall/spring)
Black-throated Warbler	Seicercus	affinis	f
Blue-winged Accentor	Prunella	collaris	s
Black-throated Accentor	Prunella	himalayana	s
Black-throated Drongo	Dicrurus	leucophaeus	s
Black-throated Warbler	Phylloscopus	maculipennis	f s
Black-brown Flycatcher	Muscicapa	latirostris	s
Black-brown Swallow	Hirundo	rustica	s
Black-brown Owllet	Glaucidium	cuculoides	s
Black-throated Minla	Minla	strigula	f s
Black-headed Vulture	Gypaetus	barbatus	f s
Black-throated Niltava	Muscicapa	sundara	f s
Black-throated Drongo	Dicrurus	adsimilis	f s
Black-throated Redstart	Phoenicurus	ochruros	f s
Black-capped Sibia	Heterophasia	capistrata	f s
Black-faced Laughing Thrush	Garrulax	affinis	f s
Black-faced Warbler	Abroscopus	schisticeps	s
Black-headed Shrike	Lanius	schach	f s
Black-throated Babbler	Stachyris	nigriceps	f
Blood Pheasant	Ithaginis	cruentus	f s
Blossom-headed Parakeet	Psittacula	himalayana	f
Blue Rock Thrush	Monticola	solitarius	s
Blue Whistling Thrush	Myiophoneus	caeruleus	f s
Blue-fronted Redstart	Phoenicurus	frontalis	f s
Blue-headed Rock Thrush	Monticola	cinclorhynchus	s
Blue-throated Barbet	Megalaima	asiatica	s
Blue-winged Minla	Minla	cyanouroptera	s
Bronzed Drongo	Dicrurus	aeneus	s
Brown Dipper	Cinclus	pallasii	f s
Cattle Egret	Bubulcus	ibis	s
Chestnut-bellied Nuthatch	Sitta	castanea	f s
Chestnut-bellied Rock Thrush	Monticola	rufiventris	f s
Chestnut-crowned Warbler	Seicercus	castaniceps	f s
Chestnut-headed Tit Babbler	Alcippe	castaneiceps	s
Coal Tit	Parus	ater	f s
Collared Pygmy Owllet	Glaucidium	brodiei	s
Common Iora	Aegithina	tiphia	s
Common Koel	Eudynamis	scolopacea	s
Common Myna	Acridotheres	tristis	f s
Common Stonechat	Saxicola	torquata	f s
Common Tailorbird	Orthotomus	sutorius	f s
Coppersmith Barbet	Megalaima	haemacephala	s

Birds of the Kangchenjunga Region, fall 1994 and spring 1995

Crag Martin	Hirundo	rupestris	f	s
Crested Brown Tit	Parus	dichrous		s
Crested Bunting	Melophus	lathamii	f	
Crested Serpent Eagle	Spilornis	cheela	f	s
Crimson-horned Pheasant	Tragopon	satyra		s
Crossbill	Loxia	curvirostra	f	
Crowned Leaf Warbler	Phylloscopus	reguloides	f	s
Darjeeling Pied Woodpecker	Dendrocopos	darjellensis		s
Dark Cuckoo-Shrike	Coracina	melaschistos		s
Dark Kite	Milvus	migrans		s
Dark-sided Flycatcher	Muscicapa	sibirica	f	s
Dull Green Leaf Warbler	Phylloscopus	trochiloides		s
Eurasian Cuckoo	Cuculus	canorus		s
Eurasian Griffon	Gyps	fulvus		s
Eurasian Kestrel	Falco	tinnunculus	f	s
Eurasian Kingfisher	Alcedo	atthis	f	s
Eurasian Nuthatch	Sitta	europaea	f	
Eurasian Tree Sparrow	Passer	montanus		s
Eversmann's Redstart	Phoenicurus	erythronotus		s
Ferruginous Flycatcher	Muscicapa	ferruginea		s
Fire-breasted Flowerpecker	Dicaeum	ingipectus	f	s
Fire-tailed Sunbird	Aethopyga	ignicauda		s
Golden Bush Robin	Erithacus	chrysaeus		s
Golden Eagle	Aquila	chrysaetos	f	
Golden Oriole	Oriolus	oriolus		s
Golden-breasted Tit Babbler	Alcippe	chrysotis	f	s
Golden-throated Barbet	Megalaima	franklinii		s
Goshawk	Accipiter	gentilis	f	
Gould's Sunbird	Aethopyga	gouldiae		s
Grandala	Grandala	coelicolor		s
Great Barbet	Megalaima	virens		s
Great Eastern Rose Finch	Carpodacus	rubicilloides		s
Green Magpie	Cissa	chinensis		s
Green-backed Tit	Parus	monticolus	f	s
Grey Bulbul	Hypsipetes	madagascarensis	f	s
Grey Heron	Ardea	cinerea	f	
Grey Tit	Parus	major	f	s
Grey Wagtail	Motacilla	cinerea	f	
Grey-headed Flycatcher	Culicicapa	ceylonensis	f	s
Grey-headed Myna	Stumus	malabaricus		s
Grey-headed Warbler	Seicercus	xanthoschistos	f	s
Hair-crested Drongo	Dicrurus	hottentottus		s
Herring Gull	Larus	argentatus	f	
Himalayan Cuckoo	Cuculus	saturatus		s
Himalayan Goldfinch	Carduelis	spinoides	f	s
Himalayan Griffon	Gyps	himalayensis	f	s
Himalayan Tree Pie	Dendrocitta	formosae	f	s
Hoary Barwing	Actinodura	nipalensis	f	s
Hodgson's Mountain Finch	Leucosticte	nemoricola		s
Hodgson's Redstart	Phoenicurus	hodgsoni	f	
Hodgson's Tree Pipit	Anthus	hodgsoni		s
Hoopoe	Upupa	epops		s

Appendix

Tree and Bird Species Recorded in the Kangchenjunga Region

Birds of the Kangchenjunga Region, fall 1994 and spring 1995

Robin Accentor	Prunella	rubeculoides	f	s
Rock Bunting	Emberiza	cia	f	
Rock Pigeon	Columba	livia	f	s
Rose-breasted Pipit	Anthus	roseatus		s
Rufous Turtle Dove	Streptopelia	orientalis	f	s
Rufous-backed Shrike	Lanius	schach		s
Rufous-bellied Bulbul	Hypsipetes	virescens		s
Rufous-bellied Bush Robin	Erithacus	hyperythrus		s
Rufous-bellied Sapsucker	Hypopicus	hyperythrus		s
Rufous-breasted Accentor	Prunella	strophata		s
Rufous-fronted Tit	Aegithalos	iouschistos	f	s
Rufous-vented Yuhina	Yuhina	occipitalis	f	s
Rusty-cheeked Scimitar Babbler	Pomatorhinus	erythrognys	f	
Sand Martin	Riparia	paludicola		s
Scaly-breasted Wren Babbler	Pnoepyga	albiventer	f	s
Scarlet Minivet	Pericrocotus	flammeus	f	s
Scarlet-breasted Sunbird	Aethopyga	siparaja	f	s
Short-toed Lark	Calandrella	cinerea		s
Sikkim Black Tit	Parus	rubidiventris	f	s
Slaty-backed Forktail	Enicurus	schistaceus	f	
Small Niltava	Muscicapa	macgrigoriae	f	
Small Pied Kingfisher	Ceryle	rudis	f	
Snow Partridge	Lerwa	lerwa		s
Snow Pigeon	Columba	leuconota		s
Sparrow Hawk	Accipiter	nisus		s
Spotted Dove	Streptopelia	chinensis	f	s
Spotted Piculet	Picumnus	innominatus	f	
Spot-winged Grosbeak	Mycerobas	affinis		s
Steppe Eagle	Aquila	nipalensis		s
Steppe Eagle	Aquila	nipalensis	f	
Streaked Laughing Thrush	Garrulax	lineatus		s
Striated Laughing Thrush	Garrulax	striatus		s
Stripe-throated Yuhina	Yuhina	gularis	f	s
Strong-footed Bush Warbler	Cettia	fortipes		s
Tawny Wood Owl	Strix	aluco		s
Tibetan Snowcock	Tetraogallus	tibetanus	f	s
Tickell's Leaf Warbler	Phylloscopus	affinis	f	s
Velvet-fronted Nuthatch	Sitta	frontalis	f	
Verditer Flycatcher	Muscicapa	thalassina	f	s
Wedge-tailed Green Pigeon	Treron	sphenura		s
White-breasted Kingfisher	Halcyon	smymensis		s
White-browed Blue Flycatcher	Muscicapa	superciliaris	f	s
White-browed Rose Finch	Carpodacus	thura		s
White-browed Shortwing	Brachypteryx	montana		s
White-browed Tit Babbler	Alcippe	vinipectus	f	s
White-capped River Chat	Chaimarrornis	leucocephalus	f	s
White-cheeked Bulbul	Pycnonotus	leucogenys	f	s
White-collared Blackbird	Turdus	albocinctus		s
White-crested Laughing Thrush	Garrulax	leucolophus	f	s
White-necked Stork	Ciconia	episcopus	f	s
White-spotted Laughing Thrush	Garrulax	ocellatus	f	s

Birds of the Kangchenjunga Region, fall 1994 and spring 1995

White-throated Laughing Thrush	Garrulax	albogularis		S
White-throated Redstart	Phoenicurus	schisticeps		S
White-winged Grosbeak	Mycerobas	carripes		S
Wren	Troglodytes	troglodytes	f	S
Yellow-bellied Fantail Flycatcher	Rhipidura	hypoxantha	f	S
Yellow-billed Blue Magpie	Cissa	flavirostris	f	S
Yellow-billed Chough	Pyrrhocorax	graculus	f	S
Yellow-cheeked Tit	Parus	xanthogenys	f	S
Yellow-eyed Warbler	Seicercus	burkii	f	S
Yellow-naped Yuhina	Yuhina	flavicollis	f	S
Yellow-rumped Leaf Warbler	Phylloscopus	proregulus	f	S