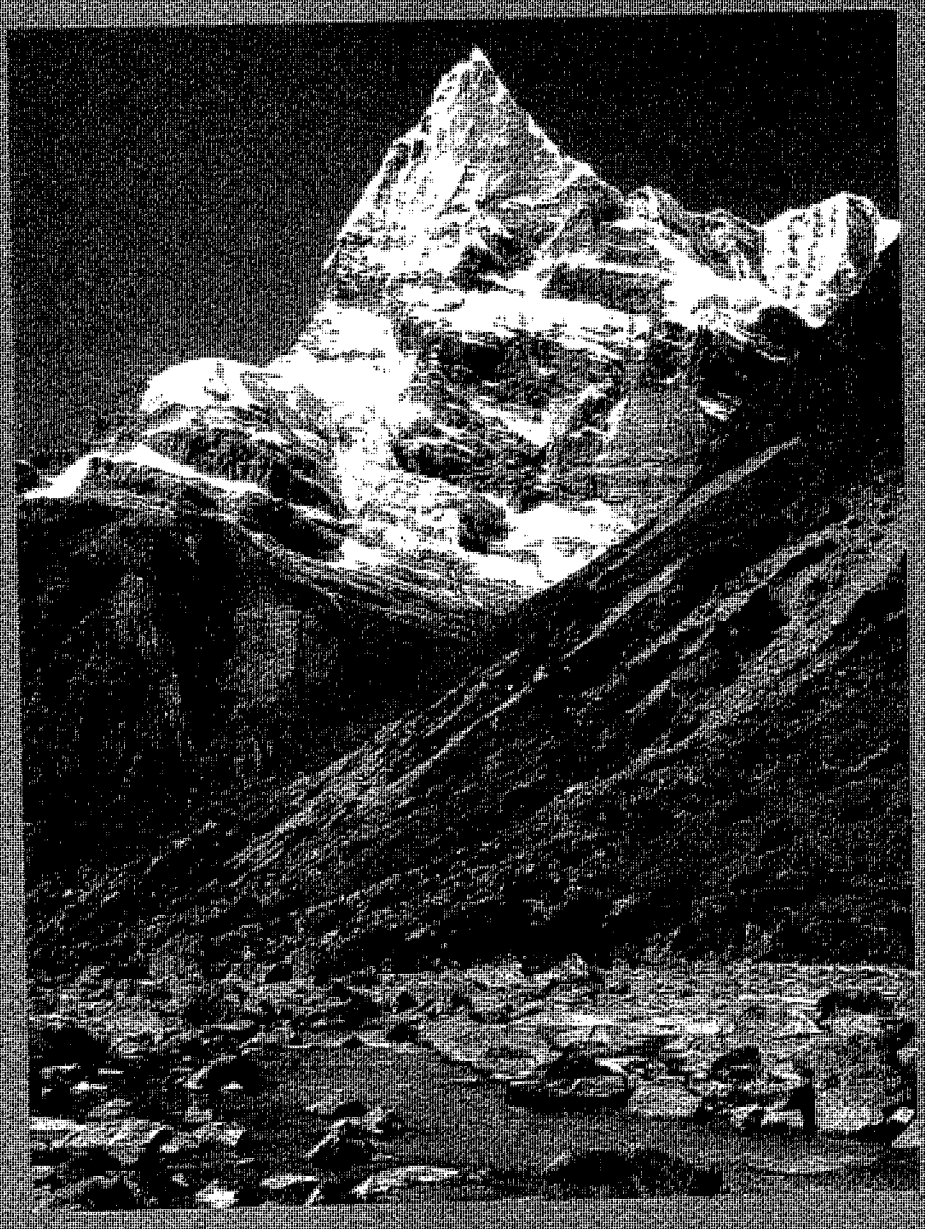
AN ASSESSMENT OF HABITATS AND HUMAN INTERACTION IN THE HINKHU, HONGU, KASUWA AND BARUN KHOLAS OF MAKALU-BARUN NATIONAL PARK AND PERIPHERAL AREAS

19 April - 24 June 1995 and 4-13 November 1996

Jack H. Cox



The Mountain Institute
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Mount Everest Ecosystem Conservation Program

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Introduction

Background. This report has been prepared as a supplemental publication for the current cooperative project implemented by the Department of National Parks and Wildlife Conservation (DNPWC), His Majesty's Government of Nepal (HMG), in collaboration with The Mountain Institute, West Virginia, USA (TMI). The aim of the Makalu-Barun Conservation Project (MBCP) is to design and establish a management program based on integrated conservation and development of the unique biodiversity in Makalu-Barun National Park and Buffer Zone (MBNPBZ). Since inception in 1988 MBCP activities have emphasized a community-oriented approach to conserving the biota of the area.

Formal protection for the Makalu-Barun area was initially proposed in the late 1980s following the studies of a two-year Task Force composed mainly of Nepalese scientists. In November 1991 a 2,330 sq km National Park bufferred by an 830 sq km Conservation Area (CA) was gazetted (Figure 1). The CA was re-gazetted as a Buffer Zone in February 1999. MBNPBZ is bordered by 1,148 sq km Sagarmatha National Park in the NW, and the *ca.* 35,000 sq km Qomolongma Nature Preserve in Tibet. Taken together the three contiguous areas comprise the second largest nature reserve in the Asia-Pacific region.

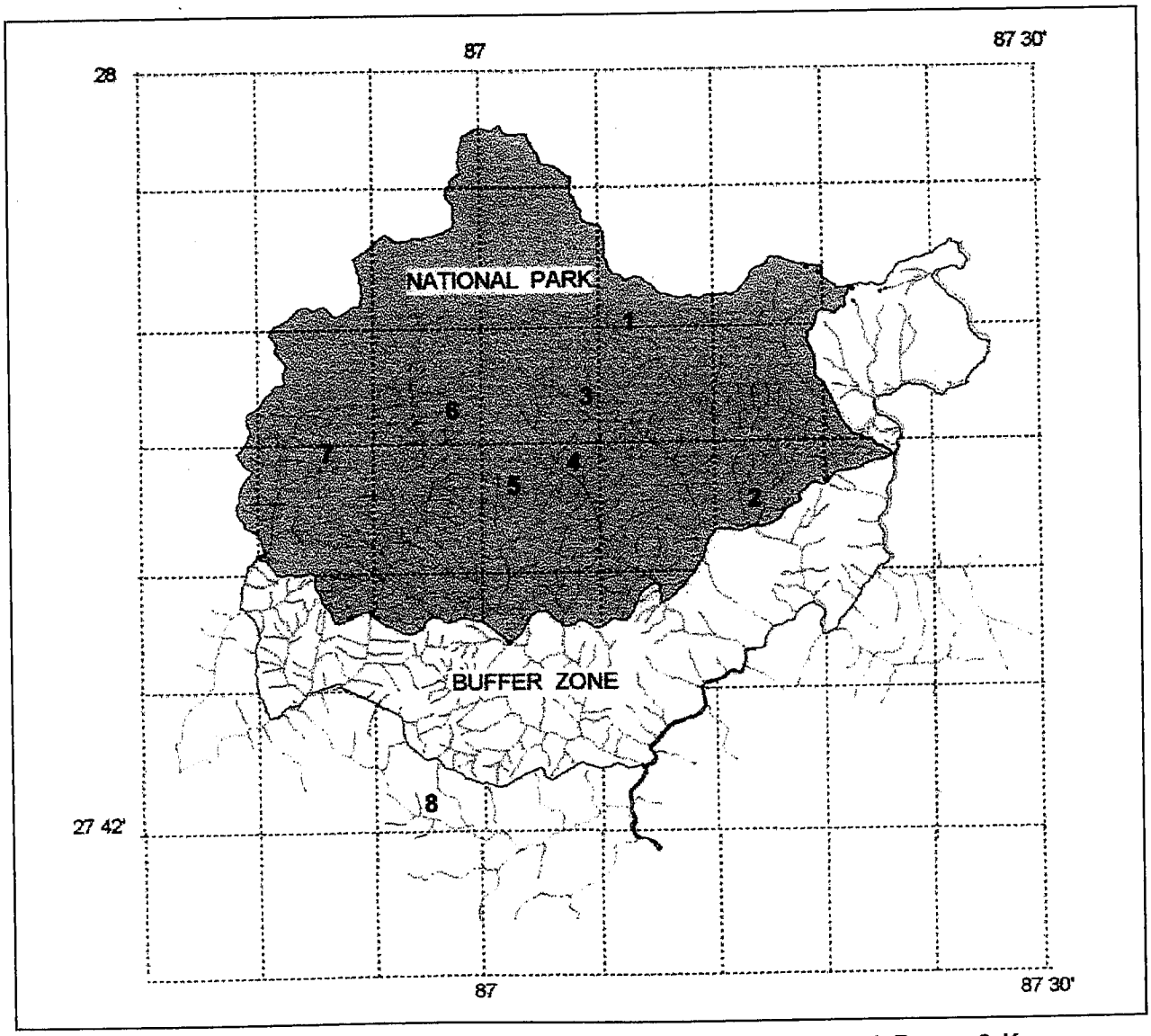


Figure 1: Makalu Barun National Park and Buffer Zone showing river systems: 1. Barun, 2. Kasuwa, 3. Ishuwa, 4. Apsuwa, 5. Sankhuwa, 6. Hongu, 7. Hinkhu, 8. Irkhhuwa

Makalu-Barun National Park contains only one permanent human settlements, the small village of Saisima in the NE, but approximately 32,000 people inhabit the BZ. Diverse ethnic groups of Rais, Sherpas and Shigsawas (Bhotias) populate arable land in the lower reaches of all river valleys below the cloudline (*ca.* 2400 m). Soils on these slopes tend to be poor and insufficient for subsistence farming. Consequently, grassland for grazing and forest products at higher elevations (*e.g.*, fodder, herbs, honey, bamboo) are exploited to meet basic dietary needs, and for small but crucial amounts of income. Due to the remoteness and isolation of these communities, development of market economies has been seriously impeded. MBCP therefore prioritizes establishment of eco-enterprises to both assist community development and alleviate the pressure of unsustainable utilization on proximate habitats. Thus far this novel approach is showing promise with enhanced production and marketing of *allo* cloth (made from nettles *Girardinia diversifolia*), *lokta* paper (from the inner bark fibers of *Daphne bholua* shrubs) and woven handicrafts (from *ningalo* and *malingo* bamboos *Arundinaria* spp.). MBCP also supports cultural preservation by assisting monkshood studies, local language programs, and the restoration of *gomba*(s) (monasteries) and shrines (Anon. 1993).

Nearly the entire spectrum of biomes found in the Himalayan ecosystem occurs in MBNPBZ, from tropical and subtropical forest associations in lower valleys of the BZ at confluences with the Arun River (as low as 330 m), to Tibetan steppe and the aeolian zone of the Kumbhakarna Himal in the upper Barun Khola, and as high as 8475 m at the summit of Makalu, the world's fifth highest mountain - a staggering altitudinal variation of more than 8000 m. At least 3000 species of flowering plants, including 25 species of rhododendron *Rhododendron* spp., 12 species of poppies *Mecanopsis* spp., 48 species of primulas Primulaceae, 47 orchid species, about 75 mammals, 30 reptiles and 25 amphibians have been recorded from the area (Majpuria and Kumar 1998). 349 species of birds have been recorded thus far (see Appendix B), and the total is likely to exceed 400 species once low altitude forest residents, seasonal

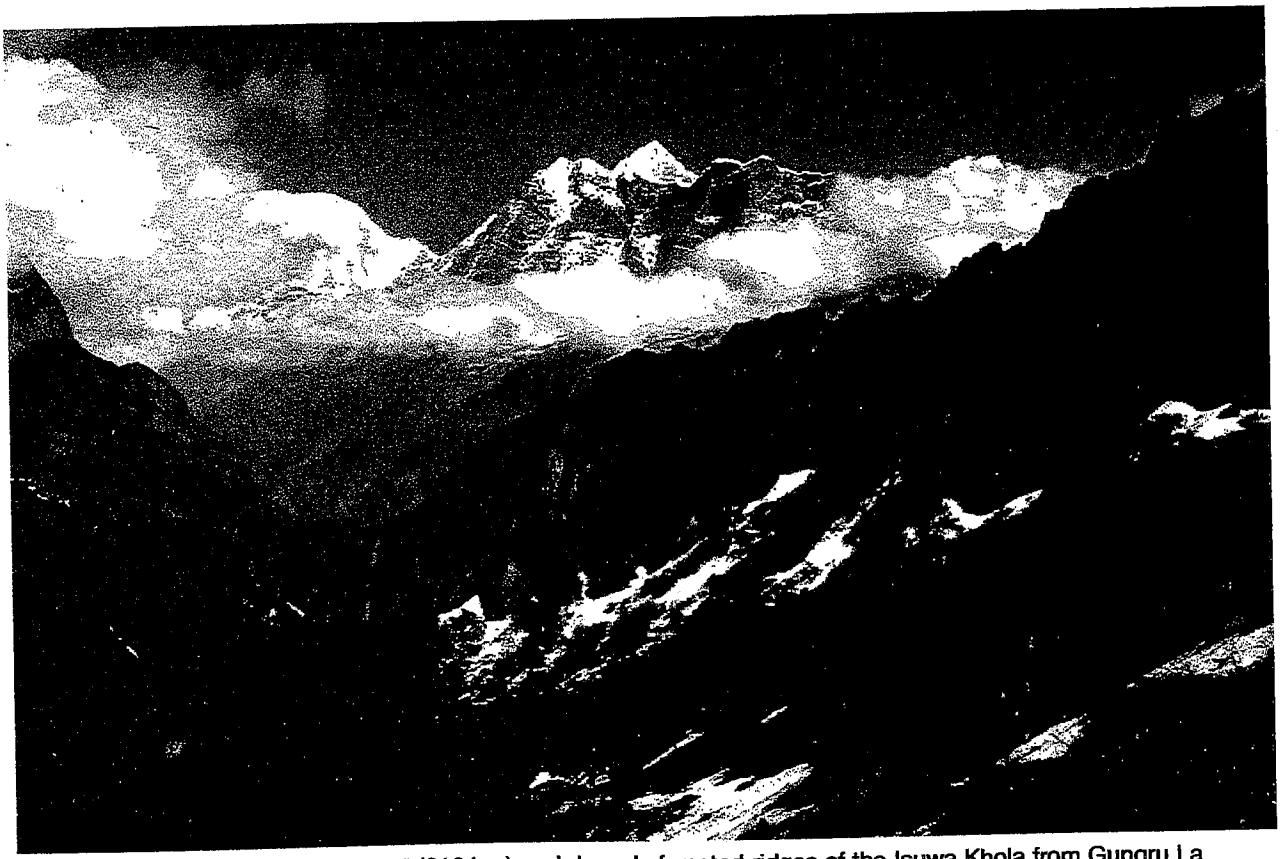


Figure 2. Peak 6 (6758 m), Peak 7 (6164 m) and densely forested ridges of the Isuwa Khola from Gungru La (3810 m), above Kongma Kharka.

visitors and passage migrants are thoroughly inventoried. MBNPBZ is a major site for conservation of flora and fauna in the biologically rich Eastern Himalayas ecoregion, a zone that is a highest priority macrosite for conservation of global terrestrial biodiversity (Wilson 1992).

Of particular importance is that large tracts of most habitat types in the reserve are nearly pristine in character. The Makalu-Barun area is also of great cultural significance, harboring remote Buddhist shrines, monasteries and meditation caves that apparently inspired the description of Shangra La, an idyllic and legendary Himalayan refuge (Hilton 1938). In addition, the massive Kumbhakarna Himal and rugged forests of seven emanating river valleys are sources of spectacular aesthetic value. In its entirity, Makalu-Barun is a unique synergy of countryside and culture, and a gem of Nepal's protected area network.

Assessment summary. Several remote sectors of MBNPBZ were assessed during the course of two recent treks in East Nepal. The first trek was undertaken 13 April through 24 June 1995 from Jiri to Basantapur, and comprised lengthy sections of the Hinkhu, Hongu, Arun and Barun *kholas* (rivers) within the reserve, in addition to biologically important peripheral areas in the Irkhuwa Khola and Upper Arun. The second trek was conducted 7 October through 13 November 1996 from Barabhise to Lukla (via RolwalingValley/Teshi Lapcha pass), including the Upper Hongu from Amphu Lapcha to Mera La, and a revisit of the upper Hinkhu Khola.

Objectives. The purpose of the multi-faceted treks was to: 1) assess local forest types, in particular those of restricted distribution in Nepal; 2) reconnoiter some of the remotest and least known areas of MBNPBZ; 3) document avian populations, in particular breeding behavior, and note other wildlife encountered; 4) assess human activities and impact; 5) evaluate ecotourism potential of the areas visited; and 6) produce management guidelines and recommendations.

Main river systems of the Buffer Zone, and to a lesser extent the Park, were surveyed during initial stages of the MBCP by consultant teams in the early 1990s, but many of the remoter areas were not. Almost no information was previously available on the nearly impenetrable middle Hongu river valley. Accessible and important areas of the Park, such as the Upper Barun and Panch Pokhari lakes/Amphu Lapcha pass of the Upper Hongu, were known only superficially and remain inadequately explored.

Methods. The treks were organized independently by the author and his team of field assistants. Considering the character of the excursions as extended ventures that often traversed remote areas, it was evident that a small, largely self-sufficient group would increase the likelihood of success. Even so, restocking of staple foodstuffs from villages and trekking stores was necessary at regular intervals.

Keeping the group small saved on costs and afforded increased mobility. Flexibility was gained by the ability of multi-skilled assistants to switch tasks when necessary. The capabilities of the group were also enhanced by the aggregate experience of its members, most of whom participated and performed essential roles in accomplishing a similar long and remote trek in far east Nepal during 1992. Basic mountaineering equipment, its prior use by most members, and a proven ability to perform adeptly during prolonged stays at high altitude were instrumental in accomplishing the objectives of the treks.

In uninhabited areas, particularly at high altitude, tented campsites, overhangs, and seasonally occupied *ghots* (shepherds' huts) were used for accommodation. At lower altitudes, village homes and inns were usually preferred over tents, in keeping with an intention of the trek to positively impact local communities where visited. In this regard, lodging and kitchen fees were paid to assist environmentally benign

income generation, as were purchases of surplus foodstuffs (mostly vegetables), and probably served to reinforce the ecotourism potential of trekking.

Several reference texts proved invaluable as sources to identify flora and fauna of assessed areas. *Birds of Nepal* (third edition) by Fleming, Fleming and Bangdal (1984) was indispensable, enabling most bird species to be identified immediately. Distinguishing species of other, more difficult and confusing groups was facilitated using *A Guide to the Birds of Nepal* (second edition:1991) by Tim and Carol Inskipp and Inskipp. This text was also essential in discerning the status and distribution of birds encountered. *Nepal's Forest Birds: Their Status and Conservation* provided further data on the importance to biodiversity conservation of avian species in the Makalu-Barun area. *The Mammals of Nepal*, by T. K. Shrestha, and the *Book of Indian Animals* by S. H. Prather were particularly valuable for identification of observed mammals, as was *The Book of Indian Reptiles* for snakes, agamids and monitor lizards. Identification of flora was immensely aided by *Flowers of the Himalaya*, by Polunin and Stainton, and proved to be an basic field companion. *Forests of Nepal*, by A. Stainton was additionally useful for understanding the distribution of tree species and forest associations within Nepal.

The gauging, selection, and following of routes was greatly facilitated in many areas by the E. Schneider series of 1:50,000 topographic maps (Khumbu Himal, Shorong/Hinku, and Dudh Kosi sheets). Although some minor trails are not shown, and the series is becoming outdated for locations of villages and newer trails, these maps are highly accurate in depiction of 40 m contours and terrain features. For areas not covered by the Schneider maps in the Upper Barun and Arun river valleys, the *Dhankuta to Kanchenjunga Mt. Everest Makalu & Arun Valley* sheet at 1:192,500 (1993/94 edition) published by Mandala Trekking Maps, Kathmandu was helpful in following main trails, depiction of general contours, and discerning the location of most villages. The Mandala *Lamosangu to Mt. Everest & Solu Khumbu* sheet (1995/96 edition) was also useful, as it depicts some villages and secondary trails not shown on the Schneider Khumbu Himal sheet. Subsequent to the treks, the Survey Department, HMG published 1:50,000 topographic maps of the area in 1997, based on aerial photography flown in 1992 and groundtruthing conducted in 1996. Individual sheets are particularly useful for areas in the eastern part of the Park and BZ that are beyond the boundaries of the Schneider map (Khumbu and Shorong/Hinku sheets), and are annotated with additional spot heights, trails, general forest types and sites of cultural significance. These maps are available from Maps of Nepal (P) Ltd., New Baneshwor, Kathmandu (ph: 492304) or the Topographical Section, Ministry of Land Reform, New Baneshwor.

A Magellan 2000 GPS satellite navigator was used on the 1996 trek to obtain accurate geographic positions (± 100 m) and altitude (± 50 m) of main passes crossed, and stays at camps and settlements that were unobstructed by tree canopies (see Appendix E).

Observations of mammals and birds were usually conducted on an as-encountered basis, during the course of slow to moderate pace of walking. Extended searches, some for several hours, were made at sites of relatively high avian activity and diverse forest cover to better assess habitats that were evidently species-rich.

1. Area 1: Hinku Khola watershed from Zattara Danda to Mera Peak (19-25 April 1995 and 7-13 November 1996)

The route, logistics and trailside habitats along much of the Hinkhu Khola described in this section, have been subsequently altered by a tumultuous outburst of Sabai Tsho, a large glacial lake located in the headwaters of this tributary system. The outburst occurred on 4 September 1998 and apparently scoured all riverine settlements from Tangnag to Tashing Dingma with water, rock and accreted forest debris. The extent of damage to settlements, trails and adjoining *kharka*(s) (pastures) remains unassessed at the time this document was finalized for publication. Obviously, specific management initiatives recommended herein for these areas will need to be modified. Nevertheless, the pre-outburst descriptions serve as an historical record of prevailing conditions and trends from the effects of increasing adventure tourism. Managerial decision-making can draw upon these prior patterns and impacts of human utilization, in particular those related to development of an effective ecotourism policy, when seasonal habitation resumes with the April-May and October-November 1999 trekking season.

1.1 Route and logistics

To reach the western sectors of MBNPBZ in the spring of 1995, our group followed the main W-E trekking route to the Sagarmatha (Mt. Everest) region from Jiri (1900 m) as far as Khari Khola village (2010 m; Figure 3). A variety of reasonably priced store goods, including canned meats and fish, was available in Khari Khola. Restocking was considered essential as little if any foodstuffs could be expected in the Hinku and Hongu kholas.

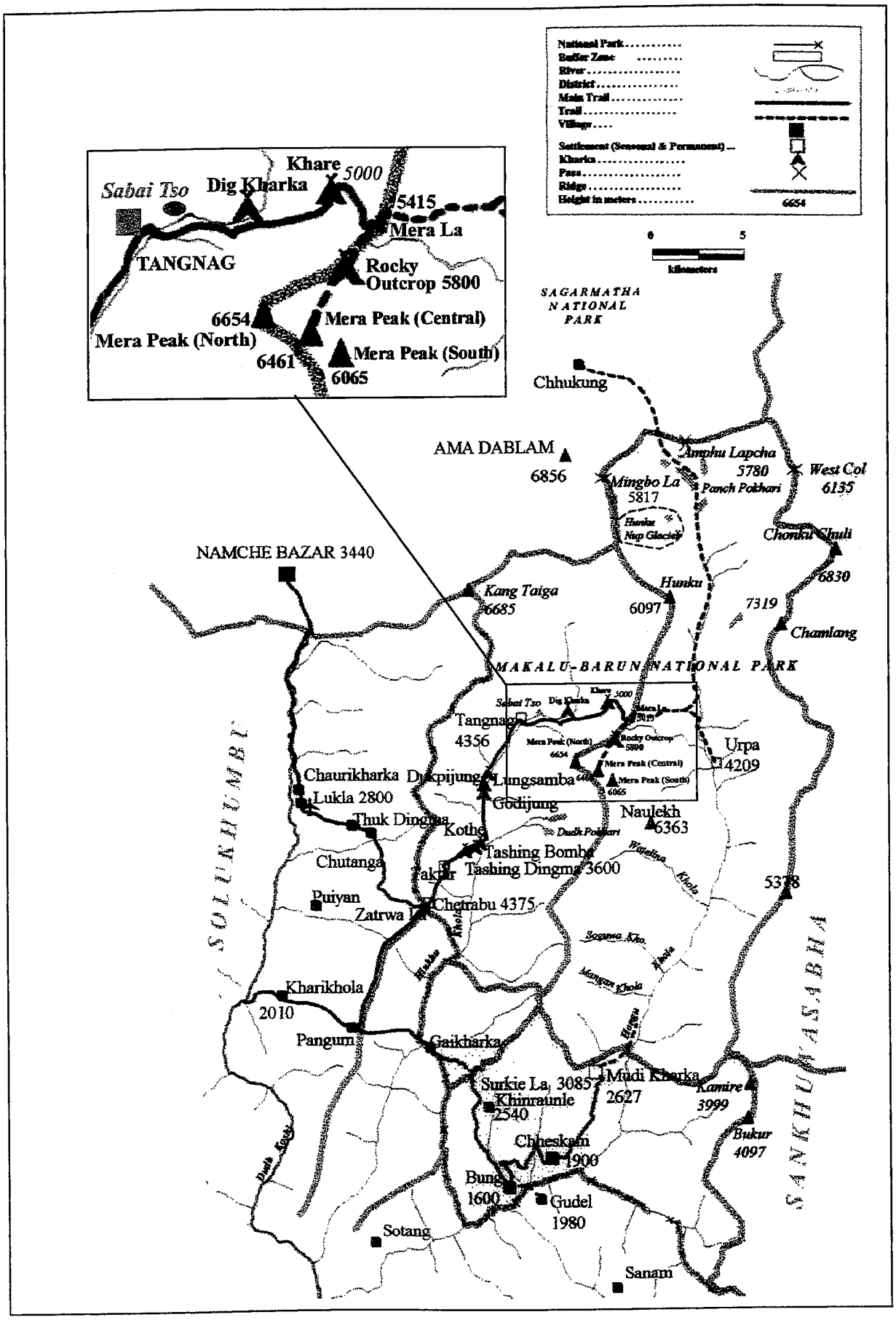
On 19 April we ascended the Khari Khola over a much narrower and less used trail, crossed Punggum (= Pangkongma) La (3173 m) on Zattara Danda, which demarcates the western border of MBNPBZ, and camped nearby at a glade NE of the pass at 3100 m. Old tent sites were evident, but glade vegetation was little disturbed from trekkers or other passers-by.

The next day we continued N along the crest of Zattara Danda over rough but discernable trail, entered the BZ, and at 1-2 hr intervals passed so-called *oraals* (= "caves", although usually no more than a shallow recess at the base of a large boulder or cliff), each with evidence of camping within the past year. Our afternoon passage was hindered by an intense hailstorm, coating the ground with ice that remained past sunset. We bivouacked for the night at *ca.* 4200m at a small overhang just S of the NP border.

On 21 April, we followed a steeply undulating trail through boulders and scree that was occasionally indistinct, even though the previous day's hail had melted by noon. Fog and sleet slowed progress in the afternoon, as did several dangerously steep and icy sections, where our *dhokos* (carrying baskets) had to be unloaded, and the contents positioned ahead by handfuls to safer terrain. Again we camped for the night beneath a shallow overhang, this one at about 4250 m.

On 22 April, we continued above the tree line to the abandoned grazing huts of Thuli Kharka (4330 m), the first structures encountered since Khari Khola. After 30 minutes of walking the trail we descended precipitously through tall rhododendron *Rhododendron* spp. and Silver Fir *Abies spectabilis* forests to the banks of the Hinku Khola. Within a few minutes of heading up the *khola*, we passed the campsite of Tashing Dingma (3550 m), a tiny (10 x 20 m) glade set in thick rhododendron-fir forest, little affected by trekkers or local traffic. Another half hour brought us to the small clearing of

Figure 3. Eastern Khumbu and the Hinkhu-Hongu River System



Tashing Bomba (= Tashing Ongma; *ca.* 3600 m), where we renovated the remnants of a lean-to built against the side of a large boulder. Nestled by a stand of riverside fir, the level site's warmth and backdrop of surging waters made for a comfortable camp after three days of bad weather on Zattara Danda.

The following day was spent ascending the gentle trail that follows the Hinkhu Khola to Tangnag (4356 m). We halted for lunch at Kothey (4236 m), a small, uninhabited *kharka* without structures, and scant sign of human modification, then walked past the roofless *ghot*s of Gondishung (=Godijung; 4050 m), Dupishung (=Dukpijung; 4050 m) and Lungsumba (4063 m). Each of these summer settlements is a collection of stone huts (*ghot*s), with only the hut walls left intact while unoccupied, and surrounded by grazing grounds. Gondishung is the only *kharka* that contains a *mani* (wall of stone plaques carved with Buddhist inscriptions and figures), nearly 50 m in length.

Tangnag (formerly known as Naulekhkharka) is the largest settlement in the Hinkhu. Unlike the other *kharka*s in the valley, Tangnag has stone walls around some of its potato fields. The views from here are dramatic and impressive, especially of an unnamed 6031 m peak in the eastern Mera Himal that towers from the valley bottom directly across from Tangnag. Before the glacial outburst, Sabai Tsho (4453 m), was a glistening blue lake, about 1.5 hr to the NE until the September 1998, and destination for a superbly scenic outing for those taking a day to acclimatize at Tangnag. On 24 April 1995 only one of four *ghot*s at Tangnag was occupied, this a hut with a limited supply of relatively expensive foodstuffs. We felt fortunate, though, for the opportunity to replenish our stocks of instant noodles, rice and biscuits, and to obtain information on the condition of trails that lay ahead.

From Tangnag a short day's walk to the E brings one to Khare, a *kharka* and popular camping ground at about 5000 m. Although situated on a small knoll, the views from here are greatly curtailed, particularly so compared to the spectacular ones encountered along the trail from Tangnag. The cramped surroundings of Khare function as a base camp for groups climbing Mera Peak (6654 m), and a convenient overnight stop for groups crossing Mera La (5415 m) en route to the upper Hongu Khola. Here in the headwaters of the Hinkhu, free-range defecation by trekkers and support personnel had created a sanitation problem that considerably detracted from the pleasantry of camping there.

On 25 April we crossed Mera La and reached an open site suitable for tents in the upper Hongu. From Khare to the pass, a steep trail through rubble and cushion plants gave way to even steeper glacial ice and snow. Crampons made the going much easier and safer up a 50 m lip of the glacier to a wide plateau with hidden crevasses that reach the pass. Mera La is noted for its fickle weather, and at noon we were quickly enveloped in clouds that had risen from nowhere in the Hongu.

Mera La area was revisited a year and a half later in November 1996 on descent from the Upper Hongu. The upriver trail intersects a less distinct path E of the pass just below a walled overhang with tent sites (name indeterminable) at *ca.* 5350 m. This is a convenient camp for groups travelling from Lukla or Khari Khola to Tangnag, and is used by some as a base camp for climbs of Mera Peak. Coming from the Upper Hongu, this site provides a good acclimatization stop before continuing to a high camp above Mera La.

On our 8 November 1996 passage we enjoyed excellent weather for the half day hike over Mera Glacier, following a well-defined and stable trail to a solitary exposure of rock at *ca.* 5800 m that serves as an ideal high camp. The site was originally referred to in the trekking literature as Rocky Outcrop (O'Connell 1989), but is also becoming known by trekking groups as Hongu Ledge Camp (Capron *et al.*, 1997). Facing S at the base of the towering outcrop, the ledge is well-protected from the winds and spindrift

that often sweep the glaciated surroundings. In winter, the rocky walls also absorb the heat of the sun during its low arc across the sky; as a result, the night time cold is noticeably bufferred. Tent platforms are located on two levels, with the more secluded upper platform prone to rockfall. A walk out to the edge of the surrounding boulder field produces unobstructed and stunning views, especially at sunset, of Makalu (8475 m) in the distance and the sheer SW face of Chamlang (7290 m) in the foreground. Through a gap in the long high *lekh* to the E, the Kanchenjunga massif (to 8586 m) is clearly visible 120 km away, giving added dimension to the surreal beauty of the vista from this vantage point.

From the high camp, we scaled the southern summit of Mera Peak on 9 November 1996. Reaching the slightly higher northern summit requires a tricky traverse over a dip of steep ice and crevasses which few climbers attempt. Fine weather, a well-used trail over the glacier, and at times, a winding, almost level approach allowed for a relatively easy and rapid ascent. A steady walk of four hours with crampons was required to gain the southern summit from the Rocky Outcrop. The final 50 m is over steep, hard packed snow and ice. A set rope greatly facilitates this scramble, but is not essential. The danger of a fall is, however, clear and present. Carrying an ice ax allows a safe glissade to a shallow basin at the bottom (Figure 4). In climbing Mera Peak from Mera La, care must be taken to stay on the hardpack trail, as deep snow or hidden crevasses often border it.

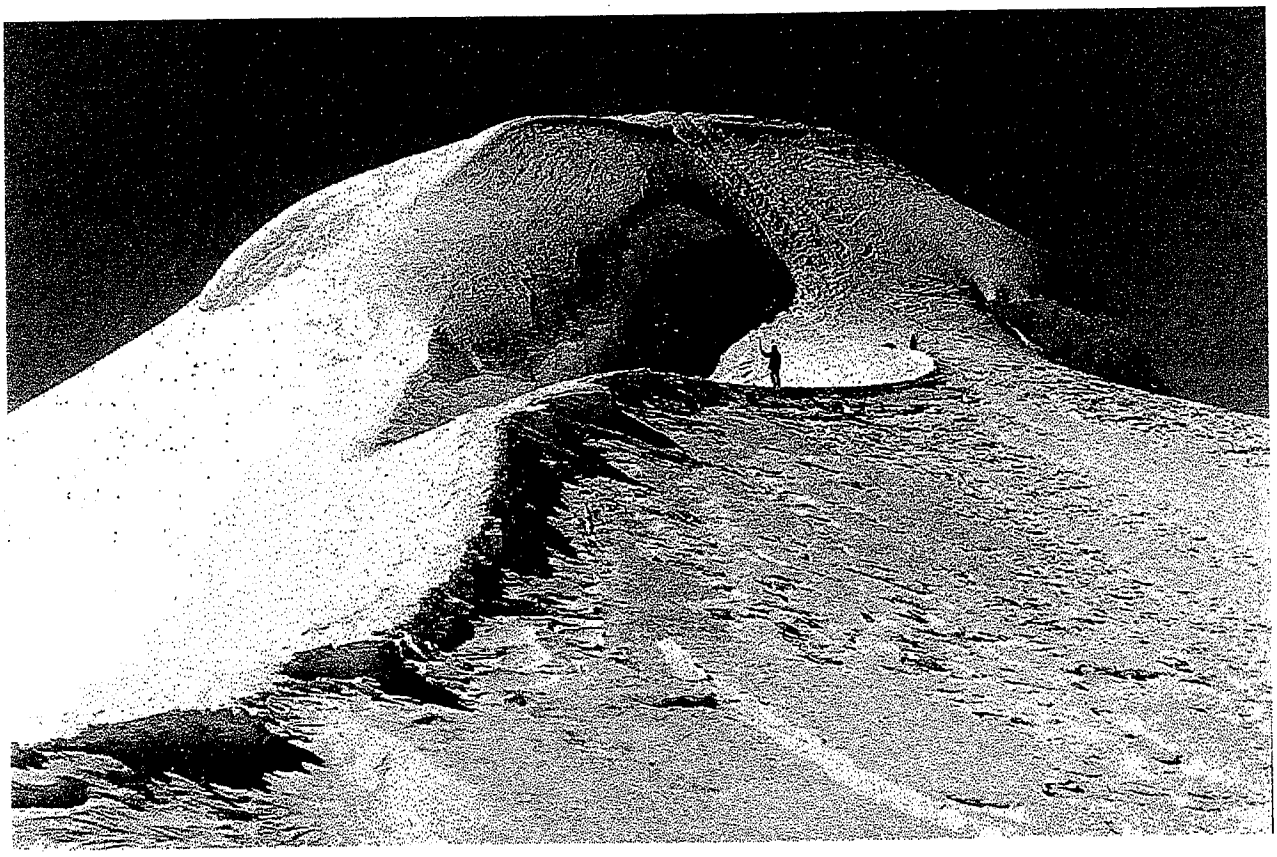


Figure 4. South summit of Mera Peak *ca.* 6595 m.

Calculated heights of the southern and northern summits of Mera Peak vary considerably. The Schneider map gives 6461 m and 6476 m respectively, and the 1967 Survey of India topographic map (sheet 72 1/14) records 6437 m and 6471 m. Unfortunately, the new Survey Department topographic maps at 1:50,000 do not help to clarify the heights. The southern summit of Mera is listed as 6470 m, but the northern peak is given the lower altitude of 6347 m, and the name "Mera" is assigned to peaks further N of Mera La. Nepal Mountaineering Association (NMA) has a single listing of 6654 m for Mera

Peak. On the southern summit, our satellite navigator was stable at 6595 m, an elevation that is reputedly accurate to within 50 m.

We descended to Khare in the afternoon, a long walk on ice paths except for the final half hour through craggy rubble and scrub. Little appeared changed since our mid-1995 visit, although the walled overhang had been extended with a dining tent to form a makeshift store. Available supplies of rice, cigarettes, *rakshi* (spirits) and beer were expensive, because goods must be portered for 3-4 days over rugged and high terrain from Khari Khola or Lukla. The confines of Khare were again found polluted by human feces, in various states of decay, at the outer edges of large boulders, and less exposed areas including the periphery of tent sites.

Clear and calm weather prevailed on 10 November 1996 for our walk to Tangnag. A wide trail traverses scrub vegetation and passes directly below Peak 43 (6769 m), a majestic, sheer pyramid of himal directly N of Tangnag, with glistening white and blue glaciers that seem to dangle above Sabai Tsho.

In stark contrast to May 1995, our revisit of Tangnag during the peak trekking season of 1996 revealed three new stores-cum- inns with a fifth under construction, each with a wall of firewood. A wide variety of trekking supplies were available, and stacks of beer bottles had begun to accumulate outside most lodges. The walled fields were extensively utilized for tent sites. Four groups, including ours, were present. These were comprised of 21 foreign trekkers and 45-50 support staff.

The next morning, 11 November 1996, we walked down the Hinkhu Khola to Tashing Dingma, and found it still uninhabited without structures. En route, however, **we passed a new settlement at Kothey** *kharka*, with five bamboo and wood huts constructed at the beginning of the trekking season to cater for the increasing Mera Peak traffic. These rudimentary structures supply porters with basic provisions such as tea, biscuits, *chung* (locally produced millet beer), and tobacco, but include instant noodles, chocolate, bottled beer and tinned goods for trekkers. **When we lunched here in 1995 there was no evidence of human habitation, even seasonal.**

On 12 November 1996 we continued downriver to Tashing Dingma camp ground, and soon thereafter turned steeply up Zattara Danda. **We lunched at Taktar (4100 m), a large boulder and now popular, littered campsite with one of the few overhangs encountered on this section of trail. In 1995 there was no evidence of camping at this site.** In the afternoon we traversed less steep trail and paused at Thuli Kharka (14,200'), little changed in terms of habitation since our passage in 1995, but noticeably more chopped over for firewood. From there we made our way up steep slopes and landslips over wide and often braided trail to the new settlement of Chetrabu (= Chhetrawa; 4372 m; 27° 38' 30" N 86° 46' 36" E). An overhang at the side of a huge boulder had been used to construct walls for a store and shelter. In addition, there were several good tent sites in the immediate vicinity. A *ghot* had been renovated as a second store, the owners of which said was a first year venture.

The next morning we ascended steeply to Zatrwala pass (4600 m; Schneider map name; Figure 3), dipped NW out of the Park to cross a high spur, and descended over an a icy, treacherously steep N face path through high altitude scrub to a forested trail that widened gradually. Below 3150 m braided trails traversed open country of pastures and old fields as we neared the regional transit center of Lukla (9,200'). Two campsites were passed en route: Kharki Teng at *ca.* 3700 m, an overhang and ghot walls set amongst tall rhododendron shrubberies and scattered fir just below the tree line, and Chutanga *ca.* 3100 m, a larger site regularly used by groups trekking to the Hinkhu valley as a camp on the first day out of Lukla.

A higher and more direct route exists from Tangnag to Lukla, crossing the northern extension of Zattara Danda known as Kalo Himal (Schneider map name) at Zatr Teng (4943 m). In the Hinkhu Khola watershed, the trail passes through the high pastures of Orshela (4324 m), keeping above the less difficult riverside trail until the ghots at Gondishung are reached. This alternate route is avoided by trekking groups due to the higher, possibly snowbound pass, and its more rugged, dangerous and time-consuming character compared to the circuitous Zatrwala route.

1.2 Habitat types and condition

The upper Hinkhu Khola contains some of the most intact examples of highland forests that occur on major trekking routes in Nepal. Unfortunately, **as observed during our two visits, the virtually pristine character of these forests was rapidly being lost by the impact of an increasing influx of trekkers and those catering to their perceived needs.**

Forests bordering the Zattara Danda trail from Punggum La to Thuli Kharka are least disturbed. Silver fir *Abies spectabilis* and mixed rhododendron *Rhododendron* spp. are dominant. A thick bamboo understorey is present at about 3200-3500 m, but in April 1995 much of this was observed to be dying or dead. Above the treeline at 3700 m, shrubberies and grassland are little modified by man, although cutting of dwarf juniper *Juniperus* spp. for firewood and close cropping of grasses from summer grazing were evident around Thuli Kharka, a steep meadow where the trail from Lukla intersects. In April 1995 cutting was discriminate and minor, barely noticeable from the main trail. By November 1996, however, burned clumps and more expansive cutting, including the removal of entire clumps, was conspicuous.

Beyond Thuli Kharka at Zatrwala La on the western Park boundary, the trekker descends steeply through zones of rhododendron *et alia* scrub, rhododendron shrubberies, fir forest, and finally upper temperate broadleaf associations, to reach Lukla in the Dudh Koshi drainage. The high altitude scrub and shrubberies on the Zatrwala-Lukla route were found to be virtually intact, but lower down fir trees in the vicinity of the trail are extensively felled for timber, and associated tall rhododendron is hacked for firewood. Nearly pure fir forest is reached at 3300 m, but this stand has been ravaged for timber in the recent past, and is clearcut 100-300 m from the trail. At 3000-3150 m mixed forest of oak *Quercus* spp., maple *Acer* spp. and deciduous broadleaf species was in better condition, but intensively utilized for firewood. Below 3000 m the upper temperate forest approaching Lukla has been nearly cleared by cutting for timber and firewood, and now provides seasonal pasture for area livestock.

Forests along the banks of the upper Hinkhu from 3200 m to the treeline at about 4100 m are composed mainly of Himalayan Birch *Betula utilis*, Silver Fir *A. spectabilis*, and *Rhododendron* spp. Woodland of tall Drooping Juniper *Juniperus recurva* and grass tussocks occur on steep S and SE facing slopes in the vicinity of Taktar (3750 m). A dwarf form of the juniper is common in the *kharkas* above the tree line. Within a few hundred meters of the river, the forest is very damp. Canopy tree branches are heavily moss-encrusted, as are large boulders in shadier sites. Ground cover is fairly dense, often with a carpet of moss and ferns, and an open bamboo component that extends to the sub-canopy. Many fallen stems and branches and some standing deadwood were evident on our April 1995 passage, and causing short detours in the trail. By November 1996, fallen stems were noticeably diminished by firewood collectors, particularly around campsites, and the widened trail was much less obstructed. Ground cover appeared reduced by seasonal grazing, mostly within 50 m of the trail. North and S of Kothey, felling of tall trailside fir for timber demand at Tangnag (as one timber cutter acknowledged) was observed to be in an unsightly initial stage (Figure 8).

At higher elevations in the Hinkhu, signs of degradation were more evident. Mats of Black Juniper *Juniperus indica* in the flats W of Tangnag have been extensively thinned by firewood demand. The cutting is fairly discrete and selective. Seen from the settlement, damage to the thickest limbs is not obvious. The higher, more fragile scrub of prostrate juniper and a dwarf rhododendron *Rhododendron setosum* that dots the slopes around Khare and a meadow E of there is even more degraded, again due to the demand for firewood. Vegetation between Tangnag and Khare is in better condition, but some trailside juniper has been lightly cut for fuel, and deadwood is sparse, even 50-100 m from the trail.

Although forests in the vicinity of the main Hinkhu Khola trail are increasingly altered by human activities, these do not appear, as yet, to have affected the ecological integrity of the forest. Most cutting is restricted to the immediate vicinity of trails and *kharkas*. Evidence of fire, even as natural outbreaks, is scant. Although valley slopes are steep in places, there are few landslips. A recce through binoculars of the E bank of the Middle Hinkhu showed an extensive unbroken canopy. Only one small *kharka* was noted, containing a single *ghot*, at about 3500 m in the Molang Drangka tributary.

1.3 Wildlife observations

Bird tallys were depressed due to poor spring weather in 1995 and the lateness of our autumn passage in 1996. The low totals of 40 species were recorded from Punggum La to Mera La in 1995, and 16 species from above Mera La to Zatrwala in 1996 (see Appendix A). Most birds encountered were common and fairly common residents of high altitude forests (3000-3700 m), and featured mixed hunting parties of *Phylloscopus* warblers, tits, tit-babblers and treecreepers. Higher up (3700-5800 m), Alpine and Rufous-breasted Accentors *Prunella collaris* and *P. strophiata*, rose finches, redstarts, Yellow-billed Choughs *Pyrrhocorax graculus*, and Ravens *Corvus corax* dominated the avian landscape. The increasing harshness of the environment with altitude was reflected, however, by a corresponding decline in species diversity and abundance.

Perhaps the most noteworthy birds at high altitude were Great Rosefinch *Carpodacus rubicilla*, at the 5800 m rocky outcrop above Mera La on 9 November 1996 (a new species for MBNP), and a flock of Altai Accentors *Prunella himalayana* in the Upper Hongu at 4760 m on 7 November. One individual was snatched by a Himalayan Mouse-hare *Ochotono* sp. and cached under a nearby boulder. The small mammal then returned to almost capture a second bird (Cox 1999) - a most unusual observation as mouse-hares, and indeed all lagomorphs, are otherwise known to be exclusively herbivorous.

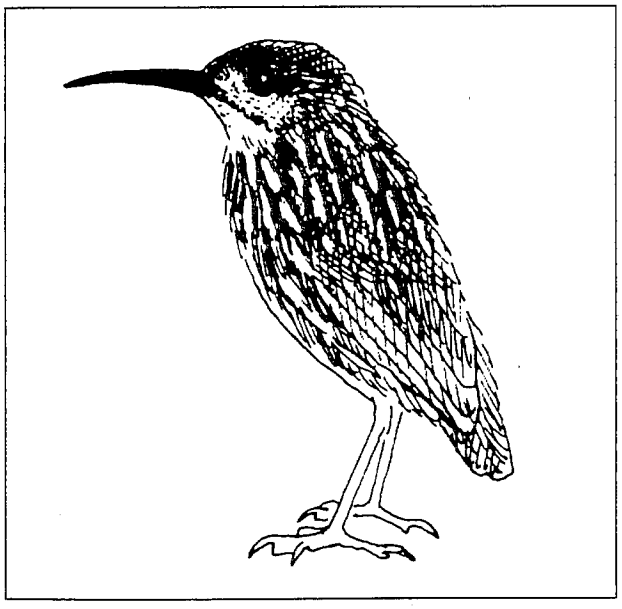


Figure 5. Long-billed Wren-babbler *Rimator malacoptilus* (source: King *et al.* 1975)

Despite the difficulties of observing birds in spring 1995, several unusual sightings were recorded. A single Long-billed Wren-babbler *Rimator malacoptilus* (Figure 5) was clearly observed on 20 April 1995 by assistant Chundak Sherpa. The site was at 3260 m on Zattara Danda 3 km N of Punggum La amongst boulders and dry bamboo understorey of rhododendron forest (Cox and

Sherpa 1999). This is the only record of the species from Nepal, and the 842nd bird species for the country (H.S. Baral, Bird Conservation Nepal, pers. comm.). Long-billed Wren-babbler is a little known monogeneric timaliid of the eastern Himalayas, with disjunct populations in NW Tonkin (northern Vietnam) and W Sumatra (Ali and Ripley 1971; King *et al.* 1975).

Figure 6. Snow Partridge *Lerwa lerwa* in a hailstorm on Zattara Danda *ca.* 3200 m.

A female Merlin *Falco columbarius* was recorded on Zattara Danda at 4200 m on 21 April, and a probable second sighting of this scarce species in Nepal (Inskipp and Inskipp 1991) was made three days later above Khare. Wood Snipe *Gallinago nemoricola* was observed and heard around the camp below Punggum La at 3100 m. This species is little known and globally threatened (Collar *et al.* 1994), but previously reported in MBNP at Kongma and in the Barun valley (Inskipp and Inskipp 1991), the latter record including the only information ever documented on its nesting biology (Cronin 1979).

Three flocks of Snow Partridge *Lerwa lerwa* (9, 12 and 8 birds respectively on 20, 21 and 22 April) were noted above the treeline on Zattara Danda between 3800 and 4300 m. The first flock tolerated an approach to within 20 m for photographs (Figure 6), and the others showed little wariness. From Tashing Ongma to the limit of tall rhododendron shrubberies below Tangnag, three pairs and a small flock of Blood Pheasants *Ithaginis cruentus* were observed along the main trail. Most individuals were watched at close range, and sometimes in full view. Their almost fearless behavior indicated that the Sherpa prohibition on hunting of wildlife extends to the upper Hinkhu Khola.

Figure 7. Male Blood Pheasant *Ithaginis cruentus* at 2750 m, Hinkhu Khola.

No large mammals or reptiles were sighted in the Hinkhu Khola watershed. Himalayan Thar *Hermitragus jemlahicus* was said by Tangnag residents to be fairly common in the Upper Hinkhu. During their stay at Tangnag in May 1997, members of a US Peace Corps/SPCC clean-up and ecotourism project observed an unwary herd on steep grassy slopes in the immediate vicinity of Tangnag (D. Laflamme, pers. comm; Capron *et al.* 1997).

1.4 Human interactions and impact

The region has no perennial inhabitants, but is increasingly occupied during the spring and autumn trekking periods. During the monsoon months, sheep and yaks are grazed at several *kharkas* in the Upper Hinkhu, and

potatoes are grown at Tangnag and S at Orshela and Saure (Capron *et al.* 1997), smaller settlements located off the main trail.

The principal impact on forests and scrub in the Hinkhu Khola is the cutting of vegetation for firewood at all campsites. Trekking group litter was found at most campsites. The felling of trailside fir N of Kothey (Figure 8) for lodges and stores in Tangnag was assessed to be a recent activity, occurring within the past year. Tree felling at Kothey is especially damaging to the negligibly marred beauty of the river valley, and its trailside character suggested that either the cutters were unaware of Park regulations or unconcerned about possible enforcement actions.

As may be expected from the increasing frequency of human presence at and around the forested campsites of Taktar, Tashing Dingma, and Tashing Ongma, the presence of deadwood has diminished noticeably from 1995 to 1996. While some large fallen tree stems remain undisturbed, many smaller stems and branches were no longer evident by November 1996. At Taktar and Tashing Dingma, several fir trees in the vicinity of these campsites had been ringbarked within the past year.

Higher up the Hinkhu river valley, shrub vegetation bordering most *kharka*s was found to have been similarly degraded during the 1995-1996 period, with more patches of dwarf juniper and rhododendron removed and burnt near campsites.

Most store owners at Tangnag stated they were from Lukla, and appear to be earning sufficient income to continue their seasonal enterprises. Juniper scrub in flats W of the settlement has been extensively cut for firewood since initial inspection in 1995. The cutting has been somewhat selective in pattern, with only the thickest branches of most plants removed, and plants on the surrounding slopes apparently unaffected by May 1997. Nevertheless, this practice is obviously unsustainable.

Because of an inverse relationship between growth (biomass generation) of woody plants and altitude, the juniper and other scrub at Tangnag is more fragile and prone to overharvesting compared to forests at lower elevations. High altitude juniper in MBNP has been found to grow very slow, taking 30-50 years to form a single clump (Brewer Lama 1995 citing Carpenter 1993). There is also a tendency for fuel demand to increase at higher altitudes. All four groups at Tangnag during our stay in November 1996 had kerosene stoves and apparently used them for most members, although porters and guides from several, possibly all, groups joined store owners to cook their own food and purchase hot drinks.

Efforts to meet trekker demand are obviously overwhelming the regenerative ability of vegetation in the Upper Hinkhu, which is already under some pressure from grazing of Lukla based livestock during the summer months. Because the Upper Hinkhu was not visited during summer, it was not possible to evaluate the scale and effect of grazing. Even so, much of the forest in the upper Hinku is evidently not grazed simply because it

Figure 8. Trailside fir felled for timber, S of Kothey, November 1996.

is too steep. Livestock venturing more than 50-100 m from the Hinkhu trail would be prone to falls in most places. Reduction of vegetation by cows and yaks is therefore confined to the immediate vicinity of the main trail, where thinning of understorey shrubs and herbaceous ground cover was apparent in November 1996. Observations made while birdwatching showed that the few side or auxiliary trails usually extend only 30-100 m from the main trail.

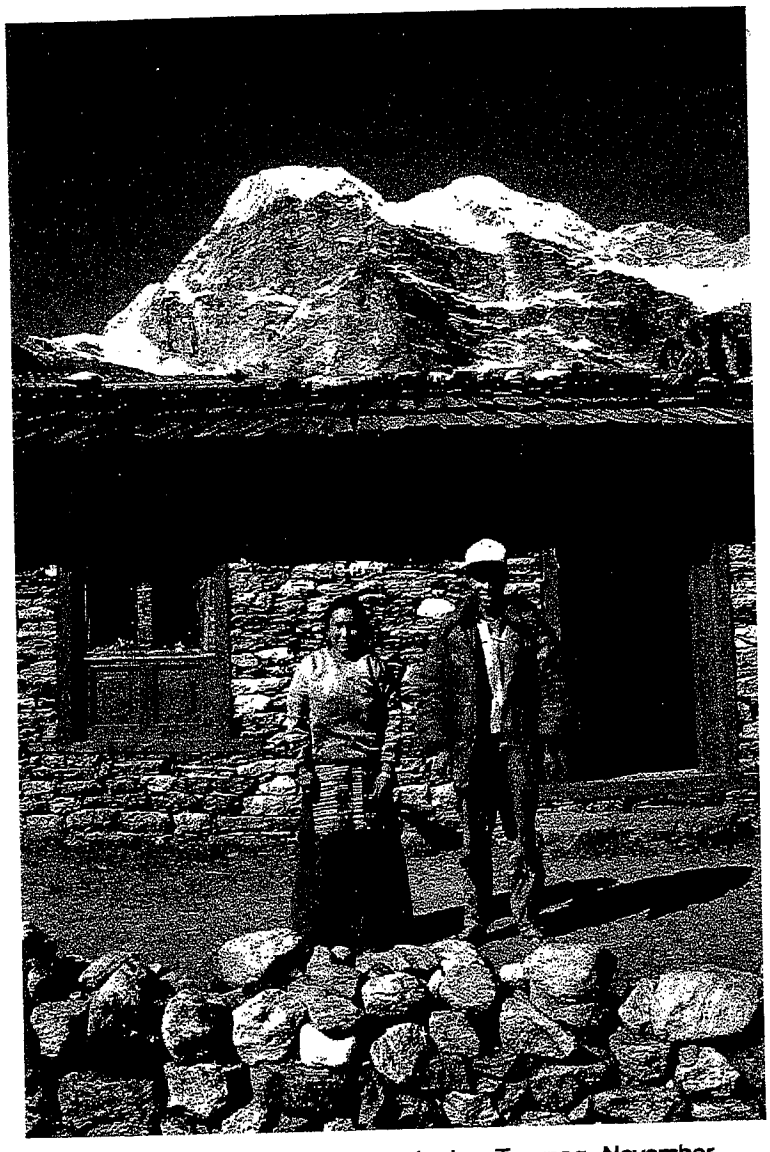


Figure 9. Owners of the Namaste Lodge, Tangnag, November 1996.

The recent large influx of climbing groups and limited project management activities has led to a litter and sanitation problem. Plastic wrappers, empty tins, and discarded batteries were becoming commonplace along the entire Lukla-Tangnag-Rocky Outcrop trail by November 1996. Even more unsightly was the extent of free-range defecation, particularly atop the trailside ice at Mera La, and at the periphery of the Khare and Rocky Outcrop. At the latter site, combustible trash composed of cardboard boxes and plastic wrappers was burned. Scattered cans and bottles and other non-burnable litter were collected and buried in a shallow pit at the base of the ledge.

In May 1997 the Peace Corps/ SPCC/ MBCP project found that environmental degradation had intensified at most campsites. Existing, basic garbage pits were overflowing at Tangnag and Khare, and disused at Kothey, where trash was piled at the perimeter. Piles and scattered garbage were found at the Rocky Outcrop and Tashing Dingma. Free-range defecation was an increasing problem at all sites, and cutting of vegetation, primarily for fuelwood, had similarly worsened. **At Tangnag, the dwarf juniper was "being devastated by trekking groups and local lodges. At each lodge huge piles of firewood are burned in the stove, porters can be seen out daily chopping away at the (juniper)".** Many trekking groups were reported to stock up on firewood at Tangnag for use higher up at Khare and Mera Peak base camps (Capron *et al.* 1997).

The cleanup and ecotourism project constructed two compartment garbage pits and pit toilets at Kothey, Tangnag and Khare. Trash was collected and burned at most lower sites. Recent snowfall and freezing of litter into glacial ice prevented cleaning of the Mera La campsites. Some trash at the Rocky Outcrop was collected and burned, and non-combustibles carried down to Khare.

1.5 Management considerations

Although the scale of habitat degradation in the Hinkhu valley is still manageable, the rate of degradation continued to increase rapidly through the spring 1997 season (Caprone *et al.* 1997). The number of trekkers and climbers to Hinkhu valley areas has swelled from about 400 in 1995 to more than 992 by 1999 (NMA, unpubl. data). Visitorship currently exceeds that of the Park's other main trekking route, Seduwa-Makalu Base Camp, where at least 872 trekkers (and probably not more than 900) visited in 1998 (DNPWC, unpubl. data), making Hinkhu valley the most popular destination in the Park.

Most visitors are attracted to the area by the opportunity to climb Mera Peak, the highest of Nepal's 18 trekking peaks, yet one of the easiest to summit. Mera provides the rare opportunity for a mountain adventurer to go above 21,000 ft (6400 m), and is one of the finest viewpoints in the Himalayas, featuring a majestic panorama that includes four of the world's six highest mountains (Figure 10). To the N, Mt. Everest (8848 m) and Lhotse (8501 m) of the Sagarmatha group tower in the distance. Makalu (8475 m) and Chamlang (7290 m) dominate the NE skyline, and the Kanchenjunga massif (to 8586 m) and Singalila *lekh* (high ridge) taper off into the distant eastern horizon. To the S, the Khandbari area of the upper Arun River and the forests of the Lower Hinku are seen clearly through binoculars. The stunning vista is completed in the W with Mera's nearby northern summit set amongst a jagged backdrop of ice-capped peaks that comprises Mera Himal.

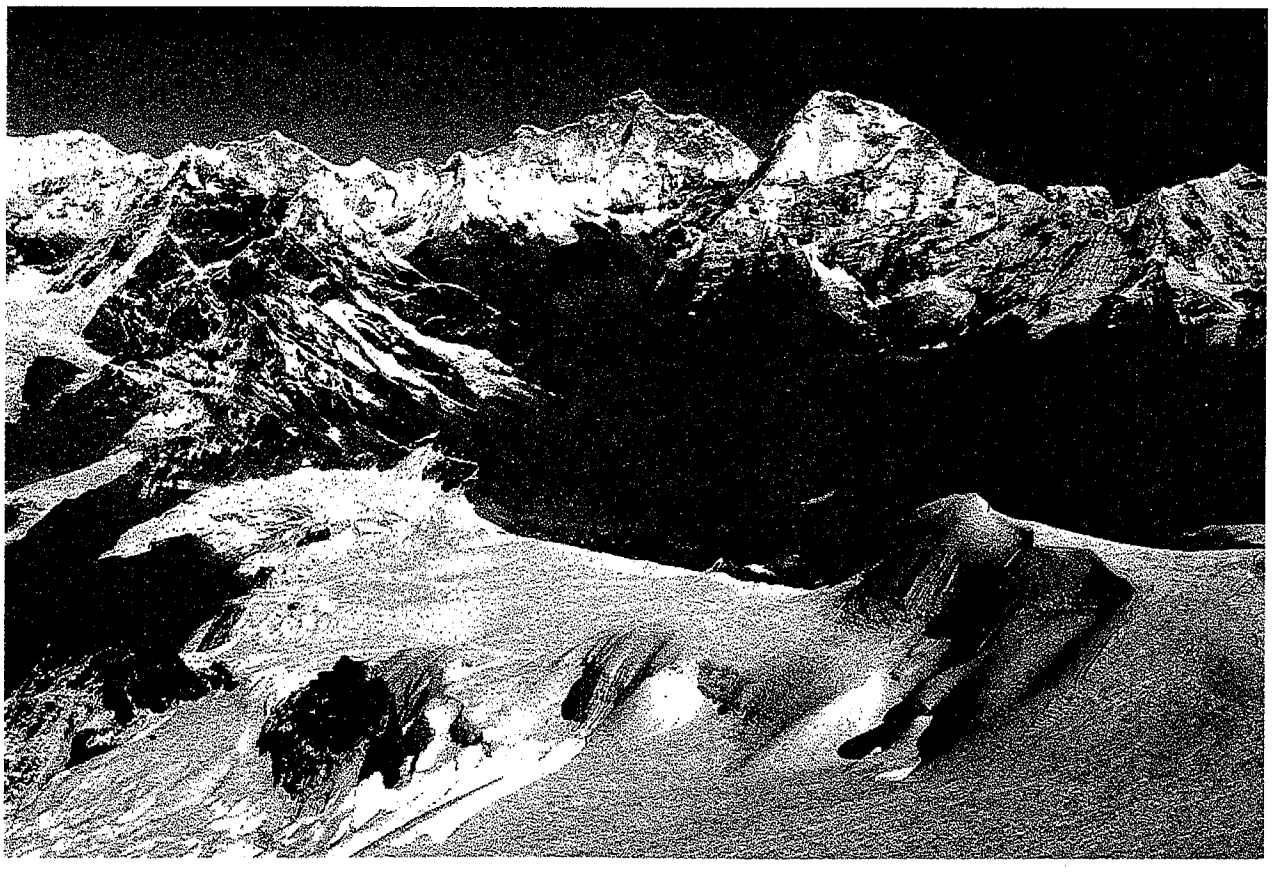


Figure 10. Makalu (8475 m), Chamlang (7848 m) and the the Upper Hongu Khola from the central summit of Mera Peak (ca. 6595 m).

Considering the semi-pristine local surroundings of the approach march, and the beauty and immensity of the panorama, it is not surprising that Mera Peak is rapidly attracting a wide variety of groups. For a time pressed visitor to Nepal, the proximity of Lukla airstrip allows a relatively short (14-16 day) climbing

trek to be undertaken. Trekkers, however, expect an aesthetic approach through intact habitats. All stakeholders should be aware that degradation of the Park's aesthetic beauty will, in turn, degrade the economic value of the Park. Even with the prize of summiting a 21,000 ft peak, no one wants to undertake an arduous trek with the knowledge of finding trash dumps or mutilated forests and chopped over alpine vegetation. Disappointed by unsightliness, adventure trekkers will be tempted to search elsewhere for a wilderness experience. Clearly, it is in the best interests of all stakeholders to preserve the attractiveness of trails, campsites and peripheral habitats in the Upper Hinkhu.

As a result of this author's assessment and the activities of the Peace Corps/SPCC/MBCP project, the stakeholders and principal management issues involved with design and implementation of an enduring, site-specific ecotourism policy have been identified. Recommendations are offered to put such a policy into action.

1.5.1 Stakeholders:

Government and people of Nepal: Tourism is the second largest industry and foreign exchange earner in Nepal, and will likely become the largest within the next few years. Tourism-related revenue allows funding of important social services programs that an increasingly vocal electorate is clamoring for. The reputation and pride of Nepal as a country of spectacular natural beauty and rich cultural diversity is at stake. Due to official demarcation of the Upper Hinkhu as part of a National Park, under Nepalese law the land is owned by the government and administered by DNPWC. Locally, the Park generates substantial revenue for HMG from issuance of trekking permits, visa and entry fees, as well as mountaineering and trekking peak charges.

Seasonal grazers and farmers: Historical seasonal inhabitants of the Hinkhu valley. Some residents of Lukla and Chaunrikharka outside the Park, and Chheskam and Gai Kharka of the BZ in the Lower Hinkhu, maintain and increase their wealth earned from livestock (yaks and sheep). They rely on growing potatoes at several *kharka*s to supplement local food stocks, and now regard the crop as an important source of income from sales to lodges and trekking groups.

Lodge and tea shop owners: Recent migrants from the Lukla-Chaunrikharka area. The stakeholding claim of these seasonal inhabitants is disputable. Even so, they provide important benefits to trekking groups and evidently earn substantial income from the sale of accommodation, drinks and meals. These entrepreneurs are also important sources of information for visitors on conditions of trails and campsites in the area, and are potential monitors of trekking activities.

Trekkers and climbers: Visitors who pay relatively large sums of money to various other stakeholders to enjoy the natural beauty of the Hinkhu valley, in particular the experience of climbing Mera Peak. In addition, most of these visitors value the opportunities of cross-cultural interaction on their trek.

Trekking agency personnel: Kathmandu based service providers who satisfy the main logistic needs of most trekkers visiting the region, and provide employment as guides, cooks and porters to members of largely external local communities.

Nepal Mountaineering Association (NMA): This parastatal (quasi-government organization) derives substantial revenue from issuance of Climbing Permits (US$ 300 per group of 2-10 foreigners). Of the 18 Trekking Peaks, only Imja Tse (Island Peak, in Khumbu; 6189 m) attracts more climbers than Mera.

1.5.2 Principal issues.

User rights are the overarching management issue in the Hinkhu valley. Perverse economics are at work because the seasonal grazers at and below Tangnag do not depend on area storekeepers, and in theory, compete with them for what they consider a cost-free fuelwood resource. Because supplies remain readily available grazers do not object, and probably welcome the expansion of pastures created by overexploitation for fuelwood. Nonetheless, seasonal entrepreneurs lose potential benefits if the touristic appeal of the area is degraded to such an extent that the number of trekkers declines.

Deforestation. Cutting of Silver Fir trees for lodge construction, mainly in the Kothey vicinity, ringbarking of trees to enlarge forested camp sites at Tashing Dingma and Taktar, and ubiquitous fuelwood demand are the main concerns. The problem increases in severity towards the altitudinal limit of shrubberies, where pressure is greatest and regeneration of the vegetation is slowest (*i.e.* dwarf juniper at Tangnag). Substitution with kerosene is problematic because it must be portered from Lukla over a difficult route frequently subject to closure by snow, resulting in high transport costs.

Removal of vegetation at high altitude in the Upper Hinkhu at current, increasing rates risks local ecological destabilization within the near future. Even minor cutting at camping sites and lower elevations is harmful because it conspicuously degrades the unique pristine character of the area, and diminishes the ecotourism value of the Park in both the near- and long-term.

The historical local community in this area is a relatively small group of seasonal herders and hunters who come to graze their yaks during the June-September monsoon. The activity has apparently occurred annually for several generations without substantial expansion of pastures. Clearly, much of the habitat degradation at Tangnag and other sites is a recent phenomenon and directly attributable to catering for trekking groups, both individually and agency organized.

Lodge and tea shop management. At present, the number and activities of lodges and tea shops remains unregulated and inadequately monitored. Contact with the Park authority is logistically very difficult. Travel to the distant headquarters at Seduwa is infeasible, and the nearest sector office of MBCP at Bung (via Thuli Kharka and Punggum La) is several days walk away over rough, remote trails with few facilities en route.

The Kothey, Tangnag and Khare store owners are apparently not involved in grazing activities and retreat to Lukla outside the trekking seasons. Their recent arrival after the Hinku was gazetted as part of the Park gives them no legitimate claim to the land. As such, they may be considered squatters, but describe themselves as pioneering entrepreneurs, lacking alternate opportunities for income and satisfying an important economic demand. Their role can largely be supplanted by individual trekkers and trekking agencies who hire additional porters to ensure self-sufficiency, but this adds costs for the agencies, which would likely be passed along to their clients. Is an uninhabited Upper Hinkhu, however, necessary or even desirable to limit habitat degradation? Are interventions available that would enlist the effective participation of local entrepreneurs in managing the area to rehabilitate and conserve habitat, in turn easing a burden on the resource-strapped management authority?

Garbage and litter. Prior to the Peace Corps/SPCC/MBCP project, these pollutants were increasingly degrading the visual beauty and quality of trekker experience along most routes in the Hinkhu valley,

particularly at major campsites. Although increasing volume of trash and indestructibility of some components are important concerns (*e. g.*, batteries), the problem is mostly superficial in character, and thus more amenable to resolution than damage to vegetation. The joint project has made an important initial effort to resolve this issue by constructing garbage pits and enlisting the support of lodge and tea shop owners to maintain these sites. Awareness and an impetus to mobilize was created among these stakeholders by clarifying the purpose of the Park, and elucidating the link between negative impacts on tourism and a reduction in their benefits. The questions, however, remain:

Who will follow up the work of the project to monitor signed "contracts" with seasonal entrepreneurs and effectively address littering by trekkers and trekking agency personnel?

Can a site-specific policy be devised from provision of incentives and/or deterrents that will strengthen the responsibilities of each stakeholder?

Human waste and sanitation. The lack of toilets has led to a sanitation problem at all camp sites and settlements. This is pronounced at confined locations such as Khare and the Rocky Outcrop, and heavily used sites such as Tangnag. As noted by Caprone *et al.* (1997), the problem is arguably most acute on the Mera La glacier camps because excrement frozen into the ice is extremely slow to decay. In addition, the very source of the Hinkhu Khola is being contaminated, and the conspicuous contrast of pure snow and ice with excrement is particularly repulsive to trekkers. Construction of toilets and local management arrangements initiated by the Peace Corps/SPCC/ MBCP project is an important first step in resolving the issue, but a successor initiative is required.

Trekker and trekking agency actions. As those who constitute the majority of the rapid influx, trekkers have a clear if not primary responsibility, to minimize, directly and indirectly, negative impact to the local environment. As clients, trekkers can insist and receive assurances before contracting that the agency will adhere to Park guidelines and regulations. During their trek they can set important examples with their own behavior, and express their environmental concerns with agency personnel and local entrepreneurs. Some trekkers already perform this role, but a substantial increase in such pro-active "eco-trekking" would greatly facilitate management of garbage, litter, human waste, and fuelwood consumption.

Treatment of porters is also a cause for concern. In November 1996, a sick and incapacitated porter was abandoned W of Mera La by members of a well-known Kathmandu based trekking agency. A successful search and rescue operation was mounted by the author, his assistants and members of another trekking agency. In addition, reports have been received of poorly equipped porters attempting to traverse Mera La in bad weather, a directly life-threatening situation.

Enforcement ability. Park staff are hindered in regularly patrolling the Upper Hinkhu by limited budgets, remoteness of the nearest sector office at Bung, and the high altitude constraints of establishing a permanent base at Tangnag. The proximity of Sagarmatha National Park staff and associated NGOs such as SPCC in Lukla presents the possibility of effective liaison (as the PC/SPCC/MBCP project demonstrated), but there remains no authoritative presence to adequately monitor events in the Hinkhu and enforce Park regulations.

Park "development". A MBCP poster exhibition at the SPCC office in Lukla promotes the Hinkhu Khola and Mera Peak areas as "a Trek on the Wild Side", and encourages trekkers to go there. A well designed series of photographs and captions effectively illustrate the attractions of the area. Tangnag-

based entrepreneurs expressed their aspirations for a variety of facilities, including an airport, electricity, and hot showers (Capron *et al.* 1997). If introduced, these changes would offer greater comforts to lodge owners and tourists, but for some or perhaps many adventure trekkers, development of such small town amenities would clash with the quest for solitude and a wilderness experience. In competing visions, whose aspirations should take precedence? To what extent do products of "development" negatively impact the attractiveness and potential of the Park to generate income and other economic benefits for local stakeholders and the Park itself?

1.5.3 Recommendations

The current Makalu-Barun project prioritizes its activities to establish community-participatory management of the Park and Buffer Zone. Such an approach seems indispensable in achieving the conservation goals of the project. While project resources are necessarily prioritized for local communities in the BZ, the upper Hinkhu Khola area within the Park is experiencing a rapid influx of visitors and settlers, and therefore merits priority attention.

I. Re-assessment of Hinkhu Khola habitats. A survey of the damage and disturbance caused by the Sabai Tsho glacial outburst is needed as a highest priority activity to evaluate the condition of habitat, trails and settlements. Survey results would be particularly valuable in calculating construction requirements (*i. e.* re-opening of trails, reestablishment of campsites, lodges, stores and sanitation facilities) and most important, expected impacts of fuelwood demand in the Upper Hinku. If the outburst has felled and strewn many forest trees in the Kothey-Tashing Dingma section of the trail, some of this deadwood may be benignly utilized as a source of fuelwood for the near future to alleviate the need to cut vegetation along the higher Tangnag-Khare trail.

II. Establishment of a help-oriented outpost at Tangnag. MBCP and DNPWC should organize at least a seasonal presence in the Upper Hinku. Even an occasional patrol to monitor visitor use and habitat change would be valuable for the knowledge gained and resulting feedback for management decision-making. Moreover, heightened awareness and education on the part of user groups regarding the value and benefits of protecting this unique environment could be inculcated in a variety of ways. Ideally, Tangnag should be developed as a help-oriented outpost that primarily assists stakeholders and is able to monitor activities in both the Hinkhu and Hongu valleys. Tangnag is strategically located for both functions. A small aid and rescue post that includes a Gammow bag would substantially reduce the hazards of altitude sickness in the region and treat trekkers, agency personnel and seasonal entrepreneurs alike. Installation of a single side band (SSB) radio would allow rapid communication in the event that evacuation by helicopter is required.

In addition, the outpost could reinforce the need for sustainable impacts on the fragile Upper Hinkhu environment. This can be accomplished with a permanent poster presentation, regular discussions with local entrepreneurs, and a guest book that records impressions of visitors and is used in part to regularly assess and, if necessary, adjust management policies.

Construction of the outpost should utilize locally obtainable materials that are in harmony with natural surroundings. Cement and tin roofing should be avoided. Slate (if available), or wood shingles from the possible abundance of fir stems in the area would make attractive roofs, not adversely impact the local environment, and by presence and example help restore trail quality and the scenic beauty of the Upper Hinkhu.

As at other campsites on the Lukla-Tangnag trail, rubbish pits and pit toilets could be periodically inspected, and as needed, catalyze and encourage continuance of maintenance arrangements by local entrepreneurs and trekking agency personnel. These facilities can be constructed and designated with a minimum input of resources. In addition, a kerosene depot should be established, although its operation may be more effectively carried out by local entrepreneurs.

III. Licensing and management of Park entrepreneurs. In order to regulate the impacts of seasonal entrepreneurs in the Hinkhu valley, a licensing system is urgently needed that sets forth conditions of operation which are consistent with national park objectives.

Although the Upper Hinku is particularly suited for well-organized climbing groups, some individual trekkers with porters make their way as far as Mera La, and at least a few of these probably climb Mera Peak. Residents at Tangnag and Khare expressed interest in acting as guides or scouts for excursions to Sabai Tsho and Mera La. Such persons could provide valuable assistance with route finding and other logistics if bad weather is encountered, but they are poorly positioned for recruitment of this service. Groups and individuals arriving at Tangnag, whether from Lukla or Khari Khola, pass through regions with less distinct trails or potentially confusing junctions with side trails. If inclined to hire a guide, trekkers would likely do so in Lukla, Khari Khola or Kathmandu. Even so, seasonal residents of Tangnag who are interested in guide services could be trained in these skills and appropriately equipped.

IV. Educating trekkers and trekking agencies. It is important to reach trekkers at Lukla, as this is where most groups visiting the region begin their travel. If necessary, trekkers can adequately prepare themselves to be self-sufficient by purchasing stoves, kerosene, and additional foodstuffs available in the town. Provision of pamphlets which promote the unique attributes of the area but also emphasize necessary environmental safeguards would be effective. Trekkers could also be attracted to visit the Lukla SPCC office if a detailed map and route description was available. Information updates regularly obtained by radio contact on current conditions in the Hinkhu Valley would also attract visitors to the office. Similar MBCP publications distributed in Kathmandu should encourage trekkers to visit, register and leave comments in the guest book at the SPCC office.

V. Self-financing initiatives. Nepal Mountaineering Association (NMA) currently receives US$300 for each climbing permit that is issued for Mera Peak. For the year 2055 B.S. (autumn 1998 and spring 1999 seasons) this amounted to US$ 48,000. The agency is not obliged, however, to return any of the revenue to the Park as an investment for future returns. If only a small proportion (*e.g.*,10%) of the revenue was available for clean-up treks and monitoring patrols, the Park landscape along main trails would substantially benefit. The same applies to a lesser extent for Department of Immigration revenue generated from trekking permit and visa extension fees. DNPWC receives MBNPCA entry fees (Rp. 1,000/- = *ca.* US$ 15) but nearly 80% of the department's revenue is earmarked for use by the military in other protected areas of Nepal. Because a military presence is deemed unnecessary in MBNPBZ, there seems to be a strong arguement for increased funding of Park personnel activities that support enforcement. Initiatives are needed within HMG to increase the amount of Park revenue that is available for local management activities.

Good potential appears to exist for the project to liaise with the SPCC office in Lukla to organize retrieval of glass and other non-combustible garbage from the Hinkhu valley. Helicopters occasionally return empty to Kathmandu, especially at the start of spring and autumn trekking seasons. SPCC staff reported that, if loadless, the airlines were amenable to transporting this type of rubbish free of charge (Ngima Sherpa,

SPCC, pers. comm.). Retrieval would be in the best interests of airlines as they depend primarily on tourists and support staff for passengers. Additional efforts are needed to formalize such an agreement, and to organize pack-out treks to Hinkhu Khola sites, especially high altitude campsites.

Consideration should be given to banning the importation of glass containers, especially beer bottles. This approach has been successfully initiated in Sagarmatha National Park, where alternative, cost-effective transport and sale of beer in aluminum cans is being well-received by all stakeholders (Gurubacharya 1998). Unlike bottles, aluminum containers are lighter to transport and effectively generate local employment. Recyclers can currently earn US$ 0.27 per pound (= Rp. 40/- per kg) and compacting of cans allows adequate weight to be profitably carried.

Ecotourism potential remains high for the Mera Peak and Hinkhu Khola areas, and there is still time and opportunity to devise and implement measures to preserve its near pristine character. In doing so a valuable marketing asset will be maintained to target the rising number of trekkers in search of wilderness, and disappointed by commercial clutter and environmental degradation. Solitude and unaltered habitat are increasingly prized by adventure travellers, and the market niche for such destinations can be expected to grow rapidly in the near future. **Due to an expanding human presence and mounting pressure on habitats in Nepal, including those at high altitude, the already rare wilderness aspect of trekking on standard routes is quickly disappearing. For this reason alone, measures to effectively preserve habitats in the Hinkhu Khola watershed, including regulation of commercial development, merit highest priority.**

2. Area 2: Hongu Khola from Amphu Lapcha to Guidel (25 April-10 May 1995 and 4-7 November 1996)

2.1. Route and logistics

The middle and lower reaches of the Hongu valley within MBNPCA were explored in April-May 1995. The Upper Hongu was rapidly surveyed in November 1996.

The Upper Hongu can be reached from the N (Khumbu side) by crossing Amphu Lapcha (*ca.* 5900 m; Figure 11). This is a difficult and dangerous pass that requires mountaineering skills and equipment, as well as the favor of good weather. The services of a guide experienced in crossing Amphu Lapcha are an enormous asset, and are indispensable if inclement weather is encountered. A base camp at 5350 m above the Amphu pastures is reached after a leisurely one day walk from Chhukhung village (4730 m). The trail follows the southern bank of the Imja Khola, then stays 50-100 m above the lateral moraine of the Imja Glacier. Set

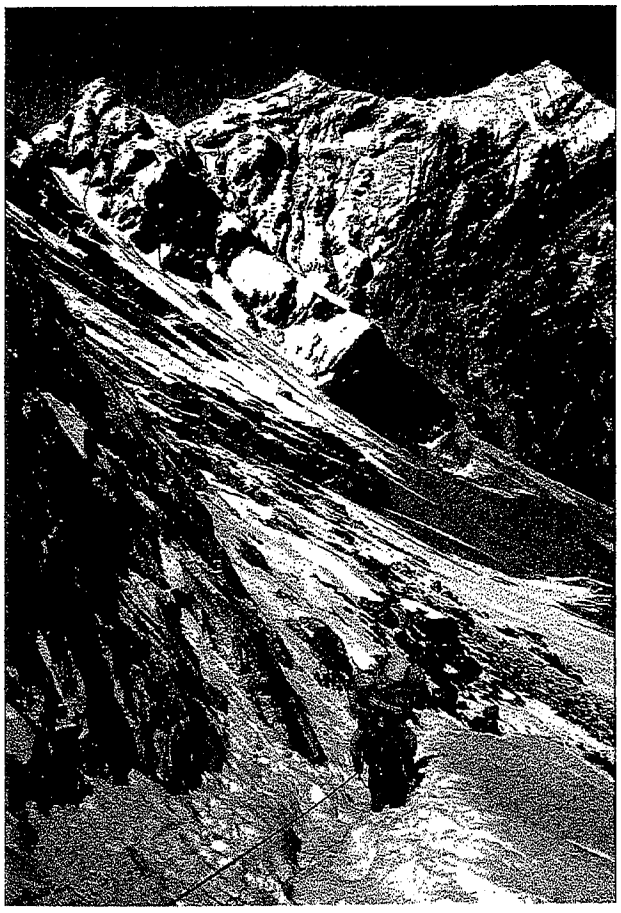


Figure 11. Ascending Amphu Lapcha via the *Japani Baato* route; at ca. 5500 m

in a deep amphitheater, several faint tent sites of the level base camp are safe from rockfall or avalanche, but receive little sun, and are thus a cold staging point.

The traditional route from the S over Amphu Lapcha entails abseiling from the true pass at 5780 m over sheer ice for approximately 300 m. For all but the hardiest of mountaineers this route is technically infeasible from the N. An alternate N-S route, known as *Japani Baato* has been opened in recent years. It leads SW from base camp on the Khumbu side up a scree and boulder slope, then curves precipitously to the E over ice, snow and boulders to a notch at *ca.* 5900 m. Several ropes need to be set along the upper section of the route, with the most challenging and dangerous stretch encountered 50 m below the pass. Rock climbing skills come in handy here for pulling oneself up through two sheer crevices between large boulder slabs.

On our 1996 passage, we apprehensively approached Amphu Lapcha because one week earlier four members of a small group descending to Khumbu on the traditional route had died in an avalanche. Upon reaching Amphu base camp on 4 November, we found three fresh graves attended by curious Common Ravens at the base of a large boulder 100 m S of the main tent sites.

While crossing the pass on 5 November, we were fortunate to have excellent weather. The entire day was cloudless and only at the top did we encounter any wind, which was light. The traverse was also facilitated by a distinct path over snow and ice, and the experience of one of our members (DSR) who had twice crossed Amphu Lapcha. Even so, our ascent required the setting of seven ropes. At three steep points, *dhoko*s (carrying baskets) had to be unpacked and the contents ferried higher to a level repacking site.

Views approaching the top of the *Japani Baato* were superb. Northeastern Khumbu was seen in all its grandeur, with Island Peak (6189 m) and the Sagarmatha group jutting to the N over Lhotse Shar Glacier. From the pass, the stark Upper Hongu region of Panch Pokhari (5400 m) unfolded, and to the E the traditional Amphu Lapcha pass and summits of Baruntse (7220 m) and Makalu (8475 m) commanded the horizon.

Descending S from the pass, we skirted an icefall on a discernable trail of hardpacked snow and ice (Figure 12), then used ropes to lower our *dhokos* over twisted switchbacks past cascades of ice to steep boulders and scree at 5600 m. Braided paths then led to Panch Pokhari (5400 m), where at dusk we pitched a tented camp in the valley between two large and nameless lakes (Figures 18 and 20).

On 6 November we walked over level but rocky lakeside trail to the main tent sites SE of the largest lake, then continued down along moraine and scree to the upper pastures of Hunku Teng (4600-5200 m; Schneider map, Shorong/Hinku sheet; no local knowledge of this name?). A long section of easy downhill walking then followed through grazed steppe and scattered scrub. Four campsites, each

Figure 12. Traversing icefields at 5700 m, S face of Amphu Lapcha.

fashioned from an overhanging boulder, were passed along the way. In the late afternoon we stopped for the night at a well-used fifth camp on the sheltered side of a boulder (GPS coordinate: 27° 45' 42" N 86° 56' 11" E). Low walls of piled rocks provided additional protection from the wind.

The next morning we again walked down an easy incline to a sixth campsite at *ca.* 4650 m. From there we ascended steeply through scrub, then scree and finally boulder fields to 4950 m, where we intersected

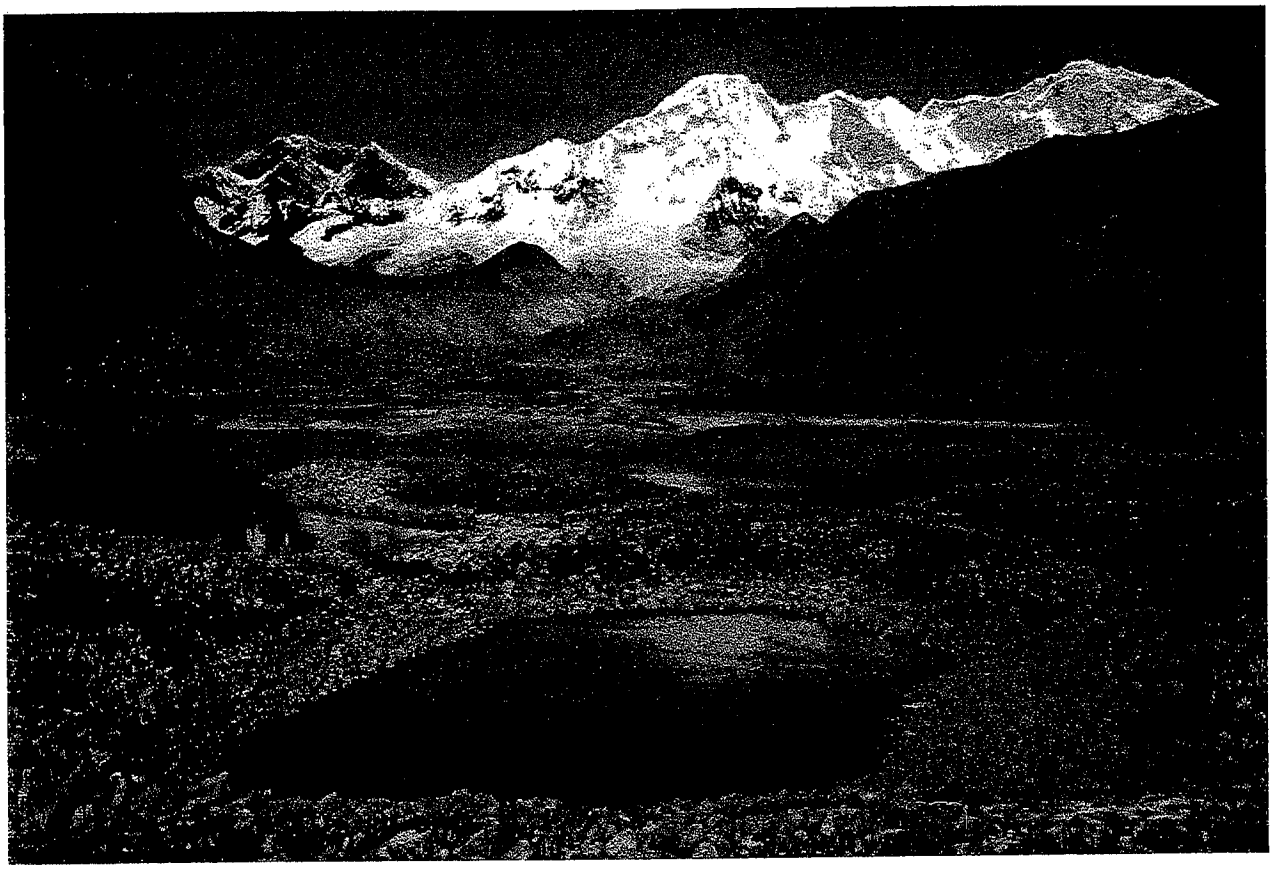


Figure 13. Glacial pools at 5000 m, Upper Hongu Khola, with Sagarmatha (8848 m), and Baruntse (7220 m) in the distance.

the trail leading from Mera La to the broad spur of Kongme Dingma (Schneider map, Shorong/ Hinku sheet). In the late afternoon we reached an overhang with stone walls and tent sites at 5350 m, the so-called "East Mera La Base Camp", to halt for the night.

In the spring of 1995 the Middle and Lower Hongu were reached by crossing Mera La from the upper Hinkhu Khola and traversing Kongme Dingma *danda* (Schneider map name). Poor afternoon weather on 25 April precluded an assessment of habitat below East Mera La Base Camp. From this point we followed an indistinct path SE through sleet and snow to an improvised camp site at about 4500 m.

The next morning produced a good view of the snowbound upper Hongu as we rounded Kongme Dingma and descended steeply to the riverside. We chose a narrow point in the river to cross to a barely visible trail on the E bank. No timber is available in the area for bridge construction, so we were reduced to leaping between two large boulders in the swift waters, and tossing the contents of each *dhoko* from one side to the other.

In the afternoon of 26 April 1995 our party traversed the small summer pasture of Urpa (4200 m). A perpendicular wall of stones was surmised to serve as a foundation for a simple ghot, but no structures for human habitation were present. We descended through rhododendron shrubberies, then followed a large snowslide in a ravine to the banks of the Hongu. A tented camp was hastily made in deteriorating weather on a patch of rocky ground in the middle of the river.

On 27 April 1995 we continued along the E bank of the Hongu, passing ravines of melting snowslides laden with exposed stem sections of birch, rhododendron, and fir. For 1.0 to 1.5 km downriver, the Hongu waters flowed beneath thick caps of compressed snow and debris (Figure 14). The trail remained ephemeral and rugged as we proceeded from 3500 to 3200 m along the E bank below the snow line. Heavy rainfall from the previous monsoon had apparently caused extensive landslides on the steep forested slopes above. An old campfire was met at *ca.* 3100 m, but paths in the vicinity were indistinct and quickly disappeared. In the afternoon we crossed to the W bank of the Hongu over an avalanche spanning the river, and slashed a trail over a cliff through rhododendron shrubberies and bamboo, reaching the only patch of level ground in the area suitable for a makeshift campsite.

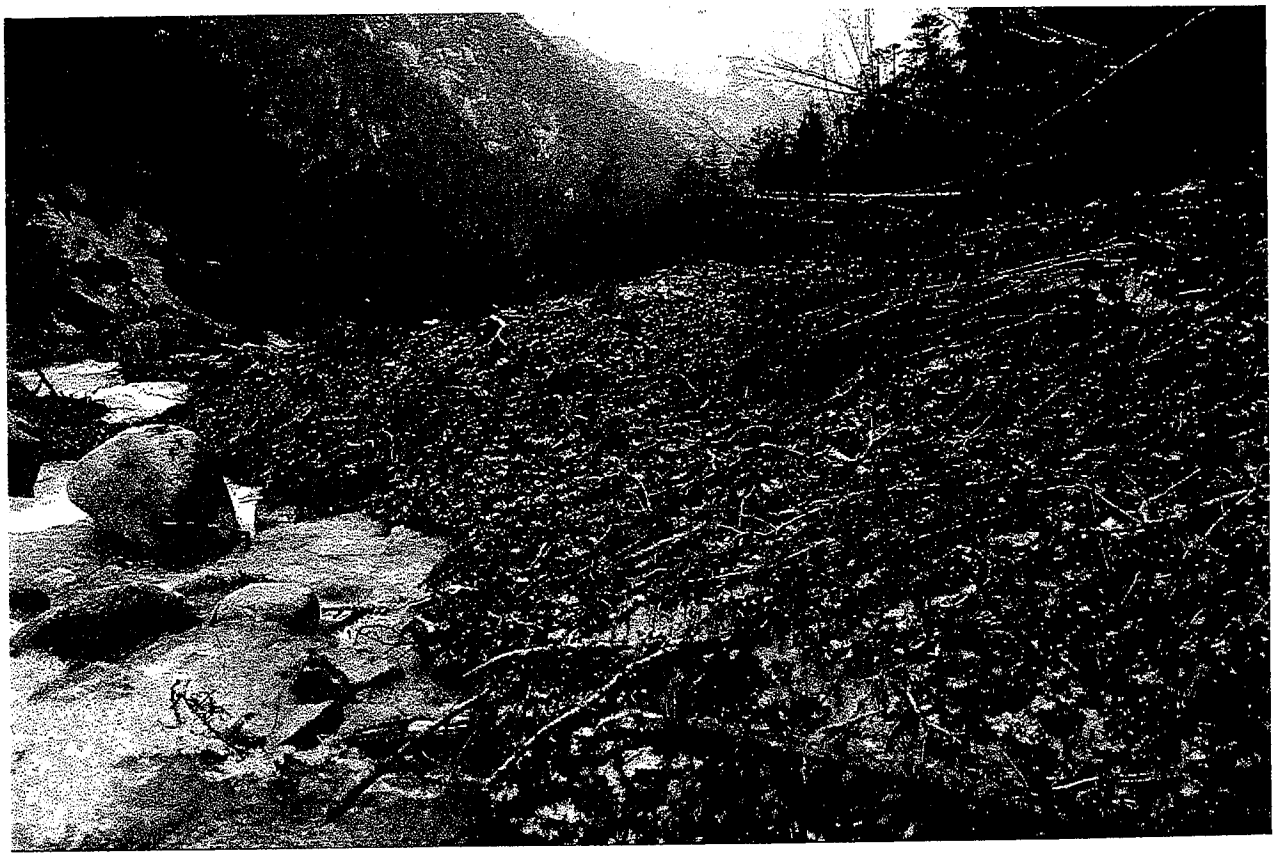


Figure 14. Snowslide in the Hongu at 3650 m with exposed fir and birch debris.

The next day we continued along the W bank of the Hongu and crossed the confluence of the Watelma Khola at midday. The snowline was about 300 m above us at this point. Most of the day we were able to follow a faint trail, probably used a year or two earlier by hunters descending from the ridges above. As we proceeded lower (to *ca.* 2800 m) the bamboo understorey became increasingly dense (Figure 15). Cutting a path wide enough for the *dhokos* was a time consuming and tiresome activity. We later camped for the night at the intersection of a small stream on a patch of level ground that was barely large enough for our tents.

On the day hacking a trail through bamboo in mixed forest, and often had to detour around steep slopes and cliffs. A twisting route of least resistance took us 100-150 m above the Hongu. In the late afternoon we descended to the riverside and soon came across a recess in large boulders that had been used, evidently several years ago, as a camp site. An old boot and discarded *dhoko* were found nearby, but no trails could be located. Dark clouds and rain were moving in, so we decided to overnight at the only level and protected site in the area.

Figure 15. Cliffs and dense bamboo at 2700 m in the Middle Hongu.

On 30 April 1995 high cliffs on the W bank were avoided by building a bridge across the Hongu with riverside birch trees. We traversed steep and densely forested country on the E bank for the remainder of the day. By late afternoon we reached a point at *ca.* 2600 m where the Hongu narrows to a gorge. A hailstorm and brief downpour forced us to make a tented camp on a high sand bar, the first we had seen along the Hongu in several days. We were wary of a possible flash flood, but an alternate camp site could not be located, so we anxiously monitored the level of the rushing river late into the night.

We had a good approximation of our location using estimated distance between the Watelma and Soguwa Kholas, but our progress had slowed greatly and expenditures of energy were increasing with our rapidly diminishing food supply. The farther down the Hongu we descended, the more precipitous the slopes and cliffs became, the denser the bamboo understorey, and the more harrowing our predicament. We had apparently reached a point of no return, for the field assistants reported that they could not carry a minimal load of necessary equipment and foodstuffs back up the Hongu and over Mera La to safety before our supplies would be exhausted.

Because the Schneider map showed wider contours on the E bank of the Hongu at this point, we decided to keep to that side of the river and try to reach a trail leading SE to Kemba La. On 1 May 1995 we tediously hacked our way up densely forested slopes, but soon found ourselves in even steeper terrain than previous days, and for the first time on the trek took falls (three, actually). We reached an elevation of *ca.* 2900 m, some 350 m above the river, but the slopes at this point were extraordinarily wet and slippery. Again, much time and effort were expended cutting away vegetation to enable the *dhoko*s to proceed. The combination of near sheerness, extremely dense *malingo* bamboo, and the ever present danger of falling led us to abandon this route. We backtracked with great difficulty to a damp ledge at about 2600 m, and bivouacked there as no level or semi-level ground was available to erect our tents.

Now our apprehension was compounded. We were losing valuable time not only trapped in a gorge but were virtually stalled above the river in high cliff country. Descent to the river bank was proving even more difficult than the ascent. We would be fortunate to get down to the banks without someone suffering a serious fall, and would then face the uncertainties and dangers of again crossing the river.

With a small and dwindling food supply, we had wasted two days and began to seriously wonder if we would escape the Hongu.

On 2 May 1995 we tried in vain to ascend nearby cliffs, and were forced to retreat using strongly rooted bamboo stems to maintain balance in several places, sidling along mossy walls in rock climbing fashion. How most members were able to do this carrying *dhoko*s was one of the most amazing aspects of the trek. Progress was excruciatingly slow and again consumed valuable stores of energy. In the late afternoon, we found some semi-level terrain and made a tented camp in wet, pristine forest at *ca.* 2700 m. With the exception of biscuits and chocolate, we nearly consumed the last of our carbohydrates by cooking a small meal of macaroni and spaghetti sauce. Despite the exhaustion of the day, our spirits were buoyed because the river now looked reachable, and during our morning foray we could see that Mangan Danda to the SW was, as the Schneider map showed, not as steep compared to the upriver *danda*s (midland ridges). We agreed to continue moving as a group for another day, but if substantial progress was not made towards Mangan Danda, we planned to split up. Two members would go ahead very light with our lone *khukuri* knife to seek food and help, and the other two wait for their return. It was not discussed who would comprise the teams.

We reached the Hongu at *ca.* 2400 m in the late morning of 3 May and decided on a plan to cross the river. At this site, the Hongu was a roaring series of cataracts, so wide that the only way across required using a large boulder in midstream to build two bridges. We were able to cut and span two spindly birch trees as far as the boulder, but a longer stem could not reach the W bank without bowing and being pulled downstream by the raging current. Hemlock trees in the vicinity were sufficiently tall to span the gap, but even if we could have felled one, the stem would have been too heavy for us to slide into place.

As we learned from constructing our first bridge over the Hongu, one person was needed on the opposite bank to guide the first log across the river. This could be accomplished by tossing across the loose end of a rope that was tied to the tip of the log, and reeling it in above the rushing waters. Two or three other stems could then be easily placed across to complete the bridge. Unfortunately, we could see from the boulder that the distance to the W bank was too great to jump, even for our long-legged lead guide, Chundak Sherpa. Coming up short and falling into the raging waters meant certain death.

Dejected after the effort expended on the construction attempt, our walled surroundings left us with no option but to search upstream for a suitable site. Suddenly, and against the consensus of abandoning our half built bridge, Chundak made a running jump to the W bank, but appeared to land far short of his boulder top goal. Changing stride in mid-air did not seem to help, but in an astonishing event witnessed by all members of the party, Chundak appeared to levitate at the last moment to reach the top of the boulder. Although we were exhausted and beyond hunger, a condition when the mind can play tricks with one's vision, the fact that all of us witnessed the same phenomenon led us to believe that a paranormal event had indeed occurred. Within a few minutes of his leap, Chundak reclined on a rock ledge, and slept for half an hour while we cut additional stems for the bridge. These were slid into place and lashed with strips of bark at 2-3 m intervals to add strength and stability (Figure 16). By 12hr 30 all members of the group had reached the W bank. In discussing the preceding events, Chundak was unable to recall how he had completed his leap, only that it had exhausted him so much that an unprecedented midday nap was required to regain his strength.

We proceeded to slash through *ningalo* bamboo along an ephemeral cliffside trail, evidently made and still used by large mammals, and reached the confluence of the Soguwa Khola (2470 m) at 14hr 00. A

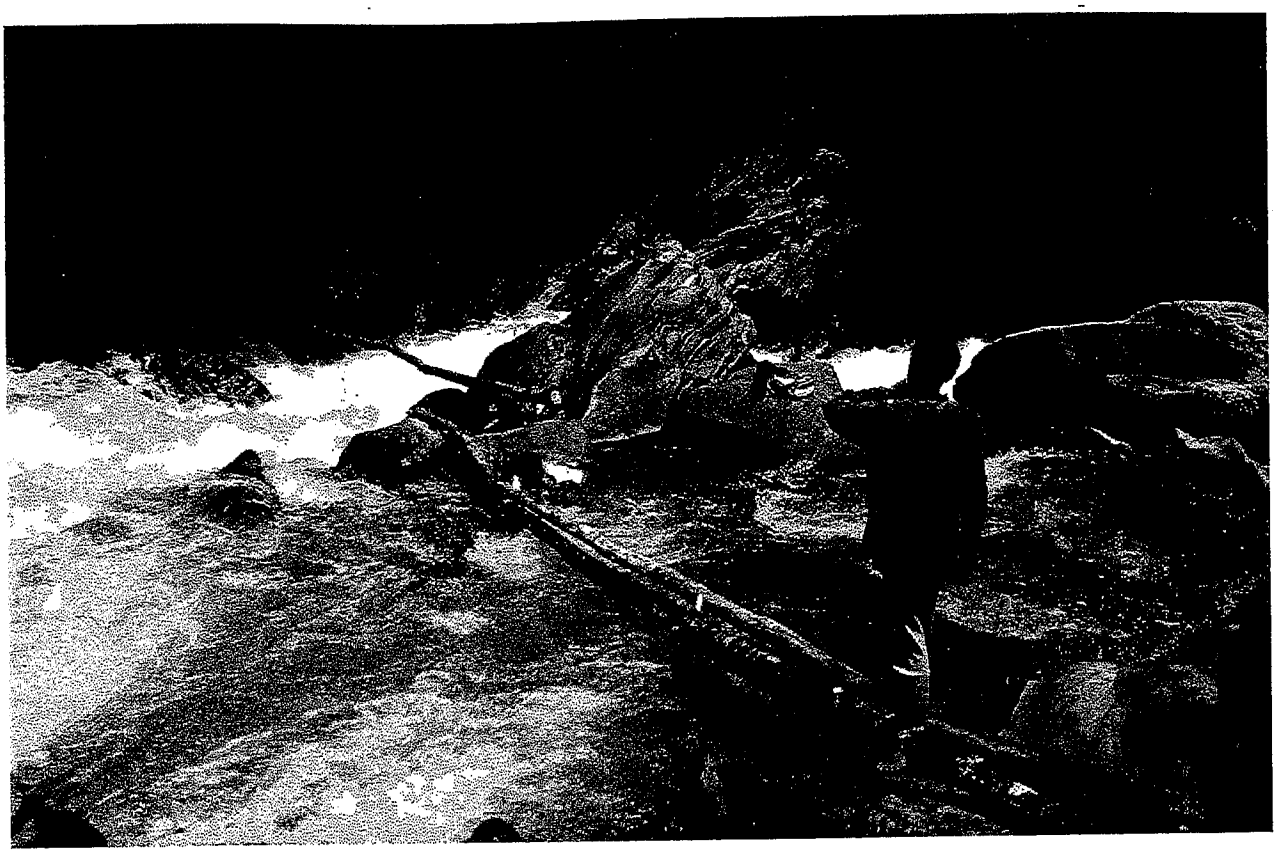


Figure 16. Bridge building at 2600 m, middle Hongu.

view of surrounding slopes was afforded, and although very steep, the *danda* seemed negotiable. For the remainder of the afternoon, we hacked our way up and around forested bluffs to the base of a cliff *ca.* 200 m above the Hongu, and hurriedly bivouacked for the night.

On 4 May 1995 we again cut a winding path through dense *ningalo*. As on previous occasions in this often maligned vegetation, extreme caution was essential, else a fall could result in being impaled on the sharp stalk bases. By early afternoon we gained the SE spur of the ridge. From the top of a tall tree it was possible to gauge a diagonal route to Mangan Khola that did not entail much loss in altitude. For the remainder of the afternoon we traversed surprisingly dense S face forest of rhododendron and *ningalo*, although at one point were nearly stopped by steep cliffs. The *dhokos* had to be lowered by rope, and we were forced to rock climb across a mossy and slippery section that proved to be extremely dangerous. Again, thin stems of *ningalo* came to our aid, helping to maintain our balance as we groped for toeholds across a sheer ledge 30 m above the forest floor. Despite the difficult terrain, we kept roughly to our intended route, and at dusk were relieved to reach the trickling waters of a boulder edged ravine at *ca.* 2600 m. The steepness of the ravine forced us to once again bivouac for the night, but we felt very fortunate to have reached water, the first we had seen since our morning camp.

The next day we continued slashing towards Mangan Khola, and by afternoon approaching cliffs forced us to descend steeply through dense forest and bamboo. Our only remaining carbohydrate was a pack of *thukpa* noodles, and the arduous day without food had left us very weak and accident prone. Precipitous cliffs along the S bank of the Mangan Khola came into view and our spirits sank further as we could not locate a point to cross where an ascent of the S bank appeared feasible. We decided to work our way higher up Mangan Khola, and at 15hr 15 were elated to find an old human path and evidence of cutting on a rhododendron shrub. From this point it was possible, with great difficulty, to descend a grassy slope, then easily ford the river to an old campsite. We paused to make a hot drink

and scouted a faint path that was found to merge with a steep but continuous trail leading up Mangan Danda. We felt tremendously relieved and reasonably confident that a trail had been reached which would take us up and over the *danda* to Mudi Kharka, an inhabited settlement that had tantalized us through the binoculars from occasional viewpoints for the previous five days. After ascending steeply for an hour the forested slopes became more gradual but the trail remained indistinct. At dusk we made a tented camp at *ca.* 2900 m along an open stream and smooth rock faces with a view of the jagged forests to the N.

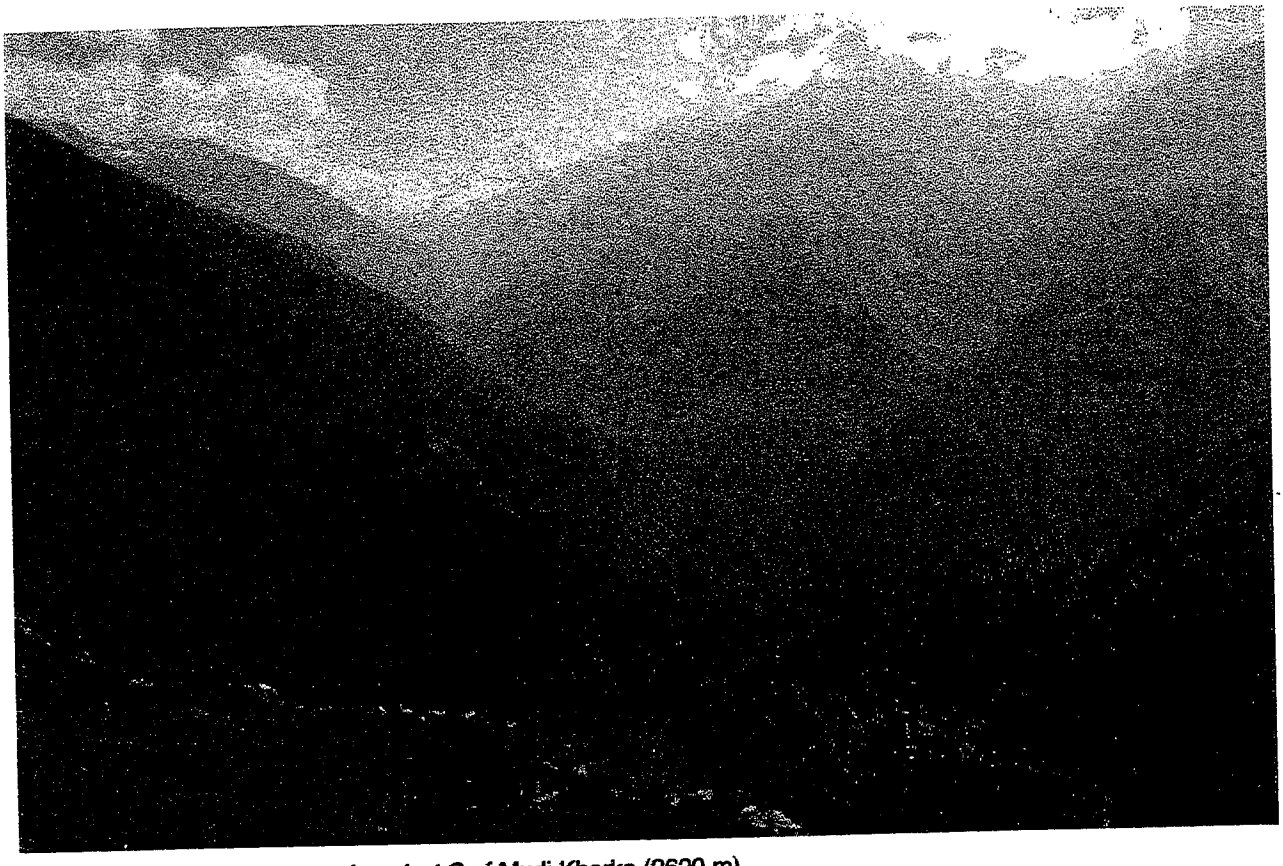


Figure 17. The Middle Hongu from just S of Mudi Kharka (2620 m).

On 6 May 1995 we continued following the narrow forested trail to 3000 m, then at a glade began a circuitous descent through grazed mixed forest. In the afternoon we rounded a spur where a view of cattle at Mudi Kharka and smoke from one of the huts was a welcome sight. We descended through thick *malingo* bamboo, which was burnt on some exposed S and E slopes. Fallen stems of bamboo made for slick footing, and we fell several times before intersecting a wide and clear trail leading to Mudi Khola. Less than an hour uphill from the crossing, we reached Mudi Kharka (2627 m) and the end of our ordeal. Upon entering this small settlement we met a woman working in a field who was stunned and speechless at our appearance, and quickly returned to methodically hoeing the soil. By evening, we were able to assure her of our benign intentions, and later feasted on *makaiko derdo* (corn flour paste) and a chicken that she had gladly sold us.

The next morning we walked over open trail through clearings and mixed broadleaf forest to Chheskam, and paused at a store there for lunch, *chang* and a long conversation with village residents. We descended gradually in the late afternoon through scrub forest and shrubs to the large, sprawling village of Bung (1600 m).

Following two days of recuperation from our travails in the Hongu and a sudden bout of dysentery, we departed Bung on 10 May for the renowned steep descent to the Hongu at 1316 m, and long ascent of the E bank to the smaller village of Guidel (1960 m).

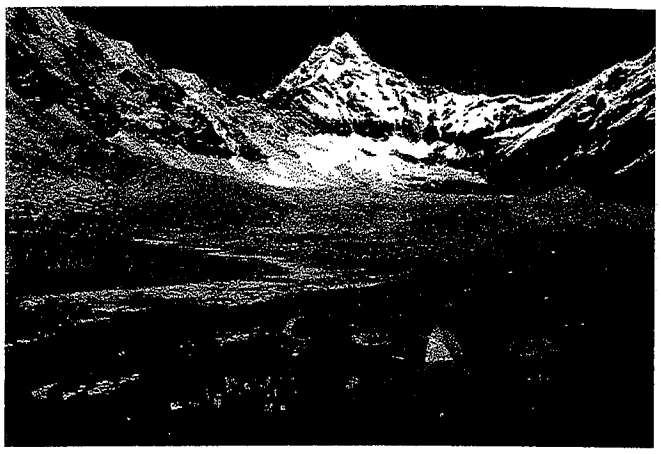


Figure 18. Panch Pokhari (5350 m) and Ama Dablam (6856 m).

2.2 Habitat types and condition

A trek along the length of the Hongu river valley within MBNPCA exposes the traveller to a wide range of habitats, from the aeolian zone crossing Amphu Lapcha, to high altitude scrub of scattered short grasses, xeric herbs and cushion plants in the Panch Pokhari area; through grasslands, alpine shrubberies and mixed conifer stands in the Upper Hongu, to moist lower temperate associations with a diverse flora of broadleaved trees, dense bamboo, tall ferns, lianas and epiphytes in the middle and lower reaches of the valley. The topography of the Hongu exemplifies Himalayan tributary systems. U-shaped, glacially carved headwaters narrow at first to a steeper but almost straight course through high open valleys. The flow increases to waters that rush through broken cliff country, then form rapids and roiling pools cutting through V-shaped gorges in its middle and lower reaches.

2.2.1 Upper Hongu

Topography. The Upper Hongu comprises a headwaters region of five, sparsely vegetated glacial lakes at 5350-5450 m known as Panch Pokhari (Figures 18 and 20). Rocky southern buttresses of the valley drop steeply for *ca.* 200 m to a sixth lake at the confluence of the Hunkhu Glacier, which 'drains' Baruntse Himal to the S. A section of rubble covered glacial ice and lateral moraines then follows for about 1.5 km downriver to where a distinguishable river begins to flow almost directly S to Urpa, the small *kharka* at 4200 m that demarcates the Middle and Upper Hongu. Glacial pools and ponds dot the valley floor from 4500-5000 m, but their locations do not correlate well with the Schneider map.

Access. Difficulties of access to the Upper Hongu help define its remoteness. As noted by Jackson (1987), in addition to distant but main entry points via Mera La and Kal Pokhari Danda (4390 m; N of Kemba La from the Arun), there are three other, more proximate routes, all crossing very high, glaciated passes that should be attempted only by groups equipped for technical ice climbing and severe weather. These are:

- ***Amphu Lapcha*** (5780 and *ca.* 5900 m) from the N via the Upper Imja Khola of eastern Khumbu; an avalanche prone route descending to Panch Pokhari over the Amphu Glacier.

- ***Mingbo La*** (5817 m) from the W via the Lower Imja Khola; a long traverse across the Nare and Hinkhu Nup glaciers and southern flanks of Ama Dablam.

- ***West Col*** (6135 m) from the E, an even longer and more difficult route that provides access via Hinkhu Glacier to Lower Barun Glacier and the Barun valley, or alternatively, over Sherpani Col (6110 m) and the Barun Plateau to the main Barun Glacier.

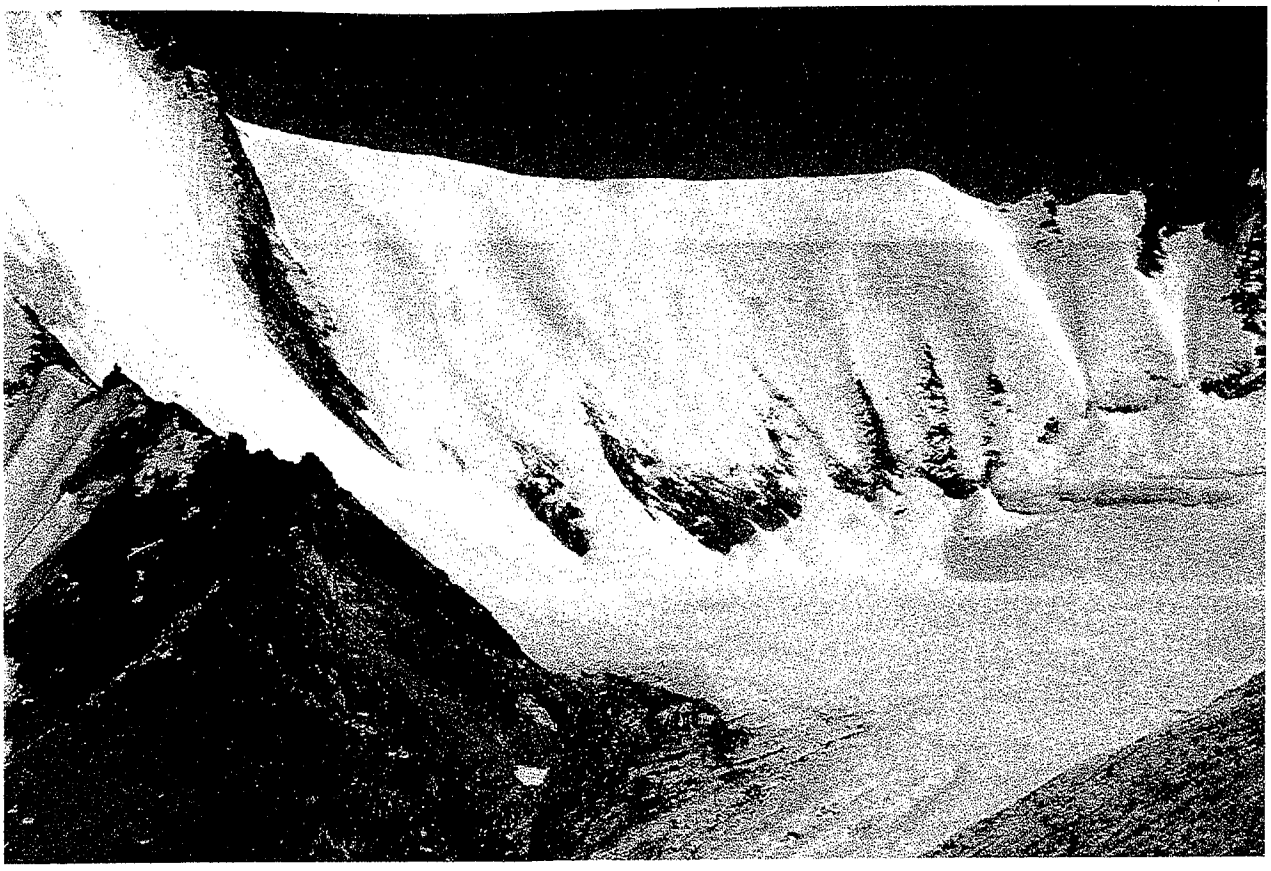


Figure 19. The West Col (6135 m), NW view from the Upper Hongu at 5300 m.

The Schneider map Shorong/Hinku sheet shows a trail heading E from Urpa off the map, apparently skirting the Hunku Himal and proceeding towards the Arun River, but a corresponding trail to the E does not appear on any available maps of the Makalu-Arun region.

Vegetation and microfauna. On descent from Amphu Lapcha to Panch Pokhari, isolated sprigs of flowered herbs, desiccated by the rarefied autumn skies, were occasionally noted in boulder crevices at 5500-5800 m. Cushion plants (saxifraga Saxifragaceae *Saxifraga* spp. and sandwort Caryophyllaceae *Arenaria* spp.) were scarce on these dry and unstable S slopes. Wind blown insects, including pierid butterflies and small black spiders, were also encountered. These close range observations defied the initial impression of this landscape as a barren world of rubble, scree and ice.

The first sward of vegetation was encountered at the two largest lakes of the Panch Pokhari area. A thin fringe of short grasses had flowered and dried to a brittle crunch. Small growths of cushion plants were scattered amongst the grasses. Along small rivulets leading into the lake were dried clumps of 10-20 cm tall maroon herbs. The lake itself was beginning to freeze over, with a thin, wide sheet of ice forming from the center (Figure 20).

Continuing down the valley to Hunku Teng at 5000 m, scattered clumps of grass became more common as did cushion plants (*Saxifraga* spp. and *Arenaria* sp.), but nowhere was a swarth of vegetation evident. Signs of grazing first appeared at the glacial lake near the lower reaches of Hunkhu Glacier.

Below 5000 m in the Upper Hongu vegetation gradually increases in cover to form alpine grassland and low shrubs, extending downriver to the small pastures of Urpa. Grasslands are dominated by a sedge (*Caryx* sp?), and best developed on less steep slopes with deeper soils (Jackson and Ahlborn 1987).

Grassy sites, composed mostly of tussocks, are interspersed with low shrub cover. Most shrubs are Ranunculaceae taxa, and form an artifact of heavy grazing and trampling. Mesic conditions of the valley are indicated by a dense moss layer in less disturbed facies, and mats of grass, sedge, shrub and wildflowers that grow from the tops of many boulders. The low (usually < 0.5 m) shrub community is dominated by Shrubby Cinquefoil *Potentilla fructicosa* and monotypic stands of dwarf rhododendrons, either *Rhododendron lepidotum* or *R. nivale* (Jackson and Ahlborn 1987). *Cassiope fastigiata*, a dwarf evergreen shrublet is also common, growing as single plants or in small patches up to 5000 m (pers. obs.).

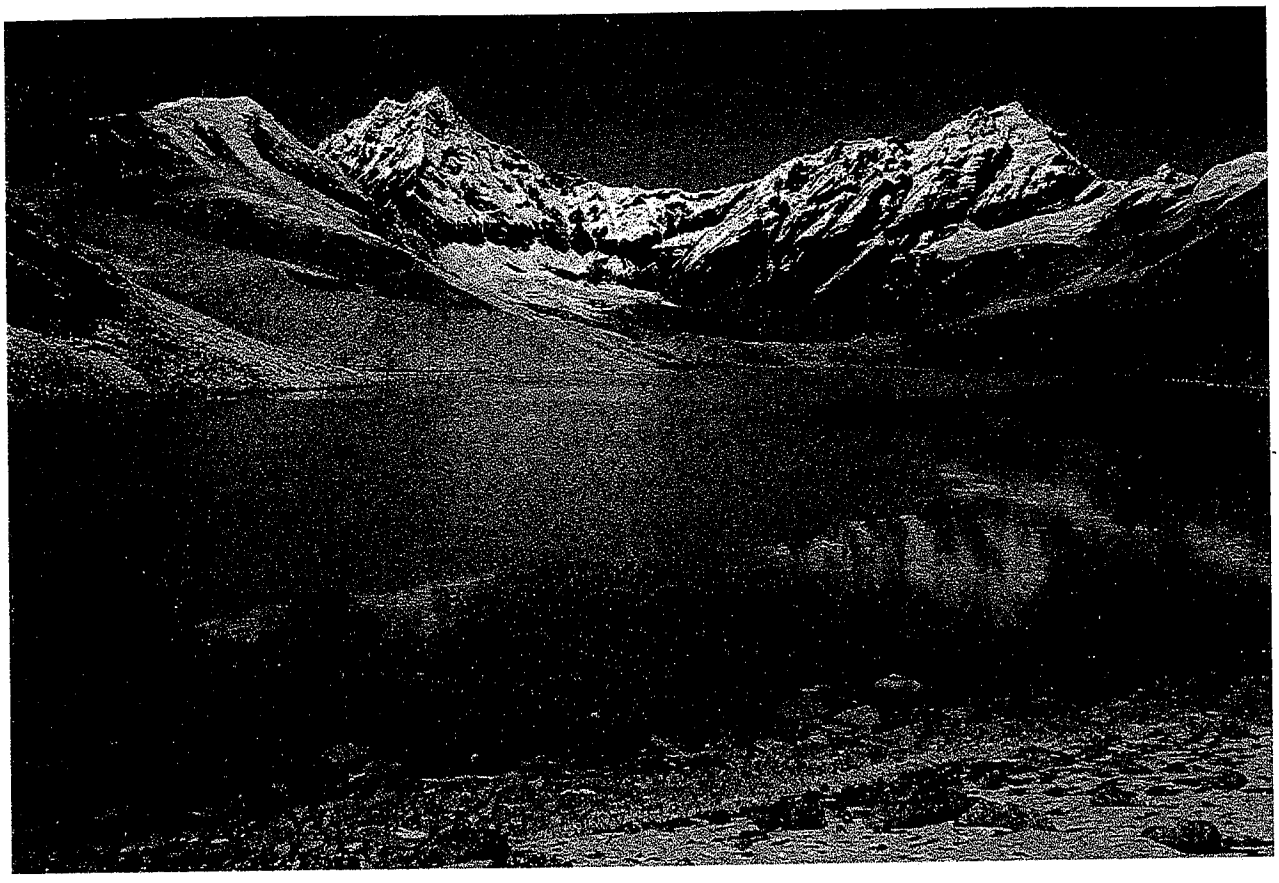


Figure 20. Largest of the Panch Pokhari lakes, Upper Hongu river valley.

Much of the grassland habitat is heavily grazed during the monsoon months. This annual activity has evidently altered the composition of floral communities on the valley floor and less steep slopes (see section 2.4).

2.2.2 Middle Hongu

The lower and middle sections of the Hongu Khola within MBNPCA contain a wider range of habitats, from high altitude rock and ice, steppe and open shrubberies, to dense and unaltered temperate forests. Forests below 3000 m, particularly lower temperate associations, are especially important for conservation because similar tracts in other areas in the region are more degraded or converted.

Forests along our route from Urpa (4200 m) to Mudi Kharka (2627 m) are briefly described in the preceding route and logistics section (2.1). Here follows a more detailed description from the 1995 passage:

Sub-alpine zone: In late spring, the Urpa grazing ground was soggy with clumps of emerging herb and forb cover, but almost none of the plants had reached flowering stage. Less than 200 m below this site rhododendron scrub (*Rhododendron nivale* and *R.* spp.) appeared, gradually became denser, and at *ca.* 3500 m formed tall shrubberies with birch *Betula utilis* at the banks of the Hongu. All tributaries in the vicinity, irrespective of aspect, were filled with snowslides. The degree to which the snowslides had scoured the tributaries and river banks, indicated by their reach and amount of debris, as well as the extent of the snow packs over the Hongu, suggested that an event of such magnitude was uncommon.

Landslides at lower elevations in mixed forests of fir, rhododendron and birch were surmised to be an entirely natural occurrence, as virtually no human disturbance of the vegetation was found in this area. Furthermore, there were few old colonized slides on unaffected slopes, which suggested that heavy precipitation in the recent past had caused the landslides.

Rainfall in the Hongu must be relatively high. The valley is located well to the E in Nepal and its proximity to the southern sides of the Charpati, Hinku and Hunku himal creates conditions for high rainfall when the southeasterly monsoon winds arrive. Chheskam and Bung villagers asserted, however, that the previous winter had been the wettest in several decades, and that it followed a long and intense monsoon. The paucity of old, colonized landslips inferred that the wide scale damage to upland forests along the Hongu was a rare event.

Below the confluence of the Watelma Khola, Hongu forests were virtually intact, except for some recent and old landslips. Forests in the vicinity were difficult to assess because the dense canopy and understorey we continually passed through frequently obstructed our view, as did nearly vertical cliffs along the river.

From the tree line at *ca.* 3900 m a fir-rhododendron (Silver Fir *Abies spectabilis-Rhododendron* spp.) association dominates, and grades to mixed broadleaf associations and rhododendron by 2700 m. On some of the steeper slopes and ledges, almost pure stands of rhododendron and grassy tussocks occur. Below *ca.* 2700 m Himalayan Hemlock *Tsuga dumosa* replaces fir and was typically the tallest tree species.

Temperate associations. The pristine temperate forests below 2800 m contain deciduous and evergreen elements, the latter more prevalent at lower elevations and on wetter slopes of the E bank. Both types usually featured a heavy understorey of bamboo *Arundinaria* spp., lianas, thickets, ferns and herbs. East bank forests were, however, denser with layers of moss and humus covering the forest floor. Vegetation was most luxuriant and wettest in west-facing ravines, almost all of which were drained by small clear water streams. Lichens and epiphytes extensively encrusted trees and taller saplings. Standing deadwood, snags and fallen branches were common elements of these forests. The ground cover was abundantly littered with rotting branches, in various states of decomposition, and heavily colonized by spongy mosses, lichen and large fungi.

Aspect and drainage patterns explain why the W bank of the Hongu is drier and somewhat less steep than the E bank. West bank slopes tend to face S and E, and are therefore more exposed to the arcing sun than those of the E bank, where slopes are predominantly oriented W and N, and thus shadier, damper and more diverse in floral composition. East bank ravines also receive more water from the higher ridges that comprise the watershed.
Forest habitat in the Mudi Kharka area has degenerated from cutting to scrub forest and shrubberies. Several hectares of land at the center of the seasonal settlement have been converted to agricultural fields, where *piraalo* (cocoa yams) and potatoes are grown.

Lower temperate forests in the Chheskam and Bung areas have been largely cleared and the land modified to agricultural terraces that support crops of wheat, potatoes and rice.

2.3 Wildlife observations

2.3.1 Upper Hongu

Mammals. No large mammals were sighted on our late autumn passage in the Upper Hongu. Himalayan Mouse-Hare *Ochotono roylei* was commonly noted (usually by call) in the Upper Hongu from 4200 m to 5100 m in open country of boulders, rubble and grass tussocks. On 7 November 1996 one individual was observed to snatch an Altai Accentor *Prunella himalayana* from a flock that was feeding amongst grass tussocks at *ca.* 4800 m. The mouse-hare cached its prey in a crevice, then returned to nearly catch a second bird. This is apparently the first report of seemingly carnivorous behavior for this heretofore described herbivore, although only feathers may have been sought to perhaps line its burrow.

The 1995 expedition recorded the first sighting of Snow Leopard *Uncia uncia* in the Hongu Khola watershed. An adult was sighted briefly in the vicinity of E Mera La Base Camp at midday on 25 April (C. Sherpa; pers. comm.). Jackson and Ahlborn (1987) surveyed the Upper Hongu in November 1986, but found no evidence of the species, and concluded that the lack of ungulate prey (mainly *jharal* Himalayan Thar *Hermitragus jemlahicus*) precluded its occurrence in the valley. Nonetheless, suitable habitat was assessed to exist in the Upper Hongu between Chamlang and Panch Pokhari (Jackson 1987). Subsequent to that investigation, however, a snow leopard was reported by local grazers in the Dig Kharka area of the adjacent Upper Hinkhu river valley to have taken five sheep at *ca.* 5400 m during the summer of 1989 (Jackson 1987).

In Nepal, snow leopards are most abundant in the high steppes of Dolpa and Mugu districts (Jackson 1979) but are widely disributed in low densities throughout the Nepalese highlands. Green (1981) reported two sites in Langtang Valley as harboring the species, and one or more presumed transients reportedly visited the Gokyo valley of Sagarmatha National Park in 1986 (Ahlborn and Jackson 1987). Reports have been received of snow leopards in the Arun river valley (Cronin 1979), where a pathway along this river from Tibet would facilitate their entry. The species is also said to occur farther east on the slopes of Kanchenjunga himal (T. B. Shrestha, IUCN, pers. comm.).

No evidence was found of wild ungulates in the Upper Hongu. The same result was obtained in a much broader and systematic assessment by Jackson and Ahlborn (1987) in their 1986 study. Thar has been reported from the Middle Hongu, where the upper slopes would allow passage to the Upper Hongu in late spring and summer. *Bharal* Blue Sheep *Pseudois nayaur* are distributed above the treeline and would find it exceedingly difficult to penetrate the Upper Hongu, with any herd vulnerable to being trapped by winter snowfall. Even so, Blue Sheep inhabit the Rolwaling and upper Mewa Khola valleys *ca.* 70 km to the W and E respectively (Jackson and Ahlborn 1987; pers. obs.).

Birds. Only seven species were recorded during three days of walking down the Upper Hongu in November 1996, but included Great Rosefinch *Carpodacus rubicilla* atop Amphu Lapcha (5900 m). Jackson and Ahlborn (1987) recorded 26 species in a three week period in November 1987. The most notable records were Little Owl *Athene noctua*, Rose-fronted Rosefinch *Carpodacus puniceus* and White-throated Dipper *Cinclus cinclus*, species indicative of the mountain desert biotope that occurs in the sequestered and precipitation deficient headwaters of the Hongu.

A Common Raven *Corvus corax*, also representative of the Trans-Himalayan ecoregion, closely followed our group for 2.5 days and 15 km from Panch Pokhari (5400 m) as far as the intersection of the trail to Mera La (*ca.* 4720 m). The bird continually and raucously begged for food from its perches atop trailside boulders directly ahead of and behind our group. Such behavior was presumably acquired as a result of handouts, and supports the view that despite its remote and isolated character, an increasing number of trekkers and/or nearby residents are visiting the Upper Hongu.

2.3.2 Middle Hongu

Mammals. On the 1995 passage down the Middle Hongu, Himalayan Mouse-Hare was also seen amongst landslide boulders below the confluence of the Watelma Khola at *ca.* 2800 m on 29 April, and on Mangan Danda *ca.* 2600 m on 6 May. A juvenile Siberian Weasel *Mustela sibirica* was watched closely amongst landslide boulders at *ca.* 3000 m on 28 April 1995. An Orange-bellied Himalayan Squirrel *Dremomys lokriah* was observed on 4 May 1995 at *ca.* 2750 m in dense mixed broadleaved forest in the Middle Hongu.

On 5 May 1995, a Clouded Leopard *Neofelis nebulosa* was surprised at close range (*ca.* 5 m) by Tirendra Yakha in relatively open forest of rhododendron, mixed broadleaf species and *ningalo* bamboo at *ca.* 2750 m. Forests in the middle Hongu also offer good habitat for a variety of smaller felines, scats of which were noted on several occasions, but no sightings or other sign of their presence were recorded.

Fecal pellets of hoofed mammals were frequently observed in the Hongu at elevations of 2600-3000 m. Pellets were more common towards the lower range, and were found on most rocky shelves and overhangs, often in fresh condition. Species identification was not possible. Himalayan Ghoral *Nemorhaedus goral* and Serow *Capricornis sumtraensis* are the most likely ungulates to be encountered in these temperate habitats. Thar is reported to inhabit the higher slopes in the Middle Hongu (Jackson and Ahlborn 1987).

A bear hollow with scats in the base of a large fir tree was found at *ca.* 2800 m on the N face slope of Mangan Danda. Habitat type suggests that the Himalayan Black Bear *Selenarctos thibetanus* rather than Himalayan Brown Bear *Ursus arctos* inhabits in the area.

Local informants said that during January and February, when snow is deepest and most extensive in the Hongu ridges, a variety of ungulates such as ghoral, serow, thar, serow, musk deer and barking deer are forced to descend to more favorable conditions near the river (Chhemsing and Chheskam residents, pers. comm.) During this period hunting of these species is easiest, although villagers asserted that the practice had ceased once the rules of the Conservation Area (read: BZ) were agreed upon.

Birds. Observations at middle altitudes in April and May 1995 were greatly hindered by our cutting and crashing through the vegetation. Steep terrain and dense foilage also decreased visibility, in particular of the forest canopy. Most sightings of birds were recorded in the early mornings while backtracking from camps along trails cut the previous day. Abundance and diversity was higher around camps in the E bank forest, compared to the W bank. Vegetation at the latter sites was denser and undisturbed (if not unvisited) by humans. Avian activity in the early mornings was markedly diminished, an observation that probably is explained best by factors such as even greater reduction in edge effect, later exposure of the canopy to the rising sun, and seasonal deficiency in food.

Several birds of bamboo habitats reported as uncommon in their East Nepal ranges (Inskipp and Inskipp 1991) were observed in this sector. Great Parrotbill *Conostoma aemodium* was seen once, in tall clumps of *malingo* bamboo N of Mudi Kharka at 3000 m on 6 May, but its distinctive whistle was heard in *ningalo* several times daily while descending the Hongu from 3400 m to 3000 m. A small flock (≥5) of Fulvous Parrotbills *Paradoxornis fulvifrons* was noted in *ningalo* at *ca.* 3100 m on 28 April. A pair of brilliantly plumaged Golden-breasted Fulvettas *Alcippe chrysotis* were observed on 4 May at *ca.* 2680 m in *ningalo* understorey of mixed broadleaf, hemlock and rhododendron forest. One bird was carrying nesting material (*ningalo* culm sheaths), the first indication in over 100 years that this species breeds in Nepal (Inskipp and Inskipp 1991).

Other records of particular interest were Satyr Tragopan (Crimson Horned Pheasant) *Tragopan satyra,* which requires a bamboo component (Inskipp and Inskipp 1991; Jackson *et al.* 1990), was heard near camps between 2450 m and 2600 m on 2,4 and 5 May 1995. A White-browed Shortwing *Brachypteryx montana*, reported as a very uncommon resident in Nepal by Inskipp and Inskipp (1991) and Grimett *et al.* (1998), but appraised as fairly common by Fleming *et al.* (1984), was seen at *ca.* 2930 m on 29 April 1995.

2.4 Human interactions and impact

The Hongu is densely populated in its lower reaches. Although a remote and ruggedly bordered valley in its isolated upper reaches, accessible habitats of the alpine zone are heavily impacted by human activity.

2.4.1 Upper Hongu

The grasslands of the Upper Hongu from 1.25 km S of Urpa to a camp at 5200 m W and slightly upstream from Chamlang were studied by Jackson and Ahlborn (1987) in November 1986 as part of a wildlife survey emphasizing Snow Leopard. The area covered about 70% of the Upper Hongu basin and some 25 km^2 of habitat.

Grass cover was found to be closely cropped with forbs and other herbaceous plants apparently displacing the more palatable grass species due to intensive grazing by livestock. Herbaceous plants were heavily browsed and in some areas almost completely consumed. Numerous livestock trails traversed the valley floor and gentler slopes. Intensive use was also indicated by dozens of stone *ghots* (shepards' huts), some of which were relegated to narrow grassy ledges above cliffs (Jackson and Ahlborn 1987).

Swarths of dwarf juniper (*Juniperus* spp.) were found burned and killed to provide fuelwood and increase the amount of available forage (Jackson and Ahlborn 1987), and also noted during 1995 on SE facing slopes SW of Urpa (pers. obs.). As in similar high altitude areas of Nepal, grasslands in the Upper Hongu are burned in late spring to stimulate the growth of more palatable shoots.

As our passage through the Upper Hongu revealed, even in late autumn, the effects of overgrazing during the monsoon months remained obvious. From 2 km S of Hunku Glacier, barely below the upper limit of grass swarths at 5100 m, the valley floor and slopes showed signs of excessive grazing. Slopes were criss-crossed with livestock trails, and only precipitously rooted plants were observed to have produced seed. As recorded by Jackson and Ahlborn (1987), ubiquitous evidence of soil erosion existed, and was most pronounced in the steeper side drainages that occur along the length of the basin. Landslips

and slumps were most frequent at the base of and opposite Chamlang. Most of these are probably caused by excessive grazing, with some exacerbating the effect of naturally occurring landslips.

The grazers of the Upper Hongu are reportedly Gurungs from Nerpa, Kotang district, who herd 1,000 to 2,000 or more sheep into the Upper Hongu each year during the July through September monsoon (Jackson and Ahlborn 1987). They travel a long and difficult route via alpine meadows W of the Hongu, passing through Jhukthusko Kharka, Chhapa, Jhar Kharka, Khola Kharka, and Majhang Kharka. Past this last meadow, the trail splits, one route heading NW to Tangnag, and the other N to the junction of the trail leading E from Mera La and towards the Upper Hongu (Dirga Shankar Rai, Chheskam resident, pers. comm.). The Kulung Rais of Chheskam and Bung villages lease the pasture rights of the Upper Hongu to the Gurungs under a 20 year agreement which was due to expire in the late 1990s (Jackson 1987). Residents of Chaunrikharka NW of Lukla in the Dudh Kosi bring yaks to graze the Upper Hongu but it is unclear what if any arrangements are made for usage rights.

Despite the heavy grazing in a long stretch of grassy steppe in the Upper Hongu, very few grazers apparently take their sheep or yaks farther upriver past glacial moraine, boulders and scree to the higher flats that border Panch Pokhari. Grasses and perennial herbs form a swarth of vegetation there, but it is thinner and shorter than in similar habitat of Hunku Teng. The vegetation is also restricted in area (<2 km^2), and thus unable to support a large number of livestock. Access for grazers to Panch Pokhari from S in the Upper Hongu requires crossing the river below Hunkhu Glacier. During the monsoon the current is too fast and turbid for fording, and there is no proximate source of timber to allow construction of a *sanglo* (simple wooden bridge).

Sheep and yaks compete for forage with large mammals such as Himalayan Thar, for which the Upper Hongu provides good habitat. But the presence of herders, in particular their shouting and tendency to harass wildlife, likely exclude these species. Furthermore, the effect is amplified by the open character of rangelands in the Upper Hongu. Jackson and Ahlborn (1987) concluded that the absence of thar in pastures above Urpa was probably due to the high degree of human disturbance during the June-September grazing season (including competition for grasses by their livestock), occasional hunting, and a paucity of good escape cover (many cliffs in the area are accessible by humans and livestock).

Although Snow Leopard is less likely to be directly pursued, due to its extremely wary and mainly nocturnal behavior, conditions for its occurrence were judged unsuitable because principle prey species have either been extirpated (*i.e.* thar) or historically absent (*i.e.* Blue Sheep *Pseudois nayaur)* (Jackson and Ahlborn 1987).

Panch Pokhari lakes have been described as a pilgrimage site (**cite reference**), but referenced authors have apparently confused lakes of the same name NW of Mudi Kharka where religious festivals are held annually. At Panch Pokhari in the Upper Hongu, there is a small *cairn* of piled boulders with a tripura and prayer cloths. Chheskam residents state that the area is visited for 1-2 days every few years by the occasional pilgrim, or small group of *damis* (shamans). Pilgrimages are undertaken in July or August during the *Naag Pancami* festival. Prayers are chanted and offerings of coins are tossed into the two large lakes. Pilgrims must be of the hardy and determined kind, as the approach entails a long and desolate march through inhospitable country.

One to five kg of non-burnable garbage was found at each campsite in the Upper Hongu. This trash was collected and stored in hastily constructed pits or in recesses at the base of boulders. Least

affected were the open tent grounds at the southern end of Panch Pokhari Lakes, suggesting that other visitors had cleaned the site, or that fewer trekking groups camped there.

2.4.2 Middle Hongu

Evidence of hunting was recorded in the middle and lower Hongu. Feathers of a male *danphe* Impeyan Pheasant *Lophophorus impejanus* were found at a trailside overhang on Mangan Danda at *ca.* 2700 m on 6 May 1995. Their condition and arrangement indicated that hunting was recently practiced in the river valley. The same day, trap fences for game birds were noted closer to Mudi Kharka on Mangan Danda (Figure 21) . An old (1-2 yr?) rope and bamboo snare was found at the confluence of the Soguwa and Hongu *kholas* on 3 May 1995. Trails reaching the Hongu along crest lines to the W were surmized to be artifacts of hunters, as were the few campsites encountered. No sign of hunting was observed on the steeper, wetter and treacherous E banks of the Hongu during our three days there. Fecal pellets of ungulates were most frequent, and often fresh, along this section.

Hunters have entered the Middle Hongu in the recent past by following perpendicular ridge crests that descend to accessible riverside sites in the gorge. These occasional visitors are reported to be mainly Rai men from downstream villages who, even though experienced, require five days to cover distances of *ca.* 15 km (Jackson and Ahlborn 1987).

The southern slopes of Mangan Danda are utilized for *malingo* collection to build thatch huts. To a lesser extent, fibers from the inner bark of the shrub *Daphne bholua* are harvested for production of *lokta* paper. The forests here are consequently more open, especially on exposed aspects where fires have created suitable conditions for pioneering climbers and thickets.

Figure 21. Gamebrid fence traps, Mangan Danda, N or Mudi Kharka

Mudi Kharka is a small settlement that is inhabited most of the year, with all occupants descending to Chheskam and Bung for the winter months. Twelve ghots are present, most of these simple wood and stone structures that are open on one side. Some of the fields associated with the *ghots* are walled with large stones. Peripheral forest has been moderately cut to provide fuelwood and fodder for cows, goats and water buffalos.

The open surroundings of Mudi Kharka allowed a recce by binoculars of E bank forests in the Middle Hongu. Patches and bands of mixed conifer forests at 2700-3300 m were seen to have been burned, with the worst affected being those of the drier S and E facing slopes in the Khemba Kharka area. Standing deadwood of fir extended NE in patches to the western spurs of Kal Pokhari Danda (Schneider map name). Information obtained later from residents in Chheskam indicated that the fires probably resulted from slash and burn activities in the Khemba Kharka area during late spring in 1990 or 1991. Lightning strikes and branch friction in the remoter areas cannot be ruled out, although in the likeliest scenario, wind apparently carried coal fragments to the Kal Pokhari Danda sites. Local informants said there was no human presence or other human-caused disturbance in the area, and no evidence could be detected through binoculars. On some slopes regenerating fir saplings and a tall, dense ground cover of weedy species and bamboos were noted.

2.5 Management considerations

2.5.1 Upper Hongu

I. Grazing

The Upper Hongu is heavily grazed, and its sustainability at current stocking levels remains questionable. As Jackson *et al.* (1990) recommend, a systematic survey based on rangelands protocol should be undertaken in late summer to assess forage productivity, habitat condition, and relative abundance of palatable grass species. The period would also allow direct assessment of grazing activities such as: extent of livestock use, grazer interaction with habitat and wildlife, estimates of carrying capacity, and the potential for reduction or phasing out of grazing.

Because previous surveys of the Upper Hongu were conducted in the post-grazing autumn months when local flora is difficult to identify and conditions are much less conducive to use by fauna, a summer inventory of birds, mammals, reptiles and invertebrates should be undertaken in conjunction with the grazing survey (Jackson and Ahlborn 1987).

The ubiquitous grazing of herbaceous habitat (with scant evidence of seed) and the presence of landslips and slumps on relatively gentle slopes suggests that grazing in the Upper Hongu is unsustainable at current levels. The socio-economic and political impact of reducing or, better yet, eliminating livestock may be minimal as few leaseholders are evidently involved and there are no permanent inhabitants of the Upper Hongu (Jackson and Ahlborn 1987). Effective implementation would likely require providing compensation to current grazing beneficiaries in Chheskam (the traditional "landlords") and participating grazers of Nerpa (and possibly Aislukharka) in Kotang district. A thorough understanding of the economics of current and past grazing arrangements, including a comparison with alternative land use returns (*e.g.*, ecotourism and intrinsic biodiversity value) and identification of income substitution possibilities, are needed to evaluate the prospects of regulating grazing in the Upper Hongu.

Such an evaluation and follow-on activities would extend MBCP fieldwork beyond the BZ, but this should not be an important consideration given the direct linkages of human interaction with Park lands.

One management option may be external purchase of grazer rights, either as a partial or entire buy-back; another option the outright purchase of livestock from the Gurung communities. At least a reduction in number of livestock may well be in the medium and long-term interests of the grazers themselves. At current stocking rates degraded pastures may not be able to sustain such numbers of livestock far into the future. These possible options, however, pose several questions:

- How would reduction or cessation of grazing affect the socio-economic life of the Gurung communities?
- Could buy-back or buy-out returns be used effectively to develop suitable alternative livelihoods for grazers?
- What additional inputs are needed to effectively transform grazer livelihoods?
- Is it realistic to assume that with limited opportunities in their local economy grazers can be transformed from the only livelihoods they know?

Another, ameliorative option may involve shifting some of the current grazing pressure to the thin band of *kharkas* NW of Mudi Kharka, but surveys are needed to determine if these pastures could tolerate more intensive grazing.

The lakes of Panch Pokhari are very infrequently used as a pilgrimage destination, and a few grazers from 'downstream' villages (Cheskam, Bung, Dhube) herd sheep there in some years during the monsoon (Cheskam residents, pers. comm.). As a result, disturbance to high altitude grasses and herbs in the vicinity of the lakes is minimal. Although the vegetation has not been thoroughly inventoried, most species are apparently widely distributed and typical of alpine vegetation on the southern slopes of the Himalaya. Current knowledge suggests that neither the *beta* nor *gamma* biodiversity value of the Panch Pokhari area is high, hence the area does not meet the criteria for status as a Strict Nature Reserve.

Combined with rehabilitated grassland habitat to the S in the Hunku Teng region, the Upper Hongu could, however, form an important Wildlife Reserve. The best potential habitat for Snow Leopard in MBNPBZ and Sagarmatha NP is found between Chamlang and Panch Pokhari in the Upper Hongu (Jackson *et al.* 1990; Ahlborn and Jackson 1987). Restoration of ungrazed vegetation and ungulate populations in the Hunku Teng region of the Upper Hongu would expand suitable habitat for Snow Leopard, and probably comprise the largest tract for this species in East Nepal. As a keystone species, Snow Leopard is especially desirable for reestablishment. This primary predator indicates that many other species of flora and fauna forming the bulk of the local ecological pyramid are in a robust condition. Furthermore, restored wildlife of the Upper Hongu would enhance ecotourism appeal and related income generating ability of the valley.

II. Ecotourism

For the trekker, the Upper Hongu is a particularly isolated region, resembling a hidden valley, because it can only be practically reached by crossing Mera La, Amphu Lapcha, or Mingbo La,

all of which are potentially dangerous, glaciated passes. Crossing Amphu Lapcha is further complicated by a lack of detailed information in the trekking literature on the region, and the absence of camping or bivouac sites on both the N and S faces of the pass. As described in section 2.1, traverses of Amphu Lapcha and Mingbo La are mountaineering propositions, nothing akin to other high passes in the region: Cho La, Kongma La, Mera La, or Teshi Lapcha.

Amphu Lapcha is appealing to the adventure trekker because a successful crossing makes possible a circuit of spectacular scenery in the Khumbu and Hongu/Hinkhu regions. In the event of poor weather, however, an attempted traverse of Amphu Lapcha becomes a highly risky venture. If the pass is to remain open for trekkers, measures are needed to minimize the potential for disaster. **Groups must be outfitted with essential climbing gear (ropes, ice axes and crampons) and cold/ poor weather clothing for all members including porters.** Also needed are the services of a "climbing Sherpa", or high altitude *sirdaar*/guide who is experienced on ice and precipitous routes, and preferably, has previously crossed Amphu Lapcha.

Difficult pass crossings in MBNP such as Amphu Lapcha, Mingbo La and West/Sherpani Cols raise a number issues related to permitted use of dangerous areas by trekkers and their support staff. To what extent is MBCP/DNPWC/HMG responsible for the safety of trekkers and support staff, especially those without adequate preparation who are seriously injured or die while attempting to cross the passes? How best can vital information be disseminated to trekkers and climbers?

One effective measure may be the preparation of a pamphlet on mountaineering and trekking guidelines for MBNPBZ, its distribution to trekking agencies active in the areas, and to local establishments near or at entry points (*e. g.*, lodges and home stays in Mingbo, Chhukung and Tangnag). The pamphlet should clearly describe in detail the various hazards encountered along the route of each crossing, how best to minimize the risks of altitude sickness, avalanche, falls in steep places, and the relative distances and travel involved to request a helicopter for evacuation of injured or sick trekkers and climbers. If Tangnag is equipped with a wireless set this would likely prove very helpful in saving lives in the Mera, Mingbo, and Amphu Lapcha areas.

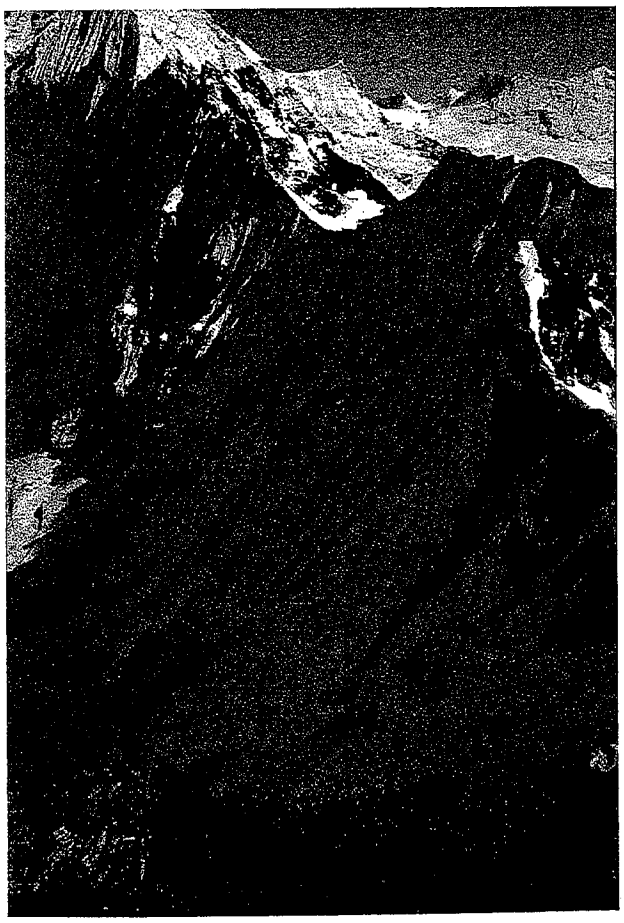


Figure 22. Amphu Lapcha (5780 m) north face.

In publicizing or promoting Amphu Lapcha, a balance is needed between providing adequate information and facilities without infringing on the lure of the unknown, unexpected or especially challenging, all which are inherent parts of the spirit of mountain adventure. If, however, passes such as Amphu Lapcha acquire a reputation as "killer" crossings, trekkers may be less likely to go there. If so, the ecotourism potential of the region will be inadequately realized.

Khumbu to Hongu crossings should be restricted to the '*Japani Baato*' because of the danger of avalanche and difficulty of approach.

Groups visiting the Upper Hongu should also allow sufficient time to acclimatize, as the onset of altitude sickness would require a lengthy and difficult evacuation over high, glaciated passes. Hongu to Khumbu crossings can be attempted via either the traditional route, which includes a sheer 300 m abseil of the N face of Amphu Lapcha (Figure 22), or an equally difficult but technically different negotiation of the '*Japaani Baato*' (Figures 11 and 12). On this latter route, ascent from the Hongu side requires an arduous traverse of steep ice and rock crevices, then a precarious descent through ice falls.

The Panch Pokhari area offers a virtual wilderness destination for trekkers, but strict rules related to camping and trail use should be designed and implemented due to the fragile and open character of the vegetation. The short grasses and wildflowers are susceptible to trampling,

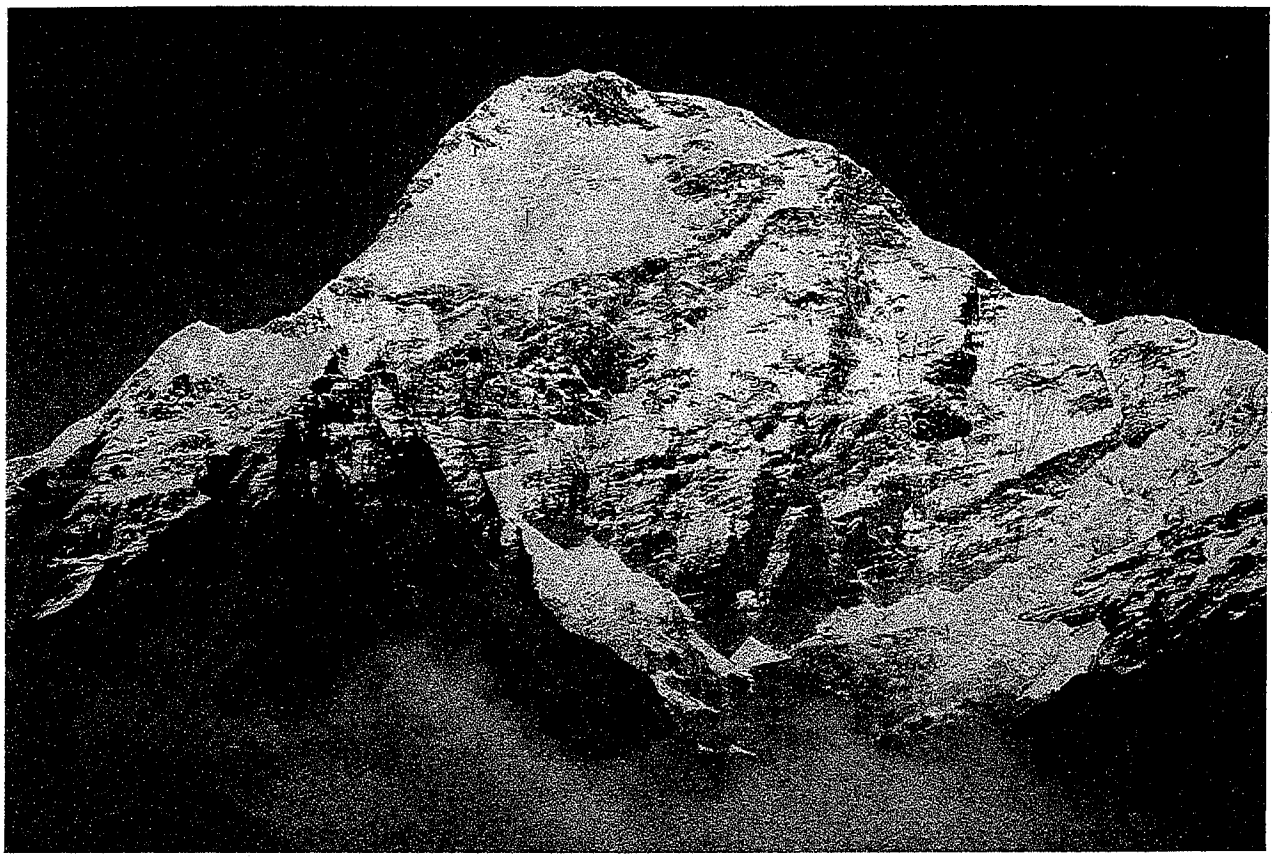


Figure 23. Chamlang (7290 m) from Mera La (5415 m).

which would be particularly conspicuous in this open landscape, therefore walking on a single, unobtrusively marked trail should be encouraged. To maintain the pristine character of this wildland, **no shelters of any kind should be constructed**. The large lakes in the valley add considerably to scenic appeal, which is enhanced by different perspectives obtained on day climbs of ridges and peaks in the area. Foremost among these viewpoints are an unnamed 5820 m peak E of the lakes and N of the Hunku Glacier, and peak 5863 SW of the lakes (Schneider map refers). Neither of these peaks appears as technically difficult to climb as crossing Amphu Lapcha, and views of the lakes and surrounding himal, including the strikingly different E face of Ama Dablam (6856 m), and area glaciers should be magnificent.

Strict enforcement of camping regulations in the Upper Hongu, especially the prohibition on use of fuelwood and proper waste management (construction of pit toilets, packing out of non-combustible garbage), are urgently needed. If trekking groups are found to violate these regulations,

substantial spot fines by Park rangers of group leaders and trekkers themselves may effectively dissuade such incompatible behavior in the future.

2.5.2 Middle Hongu

I. Limited trekking potential

As our passage through the middle and lower reaches of the Hongu showed (section 2.1 refers), this area is extremely rugged and dangerous. While technically possible to construct a trail along the river, this would be an ambitious venture, and trail maintenance costly (primarily due to the rapid regrowth of bamboos). **Despite the undisturbed and distinctly scenic character of forests along the Hongu, appeal to the trekker is assessed as limited because views of the surrounding countryside are obstructed by the many cliffs and continuous canopy.**

To accommodate the aspirations of the Bung and Cheskam communities for access to the tourism industry, and provide an attractive off-the-beaten-track experience for trekkers, an assessment is warranted of an existing route used for sheep grazing from above Cheskam across high pastures to the Mera La area. It may be feasible to renovate the main trail in a environmentally benign manner in order to enhance trekker appeal. If so, Cheskam would be linked with the main E-W trail from the Dudh Kosi to the Arun river valley, and promotion of the new route would likely bring additional benefits from the trekking trade to Bung.

II. Importance for wildlife and biodiversity conservation

The middle and lower Hongu evidently provides an important refuge for a variety of large mammals, especially in winter when they descend to the snow-free banks of the lower kholas. Trail construction and human presence here would likely be disruptive to wildlife, and facilitate poaching. The occurrence of Himalayan Thar in the middle Hongu represents a possible founder population for that species and basic prey to establish Snow Leopard in the Upper Hongu.

The deciduous and evergreen broadleaf forests in the middle-lower Hongu include a diverse mix of deciduous and evergreen elements, but are probably not as species rich as similar associations in the Apsuwa and Isuwa *kholas* of the Park. Even so, these lower temperate forest types remain poorly represented in protected areas of eastern Nepal, and by extension, the country as a whole. Strict protection of stands in the middle-lower Hongu would therefore complement and enhance the ecological viability of forests in the Apsuwa and Isuwa drainages.

The Hongu from below Urpa to Mudi Kharka would seem best designated as a Special Area for Biodiversity Protection. Local utilization of forest products is restricted to the *danda* N of Mudi Kharka where *malingo*, *lokta* and *allo* (nettles) are harvested. Grazers and agriculturalists avoid the middle and lower Hongu because of its extremely steep terrain. Even access to occasional hunting is apparently restricted to crest trails on the W bank (pers. obs.). Very few conflicts in resource utilization therefore exist with local communities, and few compromises or sacrifices are required on their part, other than the agreed upon cessation of hunting, to designate the area for biodiversity protection.

3. Area 3: Budum, Sanu and Irkhuwa Kholas from Guidel to Khandbari (10-17 May 1995)

3.1. Route and logistics

Guidel (1960 m), a predominantly Kulung Rai village, lies on the main E-W trail that runs south of the Buffer Zone from the Hongu to the Arun (Figure 22). The route is declining in importance for porterage of goods between local communities, but is gaining popularity as a trekking sector that links the Dudh Kosi-Mt. Everest area with the Arun river valley. To further promote the area for ecotourism, MBCP produced a basic trekking guide for the route in 1998 (Roberts 1998a). In May 1995 there were no inns or hotels in Guidel, in contrast with four establishments in Bung that catered to individual trekkers.

The main trail to the Arun keeps fairly high above the Budum (= Lidung Khola), a small tributary of the Hongu that originates from the slopes of Salpa Bangjyang.

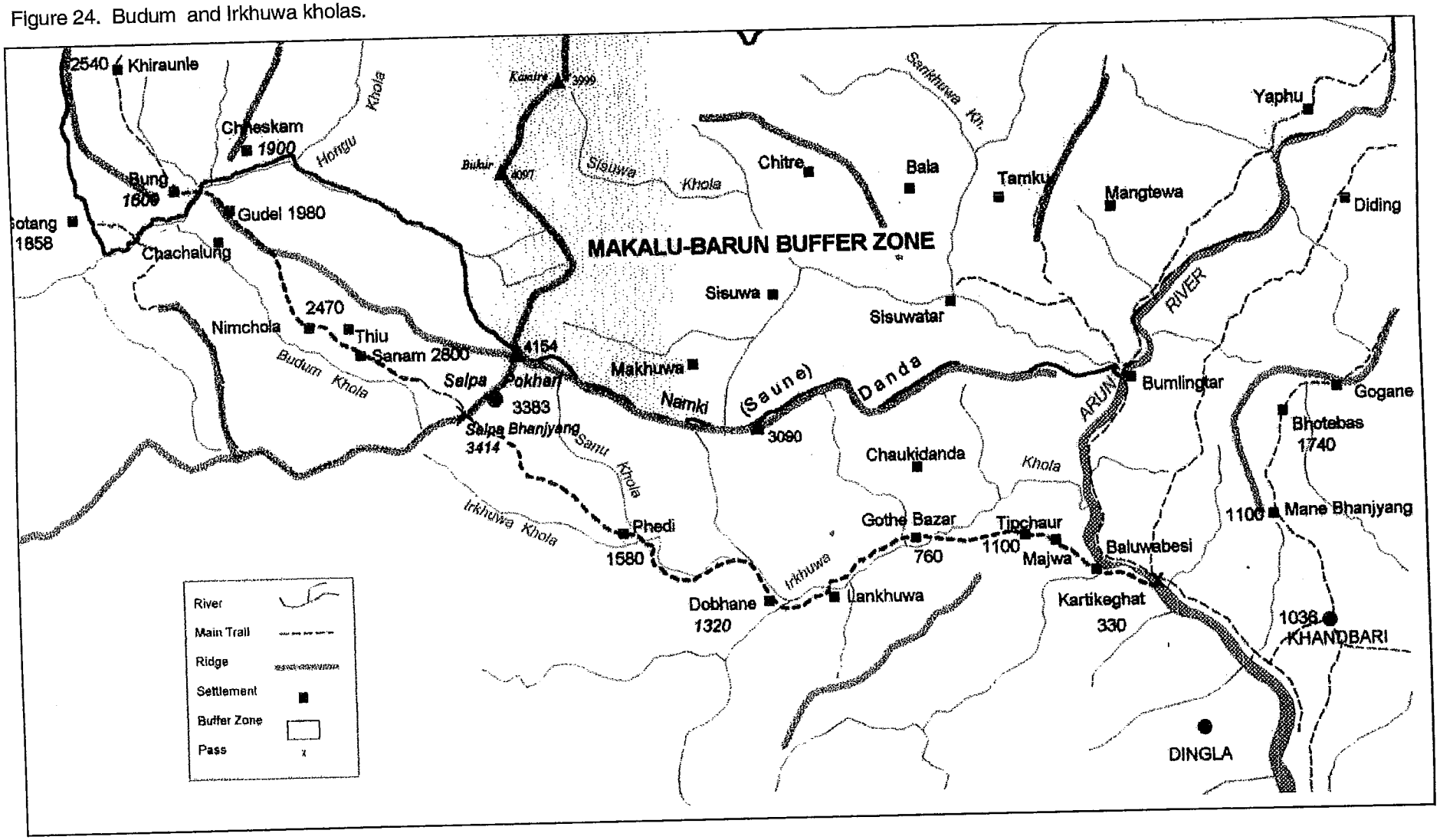
Ascending and heading SE from the terraced fields and scrub of Guidel, Sherpa communities are encountered above 2700 m. From Nimchola Gompa (2750 m), the route is well-forested with temperate and subtropical associations as far as the W bank of the Arun. Nimchola, Thiu (2800 m) and neighboring Sanam (2900 m) villagers were accustomed to trekkers, most of whom pass through in groups guided by Kathmandu based agencies and their own personnel. For individual trekkers, the first of the small "hotels" was being constructed at Nimchola in May 1995, a rustic and pleasant home stay was the only accommodation at Thiu, and there were two large inns with signboards at Sanam. Basic foodstuffs and store goods (*e. g.* rice, potatoes, noodles, tea, beer, sugar) and a surprising variety of fresh vegetables were available in each village.

From Sanam, an undulating but overall fairly level trail courses through mossy oak and other mixed temperate forests to the few huts and lone tea house of Waka (2800 m) at the base of Salpa Banjyang (3349 m). Dense forests of the middle and upper temperate zones blanket both the NW and SE slopes ('Huna Danda' on the Schneider map, Dudh Kosi sheet). The nearly undisturbed character of the mossy trailside forests makes this section of the Guidel-Khandbari trail especially appealing to nature-oriented trekkers. From Salpa Banjyang in clear weather, a panoramic view of the himal stretches from Sagarmatha on the NW horizon to Kanchenjunga on the NE (Roberts 1998a).

On our May 1995 passage, we detoured NE from the pass over an indistinct path to three small lakes known as Salpa Pokhari. Two of these lie close together and recessed in a steep bowl at 3400 m. Several *ghots* in the area provide accommodation for summer grazers, as well as are also used by pilgrims during summer fairs and the full moon festival in Baisakh (April/May), and the occasional trekker.

From Salpa Pokhari we attempted to ascend E through thick forests to the Sisuwa Khola, and re-enter the BZ. Lacking a good topographic map of the area, the ruggedness of the terrain was unexpected, and an alleged trail could not be located. For two days we slashed through heavy forest with thickets of bamboo and climbers at 3400-3500 m in search of a pass over this high ridge, locally referred to as Namki Danda. Disinclined to risk another Hongu type experience, with food reserves dwindling it was decided to descend towards cultivated areas and a presumed trail in the Sanu Khola. The shelter of a *ghot* was reached in high meadows for an overnight stay, and the next morning we descended steeply over narrow paths to intersect the main Guidel-Khandbari trail W of Phedi (1525 m), a large Rai village.

Figure 24. Budum and Irkhuwa kholas.



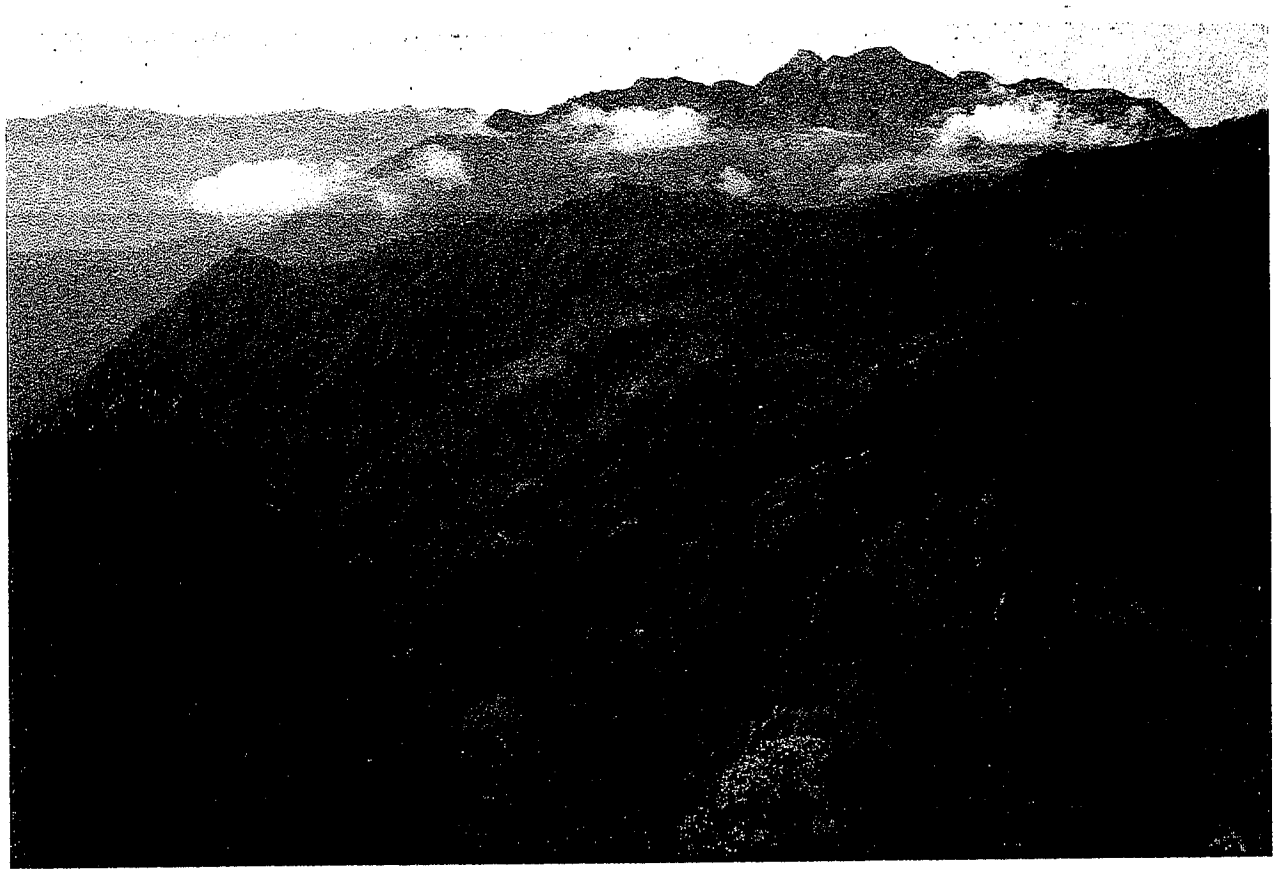


Figure 25. Grassy saddle of Salpa Bhanjyang (3414 m) from the upper Sanu Khola.

The trail from Phedi follows the Irkhuwa Khola as far as the high point S of its confluence with the Arun. Climate along this sector from 1525 m to 1050 m at Tipchaur is subtropical. A mosaic of cultivation and subtropical forest patches are passed along the way. The trail splits at Tipchaur with the main route towards Khandbari climbing gradually E on Majwa Danda and cresting at a pipal tree *chautara* (resting dais) amongst the scattered houses of Chalise. The trail then descends to Baluwa Besi at the confluence of the Arun and Chirkhuwa tributary. From there to Khandbari (1050 m) an easy one day walk follows down the Arun (Figure 27). After crossing a toll bridge at Kharti Phul (= Kartikeghat) and reaching a low point of only 330 m, a relatively steep trail ascends to Kandbhari, the Sankhuwasaba district center.

3.2 Habitat types and condition

Serious deforestation is evident in the vicinity of Guidel, which is exacerbated by the demands of Chachalung, the large village below it. Many S facing slopes have been cleared and regeneration suppressed to scrub by continual pressure from grazing and an invasion of *ban mara*. As far as could be determined, no reforestation or enrichment planting was evident in 1995, although in recent years several hectares of chir pine have been planted above Chachalung (Dirga S. Rai, pers. comm.). A variety of grains (*e.g.*, rice, corn, millet, wheat and barley) and other crops are grown, but the area lacks irrigation. Only one rice crop is cultivated, and restricted to the lower elevations of Chachalung. North slope forests of the Budum tributary were in much better condition in 1995, although large clearings for cultivated fields dominated some slopes. Remaining mixed broadleaf forests were therefore reduced somewhat in coverage. The canopy was observed through binoculars to be virtually continuous.

The Budum and Irkhuwa valley trails pass through a wide variety of forests, from dry pine scrub beyond Guidel to wet high altitude conifers, subtropical pandans and tree ferns, as well as pure stands of sal *Shorea robusta* in the Lower Irkhuwa and Arun. At Nimchola (=Limchaula) and Salpa Bhanjyang there

are tracts of intact forests, with excellent views of steeply forested northern slopes of the Budum Khola. Mixed broadleaf and conifer forests are encountered crossing Salpa Bhanjyang. Towards the pass, vegetation becomes increasingly dense with thick bamboo, and mixed conifer with a expansive understorey of *Rhododendron campanulatum*. In May the lavender blooms of this rhododendron shrub and an exquisite array of nectar sipping birds add great beauty to the walk.

North slope forest canopy appeared to be in near pristine condition >2100 m, and mostly intact as low as 1800 m. Forests are mainly mixed broadleaf associations (schima-chestnut [*Schima-Castanopsis*]), which in many areas of eastern Nepal are degraded and increasingly threatened by human degradation. Riverine forests of the lower Irkhuwa feature good belts and patches of subtropical vegetation. Screw-pine *Pandanus nipalensis* is commonly distributed on S slopes, especially in damp and shady ravines, but also grows on the exposed nooks and ledges of cliff faces, and with a variety of broadleaf species.

Below 2500 m, most slopes in the Budum and upper Irkhuwa are converted for cultivation. This elevation is the approximate upper limit on the southern side of the Himalayas at which many crops will ripen.

Large patches of mixed subtropical forests were encountered walking farther down the Irkhuwa. Screw-pine is a conspicuous forest element, usually as a subcanopy tree, and even dominates on wetter facies. In addition, much of the lightly disturbed forest was aberrantly located on the hotter S facing slopes, and densest in ravines where bananas and trees ferns were also growing, whereas the cooler N facing slopes were extensively cleared for cultivation. Approaching Ghote Bazar, a substantial sal component emerges, and the forest is noticeably drier, particularly so on S facing slopes, where it includes Chir Pine *Pinus roxburghii*. The sal becomes less mixed with decrease in altitude towards the confluence with the Arun. Although heavily grazed and foraged for firewood, mixed sal forest occurs in bands away from huts and

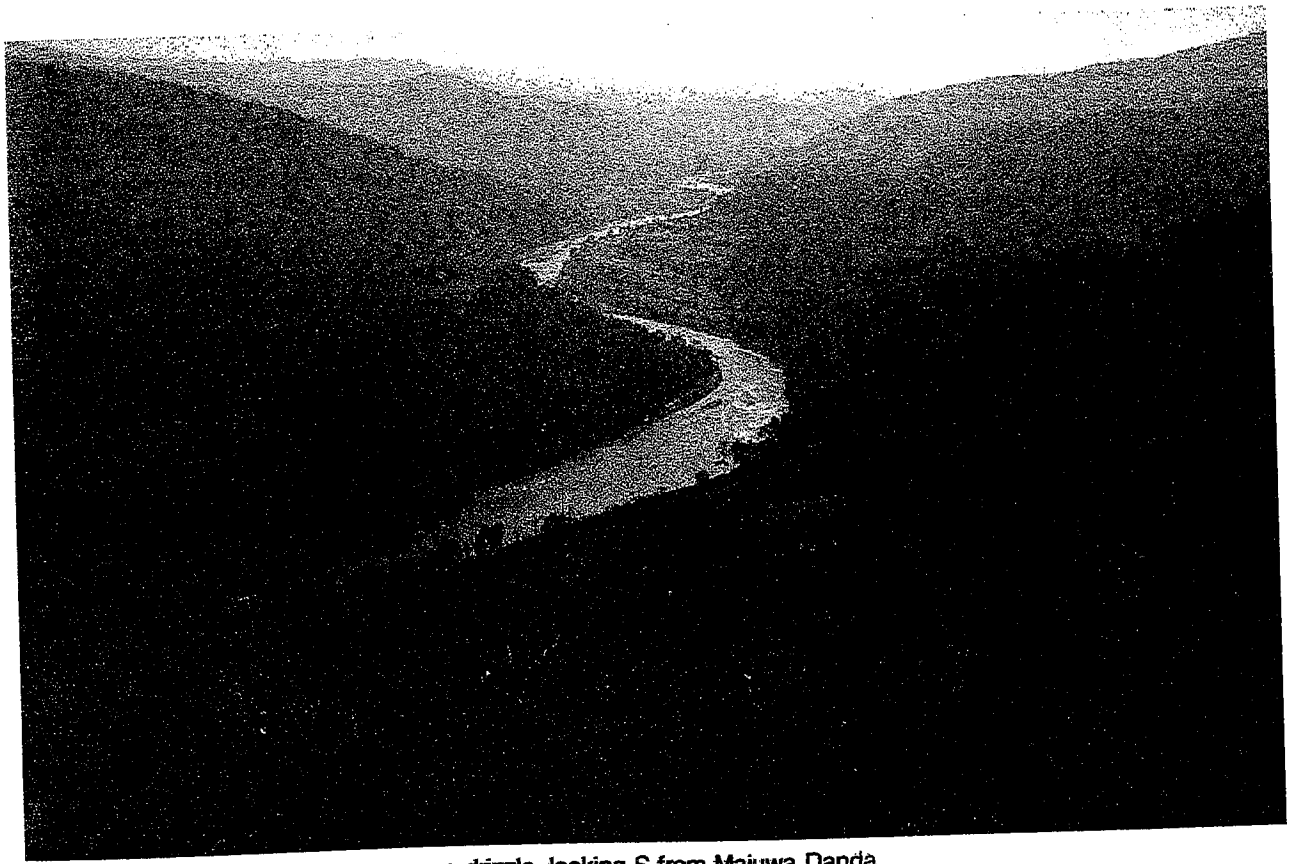


Figure 26. The Upper Arun in monsoon drizzle, looking S from Majuwa Danda.

the littoral. Nearly pure sal forest predominates along the banks of the Arun in this region, but is heavily burned and grazed, and in many areas has been extensively thinned by timber cutters.

3.3 Wildlife observations

Birds. Crested Kingfisher *Megaceryle lugubris* was noted on two occasions fishing from boulders in clear flowing water and at edges of emerald green pools in the Irkhuwa Khola. Presence of this species usually indicates a fairly abundant fish fauna. Similarly indicative was Slaty-backed Forktail *Enicurus schistaceus*, which was recorded five times along the Irkhuwa. This elegant bird of the subtropical littoral is generally uncommon in Nepal (Grimmett *et al.* 1998) and partial to forested rivers and large streams (Inskipp and Inskipp 1991). Its graceful behavior and exquisite appearance is a delight to observe. Yellow-vented Warbler *Phylloscopus cantator*, an uncommon and very locally distributed species in Nepal (Grimmett *et al.* 1998) and globally range-restricted (Baral *et al.* 1996), was found in a mixed hunting party near Dobhane.

Nepal Wren Babbler *Pnoepyga immaculata* was recorded by vocalization near Thiu. This species is morphologically very similar to the two other *Pnoepyga* wren babblers in Nepal, and was described only in 1991 (Martens and Eck 1991). It has a distinctive song and has since been found to be locally fairly common in central and east Nepal (Grimmett *et al.* 1998). The species was considered endemic to Nepal until an individual was seen and heard singing in India near Corbet National Park and the border with Nepal (Robson 1999).

Birdlife of the Upper Sanu Khola was extraordinarily diverse with several local or scarce species recorded. On 12 May, a pair of Gould's Shortwings *Brachypteryx stellata*, strikingly shaped and patterned skulkers, was observed at *ca.* 3275 m hopping about at close range while we lunched at streamside amongst dense bamboo and steep grassy slopes. A single bird was noted the following morning *ca.* 1.5 km E in similar habitat. Gould's Shortwing is classified as "scarce and very locally distributed" in Nepal (Inskipp and Inskipp 1991; Grimmett *et al.* 1998).

A rocky promontory near our tented camp on 13 May proved to be a birding hotspot. The rare, unobstructed view point showed that we were in steep, open canopy forests of oak, rhododendron, and juniper, with a dense understory of *ningalo* bamboo. Despite the southerly facing aspect, these forests were very moist in appearance. Mosses covered the branches of most trees, and wisps of 'Spanish moss' lichens dangled throughout the 2.5 - 3 m tall bamboo stands. Gold-naped Finch *Pyrrhoplectes epauletta*, Yellowish-bellied Bush Warbler *Cettia acanthizoides*, Golden-breasted Fulvetta *Alcippe chrysotis*, Great Parrotbill *Conostoma aemodium*, Satyr Tragopan *Tragopan satyra* and a displaying Slender-billed Scimitar-babbler *Xiphirynchus superciliaris* were recorded there, all within a single morning. For the birding enthusiast and scientist alike, this site in the Upper Sanu is of special significance, offering an unparalleled experience in diverse high altitude forest and an excellent opportunity for ecological studies.

The highest diversity of birds recorded per day (seen and heard) on the entire 73 day trek was enumerated from Bung to Thiu: 44 species, due to the large elevational change and variety of subtropical and temperate habitats. Also notable is the high daily total of 35 from the Upper Sanu camp to Chuleli *ghot*, where there was little elevational change but the forests are species-rich.

Mammals. A pair of Crab-eating Mongooses *Herpestes urva* was observed along the Irkhuwa Khola near Ghote Bazar at *ca.* 1150 m on 15 May 1995. The animals kept mostly to the littoral, and

searched hurriedly for prey amongst stones and rock crevices as they worked their way upstream. There are very few records of Crab-eating Mongoose from Nepal. The species reportedly occurs in Ilam district, Chitwan, Bardiya, Shuklaphantha, and Annapurna Conservation Area (Suwal and Verheugt 1995; Shrestha 1997). One reason for the lack of reports is that this mongoose is a tropical and subtropical species, occurring in eastern Nepal at the eastern limit of its SE and E Asia range (Corbett and Hill 1992). Another factor is that much of its presumed primary habitat in Nepal, clear-flowing tributaries and streams, has become seriously disturbed in recent decades.

Rhesus Macaque *Macaca mulatta* was observed twice in the Irkhuwa Khola. A troop of 3 males (adults and old juveniles) and 1 female with an infant was watched below Ghote Bazar on 15 May at *ca.* 1060 m in mixed sal forest with thickets and lianas. Another larger troop was seen the next day farther downriver at the edge of mixed sal forest.

An lone adult male Common Langur *Presbytis entellus*, showing the typically heavy coat and pale, almost white head of the mountain race, was recorded at *ca.* 3100 m on 11 May 1995 in dense mixed fir forest E of Salpa Banjyang. A 6-8 member troop of the lowland race was briefly watched outside Tipchaur in the Lower Irkhuwa on 16 May 1995.

A Yellow-throated Marten *Martes flavigula* was observed on 14 May 1995 in lower temperate forest and scrub in the Sanu Khola below Chuleli at *ca.* 2000 m, and a pair watched on 17 May 1995 near Baluwa Besi and the banks of the Arun at *ca.* 600 m.

Himalayan Goral was sighted once, an adult on 13 May 1995 at *ca.* 3350 m in steep grassy bluffs NE of Salpa Pokhari in the Upper Sanu Khola.

A Barking Deer *Muntiacus muntjak* was heard calling at twilight from the Salpa Banjyang area on 12 May 1995, and a single spotted on 10 May 1995 at *ca.* 2600 m near Nimchola Gompa.

Insects. A profusion of butterflies was observed along trails of the middle and lower reaches of the Sanu Khola from *ca.* 1600-2400 m. Papilionids, pierids, danaids, satyrids and lycaenids were well represented in all habitats, especially at lower altitudes, where they flew through the canopy, sipped nectar from shrubs and wildflowers, and puddled on sandbars. This area was by far the best segment for diversity of lepidoptera encountered on the trek.

3.4 Human interactions and impact

Demand for fuelwood and conversion for agriculture E of Salpa Banjyang has stripped the slopes of much forest cover. Extensive scrub and shrubland S and W of Guidel is heavily grazed, with some slopes denuded of tall shrubs and trees. As one ascends above the limit of most cultivation, forest area increases. Pruning and cutting of trailside vegetation is common, particularly the coppicing of oaks *Quercus semecarpifolia* and *Q. lamellosa* in the vicinity of Sanam. In a broader perspective, though, the trail passes through the only centers of human population in the river valley. Remote sensing and groundtruthing shows dense forests higher up and on the opposite N facing slopes in the valley. The region, therefore, retains a wealth of good forest cover. Most of this occurs in the upper temperate and alpine zones, although mid-temperate associations are included. The latter are distributed sparsely in other areas of the Park and BZ.

The main trail from the Dudh Kosi to the Arun is becoming a popular trekking route. In contrast to the traditional Jiri-Lukla route leading to the Everest region, there are fewer, more traditional villages, and the landscape is less modified by human activities. The trail to the Arun is uncluttered with signboards, litter, or other trekkers, and features long stretches through dense forest. Precise trekking data is unavailable, but residents of Thiu and Sanam estimated that 2-5 groups and 3-5 individual trekkers per day passed through the area during the peak weeks of the spring and autumn trekking seasons in 1994/1995, yielding an annual total of 300-500 trekkers.

Figure 27. Fuelwood and collector, Guidel.

Except on the steepest slopes, sal forests in the Irkhuwa and Arun are burned in the spring to clear the understory and stimulate grass growth for grazing. The forest within 1-2 km of villages is often heavily hacked for fodder and firewood, but is continuous in bands down much of the Lower Irkhuwa, occurring as high as *ca.* 1300 m. Small patches of forest were found recently cleared to plant crops, but cutting of live trees for fuelwood was not evident.

The construction of a large hotel adjacent to the gompa at Nimchola has marred the spectacular views of this old, attractive building against a background of densely forested slopes. Residents opined that additional hotels will likely be built as the area is discovered by the trekking community.

3.5 Management considerations

I. Expansion of the BZ to include the Budum and Irkhuwa watersheds.

The inexplicable exclusion of the Budum and Irkhuwa watersheds from the Buffer Zone during the planning and survey phase of the MBCP should be rectified for several compelling reasons.

i) The unique biological diversity of the Irkhuwa is facing threats of further degradation from a relatively isolated but expanding local population, and an expected increase in demand for forest products in the near future, exacerbated by increased trekker use. Subtropical broadleaved forests in Nepal have been heavily degraded by human pressure (Inskipp 1989), and are increasingly threatened in their remaining fingers of distribution in ravine and river valleys. Inclusion of mixed pandan forest and intact *sal* (*i. e.* mainly the Lower Sisuwa Khola), which are poorly represented in other areas of the Park, and the biological richness of the Upper Sanu, would add to and buttress the ecological integrity of the relatively restricted amount of lower temperate and subtropical forests in the Sisuwa drainage. As evidenced by its extensive littoral forest cover and lightly exploited waters, the Irkhuwa Khola is an important example of aquatic habitats in Nepal that are perhaps best defined as well-forested hill tributaries.

ii) ***Ecotourism.*** There appear to be few communal links to other areas of the Park. Irkhuwa communities do not graze their livestock in the distant upper valleys of the Park. While this makes it

more difficult to justify inclusion of the area in the current community-development oriented project, **the main trail through these villages is becoming increasingly popular as a trekking route. Therein lies an excellent opportunity for the project to stimulate development of ecotourism and eco-enterprises.** Much undisturbed forest, idyllic village settings, and hospitable residents are located only a few days from the main trail to Mt Everest. Phedi is a relatively large village in the Irkhuwa that is well-positioned for the establishment of a Sector Office for the Budum and Irkhuwa watersheds. (Guidel, though, may be more efficiently served by the Sector Office at Bung). Local communities should be canvassed on whether they wish their lands to be included in the BZ. Residents of Guidel have requested several times in the recent past that their area be included within the formerly gazetted CA (B. Peniston, pers. comm.).

The Sherpa settlements of Nimchola, Thiu and Sonam are small, and even a modest number of trekkers can provide substantial income to the community from their stopovers. However, due to the nearly intact character of the surrounding forests, unmanaged demands resulting in a large increase in visitors would more quickly and noticeably impact the forest and future prospects of tourism income. A more challenging situation exits farther down the Irkhuwa from Phedi to Dang Maya, where riverine forests are extensively modified. Even so, this sector is a pleasant walk for trekkers, winding through otherwise rarely encountered patches of subtropical forest. Small rustic villages, terraced cultivation, and bamboo bridges over the Irkhuwa add to the appeal of the route. With the integration of effective conservation measures, prospects for long-term improvement of local welfare via ecotourism holds real promise.

Ecotourism development should include specific regulations concerning the construction of lodges. Local materials should be used as much as possible, and design of structures should be in harmony with the local environment, in particular reflecting traditional architecture. Nature lovers and adventure trekkers

Figure 28. Typical Sherpa home, Sanam, Budum Khola.

appreciate the rustic elements in a landscape. Introduced materials such as tin sheeting (for roofs), the conspicuous use of cement, and advertisements (whether painted on structure walls, signboards or boulders) clash with such traditional landscape. Their discouragement would enable residents to maximize appeal to trekkers, persuade them to stay longer, and spend more money.

Home stays often provide the opportunity for a closer experience of traditional culture, and patronage of these establishments helps the less advantaged or privileged members of the community. Contrary to some popular impressions, "modern" accommodation in hotels of standard design is not the preferred type of individual trekkers. There are an increasing number of visitors who are in search of traditional Nepal. A home-like atmosphere with basic amenities (sleeping quarters/bedroom, clean toilet and good food) is especially suited for the increasing number of trekkers who are selecting less travelled, multi-attraction routes as their destination. As the author's observations along this route show, particular potential exists to promote the area for birdwatching.

iii) ***Other eco-enterprise development.*** Priority also needs to be given to discerning the needs and aspirations of the local community through a PRA exercise, as used in other areas of the BZ. The results can then be used to select and design interventions for income generation, and supporting services such as health, sanitation and education. These activities would provide mutual benefit to locals and trekkers, although any initiative that confers non-consumptive economic value to the local environment would be beneficial for conservation and all stakeholders.

Additional local income could be derived by growing a wider variety of pesticide-free vegetables, and marketing these as organically grown to trekkers at moderate to high prices. Organized groups would likely purchase greater quantities of fresh vegetables if available on a reliable basis, and individual trekkers contribute even more by purchasing meals, supplemental foodstuffs, and accommodation. These activities alone, however, probably do not add substantial income earning ability for the area. To effect community-wide improvement in welfare, larger scale eco-enterprises are needed. Best prospects appear to involve handicraft production based on *lokta* paper, *allo* cloth, other locally produced fabrics, bamboo and medicinal plants. Production effects on the environment (*i. e.*, depletion of source plants and supportive forest cover) must be taken into account when developing such industries (Shrestha 1989) and monitored at the source level.

iv) ***Other development initiatives.***

Irrigation is needed in the Guidel and Chachalung villages areas to intensify agricultural production, contribute to improvement in the local economy, and in turn, relieve the intense and unsustainable utilization of forest products. A study should be undertaken to determine the design and costs of an economically viable yet environmentally appropriate system that establishes linkages with regeneration of natural forests.

There is also a pressing need to establish community forest user groups (CFUGs) in the Budum and Irkhuwa watersheds. Reforestation for future fuelwood and construction is an apparent priority. To mesh with ecotourism and biodiversity promotion, use of locally occurring species should be encouraged to help restore local habitats. A complementary and perhaps even more effective and quicker method to bring forest utilization within carrying capacity would be enrichment planting. Wide scope for this appears to exist in the vicinity of most villages along the main trails of the Budum and Irkhuwa *kholas*. At the lower altitudes *Schima wallichii* is a co-dominant forest species that exhibits good capacity for regeneration, and is therefore suitable as an afforestation species (Shrestha 1989).

4. Area 4: Kasuwa Khola from the Arun River to Zanthe, Barun Khola (25-29 May and 10-15 June 1995)

4.1. Route and logistics

The area was reconnoitered twice, initially en route to the Upper Barun, and subsequently retraced as far as Chekshe Danda (= Murmidanda; 1556 m) on return (Figures 29 and 41). From the spurtop school at Chekshe Danda, we diverted from the main trail to cross the Lower Kasuwa above its confluence with the Arun, then followed this major river to our next destination, N slope forests in the vicinity of Phyaksinda (796 m) (see Section 6).

Most of the route covered in this section has been recently described in a separate MBCP publication (Roberts 1998b), a detailed trekking guide to the Barun area from Tumlingtar (320 m) to Makalu Base Camp (5000 m). This is the sole guide prepared exclusively for the area and is especially valuable for site and trail information, in addition to effective promotion of ecotourism measures.

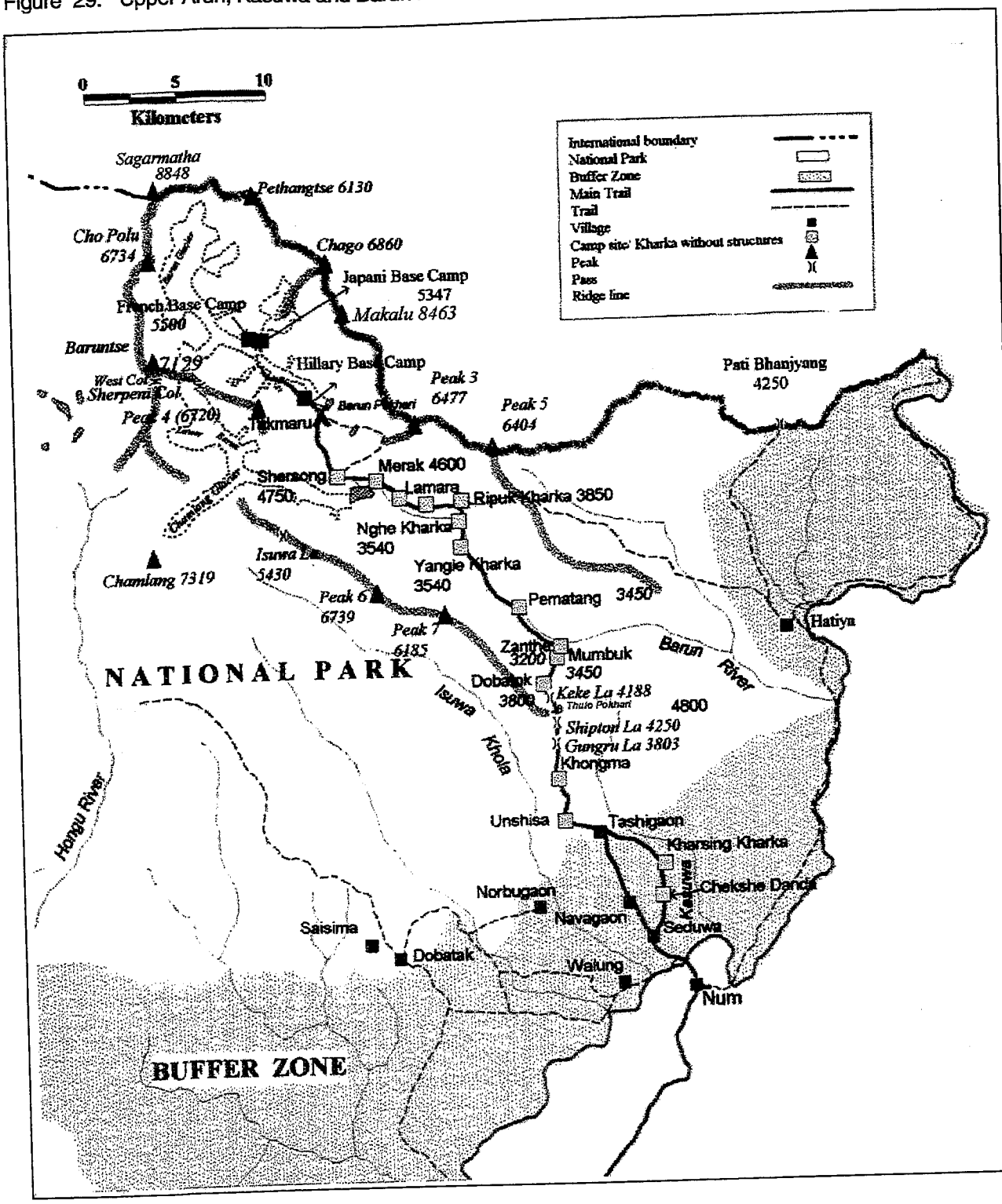
The following summary of the route taken by the author gives additional information on previously described sites, and recounts the high route from Seduwa to Tashigaon. Clarifications are included to resolve lingering confusion regarding some elevations and place names.

From Park headquarters at Seduwa (1470 m) in the Lower Kasuwa, two trails ascend through the BZ to Tashigaon (1864 m). A lower trail keeps to within 200 m of the river, passing through fields and scrub forest. A higher path goes via the small Brahmin village of Yengdim (1700 m), where pleasant veranda accommodation and supplemental foodstuffs are available. Very few trekkers have halted among the friendly and hospitable villagers there, in a setting that is quintessential midland Nepal. The trail then passes through upper temperate forest of schima, oak, rhododendron and other broadleaves, interspersed with several glades, before descending to the Sherpa village of Tashigaon.

From Tashigaon the single main trail to the Barun climbs steeply up a forested spur to Kongma (*ca.* 3400 m), a meadow just N of the NP boundary, with adjacent overhangs that are regularly used by trekking group porters (Figure 29). The ascent is fairly rugged and long with no settlements, although the lone wooden hut at Chiple (2600 m), and small *kharkas* and overhangs at Unshisha (3250 m) on the Ishuwa-Apsuwa watershed may be occupied by livestock grazers in late spring. Due to the 1500 m gain in altitude, most groups stay at Kongma for a day of acclimatization before ascending farther to tackle three passes in close succession: 1) indistinct and knoll-like Ghungru La (4229 m; Brewer Lama and Sherpa 1995; local name, B. Peniston, pers. comm.), where prayer flags and a *mani* wall are found; 2) the highest point of Shipton La (4250 m; named by the explorer Eric Shipton), and Keke La (4188 m; local name?). Shipton La marks the intersection of the Barun, Kasuwa and Isuwa watersheds. A small station to collect meteorological data has been installed *ca.* 200 m below the pass on the N slope.

The trail over these three passes is rough, time-consuming, and subject to inclement weather, especially snow storms in almost any month outside the monsoon season. Adequate campsites are found at Kalo (=Thulo) Pokhari (4040 m) between Shipton La and Tutu La, and at Dobato (4120 m) just N of Keke La. Approximately 300 m W of the last pass there is a small (2-3 person) walled overhang used by grazers (and hunters?), but there is no distinguishable trail leading to it. From Dobato, the trail descends steeply through alpine shrubberies and thick rhododendron-fir forests to the small clearing of Mumbuk.

Figure 29. Upper Arun, Kasuwa and Barun *kholas*.



In 1995, a signboard denoted entry into the NP, and was anonymously annotated with an altitude of 3240 m. Shipton La was demarcated with a Park signboard giving an incorrect altitude of 4500 m. Ghungru La and Keke La were undemarcated.

This route is inaccurately described by Bezrucka (1996; 1997), who gives Keke La as the local name for Shipton La. The Survey Department 1: 50,000 topographical map of 1997 (Bala sheet No. 2787 05) contains spot heights for the area but does not denote any passes or place names. Three passes are depicted on the Mandala 1: 192,500 trekking map of the region, *Dhankuta to Kanchenjunga Mt. Everest Makalu & Arun Valley*, and its current version the 1: 225,000 *Kangchenjunga Makalu* sheet, but are

incorrectly named with measured (in ascending order) as Keke, Shipton and Tutu passes. The varying altitudes given in the two series are lower than Bezrucka's (1997). His are closer to those calculated from spot heights and reading of 40 m contours of the Bala sheet, which have been used herein.

From Keke La, a 20 minute descent to rhododendron shrubberies and scattered Silver Fir brings one to the small *kharka* of Dobato (*ca.* 4120 m). Several tent sites near a small stream are ideal for camping, and in early summer the meadow is carpeted with a variety of blooming wildflowers. This site makes a convenient and scenic camp ascending from the Barun for those unable to reach Kalo Pokhari. Dobato is also attractive because it is sheltered from southerly winds that may be encountered higher up on the passes. During the trekking seasons, Dobato may also be free of snow when Ghungru, Shipton and Keke passes are often covered.

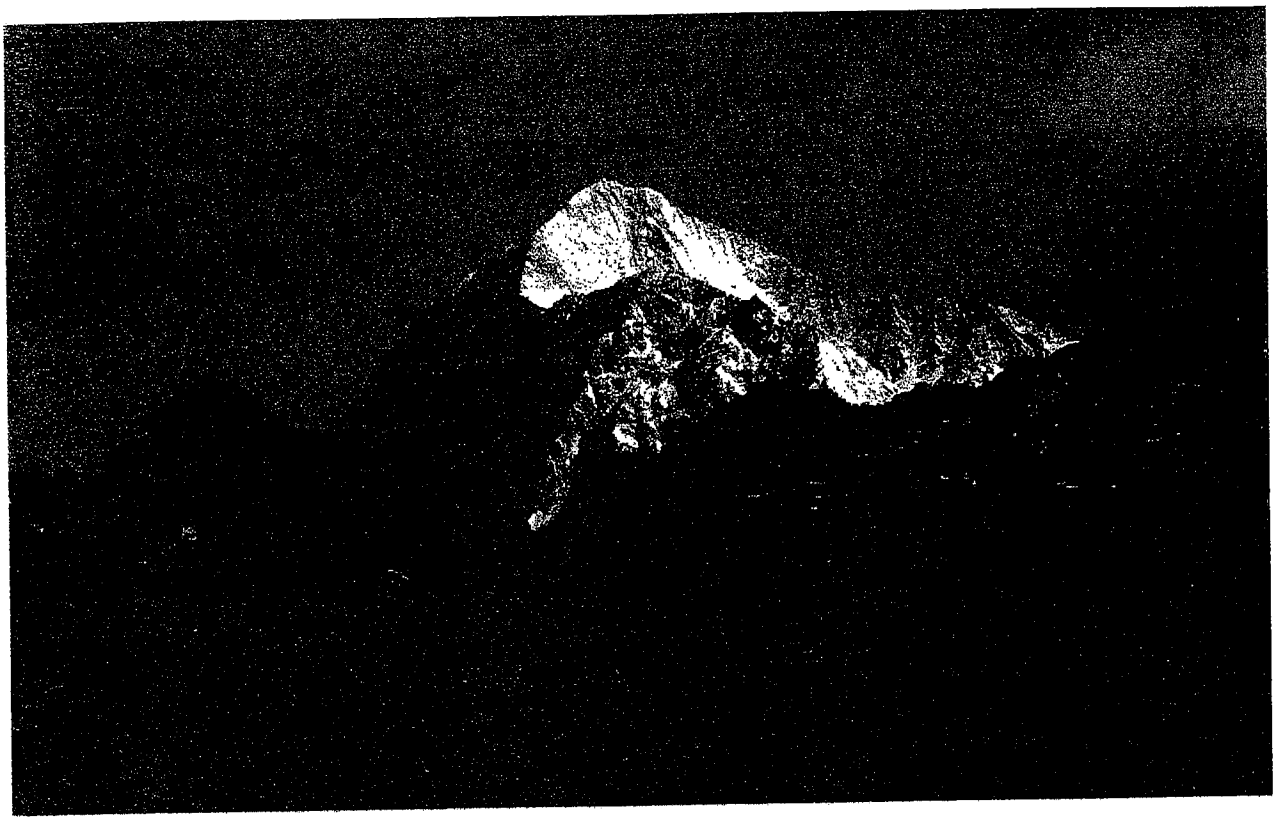


Figure 30. Makalu (8563 m) from Ghungru La.

Descending further towards the Barun, two other overhang camping sites are passed before the forested campsite of Mumbuk (*ca.* 3450 m) is reached. From there, the trail was obstructed in places by fallen fir stems as it descends less steeply through dense forest to Zanthe (*ca.* 3200 m), a shallow overhang <100 m above the Barun. There is space in an adjoining cleared area for one or two tents, although the site is used mostly by herders travelling to and from the Upper Barun.

The only structure encountered from Chiple (above Tashigaon) to Zanthe, and indeed well into the Upper Barun, was a roofless stone ghot at Kalo Pokhari. This is a wild stretch of densely forested country and harsh highlands. The great aesthetic value of the region is epitomized by the first views of Makalu (8485 m), obtained above Kongma and a truly awe-inspiring sight. The massive mountain - the world's fifth highest - looms on the horizon 25 km away, and is set against a deeply incised foreground of forested bluffs and the pristine course of the Isuwa river valley (Figure 2). The vast tracts of undisturbed lush forest against the lifeless yet exquisitely carved summit of Makalu remains one of the most contrasting and memorable views on the trek (Figure 30).

4.2 Habitat types and condition

The main trail from the Lower Kasuwa Khola to the Barun passes mainly through cultivation and scrub forest as far as the out skirts of Tashigaon. The higher trail to Tashigaon from Seduwa is well-forested in oak-rhododendron associations including the large white-flowered *Rhododendron dalhousiae* (Figure 31). There is much trailside cutting for firewood and timber to meet local needs, and this has led to substantial growth of thickets and shrubs along the path. Often one is walking only 100-200 m above fields and scrub. The oaks in this forest were moderately coppiced for fodder, and some of largest trees evidently senescent, their bare canopy limbs encrusted with a variety of epiphytes. The section of forest on this walk has been described as "minimally disturbed cloud forest" (Bezrucka 1996), but only on descent to Tashigaon (2150 - 1900 m) does one pass through nearly intact forest.

From Tashigaon (1864 m) to Kongma, the main trail is bordered with moist temperate forests, often including a dense understorey of *ningalo*. Rhododendron species become increasingly prominent and varied as one ascends the ridge towards Kongma. On our May, 1995 passage yellow blooms of *R. wightii* shrubberies lined the trail rounding the knoll above Kongma. Resplendent Fire-tailed Sunbirds *Aethopyga ignicauda* were common, busily sipping nectar from rhododendron flowers. We found the forest very wet, with a profusion of epiphytes, mosses and lichens. Already there was a monsoon feel to the surroundings, which were often veiled in mist and fog by late morning.

Ascending farther, a poorly developed conifer element is met. Above the tree line at *ca.* 3800 m, rhododendrons continue to dominate the wetter slopes. Higher still, around the passes, dwarf rhododendrons were blooming in the snow, comprised mostly by bleached red *R. setosum* and the small yellow flowered shrub *R. anthopogon.*

Kalo Pokhari (4080 m) is a scenic, shallow lake set in the headwaters of a large (nameless?) stream that flows W to the Isuwa. A marshy littoral grades to drier ground where extensive cover of wildflowers, primarily *Primula* spp., were in bloom. In clear weather, views of Peak 6 (= Nepo; 6739 m) and Peak 7 (6185 m) reflect magnificently off the lake (Bezrucka 1996). Slopes above Kalo Pokhari facing S and SE are densely covered with thickets and shrubs of Drooping Juniper *Juniperus recurva.*

From Dobato to Zanthe mixed Silver Fir and rhododendron shrubs dominate the dense steep forests. A rhododendron subcanopy (to 15 m) is especially well-developed in the vicinity of Zanthe.

4.3 Wildlife observations

No large mammals were sighted in the Tashigaon to Zanthe sector. The extensive intact habitats of this sector should support populations of Ghoral, Serow, Spotted Leopard and other smaller cats. Snow Leopard possibly occurs at higher elevations, in particular during the winter months when the species may descend from the Upper Barun and Ishuwa *kholas*.

Observations of birds were frequently disrupted at higher altitudes by wet weather on both the approach to and return from the Barun. Greatest avian diversity on this sector was noted from Tashigaon to Kongma, where a total of 36 species was recorded on 27 May 1995. This relatively high total was due to good weather during much of the day, and *a fortiori* the variety of virtually intact forest habitats traversed on this steep climb. Species totals declined with altitude and increasingly poor weather. On the Kongma-Shipton La trail only 8 and 13 species were tallied on our two passages.

The fauna of the Kasuwa Khola has been collected and studied by Cronin (1979). A subsequent biodiversity expedition assessed the area in 1984 and identified numerous species of plants and birds, some new to Nepal (Nepali *et al.* 1984). Buckton and Baral (1995) surveyed birds from below Seduwa to the Mumbuk/Zanthe area in November 1994, and a Naturetrek tour birdwatched along the Seduwa to Kongma route in May 1998 (Choudhary 1998).

Figure 31. *Rhododendrom dalhousiae* near Tashigaon.

4.4 Human interactions and impact

Local communities in the lower Kasuwa earn some tourism income from operation of lodges and sales of provisions at Tashigaon. Most porters must be hired from outside the area, however, as employable men from area villages continue a tradition of migrating for work outside the district (Brewer Lama and Sherpa 1995).

Grazers evidently have little impact on the forests from Tashigaon to Zanthe. There are few patches of semi-level ground that could be cleared for *kharkas*. The trailside understorey was slightly thinned by browsing livestock, most of which only transit the area en route to and from the Upper Barun during early and late summer.

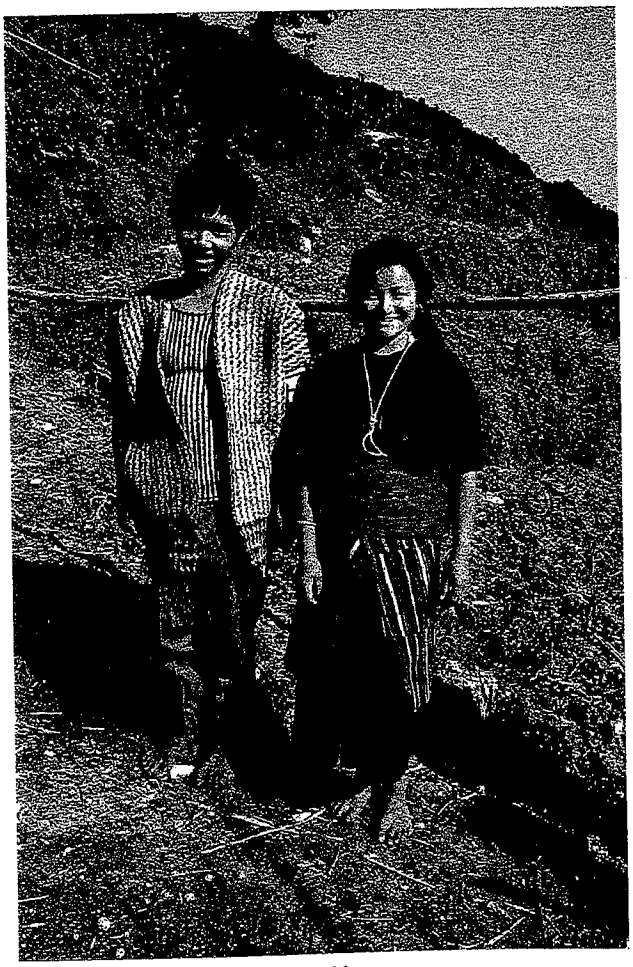


Figure 32. *Young couple at Navagaon.*

There is widespread collection of honey from Giant Rock Bee *Apis dorsata* nests in isolated cliff faces of the Kasuwa river system. Residents at Tashigaon stated that the abundance of bee nests, and by extension, local bee populations have decreased during the past 10-20 years due to overharvesting and disturbance. Collectors said that in recent years they have had to venture farther up the Kasuwa and Hiwa *kholas* to obtain the same amounts of honey. One site *ca.* 1.5 hr from Tashigaon thought to still harbor a bee colony was visited on 13 June 1995, but found abandoned and any comb(s) long since removed. Two active bee nests were sighted in the lower Kasuwa Khola (pers. obs. section 6.3) where Tashigaon villagers do not forage. Four active nests were mapped in the area of the Kasuwa-Arun confluence in November 1994 (Buckton and Baral 1995).

Honey is collected in the spring and summer months, kept at Tashigaon, and subsequently sold to buyers from Khandbari and other areas. Substantial fees were said to be assessed by local authorities, which diminished profitability of the enterprise.

Forest openings near Tashigaon (*e. g.* Bakang Kharka) are inhabited by Chetri settlers, who have apparently been allowed to homestead this area by Park staff. Otherwise, villages above Seduwa are composed entirely of Sherpa communities.

Cutting of trailside vegetation (mostly rhododendron shrubberies) for firewood was observed at Kongma, Dobato, and Zanthe. The activity and associated disturbance does not threaten the integrity of local habitat, but does allow weedy species such as *banmara* to invade, is unsightly, and apparently is causing enlargement of these cleared sites. This situation contrasts rather starkly with the wilderness character of immediate surroundings.

Above Tashigaon at *ca.* 3000 m, open campfires were found burning by the trail during the afternoon. These were deduced to have been built by local residents. No other groups or individual trekkers were encountered in the Barun area when we visited at the end of the spring trekking season. It was unclear why these fires were lit, perhaps for smoke to drive away the constant swarms of annoying *busuna* (biting gnats) found along these trails. Substantial amounts of firewood are evidently consumed, and in some sections above Tashigaon, recent damage to trailside vegetation was evident.

4.5 Management considerations

A comprehensive assessment of the main trekking route along the Kasuwa Khola and measures to promote ecotourism in the area have been produced by Brewer Lama and Sherpa (1995) as part of the *Tourism Management Plan for the Barun Valley*.

In the interest of accuracy and trekker orientation, all project publications for dissemination should show correct features. This will help to eliminate confusion over place, pass names and altitudes, especially in the Shipton La area. Main features there were correctly first described by Brewer Lama and Sherpa (1995), but current trekking books and guides continue to rely on outdated and incorrect information.

The Shipton and Keke passes are critical crossings on the sole trekking route into the Barun Valley. Difficulties are compounded on return from the superbly scenic but distant Upper Barun, when a long stay at high altitude and dwindling supplies push the trekker to cross these potentially dangerous passes. This underscores the need to develop basic campsites and trail markers as recommended by Brewer Lama and Sherpa (1995). Rather than establish and maintain aluminum pole markers to indicate trails in deep snow, it may be more cost-effective and environmentally compatible to build *cairns* (rock markers) at prominent places from N or Ghungru La to Keke La. If local labor is available, the income generated from *cairn* construction would likely assist the community development and participatory aspects of MBCP.

Construction of a basic building at Kalo Pokhari has been proposed to provide emergency shelter in white-out or deep snow conditions (Brewer Lama and Sherpa 1995). A metal structure was built at Kalo Pokhari in September 1999 for this purpose (B. Peniston, pers. comm.). The dilapidated stone hut there could serve the same purpose if renovated, and would not clash with the local landscape. It may even be possible to convert the new structure by using it as a frame for a more durable and harmonic building constructed primarily from stone and slate. Furthermore, a structure may be redundant given the fact that groups entering the Barun Valley would need to be fully equipped with tents for similar (or even worse) conditions that may be encountered in the Upper Barun.

Dobato is a strategically positioned as a camp site. The number of tent sites and rubbish in 1995 indicated that the small *kharka* was regularly used by groups on return from the Barun, especially when late

afternoon weather higher up on Keke and Shipton passes makes the crossings difficult or risky. Its proposed closure (Brewer Lama and Sherpa 1995) may help regenerate overexploited peripheral vegetation, but alternative sites in the area for use in bad weather are inadequate or may be unreachable in poor weather. **Dobato remains important as an emergency campsite and is particularly well-suited for birdwatching and viewing of wildlife.** The *kharka* is set amongst dense shrubberies, but there are open views of surrounding slopes, whereas descending towards the Barun brings one down a long stretch of trail bordered primarily by dense forest.

Unobtrusively placed signboards and information plaques in several languages may be effective in alerting trekkers to the fragile surroundings, and eliciting their cooperation at halting, and even reversing, local degradation. Routine patrols are needed to gauge the severity of this problem and identify practical management measures.

The designated camp site of Mumbuk has become rapidly degraded in recent years and was closed in September 1998 (B. Peniston, pers. comm.). Although the site is large enough to accommodate 6-8 tents, the surrounding fir and rhododendron forest has been heavily impacted for firewood. In 1995 Mumbuk was found to be especially important for woodpecker nesting. Several live and dead fir trees contained old and active nesting cavities, the latter occupied by Darjeeling Woodpecker *Dendrocopus darjellensis*. Even during the wettest months of the trekking seasons, a water source for campers is distant and difficult to access due to the steep local topography. Water is readily available at Zanthe, about two hours walk downhill from Mumbuk. **It is recommended that Mumbuk remain officially closed and used only in emergency situations with strict adherence to site use guidelines as recommended by Brewer Lama and Sherpa (1995).**

Deep toilet pits are needed at all designated camp sites beyond Tashigaon in this sector (*i. e.* Kongma, Dobato and Zanthe). Construction should take into account the need for a self-composting or maintenance-free structure, built inasmuch as possible from local materials, and functional for at least five years.

The sustainability of the forests above Tashigaon which are pressured by camp and open fires is doubtful, and at current rates of utilization could soon lead to severe degradation of trailside vegetation. The trail above Tashigaon at 1900-3200 m needs to be be regularly monitored, and is easily accomplished given the proximity of Park Headquarters at Seduwa. Any unattended fires should be extinguished, and efforts made to discern their cause so that measures can be devised to prevent this wasteful use of forest resources.

Bees are, in all likelihood, important pollinators of forest plants in the lower temperate associations of Kasuwa Khola and farther afield. The economics of the annual honey harvest by Tashigaon (and other?) villagers need to be evaluated, in particular the importance of generated income to local communities in meeting their needs vis à vis its apparent unsustainability. The apparent decline of bee populations calls for development of controls and a monitoring system. The potential for sustained local harvest of wild honey for sale to trekking and mountaineering groups also needs to be assessed, as does potential for home beekeeping. The latter may confer limited conservation value as introduced bees may be perceived to roam smaller home ranges than wild populations from a variety of hives located farther from the village. If the crucial link of a healthy forest sustained in part by wild bee populations can be instilled, and the harvest adequately monitored, continued wild harvesting at a sustainable level may be preferred for the stronger conservation incentive to keep area forests minimally disturbed.

5. Area 5. The Upper Barun River from Zanthe to Peak 6160 m (29 May - 9 June 1995)

5.1. Route and logistics

The Upper Barun route as far as Tsho Karpo (Barun Pokhari) and main logistical considerations are described by Brewer Lama and Sherpa (1995) and Roberts (1998b). Additional information, including updates on trail and campsite conditions, and other trekking considerations are provided in this and following sub-sections.

The trail from Zanthe (*ca.* 3200 m; Figure 29) proceeds W in a generally level direction above the banks of the Barun, but is frequently obstructed by fallen trees and tall, uprooted rhododendron shrubs. Large boulders and several rocky outcrops also require short detours and add to the tortuous character of the trail. Views of the surrounding countryside are obscured by dense forest until a landslide area is reached *ca.* 1 hr W of Zanthe. A small chorten and prayer flag mark the edge of this site. For the next two hours unstable scree and boulders are traversed. We found the trail wiped out in several sections by active landslips, and at one point the spillover from an opposite bank snowslide (Figure 33). Falling rocks and treacherous footing constitute considerable hazards in this area. Where the trail is ephemeral or absent in boulder strewn sections, the lay of the land helped to chart a route across the most stable and least steep sections.

Figure 33. Traversing landsides at 3350 m between Zanthe and Pemathang Kharak.

At a second small *chorten* and prayer flag, the trail twists through a forested ravine, then becomes easier across forested slopes to Pemathang Kharka (*ca.* 3450 m). This small level meadow at the banks of the Barun is a pleasant site to camp, and judging from the amount of human artifacts, fairly popular.

By this point, the Barun has widened and a series of summer pastures are next traversed. The first structures are found at the largest settlement of Yangle (=Yangre) Kharka (3540 m) along a quiet stretch of the Barun. Two hours farther upriver at Nghe Kharka (3750 m), views of the spectacular Upper Barun begin to open up. The trail then crosses the river and climbs through Ripuck Kharka (*ca.* 3900 m), and ascends gradually through Jark Kharka (*ca.* 4000 m) and Lamara (=Ramara; *ca.* 4250 m), the largest *kharka* in the Upper Barun. There we found a single well-stocked store for welcome replenishment, and were informed by the owner that one of three other buildings (all locked) also functioned as stores. Beyond this settlement in the Upper Barun, there are no facilities, even seasonal, to purchase basic or other supplies.

From Lamara, the trail passes through increasingly dry alpine country to the first suitable campsite at Merek (*ca.* 4600 m; a.k.a. Mera and Merik). Merek is an 'oasis' among steep slopes, where a platform has been levelled out just above the river to accommodate 3-4 tents. A shallow cave is reportedly also present (Bezrucka 1996), but could not be located by our group.

The trail then stays fairly level and near the river, but at *ca.* 4650 m on our passage a 50 m section had been washed away by a meander of the Barun. This required a short but time-consuming and precarious detour over cliffs and scree.

Continuing along an easy uphill gradient and paralleling the lateral moraine of the Lower Barun Glacier, the summer *ghots* of Shersong (4750 m) are reached about two hours from Merak. Good views are afforded of the surrounding himal, especially Peak 6 (= Nepo; 6739 m). For a better panorama of the area we climbed steeply NE from the *ghots* for two hours up a pathless spur to a plain at 5300 m. Suitable tent sites were easily located, but there was little evidence of use by other trekkers or mountaineers. No water is found in the vicinity of this desiccated plateau, although snow, when available, can be melted. Otherwise, water must be carried from Shersong or fetched from the flanks of Peak 3 (6477 m), the latter task requiring about 1.5 hr. The S face of Makalu dominates the northern horizon, and was surmised to yield a stunning alpenglow sunset in clear weather.

We attempted to proceed up the Barun from the stark plain above Shersong by descending N towards the southern shore of Tsho Karpo (4848 m). Unobstructed views of the lake were provided en route. To proceed up the valley at this point, there is no alternative to crossing the river as vertical cliffs and falling rock border the northern shore of Tsho Karpo.

Shersong grazers informed us that a *sanglo* was located just below the outlet of Barun Pokhari, but only its stone abutments were found. Here the Barun is formed by twin flows, one emanating upstream from the valley glacier, the other from Barun Pokhari. At the narrowest points each of these tributaries is only 12-15 m wide, but the melting of snow and ice in late spring and summer turns the waters into cold muddy torrents that are potentially life threatening to ford.

We therefore decided to return to Shersong along the infrequently used E bank trail, and cross to the W bank over a *sanglo* near the herder huts. To our astonishment, the two logs used for the Barun Pokhari *sanglo* were found propped against the Shersong huts. The grazers stated that the Lamara store owner had travelled to the Barun Pokhari *sanglo* while we traversed the plain above Shersong, and removed the logs. This was inexplicable as we informed him of our plans while purchasing supplies at his store. The grazers told us that several years ago the store owner had cut the logs from forests lower in the valley to construct the bridge. He was said to consider the *sanglo* his property, charging mountaineering groups a considerable fee to use it. Despite the store owner's knowledge of our planned route and his

advising us of the *sanglo*'s location, there was no mention of a toll by the store owner when amicably purchasing supplies from him.

On 3 June we crossed the shaky *sanglo* at Shersong, and continued along the main W bank trail, passing a "Takmaru 4795 m" signboard and camping ground below Barun Pokhari, a.k.a. Makalu Base Camp. We then rounded a knoll to the W above Barun Glacier to reach Hillary Base Camp (*ca.* 5000 m). Extensive litter, both from this season and past years, was collected, estimated to comprise 1.5 m^2, and covered in a shallow pit. We continued up this trail to a small depression at *ca.* 5070 m where level ground is available for tent sites.

This camp is directly across (S) from the ramparts of Makalu, and provides close up views of the glaciers that hang from the mountain's flanks. Better views of Makalu and the unfamiliar eastern flanks of the Sagarmatha group (Figure 34) were gained on a short steep excursion S to a small plain at *ca.* 5200 m.

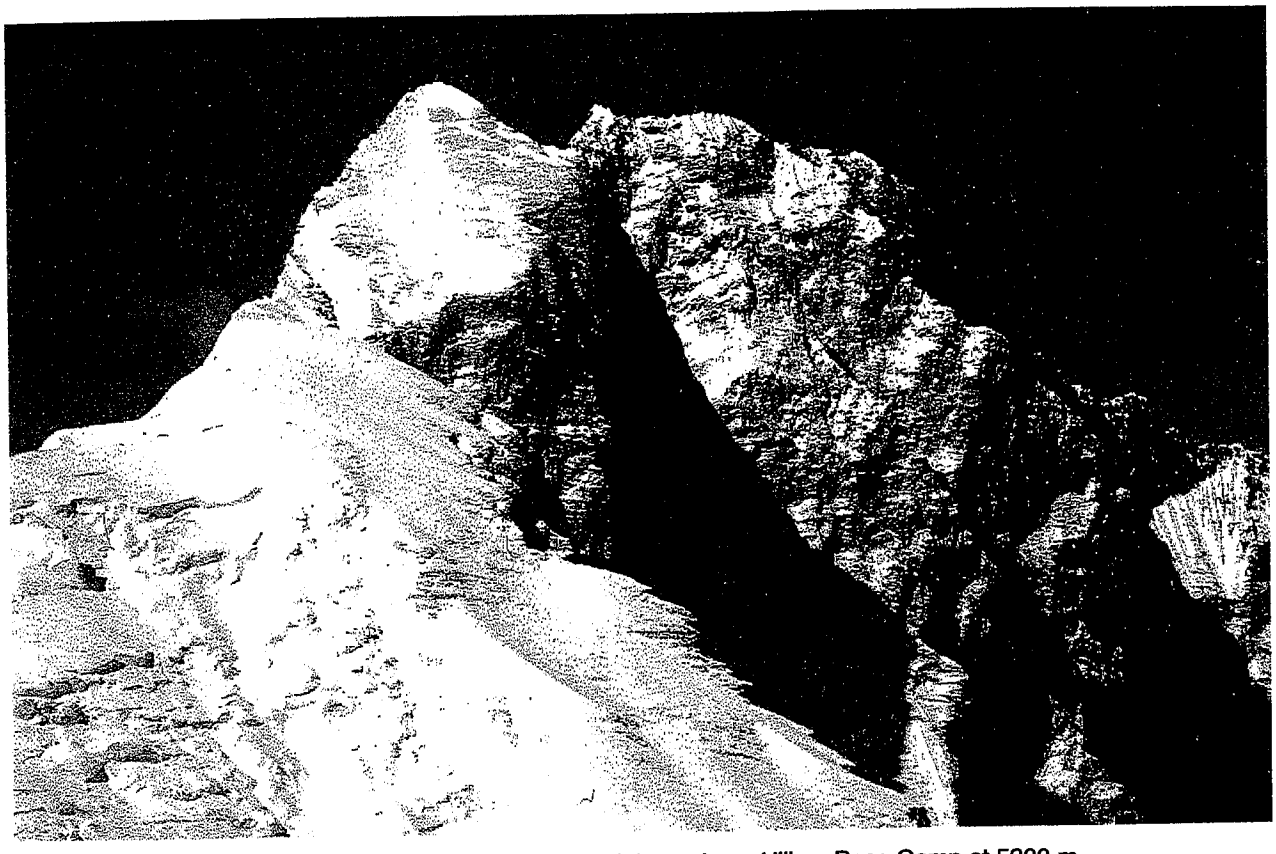


Figure 34. East faces of the Sagarmatha group (8848 m) from above Hillary Base Camp at 5200 m.

From the undesignated campsite at 5070 m the trail becomes less defined, and soon plunges down to rubble and scree of the Barun Glacier. Small *cairns* mark an ephemeral trail to the opposite side of the valley, where a more distinct path continues along lateral moraine to the confluence of the Chago Glacier. Rudimentary *cairns* again indicate the general direction across and up the glacier to a camp site at 5347 m (Survey Department 1:50,000 map height), described by the Shersong herders as "Japani Base Camp". Views of the encircling himal are restricted from this site, but it is centrally located and protected from rock slides. Stone walls form a *ghot*-like structure on a patch of level ground, and several tent sites were found in the vicinity. Approximately 0.5 m^2 of litter was present and collected. Combustible components were burned and the remainder covered in a pit against the walls.

During the late afternoon of 4 June, we ascended W to.scout a large mountaineering base camp at *ca.* 5500 m, which the Shersong herders referred to as "French Base Camp". The camp is located on a level section of the ridgetop, and contained two walled enclosures which evidently serve as rudimentary *ghots* during the mountaineering season. A substantial amount of garbage, ranging from food wrappers and meat tins to butane fuel canisters, was collected. Combustible items were burned, and the remainder piled in a comer of one of the enclosures, as it was not possible to dig a pit in the boulder field surroundings. On a ledge W of this base camp at *ca.* 5400 m , a helicopter landing pad had been constructed by clearing boulders and arranging flat stones to form a large circle with an "H" in the center.

From Japani Base Camp, a sharp ridge to the NW (Figure 35) can be climbed to a plateau at 6160 m where a splendid vista is gained of Baruntse (7220 m), the W face of Makalu - still towering above the awe-struck viewer (Figure 36); the heavily crevassed, icy surface of the upper Chago Glacier (Figure 37); and Chago Himal (to 6860 m), demarcating in part the border with Tibet. The climb from Japani Base Camp is non-technical, although above 5800 m slippery sections are encountered on frozen trickles of water that emanate from the melting snowcap.

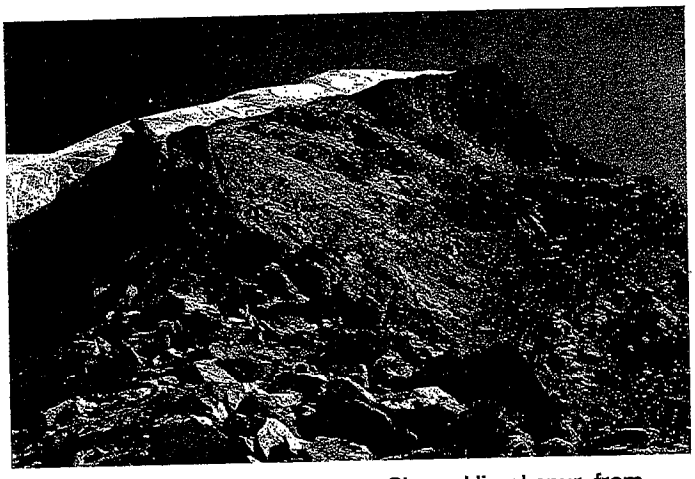


Figure 35: Viewpoint at 6160 m on Chago Himal spur, from 5870 m.

Beginning on 6 June, we retraced our route down the Barun, reaching the W bank of the river opposite Shersong the next evening. The logs of the *sanglo* used to cross four days earlier were nearly dislodged

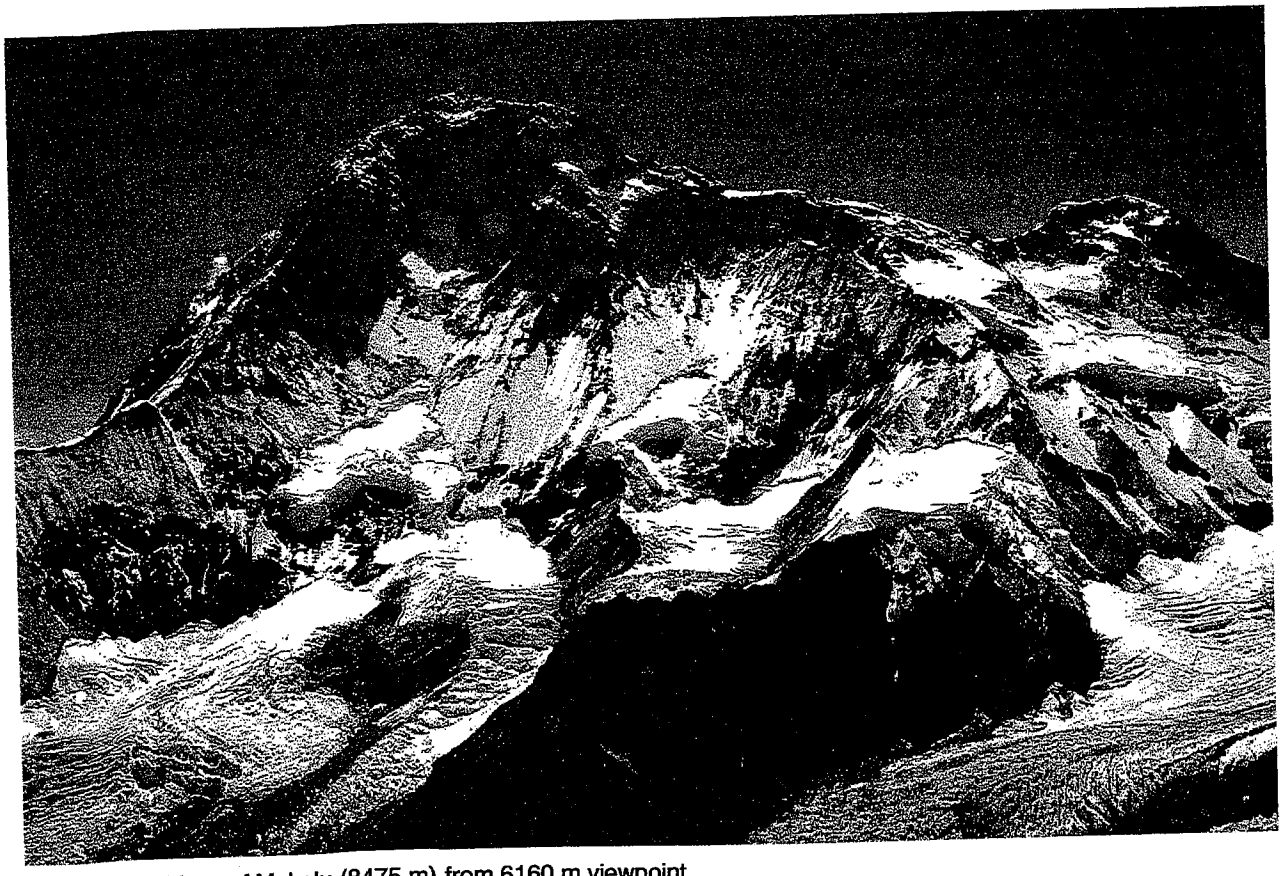


Figure 36: W face of Makalu (8475 m) from 6160 m viewpoint.

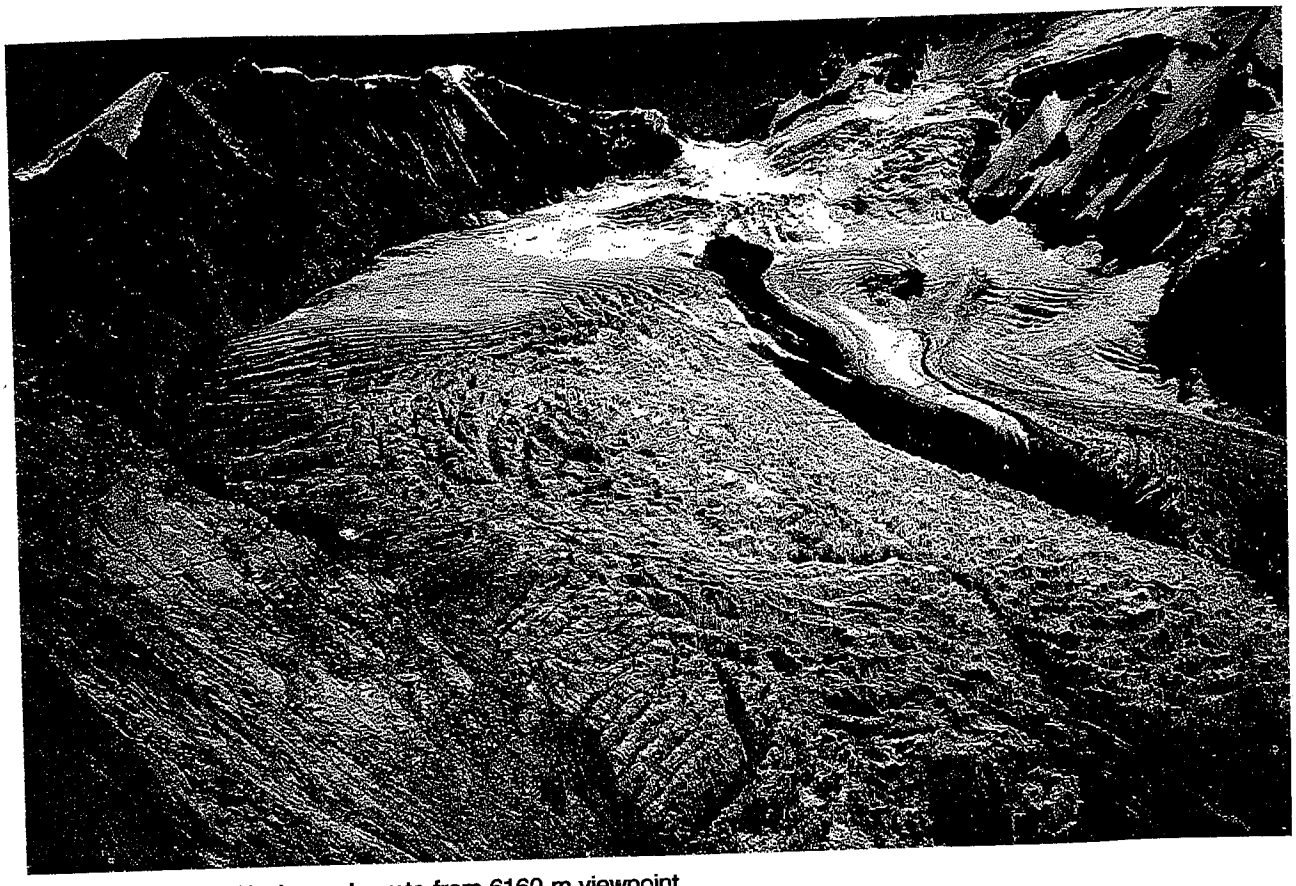


Figure 37: Chago Glacier and arrete from 6160 m viewpoint.

by overflow from the higher, now raging waters. Unable to attract the attention of grazers inside the shelter, we pitched a tented camp for the night. With the indispensable assistance of the grazers the next morning, we reinforced the *sanglo* with logs from the Barun Pokhari *sanglo* in order to cross the swollen Barun. In an ironic twist of fate, had it not been for the availability of those logs, we would have been stranded in the Upper Barun.

5.2 Habitat types and condition

Forests in the vicinity of Zanthe are mainly associations of wet mixed broadleaf and conifer. Himalayan Hemlock *Tsuga dumosa* and maples *Acer* spp. predominate in the canopy. *Rhododendron* spp. and other shrubs comprise a tall dense understorey. The rhododendron is disturbed in places by soil creep and snow compaction. Ground cover is composed primarily of a large arum *Arisaema* sp. and ferns. At higher elevations Silver Fir *Abies spectabilis* and Himalayan Birch *Betula utilis* are the main canopy species, and usually extensively draped with long and wispy strands of pale green lichen. The fir canopy limbs are heavily encrusted with bryophytes, giving a dark and damp feel that is typical of cloud forest.

North bank (S facing) forests were observed to be similarly wet with fir stands showing dense growths of moss and lichen in the canopy. Unlike the southern bank, however, bamboo is a substantial element in the understorey.

Habitat below Zanthe could not be evaluated due to time constraints, lack of trails and the precipitous character of the landscape. The forests from here to the confluence with the Arun apparently comprise some of the most species rich associations in Nepal. Rainfall there is probably higher than any other area in the country, with the possible exception of temperate forests on the southern flanks of the Annapurnas. The Lower Barun, in particular, is exceedingly difficult to access. Aerial recces have shown it to be

especially rich in undisturbed broadleaf stands. Laurel and michelia forests dominate the upper subtropical and lower temperate zones (Nepali *et al.* 1984). This valley is singularly unique for its extensively intact representation of Eastern Himalayan flora at medium altitudes (1,000 to 2,000 m). As noted by botanist T. B. Shrestha, the Barun is "the only major natural habitat in Nepal where the vegetative cover from sub-tropical to alpine (1,000 to 4,000 m) may be seen in a single sweep of slope... the Barun is Nepal's last pure ecological seed" (Nepali *et al.* 1984).

Upriver from Zanthe the lower slopes of the Barun are heavily scoured by landslides, almost all of which are naturally caused, a condition that is attributable to high precipitation and river dynamics. Soils are often waterlogged and the continual incising action of the glacier-fed river widely undercuts forested slopes 50-200 m above the valley floor. A diverse range of colonizing vegetation occurs, from nearly barren active slides to open shrub-grass-bryophyte and mixed birch forest.

Above Nghe Kharka the valley floor widens, revealing the more U-shaped terrain of a glacial past. The main high altitude forests in the Upper Barun are Silver Fir-Rhododendron grading to Silver Fir-birch-rhododendron towards the treeline. Near Jark Kharka the last of the fir juts above birch and dense shrubberies at the unusually high elevation of 3900 m. For another 100 m dense shrub flora is dominated by *R. campylocarpum*, the bright yellow flowers of which were in peak bloom during our passage at the end of May.

Alpine and forest vegetation at the perimeter of frequently used campsites at Pemathang, Ripuck and Jark *kharkas* is regularly cut for firewood. The higher meadows such as Jark Kharka and above Lamara are grazed during the monsoon, but surrounded by dense thickets and shrubberies 50-100 m from the main trail.

Beyond Lamara the climate rapidly becomes xeric, with clumps of dwarf rhododendron, mostly *R. nivale*, giving way upstream to dwarf Drooping Juniper *Juniperus recurva* and *Caragana* spp. The juniper predominates on drier slopes, and forms large, dense clumps in the vicinity of Merek, where it has been noticeably hacked. Grassland above Merek was seen to be closely cropped and criss-crossed with livestock trials. Overgrazing was evidently exacerbating slumps in the loose, sandy soils of the slopes.

At Shersong, smaller shrubs of *R. nivale, R. anthopogon* and Drooping Juniper are mixed with grass tussocks to form the main vegetation in this area of the valley. Although nearly converted to grass and herbaceous plants in a radius of 50 m around the Shersong *ghots*, prostrate shrubs and, to a lesser extent, cushion plants, grow profusely on the outlying flats and lower slopes.

Vegetation in the Barun Pokhari area is more sparsely distributed amongst scree and sand flats but diverse in species. The latter featured several xeric plants that are typically found in the steppe zone of Himalayan Inner Valleys. Mats of *Caragana* spp., the desert honeysuckle *Lonicera spinosa*, *Astrogalus sp.*, *Chesneya nubigena*, the rigid shrublets *Ephedra gerardiana* and *Cassiope fastigiata*, and an unidentified desert-like species (Figure 38) were interspersed with more mesic elements comprised by *Primula*

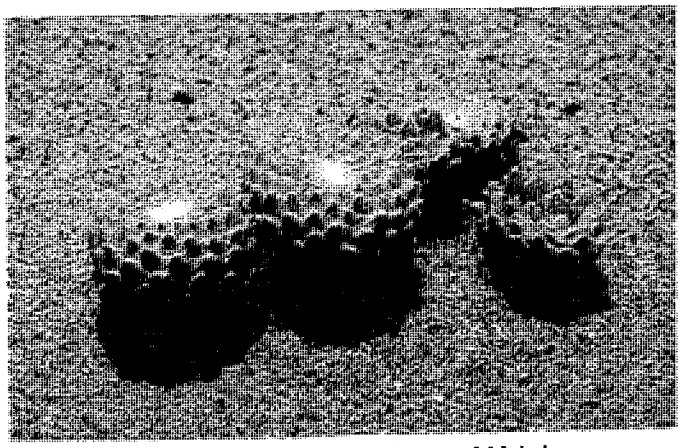


Figure 38: Unidentified xeric plants, base of Makalu.

spp. and *R. nivale*. Most plants were observed to grow in low-lying clumps or in boulder crevices where protection from the desiccating wind and cold nighttime temperatures is advantageous.

Cushion plants (*Saxifraga, Arenaria* and *Androsace* spp.) were most common, largest in size and blooming at 5100 to 5200 m (Figures 39 and 40). The yellow or green cushions were growing amongst tufts of grass, dwarf rhododendron and wildflowers. Small cushion plants in less exposed facies were found as high as 5650 m, approximately the same limit of grasses.

The nival or aeolian zone was briefly visited while climbing the spur NW of Japani Base Camp. Boulders, scree and ice were mostly devoid of dicot vegetation, but patches of green and gray lichens and a small pinnate sprout (*Caragana* sp.?) was found at 5800 m. A small black spider was noted at 5950 m and several individuals of a satyrid butterfly (*Parnassus* sp.) were flying at 6100-6200 m.

5.3 Wildlife observations

No large mammals were sighted in the Upper Barun. Habitat above Lamara appeared suitable for Snow Leopard, but its presence there has not been documented (Jackson 1990). A Siberian Weasal *Mustela sibirica* was observed at 5200 m above Hillary Base Camp, and Himalayan Mouse-hare was heard often and seen several times in various open habitats.

A diverse list of 25 mammals was assembled for the Barun by Nepali *et al.* (1985) in conjunction with fieldwork during the Nepal Tree Bear Conservation Programme, and includes Snow Leopard and Tibetan Argali *Ovis ammon hodgsoni*. The former species may wander from Tibet to the higher areas of Chepuwa and Hatiya Village Development Committees (VDCs), but the latter's seasonal occurrence has been assessed as less likely (Jackson 1990). Cronin (1979) surveyed the Barun for mammals in his natural history exploration of the Arun, and concluded that he observed spoor of the legendary *yeti* or Abominable Snowman (*Gigantipithecus* sp.) on the Kasuwa-Barun watershed.

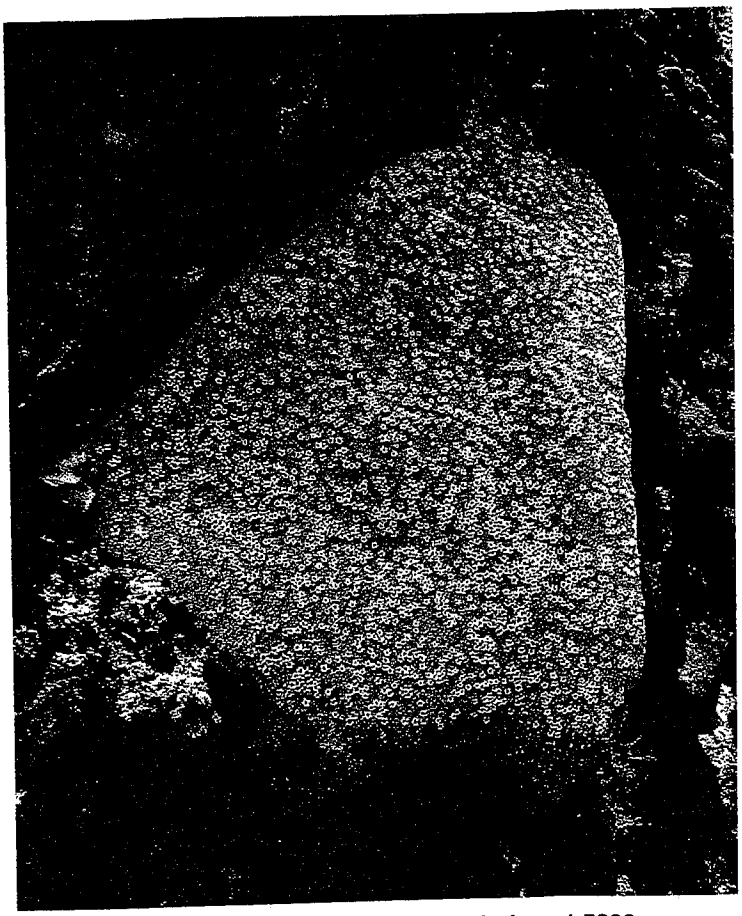


Figure 39: Large cushion of *Arenaria densissima* at 5200 m.

Tibetan Snowcock *Tetraogallus tibetanus* was commonly seen and fairly tame in the Upper Barun from 4500 to 5400 m, and Snow Partridge *Lerwa lerwa* heard several times from 4300 to 5000 m. The snowcock's abundance and behavior suggest that gamebirds were not being hunted in the Upper Barun.

Several bird species were recorded which demonstrate Trans-Himalayan elements in both the fauna and flora of the Upper Barun. Tibetan Snowfinch *Montifringilla adamsi*, White-throated Dipper *Cinclus cinclus* and Common Raven *Corvus corax* were noted above 4000 m. The last

Figure 40: *Androsace* sp. at 5100 m, Upper Barun River.

species is reported as a resident in Nepal (Inskipp and Inskipp 1991), but Shersong grazers said the birds in the Upper Barun were summer visitors from Tibet.

Many alpine birds noted during our two traverses were involved with breeding activities. Most noticeable was the commonly seen Rufous-breasted Accentor *Prunella strophiata*, which was busy nest building from 4300 to 4700 m in dwarf rhododendron and juniper.

Only 58 species of birds were recorded in the Barun watershed (28 May to 11 June), the least in any sector except the briefly visited Hinkhu (see Appendix A). The low total in the Barun reflects the normal decrease in diversity and abundance of birds encountered in alpine zones compared to lower elevation biomes. Alpine climate is much harsher and many lower habitats in this zone are subject to heavy snowfalls from October to May. The aridity and extreme fluctuations in diurnal and seasonal temperature which characterize the upper alpine and, even more so, the nival are particularly inhospitable to a variety of life forms.

5.4 Human interactions and impact

5.4.1 Mountaineering

Excessive harvesting of fuelwood by mountaineering groups was identified in 1984 as posing a serious threat to high altitude vegetation in the Makalu Base Camp area (Nepali *et al.* 1984). Continued seriousness of the problem was noted later in the decade by Banskota and Upadhyay (1990). Following gazettement of MBNPCA in 1991, National Park regulations were announced in 1993 that prohibit building of fires by mountaineers and trekkers in the Upper Barun. As in Nepal's other mountain NPs, the regulation was (and still is) interpreted to exclude support staff (*i.e.*, mainly porters) and inhabitants (both seasonal and permanent) of local communities inside parks.

The impact of mountaineers and their staff in the recent past was evaluated by Brewer Lama and Sherpa (1995) when developing a Tourism Management Plan for the Upper Barun Valley. They estimated that by 1993 the annual number of visitors associated with climbing expeditions to Makalu, Baruntse and Chamlang had reached at least 15,000. Most climbers and guides were reported to use kerosene or gas for their fuelwood needs, but their large support group of porters were often left "to rely almost exclusively on collected or cut tree branches, shrub juniper and dwarf rhododendron for cooking and heating..." (Brewer Lama and Sherpa 1995).

In the remote and fragile reaches of MBNP, fuelwood use limited to collection of deadwood (vs. cutting and drying of green vegetation) was considered impractical to enforce effectively. Since 1994 MBCP has required all personnel of mountaineering and trekking groups to refrain from building wood fires for heating or cooking (Brewer Lama and Sherpa 1995).

As our passage in 1995 confirmed, substantial supplies of kerosene were available at Lamara and Tashigaon. Of particular note is that this situation prevailed at the end of the spring trekking and mountaineering season when kerosene availability is likely to be under greatest strain, although groups returning from stays in the Upper Barun may sell excess supplies to stores at Lamara. Even so, evidence of recent fires was found at all camping sites, including those designated and at caves or overhangs commonly used by porters. Most if not all fires were deduced to have been made by mountaineering or trekking groups, as only four local grazers (based at Shersong) had thus far entered the Upper Barun at the start of the annual monsoon grazing season.

The amount of garbage and litter left behind by trekking and mountaineering groups has been cited as another problem affecting the Upper Barun environment (Nepali *et al.,* 1985; Brewer Lama and Sherpa 1995). Moderate amounts of rubbish were found on our passage, but not nearly the quantities that the number of climbers and trekkers were estimated to generate by the mid-1990s (Sherpa Brewer and Lama 1995).

The number of mountaineers, support staff and patterns of visitation have evidently changed substantially since that time. Higher climbing royalties and the availability of cost-cutting and time-saving helicopter transport has selected for smaller groups, particularly as regards the number of support personnel. Recent data (table 5.4.1) show current visitorship at only a fraction (638) of that estimated annually (>15,000) earlier in the decade. As a result, impacts are apparently more localized and less severe at present, because fewer mountaineering groups approach their peaks on foot, choosing instead to fly direct from Kathmandu to base camps in the upper Barun. These changes are probably reducing pressures on the local environment, although specific effects on local habitats, in particular high altitude zones, remain unquantified.

Other modifications in mountaineer behavior since the 1980s probably contribute to reduced impact of their stays in the upper Barun. Most important is the apparent increase in self-imposed implementation of campsite etiquette. Most groups apparently place greater emphasis on minimal impact by use of tent toilets and garbage management (collection and burning of combustible refuse; burial of other trash, and to a lesser degree, packing-out). This has been achieved through greater environmental awareness on the part of group members, and liaison officers who are better trained in their supervisory roles with mountaineering expeditions.

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Table 5.4.1 Autumn 1998 and spring 1999 mountaineering expeditions to the Upper Barun valley.

Season	Number of groups	Number of foreigners	Number of support staff[1]	Total no. of people
Autumn 1998	11	92	414	506
Spring 1999	3	24	108	132
Totals	14	116	522	**638**

[1] estimated at @ 4.5 staff per member

source: HMG Nepal Department of Tourism, unpubl. data

5.4.2 Trekking

Specific data on the volume and seasonal pattern of trekkers to the Barun Valley during the 1990s are unavailable. Based on information from the NP headquarters office and police post in Seduwa, 400-500 trekkers are estimated to have visited annually in recent years (1994-1999). Almost all of these come as members of groups organized by Kathmandu based trekking agencies.

A small number of individual trekkers (usually self-organized 'groups' of one or two members and a porter or two) also make their way into the Barun along the sole route from Tashigaon. Because facilities in the Barun remain very limited, the range and mobility of individual trekkers is correspondingly restricted. Most undertake an 2-3 week trek from the fly-in staging point of Tumlingtar to Shersong or Takmaru before retracing the route to Tashigaon, then continue over optional proximate trials to vary their return to Tumlingtar. The uncertainty of obtaining additional supplies at seasonal stores in the Upper Barun and the physical strains associated with extended stay at high altitudes often deter trekkers from exploring the spectacular high altitude scenery (as noted by Cronin, 1979; pers. obs.) beyond Takmaru .

Several campsites in the Barun were observed in May 1995 to have been adversely impacted by support staff presumably associated with trekking groups. In addition to habitat damage caused by fuelwood exploitation (see section 5.4.1), and to which trekking groups and individuals contribute, overhangs below campsites at Ripuck Kharka were used to shelter porters, and showed recent remains of large fires made from trees in the immediate vicinity, indiscriminate defecation, and substantial amounts of litter.

5.4.3 Grazing

Grazers from Sherpa communities in the Kasuwa and Ishuwa watersheds annually graze their yaks and sheep during the monsoon months in the upper Barun, mainly in alpine pastures from Lamara to Takmaru. The numbers of grazers and livestock, their various impacts on the high meadows and campsites, and importance of economic benefits derived from grazing have not been studied.

Several of the small meadows such as Pemathang Kharka and Ripuck showed disturbance to surrounding vegetation from cutting related to fuelwood needs. Shrubs and small trees in the peripheral understorey at these sites had recently been cut for their branches, which were laid out to dry atop shrubs. This was a discreet activity unnoticeable from the edge of the *kharkas*.

Dwarf juniper in the immediate vicinity of Merak has in recent years been heavily cut for firewood, for use there and higher up, at least as far as Hillary Base Camp. Above Merak the scrubby vegetation, mainly small clumps of *R. nivale*, is thinly branched and provides inferior fuelwood. Thus the site is located at the 'fuelwood line'. Campers at higher altitudes descending for fuelwood find it the first suitable vegetation to cut. In open country the cutting itself and associated burning beforehand constitutes an eyesore and has created equally unsightly slumps of the sandy topsoil. These are particularly noticeable against the backdrop of otherwise intact slopes uniformly vegetated in dwarf rhododendron and juniper.

Grazing and associated grazer fuelwood demand W of Merak and in the vicinity of Shersong is obviously exceeding the regenerative ability of alpine vegetation. Poorly consolidated soils of slopes leading to the plain above (NE of) Shersong are particularly prone to erosion. The slopes were found extensively braided with livestock trails, reduced in cover of non-herbaceous vegetation, and not surprisingly, showed numerous slumps. Along the main trail through Shersong, mats of vegetation have been thinned out or removed, presumably as a result of fuelwood cutting) to create additional grazing. Landslides, evidently exacerbated by human (mostly grazer?) pressure on surrounding slopes from a ravine to the N threaten to further spread across the valley floor.

5.4.4 Timber extraction

Fir trees near the treeline at Ripuck Kharka were found indiscreetly cut, as recently as 1-2 yr prior to our visit, and apparently done to supply timber for store construction at Lamara and for *sanglos* higher up in the Barun.

5.4.5 Cultivation

The middle and upper Barun are nearly devoid of agricultural activities. Steep and unstable slopes of the middle Barun are unsuited to cultivation, although some high altitude crops can be grown from 3400 to 4500 m at the various *kharkas*. Shrestha (1987) noted that barley is cultivated at Jark Kharka. Where these fields are or were located is puzzling as no evidence was found on our passage in 1995. In 1998 small plots of potatoes were planted at Shersong, Lamara and Yangle Kharka by seasonal residents from Tashigaon. They were subsequently ordered by NP staff to cease growing the crop or face eviction (B. Peniston, MBCP, pers. comm.).

5.5 Management considerations

5.5.1 Trekking and mountaineering

The Barun is a remote valley (even for Nepal) of nearly pristine wet forests, diverse alpine communities, and astonishingly scenic high altitude barrens. In the upper reaches the visitor is surrounded with massive peaks and immense glaciers that either hang precariously or flow for long stretches in the valley floor. For the trekker, the Barun is refreshingly wild and ideally suited for the adventurer. A long, especially steep-walled gorge renders the lower Barun virtually impenetrable, and only one, long and difficult route accesses the middle reaches. The only other routes into the Barun are from the Arun via the officially

restricted Saldima Khola, which entails crossing a 5000 m pass that is usually covered with snow outside the monsoon months; and alternately via the 6100+ m Sherpani and West cols and intervening Barun Plateau, comprising an expanse of glacier and ice walls that effectively isolates the far upper Barun.

"The trails to Makalu Base Camp are rugged, steep, rocky, and in some places unstable. Persistently wet conditions, compounded by forest shade, make them slippery and dangerous. Rain and snow are possible at nearly any time; groups have been stranded for days in the upper Barun Valley when Shipton La and Keke La (passes) were snowed in. Due to trail and weather conditions, rapid and sustained elevation gains, and dangers of landslides and land slippage, this trek is one of the more difficult and dangerous in Nepal." (Brewer Lama and Sherpa 1995).

Adventure and safety. The preceding summary aptly expresses the character of the trek and safety concerns. Safety is a very important issue; if the area is deemed inordinantly dangerous, only extreme trekkers will opt to visit. In making the Barun safer for trekkers there is a paradoxical yet equally important need to preserve its wild and adventurous character. This raises valid concerns which are also applicable to other protected areas in Nepal: To what extent should MBCP allay safety concerns with construction of trails, bridges and other facilities? While these may alleviate some of the more dangerous sections or sites, at what point does increased safety begin to diminish the adventure aspect of trekking in the area?

Adventure trekking is a major drawing card for the upper Barun, and the appeal of the area will only increase as the experience of trekking established routes such as Everest and Annapurna becomes increasingly crowded and standardized with additional comforts and facilities. Unpredictability, potential danger, and the acceptance of obstacles and hazards are essential elements of adventure. Provision of such requires a minimum of capital or physical inputs, and is eminently suitable as a management strategy where resources are scarce. Perhaps the greatest need is for regular monitoring and enforcement patrols, which while not without cost, are necessary in any management option that includes tourism.

Suggested interventions. The potentially dangerous pass crossings, in particular Keke La, require trail markers. Rather than use extraneous, unharmonious materials such as flagged aluminum poles, as recommended by Brewer Lama and Sherpa (1995), tall cairns made from piled rocks should suffice. Pass crossings and indistinct trails have been traditionally denoted this way throughout Nepal, and cairns, even when large and conspicuous, blend in well with the surroundings. Unlike placed aluminum poles, these structures are essentially permanent. In fact, cairns tend to be self-maintaining, as travellers passing by will replace or add a stone to propitiate the gods of safe passage. Cairn construction also provides the opportunity to generate much needed income for local communities by contracting their skilled labor.

Construction of an alternate, opposite bank trail and a long suspension bridge from Zanthe to Pemathang to avoid a section of active landslips, as proposed by Brewer Lama and Sherpa (1995), would be expensive. In addition, a new trail along the Barun would likely mar the landscape for years to come, and the wild character of the Barun would be broken by the construction of a major bridge with steel spanning cables and towers. The section is prone to falling rock and footing is treacherous in places, but these hazards are not as serious as those encountered upvalley from Barun Pokhari. The active rockfall near the intersection of the Barun and Chago glaciers is arguably the most dangerous stretch of trekking trail in the Barun. On our traverse, large boulders, some the size of trucks, crashed down from the flanks of Makalu and the smell of flint permeated the air. The site is particularly treacherous during spring and summer afternoons when meltwater from hidden hanging glaciers renders the area most active, a situation that was noted more than 30 years earlier by a climbing expedition to Makalu (Hillary and Doig, 1962).

Detailed management guidelines related to infrastructure development and regulation of tourism in the upper Barun advocated by Brewer Lama and Sherpa (1995) continue to merit implementation. These include construction of toilets and refuse pits at all designated campsites, building a cantilever bridge at Nghe Kharka, improvements to existing trails, and regular conduct of monitoring and enforcement patrols by MBCP and DNPWC staff.

Additional recommended management actions are:

1. ***Posting of metal signs with regulatory information*** in several languages (Nepali, English, French, German and Japanese) in unobtrusive places at campsites and inside toilets. In particular, the latter sites offer the opportunity to elaborate on eco-trekking guidelines. Signs inside toilets can capture the attention of visitors, many of whom by the nature of their pause may reflect at length on detailed messages.

2. ***Re-naming of numbered peaks and other important landmarks with local names*** where these exist, and having local user groups propose names where non-existent. These introductions would help to avoid confusion with map reading and route finding, and in a small but possibly significant way, also serve to impart local ownership. In turn, a sense of stewardship on the part of local communities over the land could be imparted.

3. ***Determining the exact locations of base camps, their correct names, and elevations***. Present knowledge of these important points for route and itinerary planning is inadequate. No campsites except 'Makalu Base Camp' (= Takmaru) are depicted on any available maps or specifically described in the trekking literature.

4. ***Establishment of an enforceable licensing system for store owners and other entrepreneurs*** so that trekkers and mountaineers are not left at the mercy of their whims, and to ensure that environmental needs such as toilet construction/use, disposal of litter and non-combustible garbage, and regulation of forest resource use are better addressed. The ability to incorporate conditions into a license to operate a hotel or store in the presents an excellent opportunity to strengthen management of tourism. Furthermore, if a means can be found to locally recoup licensing fees, an important source of revenue would be created for management activities in the Upper Barun.

5. ***Construction of sanglos or small bridges in the Upper Barun.*** An on-site assessment is warranted to decide if permanent bridges are needed at Shersong and Barun Pokhari. If not, public *sanglo*s should be constructed by MBCP/DNPWC, ideally involving labor from the most proximate communities. The Lamara store owner should be relieved of any role in the functioning of these vital bridges.

6. ***Construction of toilets and rubbish pits.*** None of the designated camping sites in the Middle and Upper Barun have toilets. It is highly recommended that deep pit type toilets with above ground stone and slate structures be constructed at least 20 m from water sources at all sites. Their use should be monitored as part of regular patrols by DNPWC and MBCP staff, with toilet maintenance performed as necessary. Use of toilets can be encouraged by information included on campsite plaques.

7. ***Closure of Merak campsite.*** Due to degradation of fragile, slow-growing vegetation at this site, its appeal to upvalley fuelwood gatherers, and difficulty by remoteness of enforcing camping regulations, visitors should be prohibited from using this site. In September 1999, Merak was officially closed by MBCP due to continued overharvesting of vegetation. This policy is seen as a long-term measure including regular monitoring of the site. Trekkers can be further dissuaded from staying at Merak by construction of a shelter at Shersong, only 1.5 hr walk upvalley. The walled remains of old stone ghot sequestered E of the main pastures could provide the basis for a renovated larger structure that includes an attractive and harmonious roof of slate. Such a facility should induce groups to stay at Shersong rather than overnight at the exposed, somewhat cramped site of Merak.

8. ***Expansion and management of the trail system in the Upper Barun.*** Development and promotion of three additional routes is recommended to enhance the tourism appeal of this area:

I. *Trekking circuit NE of Shersong.* As described in section 5.1, the desiccated plain at 5300 m NE of Shersong is a superb viewpoint, featuring the striking cirque-like S face of Makalu with Barun Pokhari in the foreground and a panorama of peaks forming the walls of the Upper Barun. Groups undertaking this non-technical 2-3 day excursion must be self-sufficient in water, or bring containers to fetch water from a distance, and be wary of high altitude sickness. To alleviate further damage to the fragile vegetation in the area, a single trail needs to be delineated from Shersong up the steep slopes to a single designated campsite on the plain. Use of both should be encouraged to preserve the fragile vegetation and the area's aesthetic assets.

II. *Ice fields of the Far Upper Barun.* Cronin (1979) gives a vivid description of trekking in this remote region. Although as part of this assessment the upper reaches of the Barun were not reconnoitered beyond the confluence of the Chago Glacier, trekkers may continue tediously over the Barun Glacier to the base of Cho Polu (6734 m), where a field of towering, scattered ice pinnacles along the sides of the valley gives way to ice flows higher up. The walk over glacial rubble is time-consuming but not particularly dangerous. A minimum of one week at a moderate pace from Takmaru is needed to carry out this excursion. A longer stay is required if side climbs of the 6160 m peak NW of Japani Base Camp (see section 5.1) or the unnamed viewpoint peak of 6232 m NE of Baruntse are made. Re-stocking of foodstuffs from stores at Lamara greatly facilitate the logistical requirements to reach and return from this seldom visited area.

III. *Traverse of the Barun Plateau.* The most challenging excursion for trekkers in the upper Barun is an approximate week long traverse of the high altitude glacial plateau between the Barun and Hongu valleys. This entails ascending the glaciated and subsequent steep rocky slopes of Sherpani Col (6180 m) SW of the Barun Glacier above Hillary Base Camp; then negotiating a one day nearly level expanse of snowfields, crevasses, and (in dry years) pinnacles that comprise the Barun Plateau; and finally belaying 200 m to the Upper Hongu via the even steeper West Col (=Barunje; 6135 m). The route was pioneered by Edmund Hillary in 1961 (Hillary and Doig 1962), and is still used by some mountaineering groups to reach the Upper Barun. A traverse of the Barun Plateau provides excellent views of Makalu while ascending Sherpani Col, and a spectacular amphitheater of himal descending from West Col. Continuing from the Hongu over Mera La, Amphu Lapcha or Mingbo La, as most groups do, allows a grand semi-circuit of Makalu-Barun and Sagarmatha NPs. There exists considerable potential to promote the area as a popular and rewarding extreme trek.

Mountaineering skills and a full complement of ice climbing and cold/inclement weather equipment are essential. The services of a high altitude guide with experience crossing the Barun Plateau is highly recommended. Mountaineering groups headed towards Baruntse, Makalu I and Makalu II may facilitate the traverse if their trails are evident, although this cannot be counted on. The best times to undertake this and other high altitude excursions in the Upper Barun are October/ November (when weather is usually clearer but cold) and May (when warmer but more fickle).

9. ***Improved dissemination of information.*** There is pressing need to improve the dissemination of management information to all stakeholders in the Barun. This ranges from convincing local communities of the importance and benefits that accrue from habitat conservation in the Park and Buffer Zone, in particular the near-wilderness value of the former, to educating the trekking and mountaineering community (including their support personnel) as to the seriousness of their own negative impacts, and how these can be easily averted. Wider availability of trekking route information based either on the descriptions contained in this section, Brewer Lama and Sherpa (1995), and/or the Makalu Base Camp Trek booklet by Roberts (1998b) is also needed. A publication similar to the trekking guides for Nepal's major destinations, emphasizing eco-trekking guidelines and detailed route information, would likely contribute to improved impact of trekkers and mountaineers.

10. ***Trekking permission.*** The current policy of permitting 'individuals' (self-organized small groups) to trek the Barun evidently holds substantial potential to achieve ecotourism objectives in the river system. With the increasing availability of detailed and accurate logistic information, a self-organized group can better preprae for their visit, in effect minimizing safety concerns. In fact, a greater sense of adventure may be realized by depending on one's own organizational abilities and the key assistance of local communities. Furthermore, much greater benefits accrue to the latter stakeholders compared to 'group trekkers', who are usually part of largely self-sufficient, agency-led ventures.

Similarly, upgrading of trails, construction of additional strategic shelters, and in situ provision of information also support the involvement of local communities by enlisting their skills and labor, while mutually benefitting all trekkers.

5.5.2 Timber extraction

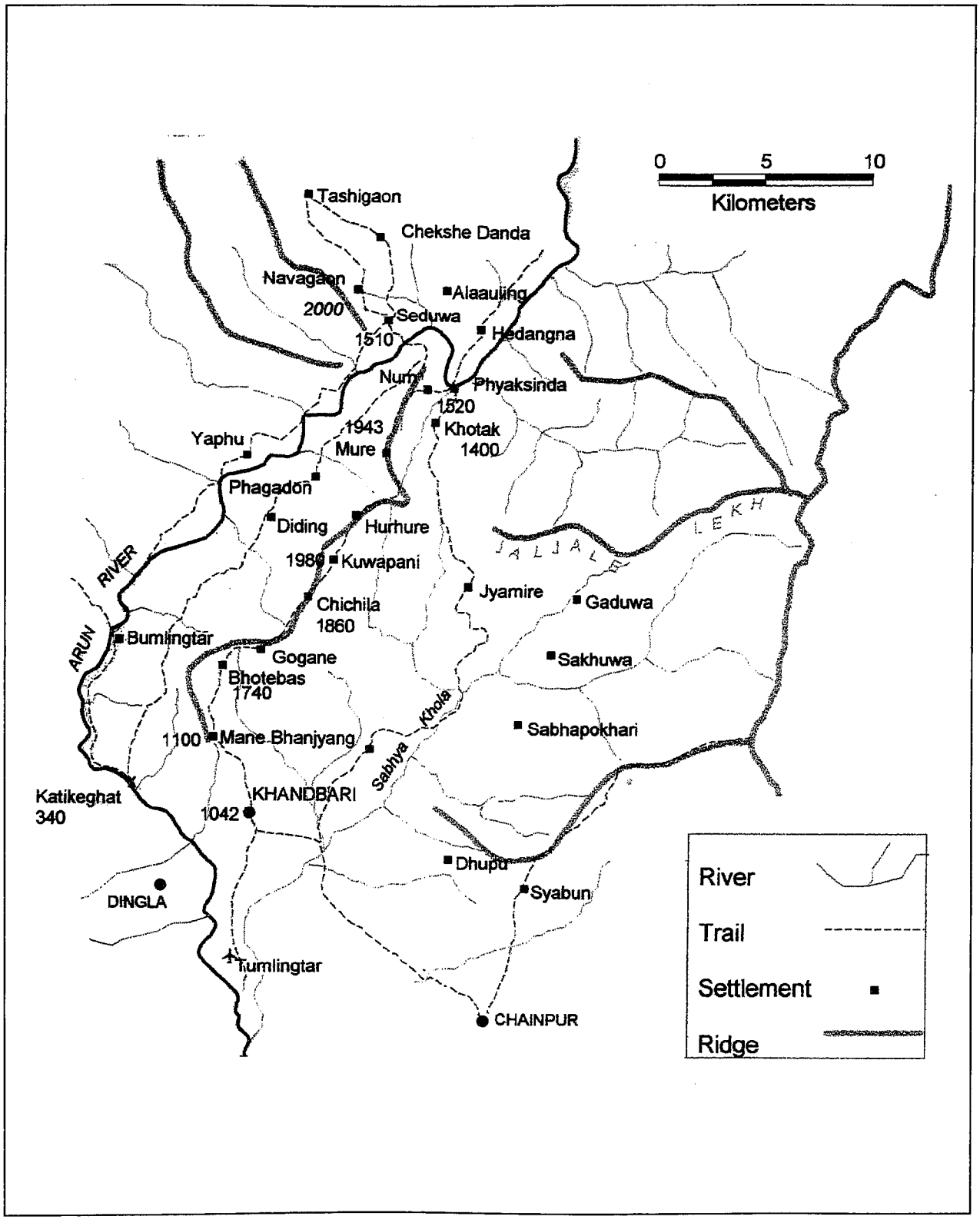
Conspicuous timber extraction clashes with ecotourism needs, especially in the scenic and nearly pristine surroundings of the Upper Barun. To alleviate unsightly cutting problems such as found at Ripuck Kharka, timber that may be required in the future to construct additional hotels or other structures can be removed in a more selective manner: not from the same immediate vicinity and farther from the main trail. In addition, future construction can be limited as a licensing condition to designs that minimally utilize wood.

5.5.3 Cultivation

Development of an effective policy on cultivation in the Upper Barun. At the present level of use for cultivation, which apparently has not been exceeded in the past, habitat is not adversely impacted. Only 1-2 ha are currently (as of 1999) under cultivation (B. Peniston, MBCP, pers. comm.). In the context of a continuing shortage of income generation opportunities, potato (and barley?) crops may provide crucial sources of cash for seasonal inhabitants. Furthermore, sales to trekking groups would extend food supplies thus permitting longer stays in the upper Barun. Visitors could afford to travel slower, thus reducing

the risk of altitude sickness while increasing accessibility to the more remote and scenic sites in the valley. The key to effectively managing current cultivation may be the ability of DNPWC/MBCP to precisely document areas of existing cultivation, then permit and regularly monitor those sites, with the proviso that if any fields are expanded or new ones created, appropriate enforcement actions (e. g., fines and reduction of cultivation; cessation of all cultivation) will be implemented.

Figure 41: The Upper Arun east of MBNPNZ



6. The Upper Arun River north of Khandbari to Ghari (21-25 May and 16-21 June 1995)

6.1 Route and logistics

An assessment of the main route in the Upper Arun to reach the Kasuwa and Barun *kholas* of MBNPBZ was conducted in late May 1995. This heavily travelled trail from the Sankhuwasabha district center of Khandbari to Hedangna (N of Ghari) ascends through cultivation and scrub to Chhyankuti Danda, then follows a series of *danda* crests at *ca.* 1900 m to Mure (Figure 36). The trail undulated through mixed broadleaf forest that was fairly dense in patches, but seriously degraded along much of the route. Continuing through scrub and recently created fields to Num (1632 m), the route then descends steeply through dense forest to a suspension bridge across the Arun at 720 m (Figure 42), and climbs gradually to Park headquarters at Seduwa (1550 m).

Figure 42. Bridge over the Arun between Num and Seduwa at 720 m.

The area was revisited three weeks later in June on return from the Barun. A precipitous diversion was made from the main Tashigaon-Seduwa trail at Chekshe Danda (Figure 29) over indistinct but regularly trodden paths across the Kasuwa through Alauli to Ghari, and from there S across the Arun to the nearly abandoned housing complex on the riverbank at Phyaksinda (Figure 41). From Phyaksinda an infrequently used trail was followed farther S to Mangmaya via Khoktak and Bhatbetini Danda. Dense and mostly intact tropical and subtropical forest was traversed climbing from Phyaksinda to Khoktak. Only remnants of subtropical forest were encountered on the trail to Mangmaya.

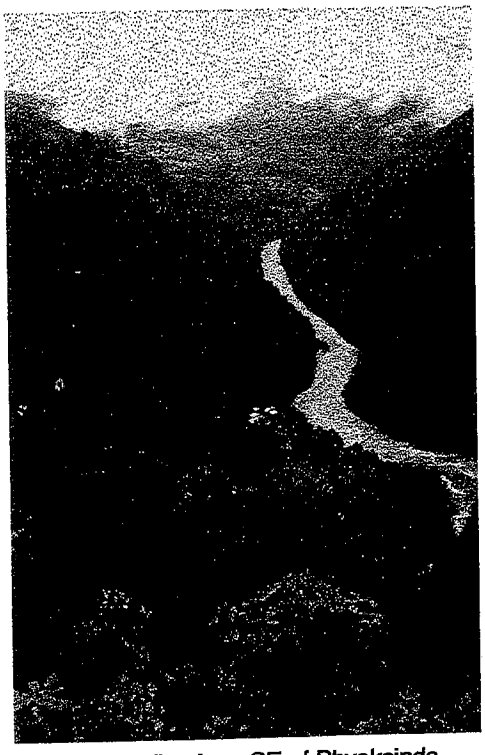


Figure 43. The Arun SE of Phyaksinda from *ca.* 900 m.

Accommodation for trekkers on the two routes consisted of small hotels at Khandbari and Mane Bhanjyang, and even smaller inns and pleasant home stay type establishments at Chichila, Mure and Num.

6.2 Habitat types and condition

Hardwood associations of *Schima wallichii* (chilaune) and *Castanopsis* (chestnut) dominate canopy forest composition in the subtropical zone (1,000-2,000 m) of the Upper Arun. *Castanopsis tribuloides* usually replaces *C. indica* above 1,500 m. Oak-rhododendron forests (mainly *Quercus glaucal* Q. *lamellosa* and *Rhododendron arboreum*) also occur on drier S and SE facing slopes, even though the effect of aspect is less pronounced in the Upper Arun (Shrestha 1989). Forests along the rolling ridge N of Khandbari were observed to follow this pattern of distribution and composition, and were mixed with a variety of other broadleaf species.

Area forests are heavily exploited for timber, grazed during much of the year, and depleted of their standing and fallen deadwood, particularly on the northern and southern edges. The intensity of exploitation waned as the center of the stand was reached, but canopy cover had been reduced by timber cutting from >70% to about 40% in most places, and as side excursions showed, at least 0.5 km from the main trail.

The steep N facing, and to a lesser degree, W facing slopes of subtropical forest were less disturbed, wetter and more diverse. A dense understory of saplings, lianas and ground cover including bamboo clumps was well-developed.

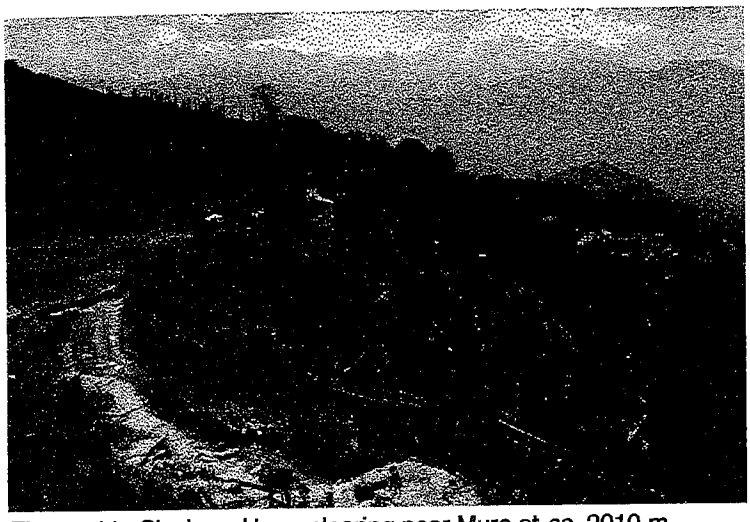


Figure 44. Slash and burn clearing near Mure at *ca.* 2010 m.

Tropical riverine forests (below 1000 m) were found similarly dense with sal *Shorea robusta* present only as minor component. *Albizzia mollis* was noted as a common species descending to the Num-Seduwa bridge, the tall spreading trees often festooned with epiphytes (mainly orchids) and draped with woody lianas. *Pandanus nipalensis* was also well-represented, particularly in ravines. Near the subtropical ecotone, alder was common in ravines and as a landslip colonizer.

Cardamom *Ammomum subulatum* was found recently planted in the vicinity of Phyaksinda. First and second year plants were growing well under a vacant middle canopy shaded by alders and other broadleaf species. Further upslope as far as 1000 m in elevation, forest undergrowth had been mostly cleared in

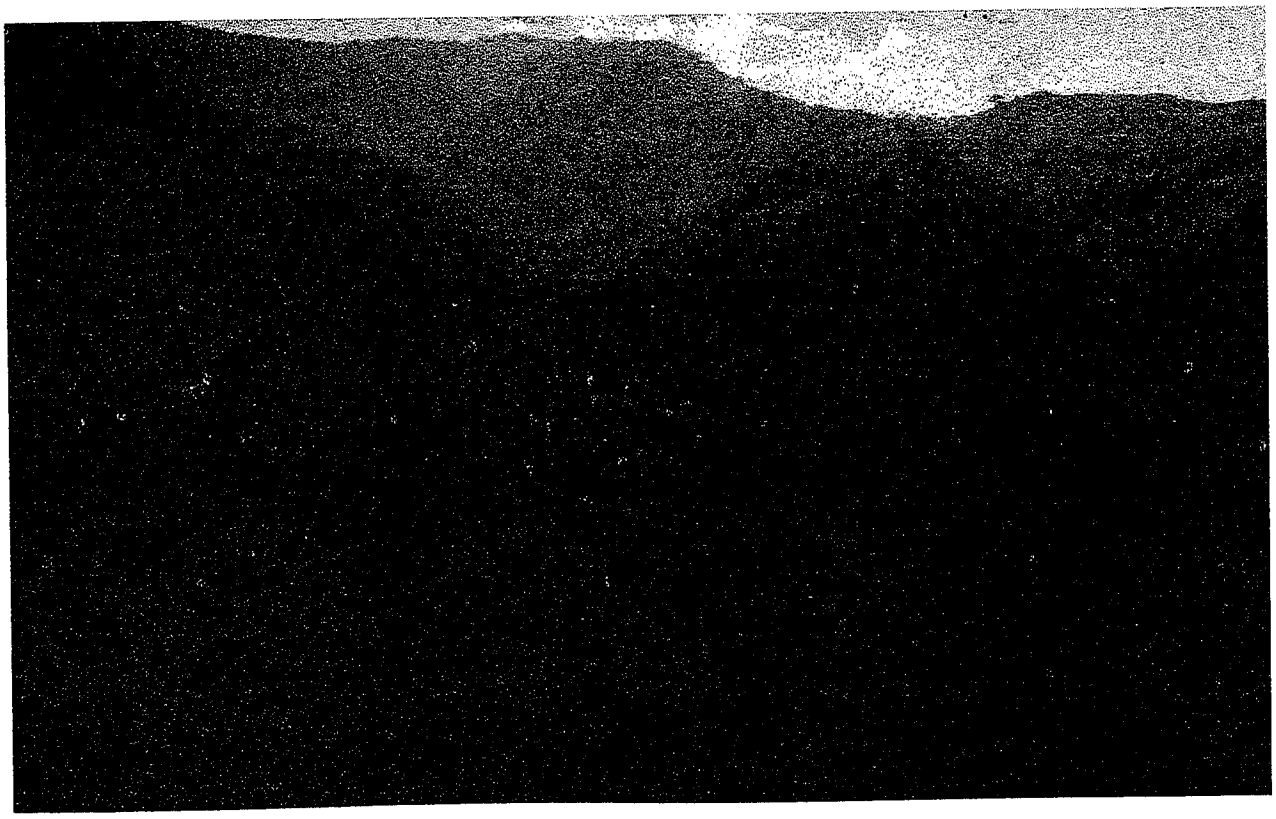


Figure 39. Dense mixed broadleaf forest NW of Num, *ca.* 750 - 1050 m.

the vicinity of the main trail; sub-canopy and canopy trees were thinned, and seedlings planted amongst herb cover on the forest floor.

6.3 Wildlife observations

Barking Deer was seen and heard calling in scrub forest SW of Goghuni (=Gogune) at 1860 m on 23 May. A Yellow-bellied Weasal was watched in alder forest S of Seduwa at 1370 m on 25 May. The only other mammal sighting was a pair of Jackal *Canus aureus* on 24 May at *ca.* 1615 m on the northern outskirts of Num.

On 25 May two small nesting colonies of Giant Rock Bees were found in cliffs near the Kasuwa Khola W of Alauli. Local grazers said the sites were not exploited for honey or wax, but asserted that this foraging activity was annually practiced higher up the Kasuwa. Most of the foragers were said to reside in Tashigaon and did not venture to the lower reaches of the valley.

Several uncommon birds of moist dense forests in the lower temperate zone were recorded from Goghuni to Num. The rare (status in Nepal per Grimmett *et al.*, 1998) White-gorgeted Flycatcher *Ficedula monileger*, uncommon Little Pied Flycatcher *F. westermanni*, scarce Ferruginous Flycatcher *Muscicapa ferruginea*, generally uncommon White-tailed Robin *Myiomela leucura*, scarce Short-billed Minivet *Pericrocotus brevirostris,* and the rare and local Spot-bellied Eagle Owl *Bubo nipalensis* were all noted on a two day passage of the area.

Approximately 19 singing males of White-tailed Robin were heard (and one seen) from SW of Goguni to Num, ranging from 1840 to 2195 m. These records disclose a new locality in Nepal where the species is seasonally fairly common if not common. White-tailed Robin is a retiring summer skulker of dense, moist broadleaf forest in the temperate zone, preferring bamboo undergrowth and ravines (Grimmett *et al.*, 1998). Although the species is difficult to observe, the male has a distinctive silvery and twinkling song (Fleming 1984), also described as a eight or nine note, hurried jangling whistling (Grimmett *et al.*, 1998). The birds are extremely adept at keeping out of sight, and rarely stray from dense forest. Once an observer is familiar with the song and can accurately estimate distances from singing birds, an area census is a practical way to rapidly monitor the species, and in turn the structural quality of upper subtropical forest along the route.

Dense mixed forest in the Phyaksinda area yielded a small flock of White-naped Yuhinas *Yuhina bakeri*, a very rare and local species in Nepal found in evergreen subtropical forests (Grimmett *et al.*, 1998), with only two other known localities: Hans Pokhari Danda in Ilam district (Fleming 1984), and the lower Apsuwa Khola (Tymstra, 1993).

6.4 Human interactions

The major impact of human utilization on the forest N of Khandbari is associated with timber extraction. The area is designated as production forest and many of the larger trees had been felled, some within the past few years. Sawing stands in various states of use and disuse were located along streams at 50-100 m intervals well into the forest. Although selective, the harvesting policy was evidently exceeding the regeneration ability of canopy species, and was substantially modifying forest structure. *Eupatorium adenophorum* (ban mara) had invaded the open forest floor from cleared areas at the edge of the stand. Once established, this exotic weed suppresses succession of tree species for many years (Shrestha 1989).

Planting of cardamom may continue to expand in the Upper Arun. There is strong demand for the crop in India, and local climate and shade tree species support its cultivation. Although promoted for its economic and agroforestry attributes, introduction and tending of cardamom evidently reduces local biodiversity. The crop requires canopy shade (alder is the tree of choice) and a nearly vacant understory. Many species of forest birds such as babblers, laughingthrushes and other sylviids depend on dense forest undergrowth of bamboo, shrubs and thickets. This forest component is widely depleted in middle and lower elevations in Nepal, primarily as a result of grazing and fodder collection (Inskipp 1989).

Forests N of Khandbari are further threatened by the envisaged USD 1 billion Arun III hydroelectric scheme. A 65 m high dam creating some four linear kilometers of backwaters would be located 1 km NE of Phyaksinda. From there an 11 km turbine tunnel would bisect a loop in the Arun to an underground powerhouse near the Seduwa-Num suspension bridge. The 400 MW project would require construction of a 164 km access road from the lowlands. A high (vs. low/valley) route following the ridge crests from Khandbari to Num appears less expensive, and would align with (and promote) HMG's development axis in eastern Nepal. A variety of roadside development would, in all likelihood, follow construction of the access road. In anticipation of the project, local entrepreneurs had purchased extensive amounts of land along the planned route of the road by the late 1980s (Shrestha 1989).

Owing to the presumed species richness of the forest stand from Khandbari to Phyaksinda, the area was proposed as a Conservation Area (CA) in 1986 following studies of biological diversity and impact of Arun III.

6.5 Management considerations

The humid broadleaf forests from Chichila to Phyaksinda warrent conservation due to their species rich character and the apparent lack of an intact subtropical forest stand on the adjacent eastern *dandas*. To better assess the extent and diversity of forests in this area, surveys are needed of the lower Induwa watershed E of Phyaksinda.

Sensitive management of forest lands is critical if the Arun III access road is constructed. Planned and built carefully, the costs of the road in terms of maintenance and transport efficiency can be reduced by realizing the environmental services provided by healthy forest cover.

Tropical riverine forests in the Arun probably function as important corridors for species migration and vital exchange of genetic material. The lake created by the Arun III dam should actually add to local biodiversity by creating waterfowl habitat, but 3-4 kms of tropical forest at its upriver limit would be lost - all the more reason to conserve the remaining bands of this habitat below the dam.

Regular monitoring of forest habitat N of Khandbari (only a one day walk from the town) can be conducted using systematic counts of indicator bird species. White-tailed Robin was identified as an appropriate species and others should be found with intensive investigation of area birds. Periodic sampling of vegetation using transects and quadrats would add to our understanding of forest structure, ecology and conservation requirements.

Local income earning ability can be enhanced by developing inns and home stays along the Khandbari-Seduwa trail. The number of trekkers visiting Makalu-Barun via this route is expected to increase as the Park is promoted and the currently more popular destinations (e. g., Annapurna, Khumbu) become overcommercialized.

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Appendix A. List of bird species recorded in Makalu-Barun National Park and peripheral areas.

No.	Species		River System					
	Common name	Scientific name	Hinkhu	Hongu	Irkhuwa	Upper Arun	Kasuwa	Barun
1.	Snow Partridge	*Lerwa lerwa*	●					●
2.	Tibetan Snowcock	*Tetraogallus tibetanus*	●	●				●
3.	Black Francolin	*Francolinus francolinus*		●	●			
4.	Blood Pheasant	*Ithaginis cruentus*	●	●	●			●
5.	Satyr Tragopan	*Tragopan satyra*		●	●			
6.	Himalayan Monal	*Lophophorus impejanus*	●	●	●	●	●	●
7.	Grey-capped Pygmy Woodpecker	*Dendrocopos canicapillus*				●		
8.	Darjeeling Woodpecker	*Dendrocopos darjellensis*		●		●	●	●
9.	Grey-headed Woodpecker	*Picus canus*			●		●	
10.	Great Barbet	*Megalaima virens*			●	●	●	
11.	Blue-throated Barbet	*Megalaima asiatica*			●	●		
12.	Golden-throated Barbet	*Megalaima franklinii*				●		
13.	Indian Roller	*Coracias benghalensis*				●		
14.	Common Kingfisher	*Alcedo atthis*				●		
15.	White-throated Kingfisher	*Halcyon smyrnensis*			●	●		
16.	Crested Kingfisher	*Megaceryle lngubris*			●			
17.	Chestnut-headed Bee-eater	*Merops leschenaulti*			●	●		
18.	Large Hawk Cuckoo	*Hierococcyx sparverioides*		●	●	●	●	
19.	Eurasian Cuckoo	*Cuculus canorus*		●	●	●	●	
20.	Indian Cuckoo	*Cuculus micropterus*			●	●	●	
21.	Oriental Cuckoo	*Cuculus saturatus*		●		●	●	
22.	Lesser Cuckoo	*Cuculus poliocephalus*		●		●	●	●
23.	Asian Koel	*Eudynamys scolopacea*				●		
24.	Himalayan Swiftlet	*Collocalia brevirostris*		●		●	●	
25.	White-throated Needletail	*Hirundapus caudacutus*				●		
26.	Fork-tailed Swift	*Apus pacificus*		●	●	●	●	
27.	House Swift	*Apus affinis*				●		
28.	Spot-bellied Eagle Owl	*Bubo nipalensis*				●		
29.	Asian Barred Owlet	*Glaucidium cuculoides*			●			
30.	Rock Pigeon	*Columba livia*				●		
31.	Snow Pigeon	*Columba leuconota*	●	●				●
32.	Ashy Wood Pigeon	*Columba pulchricollis*		●			●	
33.	Spotted Dove	*Streptopelia chinensis*		●		●		
34.	Emerald Dove	*Chalcophaps indica*			●	●		
35.	Wedge-tailed Green Pigeon	*Treron sphenura*				●		
36.	Eurasian Woodcock	*Scolopax rusticola*	●				●	●
37.	Wood Snipe	*Gallinago nemoricola*	●					
38.	River Lapwing	*Vanellus duvaucelii*				●		
39.	Oriental Honey-buzzard	*Pernis ptilorhyncus*				●		
40.	Himalayan Griffon	*Gyps himalayensis*		●				
41.	Crested Serpent Eagle	*Spilornis cheela*				●	●	
42.	Besra	*Accipiter virgatus*		●				
43.	Eurasian Sparrowhawk	*Accipiter nisus*			●			●
44.	Collared Falconet	*Microhierax caerulescens*				●		
45.	Mountain Hawk Eagle	*Spizaetus nipalensis*		●				
46.	Common Kestrel	*Falco tinnunculus*	●	●				
47.	Merlin	*Falco columbarius*	●					
48.	Black Stork	*Ciconia nigra*		●				
49.	Woolly-necked Stork	*Ciconia episcopus*				●		
50.	Golden-fronted Leaftird	*Chloropsis aurifrons*				●		
51.	Orange-bellied Leafbird	*Chloropsis hardwickii*			●	●		
52.	Long-tailed Shrike	*Lanius schach*		●		●		
53.	Eurasian Jay	*Garrulus glandarius*				●		
54.	Yellow-billed Blue Magpie	*Urocissa flavirostris*	●		●		●	

No.	Species		River System					
	Common name	Scientific name	Hinkhu	Hongu	Irkhuwa	Upper Arun	Kasuwa	Barun
55.	Red-billed Blue Magpie	*Urocissa erythrorhyncha*			●	●		
56.	Common Green Magpie	*Cissa chinensis*				●		
57.	Grey Treepie	*Dendrocitta formosae*		●	●	●	●	
58.	Spotted Nutcracker	*Nucifraga caryacatactes*	●	●	●			
59.	Red-billed Chough	*Pyrrhocorax pyrrhocorax*	●	●				●
60.	Yellow-billed Chough	*Pyrrhocorax graculus*	●	●				●
61.	House Crow	*Corvus splendens*				●		
62.	Large-billed Crow	*Corvus macrorhynchos*	●	●	●	●	●	●
63.	Common Raven	*Corvus corax*		●				
64.	Maroon Oriole	*Oriolus traillii*			●	●	●	
65.	Large Cuckooshrike	*Coracina macei*				●		
66.	Black-winged Cuckooshrike	*Coracina melaschistos*		●				
67.	Long-tailed Minivet	*Pericrocotus ethologus*		●	●		●	
68.	Bar-winged Flycatcher-Shrike	*Hemipus picatus*		●		●		
69.	Scarlet Minivet	*Pericrocotus flammeus*			●	●		
70.	Short-billed Minivet	*Pericrocotus brevirostris*				●		
71.	Yellow-bellied Fantail	*Rhipidura hypoxantha*	●	●	●		●	
72.	White-throated Fantail	*Rhipidura allicollis*				●		
73.	Black Drongo	*Dicrurus macrocercus*		●		●		
74.	Ashy Drongo	*Dicrurus leucophaeus*				●		
75.	Bronzed Drongo	*Dicrurus aeneus*			●	●	●	
76.	Spangled Drongo	*Dicrurus hottentottus*			●	●	●	
77.	Lesser Racket-tailed Drongo	*Dicrurus remifer*				●		
78.	White-throated Dipper	*Cinclus cinclus*						●
79.	Brown Dipper	*Cinclus pallasii*		●				
80.	Chestnut-bellied Rock Thrush	*Monticola rufiventris*			●			
81.	Blue-capped Rock Thrush	*Monticola cinclorhynchus*				●		
82.	Blue Whistling Thrush	*Myiophonus caeruleus*	●	●	●	●	●	●
83.	Plain-backed Thrush	*Zoothera mollissima*	●					●
84.	Long-tailed Thrush	*Zoothera dixoni*						●
85.	Tickell's Thrush	*Turdus unicolor*				●	●	
86.	White-collared Blackbird	*Turdus albocinctus*		●	●		●	
87.	Grey-winged Blackbird	*Turdus boulboul*		●		●	●	
88.	Gould's Shortwing	*Brachypteryx stellata*			●			
89.	White-browed Shortwing	*Brachypteryx montana*		●				
90.	Dark-sided Flycatcher	*Muscicapa sibirica*		●	●		●	
91.	Asian Brown Flycatcher	*Muscicapa dauurica*					●	
92.	Ferruginous Flycatcher	*Muscicapa ferruginea*				●		
93.	Rufous-gorgetted Flycatcher	*Ficedula strophiata*	●	●	●		●	●
94.	Little Pied Flycatcher	*Ficedula westermanni*				●		
95.	White gorgetted Flycatcher	*Ficedula monileger*				●		
96.	Snowy-browed Flycatcher	*Ficedula hyperythra*					●	
97.	Slaty-blue Flycatcher	*Ficedula tricolor*		●				
98.	Verditer Flycatcher	*Eumyias thalassina*		●	●	●	●	
99.	Small Niltava	*Niltava macgrigoriae*				●		
100.	Rufous-bellied Niltava	*Niltava sundara*					●	
101.	Blue-throated Flycatcher	*Cyornis rubeculoides*				●	●	
102.	Grey-headed Canary Flycatcher	*Culicicapa ceylonensis*		●	●	●		
103.	Indian Blue Robin	*Luscinia brunnea*		●	●	●	●	
104.	Golden Bush Robin	*Tarsiger chrysaeus*		●	●		●	●
105.	White-browed Bush Robin	*Tarsiger indicus*	●		●		●	●
106.	Oriental Magpie Robin	*Copsychus saularis*		●		●		
107.	White-tailed Robin	*Myiomela leucura*				●	●	
108.	Black Redstart	*Phoenicurus ochruros*						●
109.	Blue-fronted Redstart	*Phoenicurus frontalis*	●	●				●
110.	White-winged Redstart	*Phoenicurus erythrogaster*		●				●

No.	Species		River System					
	Common name	Scientific name	Hinkhu	Hongu	Irkhuwa	Upper Arun	Kasuwa	Barun
111.	White-capped Water Redstart	*Chaimarrornis leucocephalus*	●	●	●		●	●
112.	Plumbeous Water Redstart	*Rhyacornis fuliginosus*		●	●			
113.	White-bellied Redstart	*Hodgsonius phoenicuroides*		●				●
114.	Grandala	*Grandala coelicolor*	●					
115.	Little Forktail	*Enicurus scouleri*		●				
116.	Black-backed Forktail	*Enicurus immaculatus*				●		
117.	Spotted Forktail	*Enicurus maculatus*		●				
118.	Slaty-backed Forktail	*Enicurus schistaceus*			●			
119.	Common Stonechat	*Saxicola torquata*		●				
120.	Grey Bushchat	*Saxicola ferrea*		●	●	●	●	
121.	Chestnut-tailed Starling	*Sturnus malabaricus*		●		●		
122.	Common Myna	*Acridotheres tristis*		●	●	●	●	
123.	Chestnut-bellied Nuthatch	*Sitta castanea*				●		
124.	Eurasian Treecreeper	*Certhia familiaris*						●
125.	Rusty-flanked Treecreeper	*Certhia nipalensis*			●			●
126.	Winter Wren	*Troglodytes troglodytes*	●	●				●
127.	Rufous-vented Tit	*Parus rubidiventris*	●	●	●		●	●
128.	Coal Tit	*Parus ater*		●				●
129.	Grey-crested Tit	*Parus dichrous*		●				●
130.	Grey Tit	*Parus major*				●		
131.	Black-lored Tit	*Parus xanthogenys*		●	●	●	●	
132.	Green-backed Tit	*Parus monticolus*			●	●	●	
133.	Black-throated Tit	*Aegithalos concinnus*		●	●	●		
134.	Rufous-fronted Tit	*Aegithalos iouschistos*			●			
135.	Barn Swallow	*Hirundo rustica*		●	●	●		
136.	Red-rumped Swallow	*Hirundo daurica*				●		
137.	Nepal House Martin	*Delichon nipalensis*		●	●	●	●	
138.	Northern House Martin	*Delichon urbica*		●				●
139.	Asian House Martin	*Delichon dasypus*						●
140.	Striated Bulbul	*Pycnonotus striatus*			●			
141.	Himalayan Bulbul	*Pycnonotus leucogenys*	●	●	●	●	●	
142.	Red-vented Bulbul	*Pycnonotus cafer*		●		●		
143.	Black Bulbul	*Hypsipetes leucocephalus*		●		●	●	
144.	Ashy Bulbul	*Hemixos flavala*			●	●	●	
145.	Striated Prinia	*Prinia criniger*		●		●	●	
146.	Oriental White-eye	*Zosterops palpebrosus*		●		●		
147.	Chestnut-headed Tesia	*Tesia castaneocoronata*		●	●			
148.	Grey-bellied Tesia	*Tesia cyaniventer*					●	
149.	Brownish-flanked Bush Warbler	*Cettia fortipes*	●					
150.	Aberrant Bush Warbler	*Cettia flavolivacea*			●			
151.	Yellowish-bellied Bush Warbler	*Cettia acanthizoides*			●			
152.	Grey-sided Bush Warbler	*Cettia brunnifrons*			●		●	●
153.	Common Tailorbird	*Orthotomus sutorius*		●	●		●	
154.	Tickell's Leaf Warbler	*Phylloscopus affinis*		●				
155.	Buff-barred Warbler	*Phylloscopus pulcher*	●	●			●	●
156.	Ashy-throated Warbler	*Phylloscopus maculipennis*		●	●		●	
157.	Lemon-rumped Warbler	*Phylloscopus chloronotus*	●	●				●
158.	Greenish Warbler	*Phylloscopus trochiloides*		●	●		●	●
159.	Large-billed Leaf Warbler	*Phylloscopus magnirostris*		●	●		●	●
160.	Blyth's Leaf Warbler	*Phylloscopus reguloides*		●				
161.	Yellow-vented Warbler	*Phylloscopus cantator*			●			
162.	Golden-spectacled Warbler	*Seicercus burkii*	●	●	●		●	
163.	Grey-hooded Warbler	*Seicercus xanthoschistos*		●	●		●	●
164.	Chestnut-crowned Warbler	*Seicercus castaniceps*				●	●	
165.	White-crested Laughingthrush	*Garrulax leucolophus*				●		
166.	White-throated Laughingthrush	*Garrulax albogularis*				●	●	

No.	Species		River System					
	Common name	Scientific name	Hinkhu	Hongu	Irkhuwa	Upper Arun	Kasuwa	Barun
167.	Spotted Laughingthrush	*Garrulax ocellatus*			●			
168.	Rufous-chinned Laughingthrush	*Garrulax rufogularis*				●		
169.	Streaked Laughingthrush	*Garrulax lineatus*					●	
170.	Black-faced Laughingthrush	*Garrulax affinis*		●	●		●	●
171.	Chestnut-crowned Laughingthrush	*Garrulax erythrocephalus*					●	
172.	Rusty-cheeked Scimitar Babbler	*Pomatorhinus erythrogenys*			●		●	
173.	Streak-breasted Scimitar Babbler	*Pomatorhinus ruficollis*				●		
174.	Slender-billed Scimitar Babbler	*Xiphirhynchus superciliaris*			●			
175.	Long-billed Wren Babbler	*Rimator malacoptilus*	●					
176.	Scaly-breasted Wren Babbler	*Pnoepyga albiventer*		●	●	●		
177.	Nepal Wren Babbler	*Pnoepya immaculata*		●	●			
178.	Pygmy Wren Babbler	*Pnoepyga pusilla*				●		
179.	Grey-throated Babbler	*Stachyris nigriceps*				●		
180.	Black-chinned Babbler	*Stachyris pyrrhops*				●		
181.	Spiny Babbler	*Turdoides nipalensis*				●		
182.	Jungle Babbler	*Turdoides striatus*				●		
183.	Red-billed Leiothrix	*Leiothrix lutea*			●			
184.	Hoary-throated Barwing	*Actinodura nipalensis*		●				
185.	Chestnut-tailed Minla	*Minla strigula*	●	●	●			
186.	Blue-winged Minla	*Minla cyanouroptera*				●		
187.	Golden-breasted Fulvetta	*Alcippe chrysotis*		●	●			
188.	Red-tailed Minla	*Minla ignotincta*		●				
189.	Rufous-winged Fulvetta	*Alcippe castaneceps*		●	●	●	●	
190.	White-browed Fulvetta	*Alcippe vinipectus*	●	●	●	●		●
191.	Nepal Fulvetta	*Alcippe nipalensis*				●		
192.	Rufous Sibia	*Heterophasia capistrata*		●	●	●	●	
193.	Whiskered Yuhina	*Yuhina flavicollis*		●	●	●	●	
194.	White-naped Yuhina	*Yuhina bakeri*				●		
195.	Rufous-vented Yuhina	*Yuhina occipitalis*	●	●	●		●	
196.	Stripe-throated Yuhina	*Yuhina gularis*		●	●	●	●	●
197.	Black-chinned Yuhina	*Yuhina nigrimenta*					●	
198.	Great Parrotbill	*Conostoma oemodium*		●	●		●	●
199.	Fulvous Parrotbill	*Paradoxornis fulvifrons*		●				
200.	Hume's Short-toed Lark	*Calandrella acutirostris*						●
201.	Horned Lark	*Eremophila alpestris*						●
202.	Fire-breasted Flowerpecker	*Dicaeum ignipectus*				●		
203.	Green-tailed Sunbird	*Aethopyga nipalensis*		●	●		●	●
204.	Fire-tailed Sunbird	*Aethopyga ignicauda*			●		●	●
205.	Black-throated Sunbird	*Aethopyga saturata*				●		
206.	Eurasian Tree Sparrow	*Passer montanus*		●		●		
207.	Tibetan Snowfinch	*Montifringilla adamsi*						●
208.	White Wagtail	*Motacilla alba*						●
209.	Grey Wagtail	*Motacilla cinerea*		●			●	
210.	Blyth's Pipit	*Anthus godiewskii*		●				
211.	Olive-backed Pipit	*Anthus hodgsoni*		●				
212.	Rosy Pipit	*Anthus roseatus*		●			●	●
213.	Alpine Accentor	*Prunella collaris*	●	●				●
214.	Altai Accentor	*Prunella himalayana*		●				
215.	Rufous-breasted Accentor	*Prunella strophiata*	●	●	●			●
216.	White-rumped Munia	*Lonchura striata*		●				
217.	Twite	*Carduelis flavirostris*	●					
218.	Tibetan Siskin	*Carduelis thibetana*		●				
219.	Yellow-breasted Greenfinch	*Carduelis spinoides*		●				
220.	Plain Mountain Finch	*Leucosticte nemoricola*	●					●
221.	Dark-breasted Rosefinch	*Carpodacus nipalensis*			●			
222.	Pink-browed Rosefinch	*Carpodacus rodochrous*		●				●

No.	Species		River System					
	Common name	Scientific name	Hinkhu	Hongu	Irkhuwa	Upper Arun	Kasuwa	Barun
223.	Beautiful Rosefinch	*Carpodacus pulcherrimus*		●				
224.	White-browed Rosefinch	*Carpodacus thura*	●					●
225.	Spot-winged Rosefinch	*Carpodacus rodopeplus*			●			
226.	Streaked Rosefinch	*Carpodacus rubicilloides*						●
227.	Great Rosefinch	*Carpodacus rubicilla*		●				
228.	Red-fronted Rosefinch	*Carpodacus puniceus*						●
229.	White-winged Grosbeak	*Mycerobas carnipes*	●	●	●			●
230.	Spot-winged Grosbeak	*Mycerobas melanozanthos*		●				
231.	Gold-naped Finch	*Pyrrhoplectes epauletta*			●			
232.	Crested Bunting	*Melophus lathami*		●		●		
		Sub-totals	**39**	**114**	**90**	**105**	**74**	**57**

Appendix B.

Enumeration of the Birds of Makalu-Barun National Park and Buffer Zone.

Abstract. The abundance and diversity of bird species in Makalu-Barun National Park and Buffer Zone epitomizes the high species richness of flora and fauna in the Eastern Himalayas ecoregion. Most habitat types in the mountainous reserve, including large tracts of temperate, and to a lesser extent subtropical forests, have been little-altered by human pressure. Taken together, these remote lands comprise an especially important core area for regional protection of birdlife, in particular forest breeding species and the habitats that sustain their populations. Thus far, 349 species of birds have been recorded by ornithological and related expeditions.

Introduction. The results of recent ornithological surveys, related expeditions, and birdwatching trips to parts of Makalu- Barun National Park and Buffer Zone (MBNPBZ; formerly Makalu-Barun National Park and Conservation Area [MBNPCA]) have contributed substantially to our knowledge of birds in the reserve and their importance to regional biodiversity. Nevertheless, distribution, abundance and ecological relationships of most avian species remain poorly understood. Based on inventories to date and distribution of habitats, in particular the extent and quality of moist temperate and subtropical forest associations, MBNPBZ evidently provides a major refuge for a diverse range of bird species, many of which typify the biologically rich Eastern Himalayas ecoregion. The extensive, intact forests of the Park, and to a lesser degree the BZ, are especially beneficial to a variety of shy, poorly studied skulkers that require dense undergrowth and a forest floor with abundant detritus. The Eastern Himalayas is a global priority for biodiversity conservation (Wilson 1988, 1992) and exhibits a relatively high degree of bird endemism (Inskipp 1989; Carpenter 1997 citing Bibby *et al.*, 1992). MBNPBZ provides formal protection to an array of habitats at the western edge of the Eastern Himalayas.

Species list basis. The foundation for this enumeration is the checklist of Carol Inskipp (1989: 100-103) for the Barun Valley. Her tally was compiled as part of a study to determine the status of forest birds in Nepal. Emphasis was given to threatened species, primarily those with confirmed and probable breeding populations in Nepal, and to habitats that are underrepresented in the country's reserve network. Recommendations were made to survey important unprotected areas in East and Central Nepal with the aim of promoting greater representativeness of habitats and, in turn, enhanced conservation of avian diversity. The Inskipp list of 169 species (recently corrected to 167; C. Inskipp pers. comm.) was comprised mainly from locality records provided by ornithologists and birdwatchers during the 1970s and 1980s, but includes available historical records. Most of the first records for the Barun list were obtained in November 1984 by Hari Sharan (Kazi) Nepali and Robert L. Fleming, Jr., who collaborated with a flora and fauna expedition to the Barun and Saldima river valleys which was supported by The King Mahendra Trust for Nature Conservation (KMTNC) and Woodlands Institute USA (now The Mountain Institute [TMI]). That investigation focused on the taxonomic status of Himalayan Tree Bear *Selenarctos thibetanus* (= Asiatic Black Bear *Ursus thibetanus*), but was complemented by substantial findings related to birds and vegetation. A total of 131 bird species were reported, of which 115 constitute first records for the reserve. Two species: Spotted Wren Babbler *Spelaeornis formosus* and Slaty-bellied Tesia *Tesia olivea* were new for Nepal. Broad-billed Warbler *Tickellia hodgsoni* was recorded for the first time since Brian Hodgson's collection of 1846 (Nepali 1984), and Eurasian Scops Owl *Otus scops*, still unconfirmed as occurring in Nepal (Grimmett *et al.*, 1998), was possibly heard (H. S. Nepali, pers. comm.).

Updated enumeration and summary. Pertinent expedition reports, scientific articles and various unpublished data have been drawn upon to assemble an updated enumeration of birds covering the entire MBNPBZ. Records have been published for a number of species that predate the Inskipp list (*e.g.*, Jackson and Ahlborn 1987; Daniel and Hanzák 1993), but most additional species result from observations made after 1989. Thus far 349 species have been documented as occurring within the Park or BZ. Two species: Spotted Wren Babbler and Coral-billed Scimitar Babbler *Pomatorhinus ferruginosus* are, insofar as known, restricted in Nepal to the reserve. These birds may represent disjunct populations, but more likely also reside in suitable habitat elsewhere in East and Far East Nepal. Many uncommon and rare/scarce species (20.3% of the current total) in the Eastern Himalayas ecoregion have been reported from the temperate and subtropical forests of the reserve. Additional species that are seldom encountered and enigmatic, including a possible new taxon of flycatcher (H. S. Nepali, unpubl. data), merit the attention of future expeditions to the area.

Several forest birds that until recently were regarded as extirpated or absent from Nepal may persist in suitable habitats of MBNPBZ. These include Green Cochoa *Cochoa viridis*, sighted in the Upper Arun in the 1980s

(H. S. Nepali, pers. comm.), otherwise unreported since 1846; and Long-billed Wren Babbler *Rimator malacoptilus*, found *ca.* 2 km from the SW border of the reserve in 1995 (Cox and Sherpa 1998). Also possible are Red-faced Liocichla *Liocichla phoenicea*, unreported since Hodgson's time, and Brown-cheeked Laughingthrush *Garrulax henrici*. The latter species is known from SE Tibet, where it is the common laughingthrush between 2700 and 4500 m (Ali and Ripley 1987), but has been collected and considered to occur locally (as a disjunct population?) in the Arun valley in Tibet (= Pum Ou or Pongqu) and its branches up to 13,000 ft (3906 m) (Wollaston 1922: 506 cited in Kinnear 1922). In 1995 the species was recorded for the first time on the Indian subcontinent in NE Arunachal Pradesh at 1500 m (Grimmett *et al.* 1998), apparently an unusually low elevation for the species.

Enumeration discrepancies. Several authors cite substantially higher species totals for MBNPBZ (Wohlgemuth 1998: >440; Chaudhary 1998 and Majpuria 1998: 440; Shakya *et al.* 1995: 421). The first two figures presumably refer to tabulated totals given by Jackson *et al.* (1990) for MBNPBZ and Sagarmatha National Park. From this combined list of 440 species, 396 are individually recorded from "Makalu Barun Conservation Area" (=MBNPBZ), although locality data are lacking and at least some species were included on the basis of probable occurrence due to presence of suitable habitat (Rodney Jackson, pers. comm.). Confirmation of occurrence and locality records are needed before a number of species can be added to the current enumeration. Shakya *et al.* (1995) cite 421 birds in a faunal inventory of Makalu-Barun NP (and BZ?). Their list includes species outside the reserve from the Upper Arun (*e. g.*, Blue-eared Kingfisher *Alcedo meninting)* that may occur in the lower reaches of either the Park or BZ.

Initial investigations. The first reported ornithological investigation of the Makalu-Barun area was conducted by Milan Daniel and Jan Hanzák in 1973, in conjunction with a Czechoslovak climbing expedition to Mt. Makalu. The authors and support personnel collected 94 birds of 28 species, primarily to obtain information on the potential for natural foci of parasitological diseases (Daniel and Hanzák 1993). Shooting and trapping of specimens, which constituted all records, were restricted to five sites in the Barun Valley at 3450-4900 m.

Edward Cronin (1979) collected birds from MBNPBZ in the Barun and Kasuwa river valleys as part of a natural history expedition to the Upper Arun in 1973. Detailed observations on breeding behavior of the enigmatic and taxonomically unusual Yellow-rumped Honeyguide *Indicator xanthonotus* were made in the lower Kasuwa (Cronin and Sherman 1976; Cronin 1979), and the first nest of Wood Snipe *Gallinago nemaricola* was described in the lower Barun (Cronin 1979).

H. S. Nepali carried out his first bird expedition to MBNPBZ in 1979. This was a joint investigation with Prof. Moriyoku of the Tokyo Shinjo-ku Museum and included areas outside the reserve in the Upper Arun. In addition to his main collecting trip in 1984, Nepali returned again under TMI auspices in 1986 to survey lower reaches of the Barun, Kasuwa, Ishuwa and Apsuwa *kholas* (Nepali 1986). Of 211 species recorded, at least nine birds were new for MBNPBZ, and the number may be higher pending clarification of localities. In the spring and autumn of 1989, KMTNC sponsored a pair of successor trips to the Upper Arun which emphasized areas of the reserve. Data from the 1979 and 1989 investigations were unavailable for inclusion in this enumeration, but are being provided to assist preparation of an updated version in 2001.

From 26 March to 11 April 1990 Robert Tymstra and colleagues, including H. S. Nepali, were sponsored by The Mountain Institute/Makalu Barun Conservation Project (TMI/MBCP) to document bird populations of the little-known Apsuwa Khola watershed. The approach and return marches also produced additional records for the lower Sankhuwa Khola. Birds of the temperate forests were noted there, and a variety of mixed broadleaf forests (in terms of species composition and human impact), were studied in the lower Apsuwa. Unseasonably wet spring weather hampered observations. Although Tymstra (1993) concluded that his timing was too early to obtain breeding data on most birds, he tallied 172 species, 62 of which were first records for the enumeration. Most notable were several resident babblers that are threatened and rarely recorded in Nepal: Rufous-throated Wren Babbler *Spelaeornis caudatus*, Black-headed Shrike Babbler *Pteruthius rufiventer*, Brown Parrotbill *Paradoxornis unicolor*, Rusty-fronted Barwing *Actinodura egertoni*, and White-naped Yuhina *Yuhina bakeri*. Tymstra's results also indicate that species-rich habitats occur extensively in the lower Apsuwa. Understory vegetation was found to be widely disturbed by human activities, but habitats in general were assessed as amenable to conservation-oriented management.

Documentation of birdlife was included as a supporting objective of the TMI funded wildlife survey of the Upper Hongu river valley in November 1986 (Jackson 1987). Twenty-six species were counted in high altitude scrub, grassland and scree, including the first sighting in East Nepal of the scarce Little (Tibet) Owl(et) *Athene noctua*, and either a significant eastward extension in range for Rock Bunting *Emberiza cia*, or the first Nepalese

record of Godlewski's Bunting *E. godlewskii*. Little Owl and other observed species such as White-throated Dipper *Cinclus cinclus*, White-winged Redstart *Phoenicurus erythrogaster* and Common Raven *Corvus corax* revealed the Trans-Himalayan character of the Upper Hongu.

Recent investigations. During three 6-week visits in autumn (1991, 1992, 1993) and spring (1991, 1993, 1994) 269 species were recorded in MBNP and peripheral areas in the Upper Arun by Chris Carpenter and assistants from San Francisco State University (Carpenter 1994). Data from all 6 expeditions are being re-analyzed to differentiate records from within and outside MBNPBZ, and to provide locality information. Thus far, records of five birds new to the reserve and at least 23 first-recorded species have been clarified (C. Carpenter, *in litt.*). Carpenter and colleagues investigated patterns of species diversity in and nearby the reserve in spring 1993 and spring 1994. They censused birds using 'Mackinnon lists' of 20 species across a range of habitats in the Arun, Sankhuwa, Kasuwa and Ishuwa drainages (Carpenter 1994). The method was found applicable to forest types from tropical riparian to lower temperate, where 20 species could be rapidly enumerated. Results corroborated the relatively high degree of bird species richness in subtropical and temperate forests of the ecoregion (Inskipp 1989), and provided insight on the extent of seasonal overlap in species among various habitat zones. A review of the 1993 and 1994 data sets shows a total of 143 bird species recorded from MBNPBZ (Carpenter, in litt.). Among the most notable records were the rare Asian Emerald Cuckoo *Chrysococcyx maculatus*, for which there are very few records from Nepal, and Long-tailed Broadbill *Psarisomus dalhousiae*, now a scarce and local species of foothill forests (Grimmett *et al.* 1998), which seems to have undergone a population decline in Nepal during recent decades. The only record for Rufous-backed Sibia *Heterophasia annectans* beyond the far eastern Mahabharat in Nepal was contributed by their research.

From 5 to 21 June 1994 TMI and IUCN jointly sponsored a biodiversity expedition to the Sisuwa and Sankhuwa valleys of the BZ, including a short SE traverse of the NP. Eighty-six species of birds were recorded by ornithologist Bed B. Khadka. Notable sightings included Purple Cochoa *Cochoa purpurea*, a rare possibly resident species of lower temperate and wet subtropical forests in Central and East Nepal (Inskipp and Inskipp 1991; Grimmett *et al.* 1998), that was found nesting; Yellow-bellied Warbler *Abroscopus superciliaris*, an uncommon resident of damp subtropical forests (Inskipp and Inskipp 1991); Rufous-throated Wren Babbler, a rare and local skulker of dense and wet lower temperate forests (Fleming *et al.* 1984), and Yellow-cheeked Tit *Parus spilonotus*, an uncommon oak forest bird reported only from MBNPBZ and the Mai river valley of SE Nepal (Inskipp and Inskipp 1991). The Sisuwa and Sankhuwa valleys harbor the lowest elevation forests in MBNPBZ. Moist subtropical associations distributed there are poorly represented elsewhere in the reserve. Moreover, remnants of this forest type in Nepal are heavily exploited and reduced in extent (extrapolation of map data; pers. obs.), so the Sisuwa/Sankhuwa stands are particularly important for biodiversity conservation.

Investigation of birds in the Chitre village area of Sankhuwa river valley was included in ecological studies conducted from 1993 to 1995 by James Bland of Santa Monica College, USA. He noted 130 species in a variety of temperate and subtropical habitats. Four species were newly enumerated for the reserve, including two rarely recorded birds: Gould's Shortwing *Brachypteryx stellata* and Grey-sided Laughingthrush *Garrulax caerulatus*. First reports were made for 17 species, most of which are uncommon residents of temperate forests.

The author's observations in the Hinkhu, Hongu and Barun river valleys during 1995 and 1996 added 18 species to the reserve list. The most significant records are from the Upper Barun, where Tibetan Snowfinch *Montifringilla adamsi*, White-throated Dipper *Cinclus cinclus*, White-winged Redstart *Phoenicurus erythrogaster* and Common Raven *Corvus corax* demonstrate the arid conditions typical of the Trans-Himalayan zone. A variety of forest birds encountered mainly in the previously unsurveyed Middle Hongu are also included (see Appendix A).

Two recent birdwatching treks in eastern MBNPBZ have contributed an additional 33 species to the checklist. The first of these was an Cardiff University of Wales/Bird Conservation Nepal undertaking to the lower Kasuwa and Barun valleys by Seb Buckton and Hem Sagar Baral from 19 November to 7 December 1994. Of 203 species recorded, 17 low elevation forest and open country birds were new to the enumeration, including the "uncommon and very locally distributed" (Inskipp and Inskipp 1991) Yellow-vented Warbler *Phylloscopus cantator* (Buckton and Baral 1995), which is a globally Near-Threatened species (Collar *et al.* 1994) and classified as Endangered in Nepal (Baral *et al.* 1996). In May 1998 Hathan Choudhary and Paul Hall led a Naturetrek tour of the lower Kasuwa and west bank of the Upper Arun. They added 16 species to the checklist from a variety of lower elevation habitats. Most notable were Nepal Wren Babbler *Pnoepyga immaculata*, a recently described species that was considered endemic to Nepal until earlier this year (Robson 1999), Sultan Tit *Melanochlora*

sultanea, which is scarce and largely restricted to foothill forests (Inskipp and Inskipp 1991), and Black-chinned Yuhina *Yuhina nigrimenta*, a rare, probable resident of broadleaved evergreen forests (Inskipp and Inskipp 1991; Grimmett *et al.* 1998).

In spring 1998 Joseph Wohlgemuth and Shankar Tiwari studied the relationship between human population density and diversity of bird species in the lower Kasuwa and Ishuwa kholas of the Buffer Zone, and outside the reserve in the Upper Arun from north of Num to Khandbari (Wohlgemuth 1998). An eight day excursion to Makalu Base Camp from Tashigaon was included in the itinerary but bird records were not included in the report. In the focus study area at least two species, Common Hawk Cuckoo *Hierococcyx varius* and Alpine Swift *Tachymarptis melba*, were new for MBNPBZ.

To attain a near complete inventory of birds in MBNPBZ requires more comprehensive surveys of all river systems reconnoitered thus far. Highest priority is merited for wet broadleaf forests below 2500 m during each season. In addition, initial surveys of the middle-lower Hinkhu and far upper Arun (west bank) are needed. Raptors are evidently underrecorded in the reserve and their seasonal migration in the Upper Arun is poorly studied. Wide scope exists for additional systematic studies of the breeding biology and ecology of bird communities in the area. Particularly useful follow-on studies would include identification and regular monitoring of species that are indicative of critical forest habitats from the tropical, subtropical and lower temperate zones. Ornithological studies in peripheral areas such as the Irkhuwa watershed, lower Sabhaya river, and the humid broadleaf forests north of Kandbhari are needed to assess local bird communities, associated habitats, ecological linkages with similar areas in the reserve, comparative representativeness, and possible expansion of the BZ or establishment of adjoining protected areas.

How to use this species list. Taxonomy, nomenclature and systematic sequence used in this enumeration follow *An Annotated Checklist of the Birds of the Oriental Region* by Inskipp, Lindsey and Duckworth (1996). The in-depth review incorporates revised taxonomic divisions and phylogenetic relationships based mainly on DNA studies by Sibley and Ahlquist (Sibley and Monroe 1990, 1993), and standardizes common (English) names.

Status codes are defined in the key at the end of the list. Seasonal distribution follows Fleming *et al.* (1984) and Inskipp and Inskipp (1991). Insufficient data are available to ascertain the individual abundance of most species within MBNPBZ. Consequently, abundance of each species is described as a subjective assessment covering range in Nepal, and follows the work of Inskipp and Inskipp (1991). Where subsequent data have warranted revision in distributional status, such designations refer to Grimmett *et al.* (1998) and are suffixed by the superscript [1]. "Occasional" as used by Fleming *et al.* (1984) and Inskipp and Inskipp (1991) has been preferred over "frequent", except where the latter is used as revised or initial status by Grimmett *et al.* Conservation status is depicted in bold font, with the first designation following Baral *et al.* (1996) for Nepalese birds at high to extremely high risks of extinction in the immediate to medium-term future. Bold codes in the far right column denote the risk to species whose populations are globally threatened (Collar *et al.* 1994).

Ornithologists and birdwatchers can contribute to our better understanding of birds in MBNPBZ by sending additional records, preferably including notes on all birds recorded in the reserve and peripheral areas, to:

The Secretary, Bird Conservation Nepal, P. O. Box 12465, Kathmandu, Nepal.

BIRD SPECIES RECORDED IN MAKALU-BARUN NATIONAL PARK AND BUFFER ZONE

No.	Species	Source/1st record	Status	
	Phasianidae Partridges, Francolins, Snowcocks, Quails and Pheasants			
1.	Snow Partridge *Lerwa lerwa*	Jackson and Ahlborn 1987	R, FC	
2.	Tibetan Snowcock *Tetraogallus tibetanus*	Daniel and Hanzák 1993	R, FC	
3.	Black Francolin *Francolinus francolinus*	Cox 1995	R, C	
4.	Hill Partridge *Arborophila torqueola*	Nepali 1984	R, FC	
5.	Blood Pheasant *Ithaginis cruentus*	Daniel and Hanzák 1993	R, FC	
6.	Satyr Tragopan *Tragopan satyra*	Inskipp 1989	R, Uc,	**Vu, NT**
7.	Himalayan Monal *Lophophorus impejanus*	Daniel and Hanzák 1993	R, LC[1],	**SW**
8.	Red Junglefowl *Gallus gallus*	Tymstra 1993	R, LC[1],	**SW**
9.	Kalij Pheasant *Lophura leucomelanos*	Nepali 1984	R, FC	
	Indicatoridae Honeyguides			
10.	Yellow-rumped Honeyguide *Indicator xanthonotus*	Cronin 1979	R, LU,	**Vu, NT**
	Picidae Woodpeckers, Wrynecks and Piculets			
11.	Grey-capped Pygmy Woodpecker *Dendrocopos canicapillus*	Cox 1995	R, FC	
12.	Brown-fronted Woodpecker *Dendrocopos auriceps*	Nepali 1984	R, FC	
13.	Fulvous-breasted Woodpecker *Dendrocopos macei*	Tymstra 1993	R, C	
14.	Crimson-breasted Woodpecker *Dendrocopos cathpharius*	Tymstra 1993	R, O	
15.	Darjeeling Woodpecker *Dendrocopos darjellensis*	Nepali 1984	R, FC	
16.	Rufous Woodpecker *Celeus brachyurus*	Choudhary *et al.* 1998	R, Uc[1]	
17.	Lesser Yellownape *Picus chlorolophus*	Buckton & Baral 1995	R, FC	
18.	Greater Yellownape *Picus flavinucha*	Nepali 1984	R, FC	
19.	Grey-headed Woodpecker *Picus canus*	Nepali 1984	R, C	
20.	Himalayan Flameback *Dinopium shorii*	Choudhary *et al.* 1998	R, LC[1]	
21.	Greater Flameback *Chrysocolaptes lucidus*	Buckton & Baral 1995	R, O	
22.	Bay Woodpecker *Blythipicus pyrrhotis*	Bland 1999	R, LU	
	Megalaimadae Asian Barbets			
23.	Great Barbet *Megalaima virens*	Nepali 1984	R, C	
25.	Golden-throated Barbet *Megalaima franklinii*	Bland 1999	R, O&L	
24.	Blue-throated Barbet *Megalaima asiatica*	Nepali 1984	R, C	
	Upupidae Hoopoes			
26.	Common Hoopoe *Upupa epops*	Daniel and Hanzák 1993	R, FC	
	Coraciidae Rollers			
27.	Indian Roller *Coracias benghalensis*	Shakya 1995	R, C	
	Alcedinidae Small Kingfishers			
28.	Common Kingfisher *Alcedo atthis*	Buckton & Baral 1995	R, FC	
	Halcyonidae Large Kingfishers			
29.	White-throated Kingfisher *Halcyon smyrnensis*	Choudhary *et al.* 1998	R, C	
	Cerylidae Pied Kingfishers			
30.	Crested Kingfisher *Megaceryle lugubris*	Buckton & Baral 1995	R, O	
	Cuculidae Old World Cuckoos			
31.	Pied Cuckoo *Clamator jacobinus*	Shakya 1995	V, Uc	
32.	Large Hawk Cuckoo *Hierococcyx sparverioides*	Tymstra 1993	V, FC	
33.	Common Hawk Cuckoo *Hierococcyx varius*	Wohlgemuth 1998	R, C	
34.	Indian Cuckoo *Cuculus micropterus*	Carpenter 1994; *in litt.*	V, C	
35.	Eurasian Cuckoo *Cuculus canorus*	Tymstra 1993	V, C	
36.	Oriental Cuckoo *Cuculus saturatus*	Tymstra 1993	V, FC[1]	

No.	Species	Source/1st record	Status	
37.	Lesser Cuckoo *Cuculus poliocephalus*	Bland 1999; *in litt.*	V, FC	
38.	Grey-bellied Cuckoo *Cacomantis passerinus*	Choudhary *et al.* 1998	V, Fr[1]	
39.	Asian Emerald Cuckoo *Chrysococcyx maculatus*	Carpenter 1994; *in litt.*	V, R[1]	
40.	Drongo Cuckoo *Surniculus lugubris*	Carpenter 1994; *in litt.*	V, L	
41.	Asian Koel *Eudynamys scolopacea*	Carpenter *in litt.*	R, C	
	Psittacidae Parrots			
42.	Slaty-headed Parakeet *Psittacula himalayana*	Nepali 1984	R, FC	
	Apodidae Swifts			
43.	Himalayan Swiftlet *Collocalia brevirostris*	Tymstra 1993	R, FC	
44.	Alpine Swift *Tachymarptis melba*	Wohlgemuth 1998	R?, FC	
45.	Fork-tailed Swift *Apus pacificus*	Inskipp 1989	R?, FC	
46.	House Swift *Apus affinis*	Tymstra 1993	R, C	
	Strigidae Typical Owls			
47.	Mountain Scops Owl *Otus spilocephalus*	Nepali 1984	R, LFC[1]	
48.	Spot-bellied Eagle Owl *Bubo nipalensis*	Nepali 1984	R, R&L	**Cr, NT**
49.	Brown Wood Owl *Strix leptogrammica*	Nepali 1984	R, Uc[1]	**SW**
50.	Tawny Owl *Strix aluco*	Nepali 1984	R, Fr[1]	
51.	Collared Owlet *Glaucidium brodiei*	Nepali 1984	R, LFC[1]	
52.	Asian Barred Owlet *Glaucidum cuculoides*	Bland 1999; *in litt.*	R, C	
53.	Little Owl *Athene noctua*	Jackson and Ahlborn 1987	R?, Sc	
54.	Brown Hawk Owl *Ninox scutulata*	Nepali 1984	R, LFC[1]	
	Caprimulgidae Nightjars			
55.	Grey Nightjar *Caprimulgus indicus*	Tymstra 1993	R, FC	
	Columbidae Pigeons and Doves			
56.	Snow Pigeon *Columba leuconota*	Daniel and Hanzák 1993	R, C	
57.	Speckled Wood Pigeon *Columba hodgsonii*	Tymstra 1993	R, O	
58.	Ashy Wood Pigeon *Columba pulchricollis*	Bland 1999; *in litt.*	R, O	
59.	Oriental Turtle Dove *Streptopelia orientalis*	Tymstra 1993	R/V, C	
60.	Spotted Dove *Streptopelia chinensis*	Tymstra 1993	R, C[1]	
61.	Emerald Dove *Chalcophaps indica*	Choudhary *et al.* 1998	R, LC	
62.	Wedge-tailed Green Pigeon *Treron sphenura*	Bland 1999; *in litt.*	R, LFC	
	Scolopacidae subfamily Scolopacinae Woodcocks and Snipes			
63.	Eurasian Woodcock *Scolopax rusticola*	Tymstra 1993	R, LFC	
64.	Solitary Snipe *Gallinago solitaria*	Jackson and Ahlborn 1987	V/M, LUc	
65.	Wood Snipe *Gallinago nemoricola*	Cronin 1979	R?, Sc	**E, Vu**
66.	Pintail Snipe *Gallinago stenura*	Inskipp 1989	V/M, O	
	Scolopacidae subfamily Tringinae Sandpipers, Curlews, Godwits, Phalaropes, etc.			
67.	Green Sandpiper *Tringa ochropus*	Daniel & Hanzák 1993	V/M, FC/C	
	Charadriidae subfamily Charadriinae Plovers and Lapwings			
68.	River Lapwing *Vanellus spinosus*	Carpenter 1994; *in litt.*	R, C	
	Accipitridae Eagles, Hawks, Buzzards, Harriers, Vultures, Kites, Honey-buzzard etc.			
69.	Oriental Honey-buzzard *Pernis ptilorhyncus*	Cox 1995	R/M, FC	
70.	Black Kite *Milvus migrans*	Inskipp 1989	R/V[1]/M, C	
71.	Lammergeier *Gypaetus barbatus*	Nepali 1984	R, C	
72.	Himalayan Griffon *Gyps himalayensis*	Jackson and Ahlborn 1987	R, LC[1]	
73.	Eurasian Griffon *Gyps fulvus*	Carpenter 1994; in litt.	R, O	
74.	Crested Serpent Eagle *Spilornis cheela*	Tymstra 1993	R, FC[1]	
75.	Hen Harrier *Circus cyaneus*	Nepali 1984	V/M, FC	

No.	Species	Source/1st record	Status	
76.	Pied Harrier *Circus melanoleucos*	Jackson and Ahlborn 1987	V, Uc	
77.	Crested Goshawk *Accipiter trivirgatus*	Nepali 1984	R, Uc	**Vu**
78.	Besra *Accipiter virgatus*	Bland 1999	R, Fr[1]	
79.	Eurasian Sparrowhawk *Accipiter nisus*	Tymstra 1993	R, FC	
80.	Northern Goshawk *Accipiter gentilis*	Nepali 1984	R?, O	
81.	Long-legged Buzzard *Buteo rufinus*	Nepali 1984	V/M, O	
82.	Upland Buzzard *Buteo hemilasius*	Nepali 1984	V/R?, ?	
83.	Black Eagle *Ictinaetus malayensis*	Nepali 1984	R, FC	
84.	Steppe Eagle *Aquila nipalensis*	Tymstra 1993	V/M, C	
85.	Imperial Eagle *Aquila heliaca*	Shakya 1997	V/M, Sc[1]	
86.	Golden Eagle *Aquila chrysaetos*	Tymstra 1993	R, Uc	
87.	Mountain Hawk Eagle *Spizaetus nipalensis*	Bland 1999	R, LFr[1]	
	Falconidae Falcons			
88.	Common Kestrel *Falco tinnunculus*	Nepali 1984	R/V/M, C	
89.	Red-necked Falcon *Falco chiquera*	Nepali 1984	R, Sc	**Cr, NT**
90.	Eurasian Hobby *Falco subbuteo*	Choudhary *et al.* 1998	R/V/M, O	
91.	Merlin *Falco columbarius*	Cox 1995	V/M?, Sc	
92.	Peregrine Falcon *Falco peregrinus*	Inskipp 1989	R, FC	
	Phalacrocoracidae Comorants			
93.	Great Cormorant *Phalacrocorax carbo*	Buckton & Baral 1995	R, FC	
	Ardeidae Herons and Bitterns			
94.	Cattle Egret *Bubulcus ibis*	Shakya 1995	R, FC[1]	
	Ciconiidae Storks			
95.	Black Stork *Ciconia nigra*	Cox 1995	V/M, O	**Vu**
96.	Woolly-necked Stork *Ciconia episcopus*	Choudhary *et al.* 1998	R[1], FC	
	Eurylamidae Broadbills			
97.	Long-tailed Broadbill *Psarisomus dalhousiae*	Carpenter *in litt.*	R, Sc&L	
	Irenidae Leafbirds and Fairy Bluebirds			
98.	Orange-bellied Leafbird *Chloropsis hardwickii*	Nepali 1984	R, Fr[1]	
	Laniidae Shrikes			
99.	Long-tailed Shrike *Lanius schach*	Bland 1999; *in litt.*	R, C	
100.	Grey-backed Shrike *Lanius tephronotus*	Inskipp 1989	R, FC	
	Corvidae subfamily Corvinae tribe Corvini Crows, Ravens, Magpies, Treepies, Choughs, etc.			
101.	Yellow-billed Blue Magpie *Urocissa flavirostris*	Nepali 1984	R, C	
102.	Red-billed Blue Magpie *Urocissa erythrorhyncha*	Carpenter 1994; *in litt.*	R, C	
103.	Common Green Magpie *Cissa chinensis*	Tymstra 1993	R, LFC	
104.	Grey Treepie *Dendrocitta formosae*	Nepali 1984	R, C	
105.	Spotted Nutcracker *Nucifraga caryocatactes*	Nepali 1984	R, C	
106.	Red-billed Chough *Pyrrhocorax pyrrhocorax*	Jackson and Ahlborn 1987	R, C	
107.	Yellow-billed Chough *Pyrrhocorax graculus*	Danial and Hanzák 1993	R, C	
108.	Large-billed Crow *Corvus macrorhynchos*	Danial and Hanzák 1993	R, C[1]	
109.	Common Raven *Corvus corax*	Jackson and Ahlborn 1987	R, FC	
	Corvidae subfamily Corvinae tribe Oriolini Orioles, Cuckooshrikes, Minivets, Flycatcher-shrikes			
110.	Maroon Oriole *Oriolus traillii*	Bland 1999; *in litt.*	R, LFC	
111.	Large Cuckooshrike *Coracina macei*	Cox 1995	R, C	
112.	Black-winged Cuckooshrike *Coracina melaschistos*	Tymstra 1993	R, O	
113.	Long-tailed Minivet *Pericrocotus ethologus*	Nepali 1984	R, C	
114.	Short-billed Minivet *Pericrocotus brevirostris*	Nepali 1984	R?, Sc	
115.	Scarlet Minivet *Pericrocotus flammeus*	Carpenter 1994; *in litt.*	R, C	
116.	Bar-winged Flycatcher-shrike *Hemipus picatus*	Buckton & Baral 1995	R, C	

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	Corvidae subfamily Dicrurinae Drongos and Fantails			
117.	Yellow-bellied Fantail *Rhipidura hypoxantha*	Nepali 1984	R, C	
118.	White-throated Fantail *Rhipidura albicollis*	Tymstra 1993	R, FC	
119.	Black Drongo *Dicrurus macrocercus*	Tymstra 1993	R, C[1]	
120.	Ashy Drongo *Dicrurus leucophaeus*	Nepali 1984	R, C	
121.	Bronzed Drongo *Dicrurus aeneus*	Buckton & Baral 1995	R, FC	
122.	Lesser Racket-tailed Drongo *Dicrurus remifer*	Nepali 1984	R, LFr[1]	
123.	Spangled Drongo *Dicrurus hottentottus*	Shakya 1995	R, FC	
	Cinclidae Dippers			
124.	White-throated Dipper *Cinclus cinclus*	Jackson and Ahlborn 1987	R, FC	
125.	Brown Dipper *Cinclus pallasii*	Nepali 1984	R, C	
	Muscicapidae subfamily Turdinae Thrushes and Shortwings			
126.	Blue-capped Rock Thrush *Monticola cinclorhynchus*	Tymstra 1993	V, O	
127.	Chestnut-bellied Rock Thrush *Monticola rufiventris*	Tymstra 1993	R, FC	
128.	Blue Rock Thrush *Monticola solitarius*	Buckton & Baral 1995	R, O	
129.	Blue Whistling Thrush *Myiophonus caeruleus*	Nepali 1984	R, C	
130.	Pied Thrush *Zoothera wardii*	Inskipp 1989	V, Uc,	**NT**
131.	Plain-backed Thrush *Zoothera mollissima*	Nepali 1984	R, FC	
132.	Long-tailed Thrush *Zoothera dixoni*	Heegard *et. al.* 1989	R, O	
133.	Scaly Thrush *Zoothera dauma*	Nepali 1984	R/V, FC	
134.	Long-billed Thrush *Zoothera monticola*	Heegard *et. al.* 1989	R, O,	**Vu, NT**
135.	Dark-sided Thrush *Zoothera marginata*	Nepali 1984	R?, Sc	**E**
136.	Tickell's Thrush *Turdus unicolor*	Inskipp 1989	V, FC	
137.	White-collared Blackbird *Turdus albocinctus*	Nepali 1984	R, FC	
138.	Grey-winged Blackbird *Turdus boulboul*	Tymstra 1993	R, C	
139.	Chestnut Thrush *Turdus rubrocanus*	Nepali 1984	V, Uc	
140.	Dark-throated Thrush *Turdus ruficollis*	Nepali 1984	V, C	
141.	Gould's Shortwing *Brachypteryx stellata*	Bland 1999	R?,Sc&vL	**Vu, NT**
142.	White-browed Shortwing *Brachypteryx montana*	Nepali 1984	R, vUc	
	Muscicapidae subfamily Muscicapinae tribe Muscicapini Old World Flycatchers			
143.	Dark-sided Flycatcher *Muscicapa sibirica*	Carpenter 1994; *in litt.*	V, FC	
144.	Asian Brown Flycatcher *Muscicapa dauurica*	Cox 1995	M/V/R?, Uc	
145.	Ferruginous Flycatcher *Muscicapa ferruginea*	Nepali 1986	V, Sc	
146.	Slaty-backed Flycatcher *Ficedula hodgsonii*	Barus 1976	R, LSc	
147.	Rufous-gorgeted Flycatcher *Ficedula strophiata*	Daniel and Hanzák 1993	R, C	
148.	White-gorgeted Flycatcher *Ficedula monileger*	Nepali 1984	R?, Sc	**E**
149.	Snowy-browed Flycatcher *Ficedula hyperythra*	Tymstra 1993	R, O	
150.	Little Pied Flycatcher *Ficedula westermanni*	Carpenter 1994; *in litt.*	R, Uc	
151.	Ultramarine Flycatcher *Ficedula superciliaris*	Tymstra 1993	V/R? C	
152.	Slaty-blue Flycatcher *Ficedula tricolor*	Nepali 1984	R, C	
153.	Sapphire Flycatcher *Ficedula sapphira*	Tymstra 1993	R?, Sc	**Vu**
154.	Verditer Flycatcher *Eumyias thalassina*	Tymstra 1993	R/V, C	
155.	Small Niltava *Niltava macgrigoriae*	Carpenter 1994; *in litt.*	R, FC	
156.	Rufous-bellied Niltava *Niltava sundara*	Tymstra 1993	R, C	
157.	Blue-throated Flycatcher *Cyornis rubeculoides*	Cox 1995	V, R?, O	
158.	Hill Blue Flycatcher *Cyornis banyumas*	Fleming 1984	R, Sc[1]	**Vu**
159.	Pygmy Blue Flycatcher *Muscicapella hodgsoni*	Tymstra 1993	R[1], LSc	**Vu**
160.	Grey-headed Canary Flycatcher *Culicicapa ceylonensis*	Tymstra 1993	R, C	
	Muscicapidae subfamily Muscicapinae tribe Saxicolini Chats and their allies			
161.	White-tailed Rubythroat *Luscinia pectoralis*	Bland 1999; *in litt.*	R/V/M, O	
162.	Indian Blue Robin *Luscinia brunnea*	Tymstra 1993	V, FC	
163.	Orange-flanked Bush Robin *Tarsiger cyanurus*	Nepali 1984	R, C	
164.	Golden Bush Robin *Tarsiger chrysaeus*	Nepali 1984	R, LFC[1]	
165.	White-browed Bush Robin *Tarsiger indicus*	Nepali 1984	R, O	

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166.	Rufous-breasted Bush Robin *Tarsiger hyperythrus*	Daniel and Hanzák 1993	R, LFr[1] **NT**
167.	Oriental Magpie Robin *Copsychus saularis*	Cox 1995	R, C
168.	Blue-capped Redstart *Phoenicurus caeruleocephalus*	Carpenter 1994; *in litt.*	R, R (E Nepal)
169.	Black Redstart *Phoenicurus ochruros*	Jackson and Ahlborn 1987	R, C
170.	Hodgson's Redstart *Phoenicurus hodgsoni*	Buckton & Baral 1995	V, Fr/LC[1]
171.	White-throated Redstart *Phoenicurus schisticeps*	Jackson and Ahlborn 1987	R, O
172.	White-winged Redstart *Phoenicurus erythrogaster*	Jackson and Ahlborn 1987	R, Uc/LFC[1]
173.	Blue-fronted Redstart *Phoenicurus frontalis*	Daniel and Hanzák 1993	R, C
174.	White-capped Water Redstart *Chaimarrornis leucocephalus*	Daniel & Hanzák 1993	R, C
175.	Plumbeous Water Redstart *Rhyacornis fuliginosus*	Nepali 1984	R, C
176.	White-bellied Redstart *Hodgsonius phoenicuroides*	Cox 1995	V, O
177.	White-tailed Robin *Myiomela leucura*	Tymstra 1993	R, Uc/LFC[1]
178.	Grandala *Grandala coelicolor*	Jackson and Ahlborn 1987	R, LFC
179.	Little Forktail *Enicurus scouleri*	Nepali 1984	R, FC
180.	Slaty-backed Forktail *Enicurus schistaceus*	Buckton & Baral 1995	R, Uc/LFC[1] **E,NT**
181.	Spotted Forktail *Enicurus maculatus*	Tymstra 1993	R, FC
182.	Purple Cochoa *Cochoa purpurea*	Bland 1999; *in litt.*	R?, Sc
183.	Common Stonechat *Saxicola torquata*	Nepali 1984	R/V/M, C
184.	Pied Bushchat *Saxicola caprata*	Choudhary *et al.* 1998	R, C/FC
185.	Grey Bushchat *Saxicola ferrea*	Tymstra 1993	R, C[1]
	Sturnidae Starlings and Mynas		
186.	Chestnut-tailed Starling *Sturnus malabaricus*	Cox 1995	R?, FC
187.	Common Myna *Acridotheres tristis*	Buckton & Baral 1995	R, C
	Sittidae Nuthatches and Wallcreeper		
188.	Chestnut-bellied Nuthatch *Sitta castanea*	Carpenter 1994; *in litt.*	R, C
189.	White-tailed Nuthatch *Sitta himalayensis*	Nepali 1984	R, C
190.	Wallcreeper *Tichodroma muraria*	Carpenter *in litt.*	R, FC
	Certhiidae Creepers and Wrens		
191.	Eurasian Treecreeper *Certhia familiaris*	Carpenter 1994; *in litt.*	R, FC
192.	Rusty-flanked Treecreeper *Certhis nipalensis*	Nepali 1984	R, FC
193.	Brown-throated Treecreeper *Certhia discolor*	Nepali 1986	R, LFC[1]
194.	Winter Wren *Troglodytes troglodytes*	Daniel and Hanzák 1993	R, FC
	Paridae Tits		
195.	Rufous-vented Tit *Parus rubidiventris*	Daniel and Hanzák 1993	R, C
196.	Coal Tit *Parus ater*	Inskipp 1989	R, FC
197.	Grey-crested Tit *Parus dichrous*	Daniel and Hanzák 1993	R, FC[1]
198.	Great Tit *Parus major*	Choudhary *et al.* 1998	R, C
199.	Green-backed Tit *Parus monticolus*	Nepali 1984	R, C
200.	Black-lored Tit *Parus xanthogenys*	Nepali 1984	R, C
201.	Yellow-cheeked Tit *Parus spilonotus*	Shakya 1995	R, vLUc **E**
202.	Yellow-browed Tit *Sylviparus modestus*	Nepali 1984	R, FC
203.	Sultan Tit *Melanochlora sultanea*	Choudhary *et al.* 1998	R, R&L **Cr**
	Aegithalidae Long-tailed Tits		
204.	Rufous-fronted Tit *Aegithalos iouschistos*	Nepali 1984	R, O
205.	Black-throated Tit *Aegithalos concinnus*	Nepali 1984	R, C
	Hirundinidae Swallows and Martins		
206.	Eurasian Crag Martin *Hirundo rupestris*	Inskipp 1989	R, LFC[1]
207.	Barn Swallow *Hirundo rustica*	Nepali 1986	R/V, C
208.	Red-rumped Swallow *Hirundo daurica*	Bland 1999; *in litt.*	R, C
209.	Northern House Martin *Delichon urbica*	Carpenter 1994; *in litt.*	M, R[1]
210.	Asian House Martin *Delichon dasypus*	Tymstra 1993	R?, FC
211.	Nepal House Martin *Delichon nipalensis*	Nepali 1984	R, FC
	Pycnonotidae Bulbuls		
212.	Striated Bulbul *Pycnonotus striatus*	Nepali 1984	R, L&O
213.	Himalayan Bulbul *Pycnonotus leucogenys*	Daniel and Hanzák 1993	R, C

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214.	Red-vented Bulbul *Pycnonotus cafer*	Carpenter 1994; *in litt.*	R, C	
215.	Ashy Bulbul *Hemixos flavala*	Shakya 1995	R, O	
216.	Mountain Bulbul *Hypsipetes mcclellandii*	Choudhary *et al.* 1998	R, FC	
217.	Black Bulbul *Hypsipetes leucocephalus*	Nepali 1984	R, C	
	Cisticolidae African Warblers (Cisticolas and Prinias)			
218.	Striated Prinia *Prinia criniger*	Nepali 1984	R, C	
219.	Hill Prinia *Prinia atrogularis*	Tymstra 1993	R, O	
220.	Grey-breasted Prinia *Prinia hodgsonii*	Choudhary *et al.* 1998	R, C	
	Zosteropidae White-eyes			
221.	Oriental White-eye *Zosterops palpebrosus*	Tymstra 1993	R, C	
	Sylviidae Warblers, Grassbirds, Laughingthrushes and Babblers			
	Sylviidae subfamily Acrocephalinae Warblers			
222.	Chestnut-headed Tesia *Tesia castaneocoronata*	Nepali 1984	R, FC	
223.	Slaty-bellied Tesia *Tesia olivea*	H.S. Nepali, pers. comm.	R?, R[1]	**E**
224.	Grey-bellied Tesia *Tesia cyaniventer*	Tymstra 1993	R, O	
225.	Brownish-flanked Bush Warbler *Cettia fortipes*	Tymstra 1993	R, LFC[1]	
226.	Aberrant Bush Warbler *Cettia flavolivacea*	Tymstra 1993	R, C	
227.	Grey-sided Bush Warbler *Cettia brunnifrons*	Nepali 1984	R, C	
228.	Common Tailorbird *Orthotomus sutorius*	Nepali 1984	R, C	
229.	Smoky Warbler *Phylloscopus fuligiventer*	Nepali 1986	R?, Uc	
230.	Tickell's Leaf Warbler *Phylloscopus affinis*	Nepali 1984	R, C	
231.	Buff-barred Warbler *Phylloscopus pulcher*	Nepali 1984	R, C	
232.	Ashy-throated Warbler *Phylloscopus maculipennis*	Tymstra 1993	R, FC	
233.	Lemon-rumped Warbler *Phylloscopus chloronotus*	Daniel and Hanzák 1993	R, C	
234.	Yellow-browed Warbler *Phylloscopus inornatus*	Nepali 1984	V/M, Uc[1]	
235.	Greenish Warbler *Phylloscopus trochiloides*	Nepali 1986	V/M, C	
236.	Large-billed Leaf Warbler *Phylloscopus magnirostris*	Nepali 1984	V, FC	
237.	Blyth's Leaf Warbler *Phylloscopus reguloides*	Tymstra 1993	R, C	
238.	Yellow-vented Warbler *Phylloscopus cantator*	Buckton & Baral 1995	R?/V, vLUc	**E, NT**
239.	Golden-spectacled Warbler *Seicercus burkii*	Nepali 1984	R, C	
240.	Grey-hooded Warbler *Seicercus xanthoschistos*	Nepali 1984	R, C	
241.	Grey-cheeked Warbler *Seicercus poliogenys*	Tymstra 1993	R?, Sc	
242.	Chestnut-crowned Warbler *Seicercus castaniceps*	Nepali 1984	R, C	
243.	Broad-billed Warbler *Tickellia hodgsoni*	Nepali 1984	R?, Sc	**E, NT**
244.	Black-faced Warbler *Abroscopus schisticeps*	Nepali 1984	R, LFC[1]	
245.	Yellow-belliedWarbler *Abroscopus superciliaris*	Shakya 1995	R, LFC[1]	
	Sylviidae subfamily Garrulacinae Laughingthrushes			
246.	White-throated Laughingthrush *Garrulax albogularis*	Nepali 1984	R, C	
247.	White-crested Laughingthrush *Garrulax leucolophus*	Tymstra 1993	R, C	
248.	Striated Laughingthrush *Garrulax striatus*	Nepali 1984	R, LC	
249.	Spotted Laughingthrush *Garrulax ocellatus*	Nepali 1984	R, FC	
250.	Grey-sided Laughingthrush *Garrulax caerulatus*	Bland 1999	R, Uc	
251.	Streaked Laughingthrush *Garrulax lineatus*	Tymstra 1993	R, C	
252.	Blue-winged Laughingthrush *Garrulax squamatus*	Nepali 1984	R, LSc	**Vu**
253.	Scaly Laughingthrush *Garrulax subunicolor*	Nepali 1984	R, LFC	
254.	Black-faced Laughingthrush *Garrulax affinis*	Neplai 1986	R, C	
255.	Chestnut-crowned Laughingthrush *Garrulax erythrocephalus*	Nepali 1984	R, C	
	Sylviidae subfamily Sylviinae tribe Timaliini Babblers			
256.	Puff-throated Babbler *Pellorneum ruficeps*	Choudhary *et al.* 1998	R, LFC[1]	
257.	Rusty-cheeked Scimitar Babbler *Pomatorhinus erythrogenys*	Nepali 1984	R, C	
258.	Streak-breasted Scimitar Babbler *Pomatorhinus ruficollis*	Tymstra 1993	R, FC,	**NT**
259.	Coral-billed Scimitar Babbler *Pomatorhinus ferruginosus*	Fleming *et al.* 1979	R?, vSc,	**Cr**
260.	Slender-billed Scimitar Babbler *Xiphirhynchus superciliaris*	Nepali 1984	R, Sc	
261.	Scaly-breasted Wren Babbler *Pnoepyga albiventer*	Tymstra 1993	R, FC	
262.	Pygmy Wren Babbler *Pnoepyga pusilla*	Tymstra 1993	R, O	
263.	Nepal Wren Babbler *Pnoepyga immaculata*	Choudhary 1998	R, LFC[1]	**DD, NT**
264.	Rufous-throated Wren Babbler *Spelaeornis caudatus*	Nepali 1984	R, Sc&vL,	**Vu**

No.	Species	Source/1st record	Status
265.	Spotted Wren Babbler *Spelaeornis formosus*	Inskipp & Inskipp 1991	R, R&vL[1] **E**
266.	Rufous-capped Babbler *Stachyris ruficeps*	Nepali 1984	R, FC
267.	Black-chinned Babbler *Stachyris pyrrhops*	Nepali 1984	R, FC
268.	Golden Babbler *Stachyris chrysaea*	Nepali 1984	R, R&L[1] **Vu**
269.	Grey-throated Babbler *Stachyris nigriceps*	Nepali 1984	R, LFr[1]
270.	Spiny Babbler *Turdoides nipalensis*	Nepali 1984	R, O
271.	Red-billed Leiothrix *Leiothrix lutea*	Nepali 1984	R, FC
272.	Black-headed Shrike Babbler *Pteruthius rufiventer*	Nepali 1984	R, Sc&L **Vu**
273.	White-browed Shrike Babbler *Pteruthius flaviscapis*	Nepali 1984	R, FC
274.	Green Shrike Babbler *Pteruthius xanthochlorus*	Nepali 1984	R, O
275.	Black-eared Shrike Babbler *Pteruthius melanotis*	Nepali 1984	R, O&L
276.	Rusty-fronted Barwing *Actinodura egertoni*	Nepali 1984	R, Sc&L **E**
277.	Hoary-throated Barwing *Actinodura nipalensis*	Tymstra 1993	R, FC
278.	Blue-winged Minla *Minla cyanouroptera*	Nepali 1984	R, FC
279.	Chestnut-tailed Minla *Minla strigula*	Nepali 1984	R, C
280.	Red-tailed Minla *Minla ignotincta*	Nepali 1984	R, FC[1]
281.	Golden-breasted Fulvetta *Alcippe chrysotis*	Tymstra 1993	R, vL **Vu**
282.	Rufous-winged Fulvetta *Alcippe castaneceps*	Nepali 1984	R, C
283.	White-browed Fulvetta *Alcippe vinipectus*	Nepali 1984	R, C
284.	Nepal Fulvetta *Alcippe nipalensis*	Nepali 1984	R, LC[1]
285.	Rufous-backed Sibia *Heterophasia annectans*	Carpenter *in litt.*	R, R&L
286.	Rufous Sibia *Heterophasia capistrata*	Nepali 1984	R, C
287.	Stripe-throated Yuhina *Yuhina gularis*	Nepali 1984	R, C
288.	White-naped Yuhina *Yuhina bakeri*	Tymstra 1993	R, vR&L[1] **Cr**
289.	Whiskered Yuhina *Yuhina flavicollis*	Nepali 1984	R, C
290.	Rufous-vented Yuhina *Yuhina occipitalis*	Tymstra 1993	R, C
291.	Black-chinned Yuhina *Yuhina nigrimenta*	Choudhary *et al.* 1998	R?, Sc
292.	White-bellied Yuhina *Yuhina zantholeuca*	Buckton & Baral 1995	R, LFC[1]
293.	Fire-tailed Myzornis *Myzornis pyrrhoura*	Nepali 1984	R, Uc&L[1]
294.	Great Parrotbill *Conostoma oemodium*	Cox 1995	R[1], Uc **Vu**
295.	Brown Parrotbill *Paradoxornis unicolor*	Tymstra 1993	R, Uc&vL **Vu**
296.	Fulvous Parrotbill *Paradoxornis fulvifrons*	Tymstra 1993	R, Uc[1] **Vu**
297.	Black-throated Parrotbill *Paradoxornis nipalensis*	Nepali 1984	R, O
	Alaudidae Larks		
298.	Greater Short-toed Lark *Calandrella brachydactyla*	Daniel & Hanzák 1993	V/M, O
299.	Hume's Short-toed Lark *Calandrella acutirostris*	Cox 1995	V/M, C/Uc[1]
300.	Oriental Skylark *Alauda gulgula*	Daniel & Hanzák 1993	R/V, FC
301.	Horned Lark *Eremophila alpestris*	Cox 1995	R, FC
	Nectariniidae Flowerpeckers, Sunbirds and Spiderhunters		
	Nectariniidae subfamily Nectariniinae tribe Dicaeini Flowerpeckers		
302.	Yellow-bellied Flowerpecker *Dicaeum melanoxanthum*	Nepali 1984	R, LFr[1]
303.	Plain Flowerpecker *Dicaeum concolor*	Choudhary *et al.* 1998	R, LFC[1]
304.	Fire-breasted Flowerpecker *Dicaeum ignipectus*	Tymstra 1993	R, C
	Nectariniidae subfamily Nectariniinae tribe Nectariniini		
305.	Mrs Gould's Sunbird *Aethopyga gouldiae*	Tymstra 1993	R, Uc
306.	Green-tailed Sunbird *Aethopyga nipalensis*	Nepali 1984	R, C
307.	Black-throated Sunbird *Aethopyga saturata*	Buckton & Baral 1995	R, O
308.	Crimson Sunbird *Aethopyga siparaja*	Buckton & Baral 1995	R, FC
309.	Fire-tailed Sunbird *Aethopyga ignicauda*	Daniel and Hanzák 1993	R, FC
	Passeridae Sparrows, Wagtails, Pipits, Accentors and Estrildine Finches		
	Passeridae subfamily Passerinae Sparrows and Snowfinches		
310.	Eurasian Tree Sparrow *Passer montanus*	Carpenter 1994; *in litt.*	R, C[1]
311.	Tibetan Snowfinch *Montifringilla adamsi*	Cox 1995	R, C
	Passeridae subfamily Motacillinae Wagtails and Pipits		
312.	White Wagtail *Motacilla alba*	Daniel & Hanzák 1993	R/V/M, C
313.	White-browed Wagtail *Motacilla maderaspatensis*	Buckton & Baral 1995	R, FC
314.	Citrine Wagtail *Motacilla citreola*	Nepali 1986	V/M, FC/O?

No.	Species	Source/1st record	Status
315.	Grey Wagtail *Motacilla cinerea*	Nepali 1984	R, C
316.	Blyth's Pipit *Anthus godlewskii*	Cox 1995	M, ?
317.	Olive-backed Pipit *Anthus hodgsoni*	Nepali 1984	R/V, C
318.	Rosy Pipit *Anthus roseatus*	Daniel & Hanzák 1993	R/M, FC
319.	Upland Pipit *Anthus sylvanus*	Daniel & Hanzák 1993	R, LFC
	Passeridae subfamily Prunellinae Accentors		
320.	Alpine Accentor *Prunella collaris*	Daniel & Hanzák 1993	R, O
321.	Altai Accentor *Prunella himalayana*	Nepali 1984	V, FC,
322.	Robin Accentor *Prunella rubeculoides*	Carpenter 1994; *in litt.*	R, FC
323.	Rufous-breasted Accentor *Prunella strophiata*	Daniel & Hanzák 1993	R, FC
324.	Maroon-backed Accentor *Prunella immaculata*	Nepali 1984	V, Fr[1]
	Passeridae subfamily Estrildinae Estrildine Finches		
325.	White-rumped Munia *Lonchura striata*	Buckton & Baral 1995	R, L[1]/O
	Fringillidae subfamily Fringillinae Finches		
326.	Yellow-breasted Greenfinch *Carduelis spinoides*	Tymstra 1993	R, C
327.	Tibetan Siskin *Carduelis thibetana*	Bland 1999; *in litt.*	R, L[1]/Uc
328.	Twite *Carduelis flavirostris*	Cox 1995	R, Uc[1]
329.	Plain Mountain Finch *Leucosticte nemoricola*	Nepali 1984	R, C
330.	Brandt's Mountain Finch *Leucosticte brandti*	Daniel & Hanzák 1993	R, FC
331.	Dark-breasted Rosefinch *Carpodacus nipalensis*	Nepali 1986	R, FC
332.	Common Rosefinch *Carpodacus eythrinus*	Tymstra 1993	R/V, FC
333.	Beautiful Rosefinch *Carpodacus pulcherrimus*	Tymstra 1993	R, C
334.	Pink-browed Rosefinch *Carpodacus rodochrous*	Nepali 1984	R, FC
335.	Spot-winged Rosefinch *Carpodacus rodopeplus*	Nepali 1986	R, FC[1]
336.	White-browed Rosefinch *Carpodacus thura*	Heegard *et al.* 1987	R, FC
337.	Streaked Rosefinch *Carpodacus rubicilloides*	Carpenter 1994; *in litt.*	R, Fr[1]
338.	Great Rosefinch *Carpodacus rubicilla*	Cox 1996	R[1], O
339.	Red-fronted Rosefinch *Carpodacus puniceus*	Daniel & Hanzák 1993	R, Fr[1]
340.	Crimson-browed Finch *Propyrrhula subhimachala*	Jackson and Ahlborn 1987	R, Uc
341.	Scarlet Finch *Haematospiza sipahi*	Bland 1999	R, Uc&L[1]
342.	Brown Bullfinch *Pyrrhula nipalensis*	Nepali 1984	R[1], Fr[1]
343.	Red-headed Bullfinch *Pyrrhula erythrocephala*	Nepali 1984	R, FC
344.	Spot-winged Grosbeak *Mycerobas melanozanthos*	Carpenter 1994; *in litt.*	R, Uc[1]
345.	White-winged Grosbeak *Mycerobas carnipes*	Daniel and Hanzák 1993	R, FC
346.	Gold-naped Finch *Pyrrhoplectes epauletta*	Nepali 1984	R, Uc
	Fringillidae subfamily Emberizinae Buntings		
347.	Crested Bunting *Melophus lathami*	Tymstra 1993	R, FC
348.	Little Bunting *Emberiza pusilla*	Tymstra 1993	V, FC
349??	Rock Bunting *Emberiza cia*	Jackson and Ahlborn 1987	R, C[1]
349??	Godlewski's Bunting *Emberica godlewskii*	(Jackson and Ahlborn)	V?, R?

Status Codes Key:

Season		Abundance				Threat	
R	Resident	C	Common	Sc	Scarce	**Cr**	Critically Endangered
V	Visitor	FC	Fairly Common	vSc	Very Scarce	**E**	Endangered
M	Migrant	O	Occassional	R	Rare	**Vu**	Vulnerable
		Fr	Frequent	vR	Very Rare	**NT**	Near Threatened
		Uc	Uncommon	L	Local	**DD**	Data Deficient
		vUc	Very Uncommon	vL	Very Local	**SW**	Species to Watch (notable recent decline)

[1] revised distribution according to Grimmett *et al.* 1998

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Figure __. Rufous-throated Wren Babbler *Spelaeornis caudatus*, nesting in the Chitre saddle area of the Sankhuwa and Sisuwa watersheds (photo courtesy of James Bland).

Appendix C. List of mammals recorded in Makalu-Barun National Park and peripheral areas.

Species	Hinkhu	Hongu	Budum/ Irkhuwa	Upper Arun	Kasuwa	Barun
Rhesus Macaque *Macaca mulatta*			■			
Hanuman Langur *Semnopithecus entellus*		■	■			
Siberian Weasal *Mustela sibirica*		■				
Yellow-bellied Weasal *Mustela kathiah*		■		■		
Yellow-throated Marten *Martes flavigula*			■	■		
Crab-eating Mongoose *Herpestes urva*			■			
Jackal *Canus aureus*				■		
Clouded Leopard *Pardofelis nebulosus*		■				
Snow Leopard *Panthera uncia*		■				
Barking Deer *Muntiacus muntjak*			■	■		
Himalayan Goral *Naemorhedus goral*			■			
Himalayan Striped Squirrel *Tamiops macclellandi*			■			
Orange-bellied Himalayan Squirrel *Dremomys lokriah*		■	■			
Himalayan Mouse-hare *Ochotona roylei*	■	■				■

Appendix D. Itineraries

1995	
13 April	Jiri, Dolakha district - Sangbadanda (2240 m)
14 April	Sangbadanda - Tharo Khola (1600 m)
15 April	Tharo Khola - Dakchu (2805 m)
16 April	Dakchu - Junbesi (2675 m)
17 April	Junbesi - Tragshindhu (2845 m)
18 April	Tragsindhu - Khari Khola (2000 m)
19 April	Khari Khola - Pung Gum La (3110 m)
20 April	Pung Gum La - Zattara Danda overhang camp (4200 m)
21 April	Zattara Danda overhang - Zattara Danda camp (4270 m)
22 April	Zattara Danda camp - Mosom Kharka, Hinkhu Khola (3275 m)
23 April	Mosom Kharka - Tangnag (4360 m)
24 April	Tangnag - Khare (5000 m)
25 April	Khare - Kingme Danda, Upper Hongu camp (4420 m)
26 April	Kingme Danda camp - Hongu camp below Urpa (3810 m)
27 April	Hongu camp below Urpa - Hongu camp above Watelma Khola (3125 m)
28 April	Hongu camp above Watelma Khola - Hongu camp below Watelma (2895 m)
29 April	Hongu camp below Watelma Khola - Middle Hongu cave camp (2590 m)
30 April	Middle Hongu cave camp - Hongu sands tented camp (2530 m)
1 May	Hongu sands tented camp - E bank Hongu overhang (2590 m)
2 May	E bank Hongu overhang - E bank camp above Soguwa Khola (2680 m)
3 May	E bank Hongu camp above Soguwa - W bank overhang camp (2590 m)
4 May	W bank Hongu overhang camp - Rocky ravine tented camp (2590 m)
5 May	Rocky ravine tented camp - N slope mangan Danda camp (2895 m)
6 May	N slope Mangan Danda camp - Mudi Kharka (2620 m)
7 May	Mudi Kharka - middle Bung (1860 m)
8 May	middle Bung - lower Bung (1765 m)
9 May	lower Bung - Thiu, Budum Khola (2805 m)
10 May	Thiu - Salpa Pokhari (3415 m)
11 May	Salpa Pokhari - Ghot camp above Salpa Pokhari (3415 m)
12 May	Ghot camp above Salpa Pokhari - Upper Saune Khola camp (3200 m)
13 May	Upper Saune Khola camp - Chuleli (ghot) (2740 m)
14 May	Chuleli (ghot) - Dobhane, Irkhuwa Khola (1310 m)
15 May	Dobhane - Tipchaur (1035 m)

16 May	Tipchaur - Baluwa Besi, Arun (610 m)
17 May	Baluwa Besi - Khandbari (1050 m)
18-20 May	Khandbari
21 May	Khandbari - Mane Bhanjyang (1220 m)
22 May	Mane Bhanjyang - Goghuni (1950 m)
23 May	Goghuni - Mure (2075 m)
24 May	Mure - upper Num (1585 m)
25 May	upper Num - Yengdim, Kasuwa Khola (1705 m)
26 May	Yengdim - Tashigaon (2055 m)
27 May	Tashigaon - Kongma kharka camp (3535 m)
28 May	Kongma - Dobatto, Barun Khola (4040 m)
29 May	Dobatto - Pemathang Kharka (3445 m)
30 May	Pemathang Kharka - above Ripuck Kharka (3840 m)
31 May	above Ripuck Kharka - Shersong (4695 m)
1 June	Shersong - Plain above Shersong (5365 m)
2 June	Plain above Shersong - Shersong (4695 m)
3 June	Shersong - above Hillary Base Camp (5030 m)
4 June	above Hillary Base Camp - Japani Base Camp (5335 m)
5 June	Japani Base Camp - Peak 6160 m - Japani Base Camp (5335 m)
6 June	Japani Base Camp - further above Hillary Base Camp (5030 m)
7 June	further above Hillary BC - W bank Barun camp opp. Shersong (4695 m)
8 June	W bank Barun opposite Shersong - Ripuck Kharka (3885 m)
9 June	Ripuck Kharka - Zanthe cave camp (3200 m)
10 June	Zanthe - Thulo Pokhari, Kasuwa/Ishuwa watershed (4115 m)
11 June	Thulo Pokhari - Tashigaon (2055 m)
12-14 June	Tashigaon
15 June	Tashigaon - Chekshe Danda (1890 m)
16 June	Chekshe Danda - Ghari, Upper Arun (1035 m)
17 June	Ghari - Phyaksinda (670 m)
18 June	Phyaksinda - Mangmaya (1920 m)
19 June	Mangmaya - Jamire (1065 m)
20 June	Jamire - Sabhaya/Yenguwa kholas confluence (490 m)
21 June	Sabhaya/Yenguwa confluence - Chainpur (1005 m)
22 June	Chainpur - lower Nundhaki (1220 m)
23 June	lower Nundhaki - Gupha Pokhari (3035 m)
24 June	Gupha Pokhari - Basantapur (2425 m)

1996

7 October	Barabhise, Dolakha district - Simle (1150 m)
8 October	Simle - Bagaar camp (1140 m)
9 October	Bagaar camp - Dolangshe (2500 m)
10 October	Dolangshe - Tin Sang La camp (3310 m)
11 October	Tin Sang La - Peku (1800 m)
12 October	Peku - Suisang (1880 m)
13 October	Suisang - Dolang Khani (1645 m)
14 October	Dolang Khani - Chetchet (1630 m)
15 October	Chetchet - Utisey ghots (2200 m)
16 October	Utisey ghots - Kelche lodges campsite (2840 m)
17 October	Kelche - Changma Danda (3600 m)
18 October	Changma Danda - Na ghots (4165 m)
19 October	Na ghots - Chukmiya campsite (4800 m)
20-21 October	Chukmiya - W Teshi Lapcha Base Camp (4865 m)
22 October	W Teshi Lapcha Base Camp - E Teshi Lapcha Base Camp (5350 m)
23 October	E Teshi Lapcha Base Camp - Tengpo (4350 m)
24 October	Tengpo - Thame (3800 m)
25 October	Thame - Namche Bazaar (3440 m)
26-27 October	Namche Bazaar
28 October	Namche Bazaar - Phungi Thenga (3250 m)
29 October	Phungi Thenga - Deboche (3850 m)
30 October	Deboche - Pheriche (4245 m)
31 October	Pheriche - Lobuche (4930 m)
1 November	Lobuche - Kala Pattar (5545 m) - Lobuche
2 November	Lobuche - Kongma La camp (5420 m)
3 November	Kongma La camp - Chhukung (4730 m)
4 November	Chhukung - Amphu Lapcha Base Camp (5300 m)
5 November	Amphu Lapcha Base Camp - Panch Pokhari camp (5470 m)
6 November	Panch Pokhari camp - Upper Hongu overhang camp (4760 m)
7 November	Upper Hongu camp - E Mera La Base Camp (5365 m)
8 November	E Mera La Base Camp - Rocky Outcrop camp (5800 m)
9 November	Rocky Outcrop camp - Khare (5000 m)
10 November	Khare - Tangnag (4355 m)
11 November	Tangnag - Kothey ghots (4235 m) - Mosom Kharka (3275 m)
12 November	Mosom Kharka - Tashi Dingma - Taktar - Chetrabu ghots (4370 m)
13 November	Chetrabu ghots - Lukla (2790 m)