Expected Tourism Growth in the Kanchanjunga Area, Eastern Nepal Himalaya, and Its Possible Impacts to Yak Herders and Mountain Environments: Lessons from Sagarmatha (Mount Everest) National Park

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Key words: ecotourism, biodiversity, yak transhumance, soil erosion, Kanchanjunga Conservation Area, Sagarmatha (Mount Everest) National Park

I. Introduction

The Kanchanjunga (Kangchenjunga) area in the eastern part of Nepal was designated as a conservation area in 1997. Some NGOs and international NGOs (INGOs) initiated to provide contributions to nature conservation and development of this area (e.g., WWF Nepal Program, 1995; Rastogi et al., 1997). This is partly because the designation as a conservation area could lead to the increase in the number of visitors to the area.

Although such efforts by NGOs and INGOs have been attempted, academic research has been extremely limited in the area. Hokkaido University and Tribhuvan University in Nepal started scientific field study under the research exchange agreement in 1997. These two universities sent research teams to the area in 1997 and 1998 to collect basic data on mountain environments, resource use, and hazard processes, in order to establish safe ecotourism and to conserve biodiversity.

The aims of this study, within the framework of the university-university research exchange program explained above, are (1) to examine the present system of yak transhumance (seasonal movement) in the Kanchanjunga area; and (2) to discuss possible adverse impacts that would be brought by future changes in the yak transhumant system in the area. For these aims, the impacts to yak herders and mountain environments caused by the changes in the yak transhumant system due to the rapid tourism growth in Sagarmatha (Mount Everest) National Park will be examined first. Understanding of the present transhumant system is necessary for better resource use and management in the Kanchanjunga area, and hence, is necessary for establishing appropriate ecotourism and for conserving biodiversity.

II. Impacts by the tourism growth in Sagarmatha (Mount Everest) National Park

1. Rapid tourism growth and its influence to pastoral management

Sagarmatha (Mount Everest) National Park (Fig. 1), which is famous for the highest mountain on the globe, attracts many trekkers from all over the world. The area was designated as a national park in 1976.

Figure 2 shows the rapid increases in the number of trekkers to Sagarmatha National Park and

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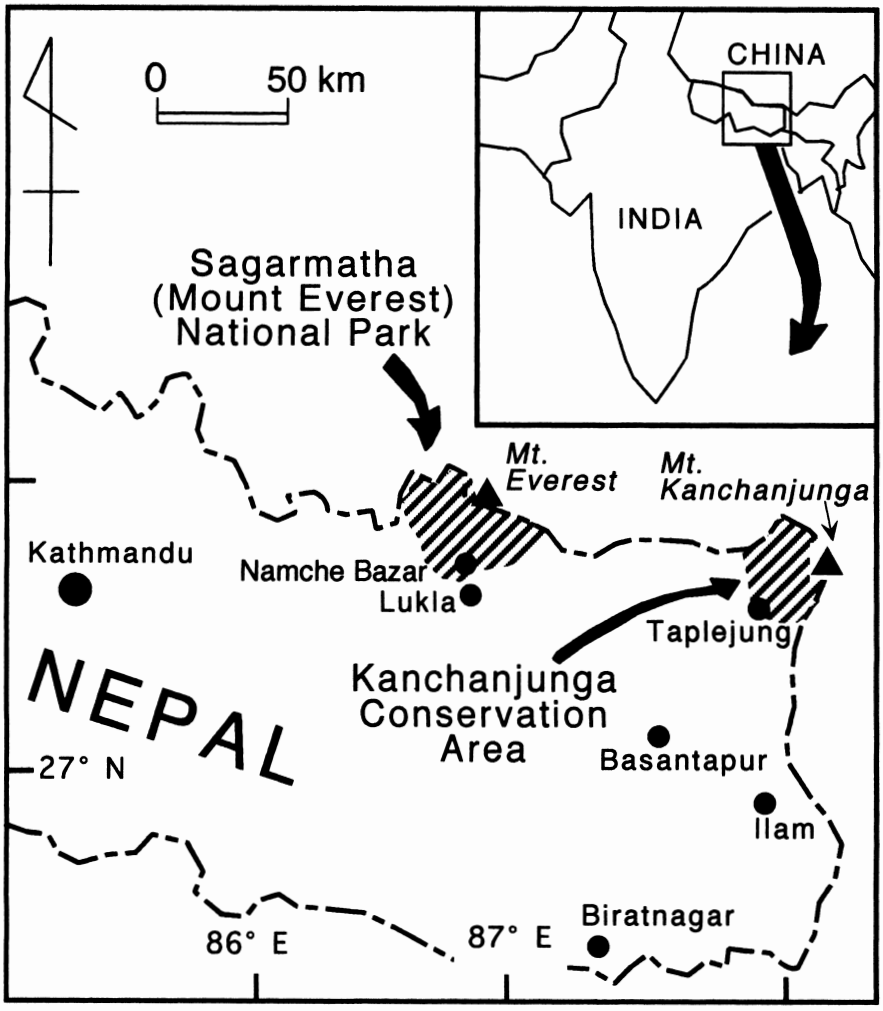

Fig. 1 Locations of Sagarmatha (Mount Everest) National Park and the Kanchanjunga Conservation Area.

in the number of lodges in the park. The annual number of foreign visitors was less than 4,000 in the late 1970s, and the number recently became more than 16,000. To provide services to these visitors, local mountain people began to increase lodges (Fig. 2). There were only seven lodges in 1973. Eighty-one lodges were scattered in the valley with some concentration in the major settlements in 1991 (Stevens, 1993), and 157 lodges were located everywhere in the valley in November 1996 (Fig. 3).

Mountain herders have kept yaks, cattle, and their hybrids in the area (e.g., Brower, 1991; Stevens, 1993). As a result of the recent growth of tourism, mountain herders have tended to increase male yaks and male hybrids (Fig. 4), which are suitable as pack animals. Carrying trekkers' baggage with pack animals is the easiest way for herders to earn cash. On the other hand, traditional female yak transhumance requires more labors and time; therefore, herders have decreased the number of female yaks (Fig. 4).

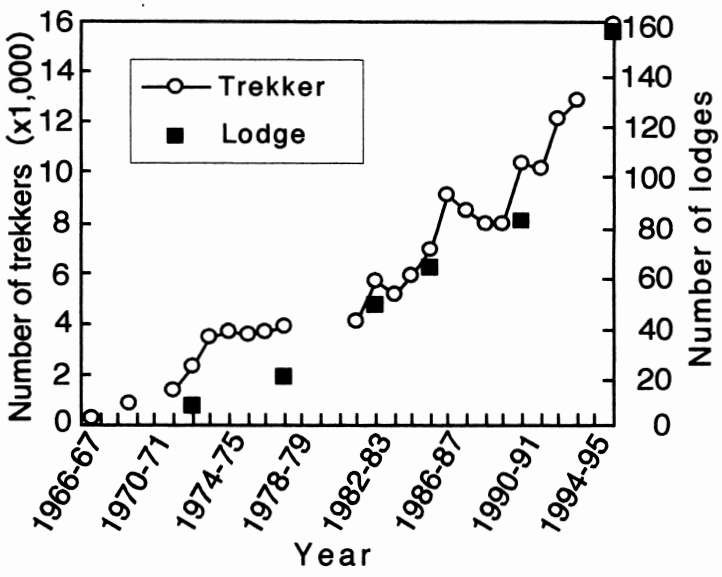

Fig. 2 The number of trekkers and lodges in Sagarmatha (Mount Everest) National Park.
Data on lodges from 1973 to 1991 were compiled from Table 30 of Stevens (1993: p. 365), those in 1996 were taken in the field, and other data were from Ministry of Tourism, Central Immigration Office, Kathmandu.

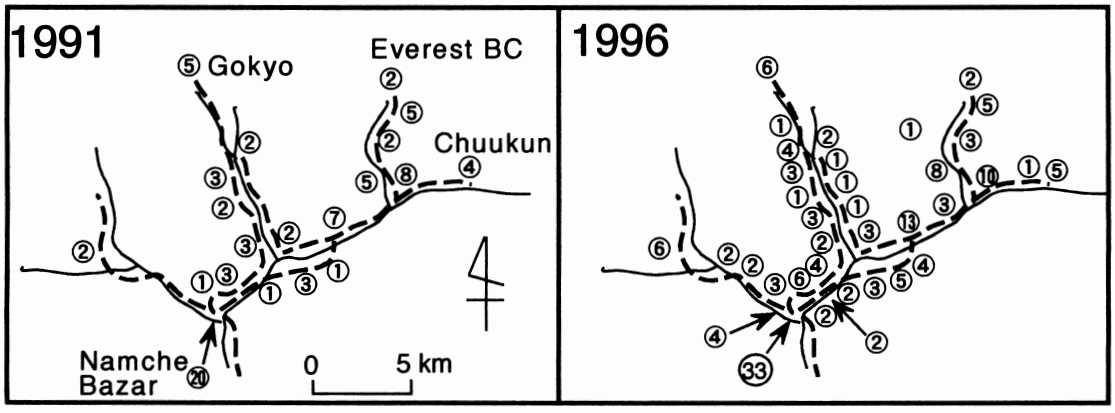

Fig. 3 Distribution of lodges with the number at site in Sagarmatha (Mount Everest) National Park in 1991 and 1996. The 1991 data were collected by Stevens (1993), and the 1996 data were collected in the field in October and November 1996.

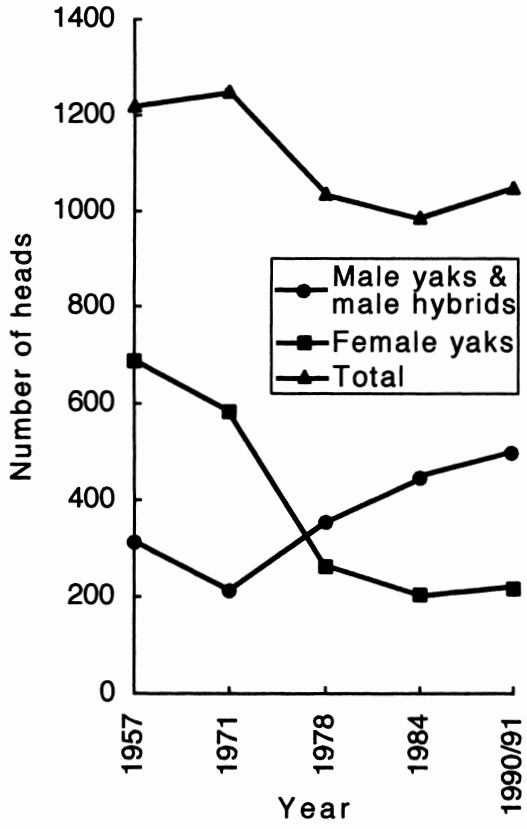

Fig. 4 The changes in the number of male yaks, male hybrids, and female yaks in the three major villages of Khumjung, Khunde, and Namche Bazar in Sagarmatha (Mount Everest) National Park. Note that male yaks and male hybrids that are used as pack animals have increased since the designation as a national park in 1976. The 1957 and 1971 data are from Fürer-Heimendorf (1975); the 1978 data from Bjønness (1979); the 1984 data from Brower (1991); and the 1990/91 data from Tsukihara (1992).

2. Adverse impacts

The changes in the proportion of male yaks, male hybrids, and female yaks (Fig. 4) have caused the overcrowding of male animals in and around the major settlements where lodges exist (Fig. 3). Soil erosion tends to occur on overgrazed slopes as observed in Langtang National Park, central Nepal (Watanabe, 1994). Grazing slopes around the major settlements in Sagarmatha National Park are already overgrazed (Fig. 5), so that soil erosion is now evident on grazing slopes around the major settlements. Sugawara (1998) demonstrated that 0.3-11.3 percent of grazing land has been eroded resulting in the loss of fodder grasses.

Most soil erosion scars remain bare ground. Overgrazing locally observed in and around the major settlements (Fig. 5) leads to the shortage in winter hay fodder as well as the shortage in summer grass. As a result, certain numbers of livestock have been killed: the manager at the "Yak Farm" in Syanboche near Namche Bazar exemplified that some 200 yaks were killed in the snowy spring of 1995 because of the shortage in hay fodder. Stevens (1993) also describes that villagers feel the amount and quality of hay made from wild grasses have both declined. He also states that in the 1980s some Namche Bazar families began sending stock to the adjacent area in the late spring because the grass had become so poor near Namche Bazar. This had not been necessary in the 1970s. If the soil erosion on grazing slopes occurs more extensively, permanent shortage in fodder grasses could affect the livestock management.

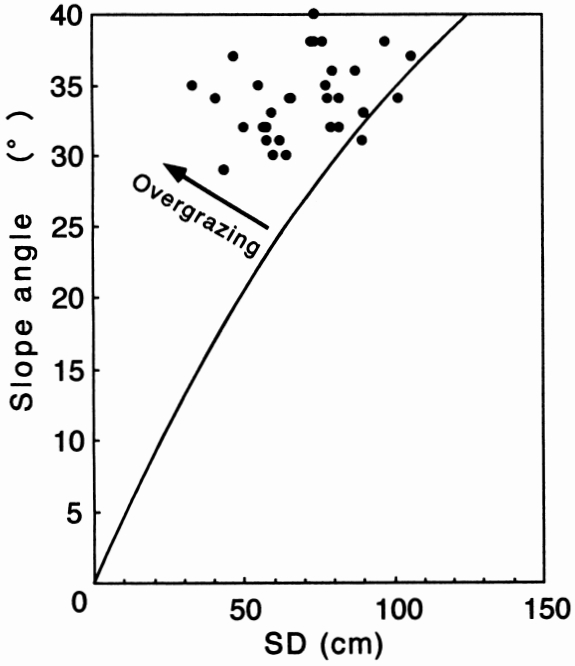

Fig. 5 SD (slope distance between grazing steps) vs. slope angle for the yak grazing steps observed in Sagarmatha (Mount Everest) National Park. The line shows the optimum level of the use of fodder grasses on the slope, which was drawn by the model of Howard and Higgins (1987).

III. Present system of yak transhumance in the Kanchanjunga Conservation Area

1. Background

The Kanchanjunga area had been closed to foreign visitors except mountain expedition climbers with permit until 1987. Lodges and campsites are insufficient and trails for trekkers are not developed well (Gautam, 1997). The number of foreign visitors (trekkers) was only 87 in 1988 (Fig. 6). The number has ranged from 436 (in 1992) to 667 (in 1995) since 1989, indicating no rapid

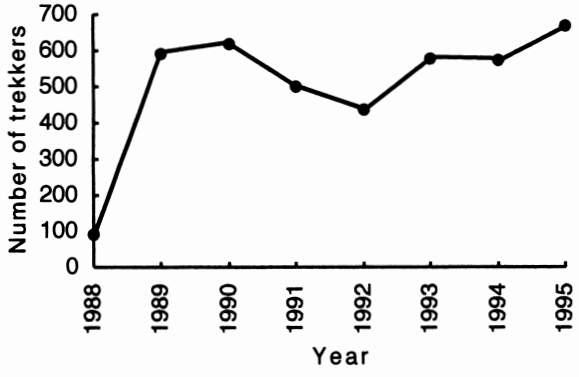

Fig. 6 The number of trekkers to the Kanchanjunga area. Data source: Ministry of Tourism, Central Immigration Office, Kathmandu.

increase in the number in the first half of the 1990s. Mountain people, however, began to construct lodges (Photo 1). It is expected that the number will increase rapidly after infrastructure and access from Kathmandu will be improved, and after capacities that trekking agencies in Kathmandu can handle will become large.

Photo 1 An example showing a lodge under construction in Lhonak (4,750 m). (28 September 1997)

2. Present system of yak transhumance

There are some brief observations and reports on the yak transhumance in the Kanchanjunga area (Wegge, 1991; Carpenter et al., 1994; WWF Nepal Program, 1995; Yonzon, 1996). WWF Nepal Program (1995) indicated that nine kharkas[1)] ranging from Gunsa (Ghunsa) to Pangpema Base Camp are managed by the residents of Gunsa and their relatives. However, even basic data such as the number of yaks and the locations of kharkas were not available.

Sadakane (1998), one of our team members, examined the approximate number of yaks, cattle, and hybrids for the first time, and we succeeded her work. Table 1 summarizes the number by the four major settlements. Herders housing at high altitudes keep more female yaks and less female

Table 1 The number of yaks, hybrids, and cattle in the Gunsa Khola (river) basin in the middle of October 1998.
Note that the percentage of the females is higher than that of the males.
Interviewed in October and November 1998.

Settlement	Yak		Hybrid		Cattle	
(altitude)	male	female	male	female	male	female
Gunsa (3,420m)	27	136-147	50-52	57	5	1
Phole (3,200m)	31	95-100	40	41	4	0
Gyabla (2,800m)	9-10	146-255*	18	70-80	5	0
Amcilesa (2,480m)	2	0	6-7	97-98	5	29
Total	69-70	377-502	114-117	265-276	19	30

*Including 18 heads which are entrusted by Gunsa herders.

hybrids, whereas herders housing at low altitudes keep more female hybrids. The herders in this area graze female yaks and female hybrids by the transhumant system. They graze parts of male yaks and cattle, but the number of such stock is limited (Table 1). The livestock farming in this area, therefore, is characterized by the transhumance of female yaks and female hybrids.

The proportion of pack stock (male yaks and male hybrids) to the total livestock is calculated as 18.0-21.4 percent, and that of transhumanced stock (female yaks and female hybrids) is 63.3-89.0 percent. In Sagarmatha (Mount Everest) National Park, the proportion of pack stock to the total is 47.3 percent, and that of transhumanced stock is 20.5 percent (based on the data in 1990/91). This means that the present pastoralism in the Kanchanjunga area is not yet disturbed by tourism unlike in Sagarmatha (Mount Everest) National Park (Fig. 4).

Sadakane (1998) interviewed about the names of kharkas to local people in 1997. She recognized several kharkas between Gunsa and Lhonak without identifying their exact locations. Figure 7 shows the locations of the individual kharkas in the Gunsa Khola (river) basin in 1998. Livestock is kept by 20 households between Amcilesa (Amjilessa, 2,480 m) and Lhonak (4,750 m). When herders stay in Lhonak, their livestock is grazed on slopes up to about 5,200 m.

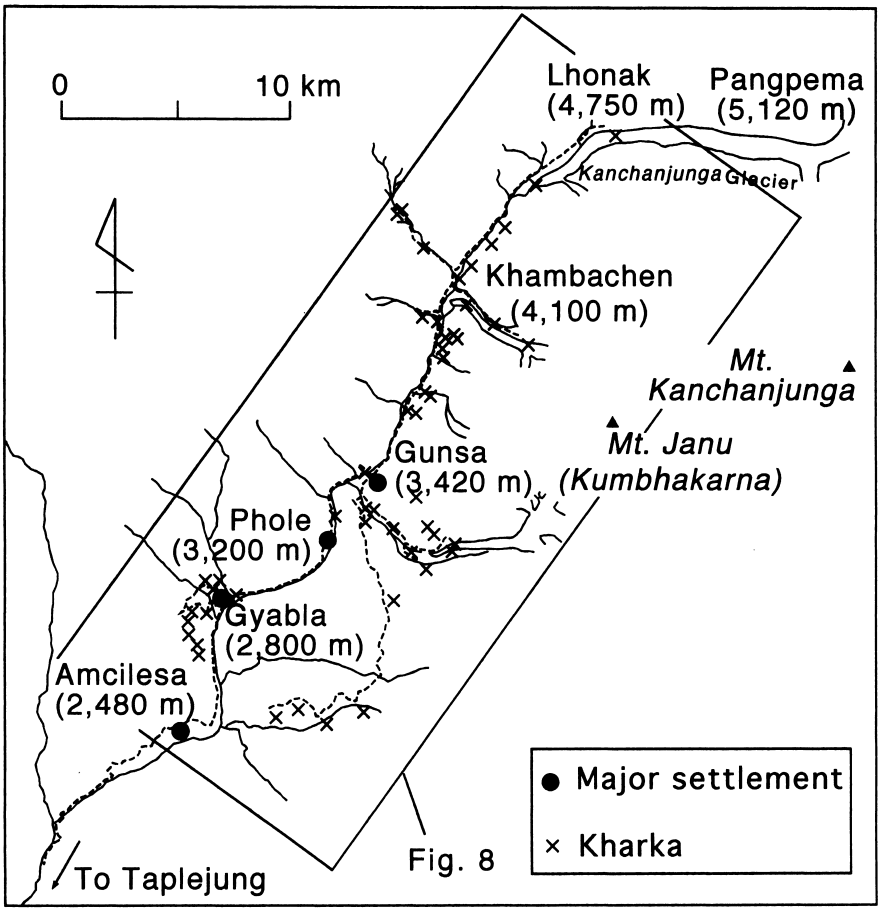

Fig. 7 Distribution of the major settlements and kharkas in the Gunsa Khola (river) basin. Names of the settlements and kharkas may be expressed in different spelling by scientists and by available maps.

The spacial transhumant patterns of the households are grouped into 13, which are labelled with Y1-Y9 and H1-H4. Group Y9 grazes yaks in the adjacent area throughout the year, so it is excluded from Fig. 8. Female yaks and female hybrids are grazed separately in this area (Sadakane, 1998). Groups Y1-Y9 mainly graze female yaks, whereas groups H1-H4 mainly graze female hybrids.

Figure 8-B shows the altitudinal transhumant patterns. The general characteristics in the spacial (Fig. 8-A) and altitudinal (Fig. 8-B) patterns are summarized as: (1) relatively concentrated locations to stay with each other in summer; and (2) broad and scattered distributions in winter. The herders move relatively freely, which agrees with the observation by Yonzon (1996).

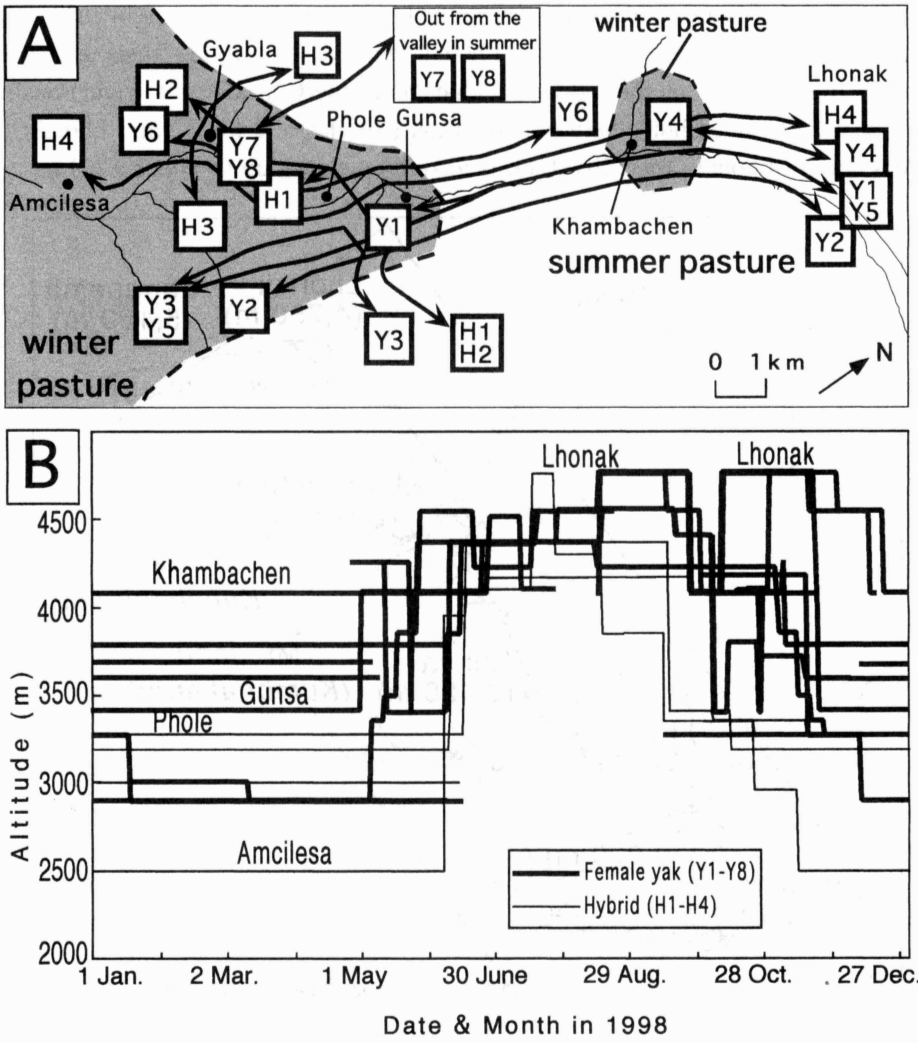

Fig. 8 The spacial distribution of winter and summer grazing areas (A), and the altitudinal patterns (B) in the yak transhumance practiced during the period from autumn, 1997 to autumn, 1998 in the Gunsa Khola (river) basin, Kanchanjunga. Mapped by interviews and field observations in October and November 1998. Groups Y1-Y8 mainly graze female yaks and groups H1-H4 mainly graze female hybrids.

IV. Possible adverse impacts

The Kanchanjunga herders keep many female yaks and female hybrids (Table 1), which indicates that the livestock farming is practiced for milk products so far. On the other hand, they already began to use their male yaks and male hybrids as pack animals (Photo 2). Moreover, eight families had already switched their job from livestock farming to trekking service between 1995 and 1998. Even a trekking tourism generates more income, herders in Langtang National Park, central Nepal Himalaya, have not let their male yaks and male hybrids carry trekkers' baggage (Watanabe, 1994, 1997). This is because local people can obtain cash by selling milk to a cheese factory in the valley. Herders in Sagarmatha National Park, on the other hand, chose to join into the porterage service using their male yaks and male hybrids. Photo 2 suggests that herders in the Kanchanjunga area may follow the scenario in Sagarmatha National Park rather than the one in Langtang National Park.

Photo 2 Male yaks and male hybrids are already used as pack animals in the Kanchanjunga area. In the upper area of the Gunsa Khola (4 October 1997).

Tourism growth would provide both positive and negative impacts to mountain people. Positive impacts are, for example, creating job opportunities and generating more income. Negative impacts include bringing waste and sanitation problems, accelerating deforestation, and eroding grazing slopes and decreasing fodder grasses. Another negative impact is decreasing the value of yaks themselves as a part of mountain landscape or as a part of tourism attraction if tourism destroys the present transhumant system. The following pages focus upon the impacts to soil erosion on grazing slopes and resulting decrease in fodder grasses.

The impacts of grazing in the Kanchanjunga area are not well understood and available reports appear to be contradictory (Yonzon, 1996). Carpenter et al. (1994) stated that the alpine meadows are under tremendous grazing pressure, whereas Wegge (1991) suggested that the yaks' number was not in excess and that vegetation did not show grazing pressure. Judging from the present

situations of the occurrence of soil erosion on grazing slopes, the present transhumance seems not to deteriorate mountain environments so far.

As mentioned above, herders already began to use male yaks and male hybrids as pack animals when possible (Photo 2). If male yaks and male hybrids will be more extensively used as pack animals at high altitudes, such as in Sagarmatha National Park, the present transhumant system in the Gunsa Khola basin would be greatly disturbed.

Such changes in the transhumant system may result in the soil erosion around the settlements and trails. Once soil erosion is developed on grazing slopes around the settlements and trails, it could result in the decrease in the vegetation cover. As described above, in Sagarmatha National Park, late snow killed many yaks. Similarly, in the Kanchanjunga area, Yonzon (1996) describes that Dawa Chind, a yak owner from Gunsa, lost 60 yaks in November 1995 by a snowstorm. Dawa Chind estimates that at least 160 yaks were killed in and above Gunsa at that time. This implies that the combination of the increase in eroded grazing slopes and heavy snow could cause the severe shortage in grasses available to yaks in the Kanchanjunga area[2], especially around Khambachen (Fig. 8-A).

Moreover, there are certain populations of large wild herbivores, such as blue sheep (*Pseudois nayaur*). Nine herds with an average size of 22 were observed during the two-month field survey in 1998 in the Gunsa Khola basin alone. The habitat of blue sheep corresponds to the grazing land of yaks above about 4,200 m, so that the shortage in edible grasses might also affect the blue sheep population in future. The changes in the number of blue sheep may influence in endangered animals such as snow leopard (*Panthera uncia*). Diet overlaps and possibilities in competition between yaks and blue sheep in summer are indicated by Yonzon (1996), although detailed studies about their relationships are necessary.

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Notes

1) A *kharka* is a seasonal settlement or camp composed of herding huts (*goth*) and space for keeping livestock. Some families have stone-walled huts, and the others use black Tibetan tents (*ri bu*).

2) Yonzon (1996) also states that the 1995 snowstorm had a significant impact on the blue sheep population in the area. In the Khambachen area, more than 60 blue sheep were killed by the snowstorm.

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東ネパール，カンチェンジュンガ地域におけるツーリズムの発達に伴うヤクの移牧と山岳環境への影響に関する考察

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キーワード：エコツーリズム，生物多様性，ヤクの移牧，土壌侵食，カンチェンジュンガ自然保全地域，サガルマータ（エベレスト山）国立公園

東ネパールのカンチェンジュンガ・ヒマールにおいて，将来，予想されるツーリズムの発達が，山岳地域のヤクの移牧体系と山岳環境に与えるであろう影響を予測，考察した。

まず，ツーリズムがすでに発達している東ネパールのサガルマータ（エベレスト山）国立公園において，ヤクの移牧体系にどのような変化が生じているのかを明らかにした。サガルマータ(エベレスト山)国立公園には，年間16,000人ほどのトレッカーがやってくるが，これらのトレッカーの荷物を運ぶためのオスのヤクとオスの交配種（ヤクとウシ）の数が増え（全体の47.3%），一方で乳製品を作るためのメスのヤクの数が減少した（全体の20.5%）。すなわちサガルマータ（エベレスト山）国立公園では，限られた餌資源を有効利用してきた従来のヤクの移牧体系が，ツーリズムによって破壊されたことになる。その結果，集落やトレイルの周辺の斜面では，土壌侵食が生じて餌となる草が減少した。

一方，カンチェンジュンガ地域は，1987年になってはじめて一般の外国人に入域が許可されるようになり，1997年に自然保全地域に指定された地域である。年間のトレッカー数は700人に満たないが，この地域が世界で3番目に高いピークであるカンチェンジュンガ山や，ジャヌーといった世界的に有名な山やまを含むことから，首都カトマンズからのアクセスや基盤整備が進めば，トレッカー数は急速に増加すると考えられる。

この地域の主要な谷であるグンサ谷では，ヤクの移牧が行われているが，これまでヤクの数や移牧ルートなどの基礎的なデータはほとんど収集されてこなかった。そこで，聞き取りと現地観察によって，ヤクの数と移牧の時空間パターンを明らかにした。この地域では，オスのヤクとオスの交配種がウシ属家畜全体の18.0-21.4%にすぎず，移牧の主役であるメスのヤクとメスの交配種が全体の63.3-89.0%を占めている。すなわち現時点では，カンチェンジュンガ地域では，ヤクの移牧はツーリズムの影響をほとんど受けていない。

しかしながら，オスのヤクやオスの交配種は，すでにトレッカーの荷物運びに利用されはじめており，今後，荷物運びに使われるオスのヤクとオスの交配種が増えて，集落やトレイルの周辺に集中するようになると，放牧斜面上で土壌侵食が発生しはじめる可能性がある。そうなると餌資源が減少し，ヤクや，さらにおよそ4,200m 以上でヤクの放牧地と重複して生育するブルーシープ，ならびにブルーシープを餌とするスノーレパード（絶滅危惧種）の生存にも影響を与えかねない。したがって，エコツーリズムの導入と生物多様性の保全が期待されているこの地域では，ツーリズムの発達とヤクの移牧体系の変化，ならびにヤクの移牧と大型野生動物の行動の関係に関する調査が重要であると考えられる。

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