

# Medicinal Plants within the Context of Pastoral Life in the Village of Pungmo, Dolpo, Nepal



The image is a high-angle, wide-area photograph showing a vast, flat landscape. The terrain is a mix of light and dark patches, suggesting different types of vegetation or soil. There are several distinct, roughly rectangular or irregular shapes scattered across the landscape, which appear to be agricultural fields or pastures. The overall color palette is muted, with various shades of beige, tan, and light brown. The lighting is even, and there are no strong shadows, indicating a clear, bright day. The horizon is not clearly visible, but the fields extend to the edges of the frame.

**Cover Photo:** Agricultural fields at 4100m within the Kunasa pasture area  
*(from the presentation by Yildiz Aumeeruddy-Thomas)*

# Medicinal Plants within the Context of Pastoral Life in the Village of Pungmo, Dolpo, Nepal

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## Background

### *Geography and culture*

Dolpo is a cultural area in Nepal inhabited by the Dolpo-pa<sup>4</sup> (Jest 1975, Snellgrove 1992) in what is today the administrative district of Dolpa, bordering the Tibet Autonomous Region to the north, Mustang District to the east, and Jumla and Mugu Districts to the west. Part of Dolpo has been incorporated into Shey Phoksundo National Park, established in 1984 to conserve a unique trans-Himalayan ecology and biodiversity. The largest national park in Nepal, Shey Phoksundo (SPNP) covers an area of 3,555 sq.km, with a buffer zone covering a further 1,329 sq.km. The park is inhabited by about 3,000 people; some 10,000 people live in the peripheral buffer zone area.

Dolpo has a strong Tibetan cultural influence, with most of its inhabitants, especially in the northern part, tracing their lineages to Tibet (Jest 1975, Snellgrove 1992, Lama et al. 2001). Upper Dolpo is culturally Tibetan, with Bonpo<sup>5</sup> and Buddhist followers. Lower Dolpo, located to the south of Phoksundo Lake, has villages that are culturally Bonpo Tibetan, such as Pungmo and Rigmo, and in the southwest villages that are a mix of Bonpo and Hindu, including Kaigaon, Hurikot, Pahada, and Tripurakot.

The Kanjiroba range, which culminates at 6883m, crosses the park transversely above Lake Phoksundo, the second largest and the deepest lake in Nepal, separating the area into southern and northern portions. The southern part, Lower Dolpo, is predominantly covered with temperate, sub-alpine, and alpine vegetation and has an annual precipitation of about 1,500 mm. The northern part is in the rain shadow of the Kanjiroba and Dhaulagiri ranges, and thus is a treeless, trans-Himalayan, arid area with an annual precipitation of less than 500 mm.

### *Changes in Dolpo lifestyle: external factors*

The political upheaval in the Tibetan Plateau, and the subsequent closure of the Tibetan border in 1959, have had major effects upon the local economy and livelihoods of all the northern border districts of Nepal, including Dolpa, where the Dolpo-pa had traditional rights to graze their cattle on the Tibetan plateau (Rai and

<sup>4</sup> 'Pa' means inhabitant. There is a very strong sense in Dolpo of belonging to a different cultural area than those of Jumla, a culturally Indian district located to the west; and Mustang, a culturally Tibetan district located to the east.

<sup>5</sup> Bonpo is the ancient religion of Tibet; it almost disappeared after Buddhism expanded in the country. Bonpo is now assimilated into Buddhism and has many common features. Very few pockets of Bonpo culture still exist. Dolpo is one of the rare Bonpo cultural areas remaining today.

Thapa 1993, Richard and MacLeod 1994, McKnight 1997, Bauer 1999). Subsequently, the Dolpo-pa have brought their herds to graze in pastures in Lower Dolpo (Kaigaon and Rimi) and in the neighbouring districts of Jumla and Mugu.

The establishment of Shey Phoksundo National Park in 1984 has affected the livelihoods of the communities both inside the park and in the buffer zone. The major aspects of park management that affect local livelihood systems are as follow.

- The buffer zone areas demarcated inside the park are limited to the villages and surrounding agricultural land and do not include the pastures and forests. Therefore, local communities lack formal control over these areas and are required to pay royalties to the park, particularly for the use of timber.
- People living inside the park are granted traditional use rights of access to resources such as pastures, including for medicinal plant collection exclusively for livelihood purposes.
- Collection of any resources inside the park for commercial use is strictly forbidden.

Another major event in Dolpo's history was the opening of an airstrip about 20 years ago in Juphal, two hours' walk from the District Headquarters at Dunai. There is now an established trade in medicinal plants, amounting to 40-60 tonnes of dried plants each year. There is also increased movement of people to and from Dolpo.

Lower Dolpo was opened to foreigners in 1989; Upper Dolpo was opened in 1992 to trekkers for a high fee. The influx of tourists has resulted in the opening of small, local tea-shops and lodges along the major trekking route in Lower Dolpo, and has provided local households with additional income. Another major change has been the opening of local schools – such as Crystal Mountain, Taprizia, and Shelri Himal – with the support of international non-government organisations (INGOs). These schools focus on traditional, in addition to modern, curricula.

The initiation of integrated conservation and development work by national and international organisations has also brought about certain changes. These include introduction of literacy classes and savings and credit schemes for women, stipends for girl students, promotion of solar lighting and fuel-efficient stoves, and strengthening of traditional healthcare.

Trade in a parasitic fungus, 'yarcha gunbu' (*Cordyceps sinensis*), has increased in Dolpo, as has trade in medicinal plants. Yarcha gunbu (literally summer-grass winter-insect) has brought additional income to local households. Each year, traders from places such as Kathmandu and Lhasa gather in the Dho valley to purchase yarcha gunbu. With this additional income, increasing numbers of people travel to Kathmandu for the winter.

Monks educated in monasteries in India and Kathmandu have been able to establish centres abroad and have been able to raise funds for monastery (gomba) renovation and community service in Dolpo, often with the help of INGOs. In July 2000, the Dolpo Saldang Shey Service Centre organised a major cultural and religious programme at Shey Monastery to celebrate their 12-year festival. Thousands of pilgrims, tourists, and traders gathered for the week-long event marked by traditional song and dance, religious empowerments, and circumambulation of the Shelri mountain.

## ***Pastoralism in Dolpo***

Studies conducted on pastoralism in Dolpo all confirm that the economy of Dolpo agro-pastoralists is an intricate system whereby agriculture, pastoralism, and trans-Himalayan trade constitute an integrated management system and way of life based on social dynamics, including communal regulatory systems (Jest 1975, Richard and MacLeod 1994, McVeigh 1994, Bauer 1999). Pastoralism in Dolpo dates back at least 1,000 years (Miller 1987). Indeed, Dolpo and the upper Kali Gandaki, including Lo, are known to have been colonised in the seventh and eighth centuries by people from the ancient kingdom of Zhangzhung, located in Western Tibet (Jest 1975, Kind 1999).

As a result of the very steep topography, arable agricultural lands are very restricted and are limited to relatively flat valley bottoms and gentle slopes; lands around villages are often terraced. Some agricultural fields are found as high as 4100m, especially in Kunasa and Upper Dolpo. The use of manure and compost is an important practice of the Dolpo-pa and maintains soil fertility; this is one of the many contributions of livestock to the local livelihood system (Richard and MacLeod 1994). Agriculture, however, only provides three or four months' supply of food, and reliance on pastoralism and trans-Himalayan trade is high. Pastoralism contributes to local livelihoods by providing milk, butter, yoghurt, wool, and animal protein (although animals are usually not killed for their meat in Dolpo but are only used if they die accidentally). Animals are also used for draught power. Finally, yaks and sometimes goats contribute to trans-Himalayan trade, while horses are used for travel. The trading system, an exchange of products from the Tibetan plateau (salt, wool, milk products, and some cereals from Dolpo) with grains from the lower valleys, is essential for the economy of the Dolpo agro-pastoralists. Livestock include yak, 'dzo' cross breeds of yak and cattle, cattle (mostly in the southern villages located outside the park), goats, and horses.

Patterns of pasture management in Dolpo, based on studies conducted in Rigmo (Richard and MacLeod 1994), Saldang (McVeigh 1994), and Pungmo (McKnight 1997, Parajuli 1998), and the work conducted by Bauer in Upper Dolpo (1999), clearly indicate that Dolpo pastoralists have a flexible approach to rangeland management, which maximises the benefits and mitigates the effects of concentrated grazing. Rotational grazing, monitoring of plant and animal performance (presence or absence of toxic plants, height and size of fodder grasses, dung size, milk production and quality), and deferred grazing are current practices. In the Himalayas, it is said that the size of yak herds per household is limited by labour constraints to 25-30 (Miller 1987). McVeigh (1994), on the basis of five households interviewed, notes that some families may have up to 45 yak, with a maximum of 90 animals, including yak, sheep, goats, dzo, cattle, and horses. The Dolpo-pas' strategy to maximise benefits is to graze different types of animals with different biologies and aptitudes for altitude, and preferences for different grasses, in different ecological niches. This ensures maximum benefit with minimum impact on the environment (Bauer 1999).

Richard and MacLeod (1994) argue, in the case of Rigmo, that lack of winter feed is a limiting factor for livestock numbers and that current stocking rate does not exceed the carrying capacity of Rigmo ranges. According to Bauer (1999), Dolpo herders value the productivity, nutritional value, and palatability of plants rather than species diversity as such, and make decisions on where to graze their animals based on ethno-ecological knowledge of the values of different areas for livestock productivity (Bauer 1999).

McKnight (1997) describes the logic behind traditional pasture management in Pungmo and the ways in which the local people take advantage of seasonal differences by keeping houses and fields in settlements at different altitudes, and through rotational grazing of livestock in different pastures, such as Kunasa and Pungphu. Decisions on the movement of animals from one pasture to another are made by groups upon the advice of Lamas and are determined by quality of grass or other factors, such as weather or biting insects. In October, livestock are brought back to the village from Kunasa and Pungphu. In this case, Kunasa and Pungphu refer to a general area as well as to specific pastures. Although only about one-third of the 30 households graze their livestock in Pungphu, all of the households jointly own houses and fields in Kunasa settlement. In 1997, the wealthiest household owned 14 male yaks and two horses (McKnight 1997). More recently, owing to the high returns from the yarcha gunbu trade, the number of horses and yak has increased.

Dynamic and semi-arid ecosystems such as Dolpo require flexibility in herd size and movement to take advantage of varying forage production due to erratic rainfall (Miller 1993 as cited by McKnight 1997). Opportunistic strategies, such as adjusting herd sizes according to the year's forage production, have long been used by herders to adapt to situations like those in Dolpo (McKnight 1997). A holistic approach to rangeland management, integrated with forest use and agriculture and based on local herders' knowledge about local vegetation and dietary needs and habits of livestock, is crucial for the effective management of pasture.

In addition to their importance as watersheds, habitat for plants and wildlife, forage for livestock and wildlife, and areas of recreation for tourists (McKnight 1997), remote rangelands are important as 'ney', or places of pilgrimage, for local communities (Ghimire et al 1999, 2000). The pasture of Kunasa is considered a 'beyul' (sacred hidden land) by the Bonpo communities of Phoksundo.

A number of relevant studies have been made of different forms of indigenous resource management and their effectiveness, especially in the case of forest and pasture resources. However, research efforts highlighting the coexistence and relation of medicinal plants and pasture resources, and their corresponding management, are lacking; as is research on how people relate to medicinal plants and other pasture resources within social and cultural contexts.

### ***Medicinal plants in Dolpo***

Medicinal plants in Dolpo are crucial for both human and animal health. Some information on the importance of medicinal plants for health care in Dolpo has been generated by different studies (Jest 1975, Gurung et al. 1996, Bauer 1999). Since 1997, the WWF-Nepal People and Plants project has developed a systematic study of the medicinal plants of Dolpo, their roles in the local health system, and the status of the 'amchi' profession (traditional Tibetan doctor), aimed at supporting the conservation of medicinal plants in Dolpo and improving public health. The case study developed in this paper is the result of investigations by different researchers working within this programme over the last five years. These investigations are compiled in different reports (Shrestha et al 1998, Parajuli 1998, Ghimire et al. 1999, 2000, 2001) and in a recently published book entitled *Medicinal Plants of Dolpo, Amchis' Knowledge and Conservation* (Lama et al. 2001). The research methodology included methods used in applied ethno-botany (Martin 1995, Cunningham 2001), social and anthropological techniques such as participant observation, standard botanical and ecology surveys,

and participatory rural appraisal (PRA), including drawing of resource use maps and rapid vulnerability assessments (Lama et al. 2001).

Medicinal plant trade is a relatively recent activity in Dolpo. Although trade of small quantities of medicinal plants is a secular activity throughout Nepal and the Himalayas (Dobremez 1976, Edwards 1996, Olsen 1997, 1998), the expansion of this trade is due to the large expansion of the Ayurvedic, Siddha, Unani, Chinese, and Tibetan traditional medical systems throughout the region; as well as the worldwide trend for phytotherapy and natural products. The opening of the airstrip in Juphal, Dolpa, and of an airstrip in the neighbouring district of Jumla were accompanied by an increase in the trade of medicinal plants in Dolpa. Collection of medicinal plants for commercial use is strictly forbidden inside the park, but small quantities for health care can be collected. Dolpo amchi, five of whom reside in Lower Dolpo in Rigmo, Pungmo, and Kaigaon, and 45 of whom live in Upper Dolpo, have identified more than 400 species of medicinal plants that are currently used in their pharmacopoeia (Ghimire et al. 2001, Lama et al. 2001). Regardless of restrictions, most households in Dolpo collect yarcha gunbu from pastures above 4,500m for trade. In the southern buffer zone area of the park, very large quantities of some 20 species of medicinal plants are being collected, and there are many signs of over-harvesting (Ghimire et al. 2000, 2001).

## **Kunasa: a high pasture of Pungmo**

### *The settlement and life in Pungmo*

Pungmo is one of the major settlements of Phoksundo Village Development Committee (VDC), located in the upper part of Lower Dolpo. The other major villages in Phoksundo VDC are Rigmo and Rainchi. Pungmo has a total of 30 households, and 159 inhabitants (73 males and 86 females). Pungmo and Rigmo are major Bonpo areas in Lower Dolpo.

Pungmo's customary lands comprise two major watersheds (Figure 1), Pungphu watershed extending north of the village, and Kunasa watershed northwest of the village. Although not formally owned, such territories are delimited by landmarks recognised by all inhabitants of Pungmo and neighbouring villages. Two smaller settlements, Phu Gumba (three households and one monastery) and Punikha (approximately five households), are located high above the river-banks of the Kunarong River.

While the people in most villages of Dolpo migrate to settlements in the south during winter, the people of Pungmo move up-valley to the settlement of Koiru between mid-February and mid-April, after the Tibetan New Year (Figure 1). There, they take advantage of longer sunshine and good forage availability for their livestock; they return to Pungmo in time to plant crops. Table 1 shows the working calendar of Pungmo inhabitants, especially women. Men are primarily responsible for ploughing, harvesting, and threshing. During the summer much of their time is spent in trans-Himalayan trade. Young men who do not accompany the trade caravans often accompany women in the high pastures.

During the winter months, if there is heavy snowfall or insufficient forage, animals are kept on the ground floor of their owners' houses and are fed with hay and porridge made of flour, grain husks, water, salt, and used tea leaves. In mid-April, the villagers

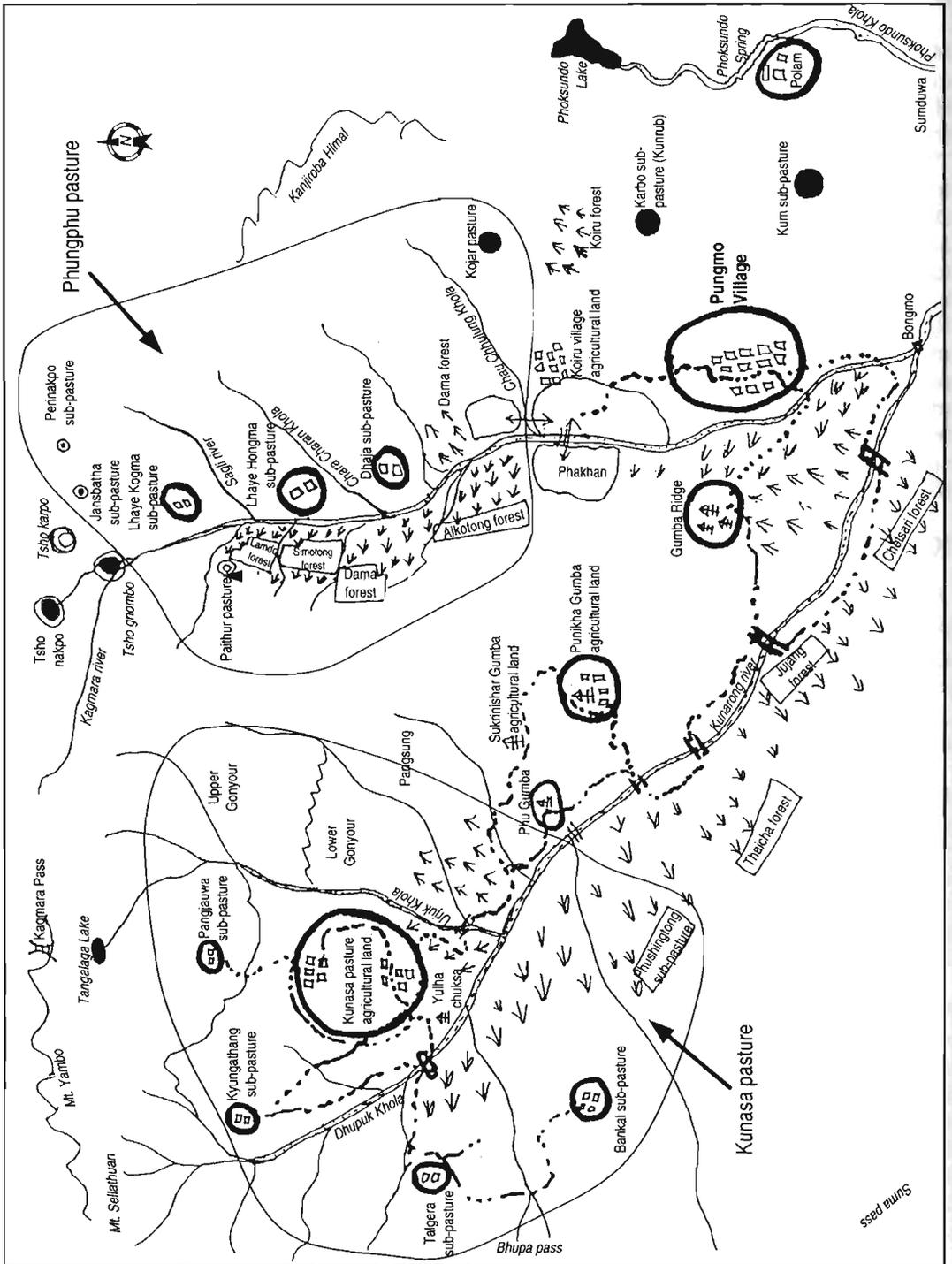


Figure 1: Pungmo's customary lands

**Table 1: Working calendar of Pungmo women**

Area & activities	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April
Ag. & others <u>Kunasa</u>	Plant wheat, barley, and potato	Weed and weave				Collect 'gains' (snow grass), harvest buck-wheat, wheat, mustard, barley, potato	Thresh barley, wheat, buckwheat	Weave				
Herding <u>Kunasa</u>						One woman from each household goes to Kunasa with the livestock and comes back to Pungmo in mid-November. Major activities include accompanying livestock in the different sub-pasture units, milking, making butter and cheese, looking for fuelwood, collecting medicinal plants for the amchis, cultivating fields, and caring for the house and children.						
Herding <u>Koiru</u>									One woman from each household goes to Koiru with the livestock.		Dung is cleaned from the stalls and brought to the fields. After Losar is celebrated, the community moves to Koiru.	Move back to Pungmo to plant fields
Ag. & others <u>Koiru</u>	Plant wheat					Harvest	Thresh					
Ag., fodder, & others <u>Pungmo</u>		Plant buck-wheat, wheat	Weed	Weave & collect fodder grass	Collect Pungmo and nearby forests							

move back to Pungmo to plant their crops. Male yaks are kept in Koiru to graze, while other animals are brought to graze in and around Pungmo. The male yaks are grazed in Pungphu until it is time for the trans-Himalayan barter trade in late June. In early June, yak, 'dri', 'dzomo' (female yaks and yak-cattle hybrids), and 'dzo' (male hybrids) are taken to high-altitude pastures in Kunasa and Pungphu settlements, where they are grazed for the entire summer, thereby enabling the low-altitude pastures near the village to regenerate (McKnight 1997, Parajuli 1998, Ghimire et al. 1999).

Kunasa, including Gumba and Punikha, is the major pasture area of Pungmo. Twenty-eight households in Pungmo rear livestock; of these, only five households take their livestock to the Pungphu watershed, while the remaining 23 take their yaks and yak cross-breeds to Kunasa. A total of 206 yaks graze in Kunasa.

### ***History, socio-cultural dimensions, and management system***

#### **The founding father in search of a hidden valley**

Elements of oral history date the foundation of Pungmo to about 10 generations back (approximately 300 years ago), with the arrival in the area of Tretton Sikyal Sambo. Whether he was the first person to arrive in the area is not quite clear, but the story says that the first person who arrived in the area was looking for a place for religious retreat. He arrived in Kunasa, a high valley tucked up in the mountains, and reached a large rock quite centrally located in the overall glacial moraine landscape. He was carrying a sacred dagger; he hit the rock, and a miracle spring started flowing out. This place is called Lama Tchumik, and once a year, pilgrims from Pungmo, Rigmo, Rainchi, and Dho Tarap converge here for a major religious ceremony.

It is thought that the neighbouring village of Rigmo was established two centuries ago (Richard and MacLeod 1994). Kunasa was certainly the first pasture area used by the Pungmo people, based on the local belief that the area was first colonised by Lamas for religious reasons and that these Lamas were accompanied by a few families<sup>6</sup>.

There are signs indicating that Kunasa has a long history.

- There are many monasteries located along the route to Kunasa, namely Yungdrung Chhungmo, Tshelling, Tshekhching Rapkaling, Punikha, Timgang, Salahot, Sugrinishar, and Saikhangpalgi. Some of these monasteries are privately owned by individual families, while others are communal monasteries.
- Retreat caves are carved out of the morainal depositional cliffs bordering Kunasa. These caves are said to be very ancient and were used for religious retreat.
- In Kunasa, the existence of important religious landmarks like 'mani' (chains of flat stones with religious scriptures) and 'chortens', such as the Yulha Chulsa, which represents the house of the village god, have been in the area as long as people can remember. In Pungphu watershed, the Yulha Chulsa was established only in 1999.

<sup>6</sup> The idea that Dolpo was colonised primarily by religious people looking for an area for retreat has been discussed by Snellgrove (1992).

<sup>7</sup> A chorten is a religious construction with a square base and pyramidal shape made of rocks simply piled up, or built up with mud or similar and covered with traditional plaster and religious ornamentation such as paintings, scriptures and esoteric signs. Chortens always contain religious relics such as texts, the bones of famous lamas, or other artefacts.

Kunasa (4200m) is characterised by the existence of a very large agricultural field located on the flattest part of the glacial moraine deposit, which is commonly owned by all the villagers of Pungmo; this area is surrounded by a stone wall, which protects the fields from animals. Even villagers who only bring their livestock to Pungphu have agricultural land in Kunasa. Two settlements, Pangdang in the southern part of the agricultural land and Lhayé in the northern part, are used by families from Pungmo, Phu Gumba, and Punikha. Some members of each family stay in Pungmo, Phu Gumba, and Punikha, while others spend the summer at Kunasa. The houses in Pangdang and Lhayé are permanent constructions and each house shelters a group of families, generally brothers and other close kin. The groups from Pangdang and Lhayé move their herds separately as described below.

### ***A cultural and religious landscape***

Understanding how people name places and how they relate to these places constitutes a major part of understanding how they relate to their land. All practices including, but not limited, to management are highly related to local spatial references, whether symbolic or material. Kunasa is a huge area, whose limits can't be seen when standing in one place. The major sub-pastures of Kunasa have been named according to topography and land morphology (Figure 2), or in relation to types of vegetation, plant species, or animals characterising the area. These sub-pastures are generally isolated from each other by natural barriers, such as ridges or rivers, or by manmade barriers or religious marks, such as 'mani', 'laptasai' (piles of stones with a pyramidal shape erected at the top of mountain passes or the entry to a village or pasture area, where visitors offer flowers to the local deities inhabiting the area) or 'tho' or 'thobo' (cairns arranged in a line along a ridge which stick out of the snow in winter). These are meant to keep away dangerous animals or evil spirits from the settlements. Local place names can be a good indicator of how people relate to their landscape. The local place names in this area have been studied in some detail. Names are given to all places, including pastures, sub-pastures, and forests. Pastures are called 'penhri', and different types of penhri are identified and named according to the names of mountain cliffs and rivers, and sometimes according to the nature of terrain and plant species. Penhri-chongba-tong, a sub-unit of Lhayé-Kogma sub-pasture in Pungphu, refers to a square area which has very flat topography and has good-quality grass species. Penhri-karpo and Penhri-nakpo are sub-units of the same sub-pasture, and look white and black, respectively, from a distance. Penhri-sopa, in the same area, refers to a meadow shaped like a human shoulder.

Similarly, Talgera sub-pasture in Kunasa (Table 2) refers to a place having ladder-like terraces. Kyunga-thang sub-pasture in the same area represents the 'kyunga' (a mythical Tibetan bird) and refers to the high altitude of the pasture, symbolically inhabited by the kyunga, and the fact that it is relatively flat land ('thang'). The name Pangjauwa, another sub-pasture in Kunasa, is based on the quality of fodder grass available in the pasture. It is derived from two words; 'pang', meaning pasture, and 'jauwa', meaning good or fine. Thus, literally, Pangjauwa means the pasture-land where fine or good-quality grass is dominant. Bankal sub-pasture refers to the plant 'baghan' (*Megacarpa polyandra*), which is found only in that area. Dhowo-penhri, a sub-unit of the Bankal sub-pasture, refers to the medicinal plant found in the area, 'pangtsi dhowo' (*Pteroccephalus hookeri*). Similarly, the sub-unit named Uiri in the same pasture refers to the grazing area at the centre of the sub-pasture. Chulung is a sub-unit of Bankal sub-pasture that means 'grazing ground fed by mountain streams'.

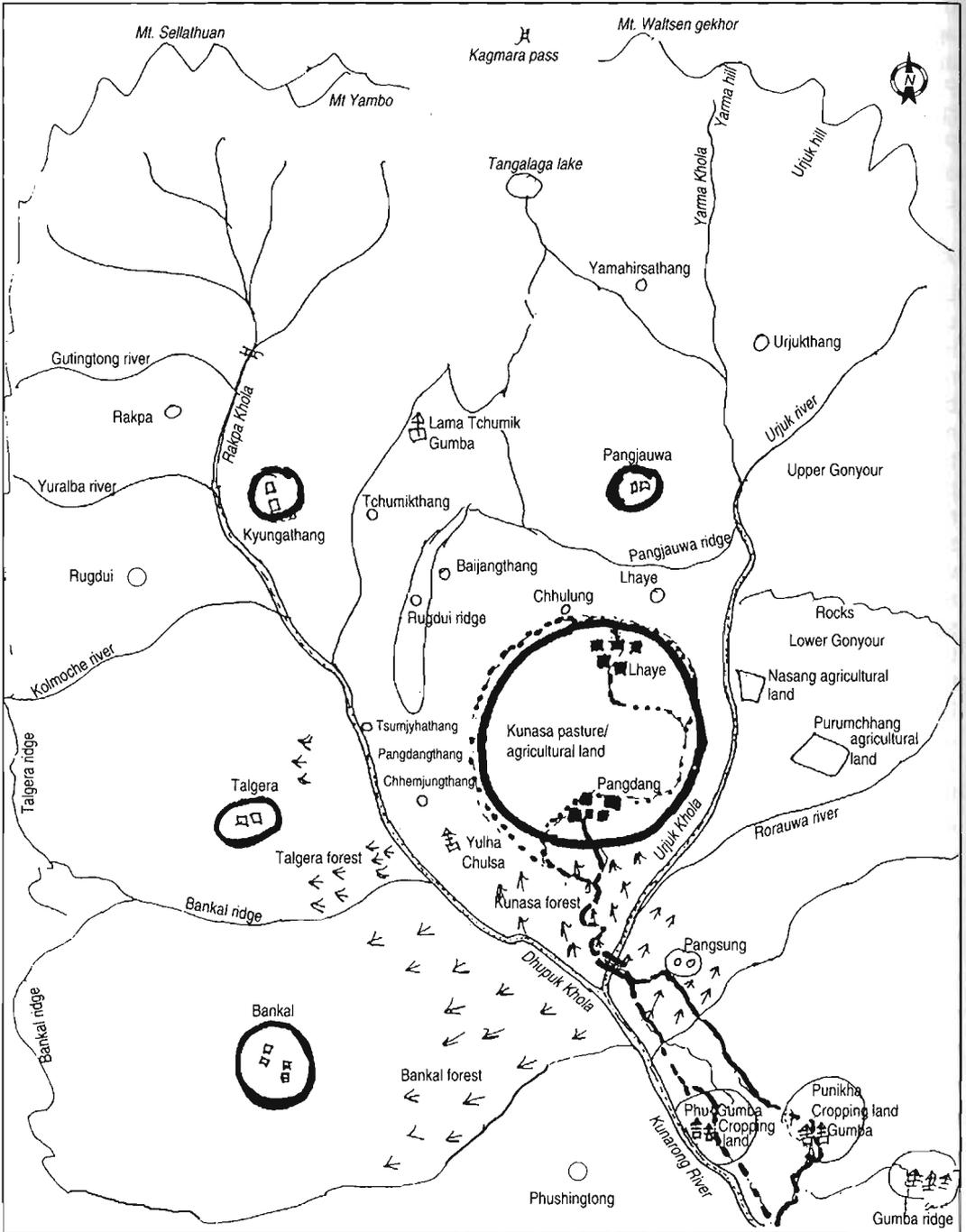


Figure 2: The Kunasa area

**Table 2: Sub-pastures of Pumphu, Kunasa, and Bankal pastures**

Penhri-chongba-tong	Sub-unit of a sub-pasture of Pungphu	This name refers to the fact that this pasture is flat and square in shape and has good-quality grasses.
Talgera	One of the four major sub-pastures of Kunasa	This name refers to an area having ladder-like terraces.
Pangjauwa	One of the four major sub-pastures of Kunasa.	This name refers to the good grass quality found there.
Kyunga-thang	One of the four major sub-pastures of Kunasa	This name refers to the bird kyunga and to the relatively flat area.
Bankal	One of the four major sub-pastures of Kunasa	This name refers to the plant baghan, only found in that area.
Dhowo penhri	A sub-unit of Bankal	This name refers to the medicinal plant pangsi dhowo found in that area.
Chulung	A sub-unit of Bankal	This name refers to a grazing ground fed by mountain streams.

Source: Ghimire et al. 1999

Besides topographical characteristics and vegetation types, the overall pasture landscape has landmarks relating to the cultural and religious links established with the land over many generations. During the ceremony of Yulha Chulsa in May, this relationship is demonstrated in the form of a religious ritual. Ceremonial cakes ('torma') are made in the effigies of the local deities 'lha', 'shidag', and 'lu', who reside in the landscape and wield power over the environment and the lives of people and livestock. These effigies also include rocks with special features. One such rock is 'singhatong', which resembles a lion and also elements of three circumambulation routes – 'nangkor', the inner circumambulation around Lama Tchumik; 'barkor', the middle circumambulation path; and 'lingkor', circumambulation of a very large area of Kunasa with specific landmarks embodying different aspects of local religious folklore. The landmarks include 'Khandroi numa', or goddess breast (a rock with this shape), where pilgrims stop and drink water; and 'Mandal thang', where there are many torma-like structures in rocks, and at which pilgrims stop to offer fruits and flowers. During the Yulha Chulsa ceremony, the names of these places and special features of the landscape are recited during the act of molding the effigies, thus embodying through ritual a very strong relationship with these different elements. Similarly, during the Lama Tchumik pilgrimage, walking around in groups, making offerings, praying, and dancing all contribute to the ancestral link of these people to their area. The ceremony of Yulsa Chulsa, which is portrayed in a film made in Dolpo (Aumeeruddy 2000), shows how people from older generations through rituals, practices, and ceremonies convey the sense of belonging to an area to younger generations and ascertain their relationships to their land, as well as to all elements natural and supernatural<sup>a</sup> that are a large part of their life. Kunasa is very characteristic of the concept of 'ney' or 'beyul', meaning hidden land, and is interpreted as such locally. Being a meditation site for Lamas, the Kunasa area has been historically considered a sacred place. Within the Kunasa area, nine gombas have been established by the late Lamas and local people for religious and educational purposes. These settlements are surrounded by agricultural lands, forests, pastures, and scrublands.

<sup>a</sup> There is no division between natural and supernatural in this society, both dimensions being intertwined in everyday life.

## ***Decision-making systems in Pungmo***

Two main local institutions have been identified by Parajuli (1998) as responsible for overseeing all activities related to the use of pastures in Pungmo. These are the 'dratsang' and 'yulgigothe'. Dratsang is the Lama hierarchical system that used to govern a very large area extending beyond Pungmo. Lamas, who were not only religious heads, but also dynamic agro-pastoralists, used to control and manage these lands; collect nominal taxes; and fine encroachers on forest, pasture, and agricultural land. However, this system was partly dismantled with the extension of the talukdari system after 1911. The dratsang was replaced with the mukhiya (talukdar), who was appointed by the king to collect taxes and revenue and to be responsible for law and order in the area. Although neither the mukhiya nor the lamas are formally recognised by present government policy, Parajuli (1998) considers them to have combined their customary strengths and to still be responsible in the village context for making all decisions relating to pasture and forest management. Since the establishment of the National Park, these local authorities have lost any prerogative to fine external persons who encroach or 'illegally' collect forest or pasture resources, but a relatively high level of control over rotational patterns of herds is still maintained within the community.

Special permission was required in the past from the head lama to collect timber from the forests, graze livestock in the pasture, or harvest medicinal plants. Today, although people may still ask permission to collect timber, the real authority regarding timber collection is the National Park, and people from any village in the park may collect from the forests of Pungmo, providing they pay royalties to the park. The dratsang and yulgigothe still determine the dates of movements of livestock between different pastures and the harvesting of pasture resources. Harvesting of other pasture products, such as fodder grass for winter ('gainsi') and medicinal plants, were traditionally performed only when lamas announced the date for public harvesting, which was after the 'tahangsung rikhi' or 'nectar rains'. This is a period in the Tibetan religious calendar at the end of October when some very fine local rains increase the potency of plants (potency can be interpreted as nutritive contents for fodder grasses and active principles for medicinal plants). After this, fodder grasses, and roots and rhizomes of medicinal plants which have already set seeds, were collected in the high pastures. Before the tahangsung rikhi, local people were not allowed to cut grass from the pasture. If necessary, they could harvest from their private land by uprooting, but not by using any metal tools. It was believed that if metal tools were used before tahangsung rikhi, the climate would change and frost would occur, damaging the cultivated crops. It was also believed that grass harvested before the tahangsung rikhi turned black and rotted easily, and therefore became less nutritious for cattle. Monks ('drawa') patrolled the resources and pastures at least once a month, and violators were fined in cash (100 silver coins) or in kind (grain) (Parajuli 1998, Ghimire et al. 1999).

The gomba system of resource management, once prevalent in the whole Phoksundo area, became confined to the Kunasa area after the extension of the yulgigothe or talukdari system in 1911 (Parajuli 1998).

Generally, the tasks of the mukhiya were guided by the traditional rules and regulations formulated by the lamas of the dratsang. Every year, the mukhiya appointed two 'tohremas', or volunteers from among the members of two different families, on a rotational basis. Each family knew about their turn in advance. The

tasks defined for the tohremas were very similar to the tasks of the monks (drawas) of the dratsang system; therefore, they sometimes worked together or alternately while patrolling the resources. In addition, the mukhiya, in cooperation with other members of the yulgigothe, determined the dates or periods of crop cultivation and harvesting of crops and other resources from the specific area. The tohremas informed all the villagers of this decision, and the people performed the specified activities in a specific period and place. The provision of fines was also prevalent in this system of management in cases of transgression of rules. Fundamentally, except for agricultural land tax collection, the mukhiyas did not bring any changes to the role of lamas regarding the control and management of natural resources within the lama territory. Since the mukhiyas were well educated and respected among the villagers, they even helped the lamas in maintaining social, cultural, and religious cohesion in Pungmo village, as well as in the Kunasa area, by implementing traditional rules and resolving disputes. Therefore, it seems that these systems were reciprocal systems for natural resource management. The yulgigothe system remained for a few generations and theoretically ended in 1996, with the government's new arrangements for local revenue collection by the VDC authorities. However, the local people have maintained the traditional methods of revenue collection by the mukhiya, who collects the revenue and deposits it at the VDC. Thus, the mukhiyas have remained, though informally, a kind of liaison officer with the government.

Relationships of this type between the village customary chiefs and the village lamas have not been described elsewhere in Dolpo so far. There are mukhiyas in all the villages of Dolpo. All the lamas in Lower Dolpo are originally from Pungmo; many other lamas and other religious people – among them some 45 amchi – live in the villages of Upper Dolpo. The work undertaken to date in this area does not enable us to establish clearly the exact role that the religious people and the mukhiyas play in relation to resource management in other villages in Dolpo.

### ***Present system of pasture management***

Today in Pungmo decisions concerning when to move from lower winter pastures to Kunasa or Pungphu are built on a consensus between the lamas, the mukhiya, and the elderly persons of the village. The decision to divide the whole village into two groups, Pungphu (5 families) and Kunasa (23 families), was made to avoid overstocking of pastures, but may have also been related to other social issues, especially family alliances.

A number of sub-pastures are used in the larger Kunasa area, including pasture units located immediately around the agricultural field, and the more distant pastures Pangjauwa, Bankal, Talgera, and Kyungathang (see Figure 2). Herds are brought from the lower winter pastures in Pungmo to Kunasa in May. People living in Lhaye, the higher settlement, graze in different sub-pastures located to the east of the upper part of the agricultural fields, whereas people living in the lower settlement of Pangdang graze their herds in the sub-pastures closer to their settlement. Distant sub-pastures such as Bankal, Talgera, Kyungathang, and Pangjauwa are closed until July.

The general pattern of looking after the herds is as follows. Herds are brought by groups of women living in the same house and are left to graze in pasture units where other herds are not grazing. Thus, there is a clear strategy to spread the impact of grazing as much as possible in each pasture unit. In July, people leave the main

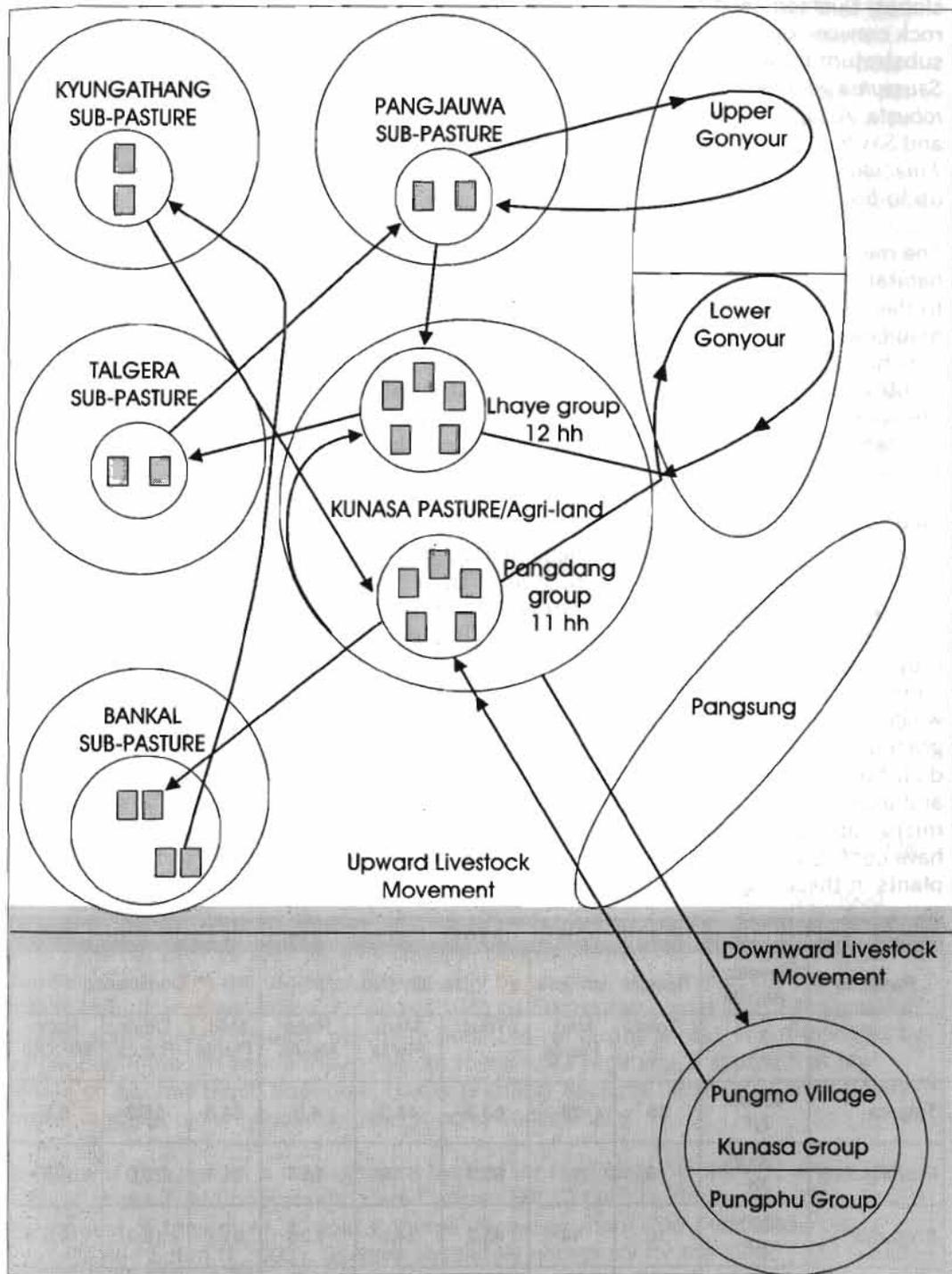
settlements and go to reconstruct secondary settlements. These are non-permanent constructions set up in pastures far from the central agricultural fields and the main settlements of Lhaye and Pangdang. People from Lhaye go to Talgera, and people from Pangdang go to Bankal. At the end of July, each group leaves the secondary settlement: the people from Talgera go to Pangjauwa, while those from Bankal go to Kyungathang. Talgera and Bankal are then closed to grazing. Herds are kept in Kyungathang and Pangjauwa until approximately mid-September, after which they are brought back to pastures adjacent to Kunasa's agricultural fields and are grazed again in the pasture units of Kunasa itself, as well as in Lower Gonyour, which is closed from May to September to allow collection of wild garlic and grass for winter (Parajuli 1998). Figure 3 shows the rotational pattern in Kunasa.

### ***Vegetation status of different sub-pastures and medicinal plant distribution***

As described by Dobremez (1976), Himalayan vegetation types (alpine, sub alpine, temperate, and others) are characterised by a large number of habitats and microhabitats; and the higher up, the larger the number of habitats and microhabitats. The principle of rotational grazing is a system by which people shift animals from one sub-pasture to another and from one pasture unit to another to allow maximal utilisation of the diversity of resources available. In this case, north and east-facing areas are often invaded by *Rhododendron*, thick bushes allowing little space for grasses; whereas south and west-facing areas have a diversity of grass species from the Poaceae family, and in the highest pastures, an abundance of sedge species, principally *Kobresia*.

Above the timber-line, the vegetation is typical alpine scrub and meadow. The region is characterised by severe winters and very short cold summers. Precipitation is low and comes in the form of snow and scanty rain. In the lower alpine belt, north and north-west facing areas are often invaded by shrubs; mainly Ericaceae (*Cassiope fastigiata*, *Rhododendron anthopogon*, and *R. lepidotum*), Salicaceae (*Salix calyculata* and *S. lindleyana*), Rosaceae (*Potentilla fruticosa*), and Grossulariaceae (*Lonicera spinosa*); forming closed extensive thickets where graminoids and other herbaceous vegetation rarely grow. On the other hand, south and south-east facing areas have a diversity of Poaceae species, including *Danthonia* spp., *Deyeuxia* spp., *Festuca* spp., *Kobresia* spp., *Melica* spp., *Poa* spp., and *Stipa* spp. Southern aspects also support scattered patches of woody vegetation, the most frequent of which are *Juniperus indica*, *J. squamata*, *Chesneya nubigena*, *Berberis* spp., and *Ephedra gerardiana*. Besides these, pasture vegetation is comprised of various herbs, such as *Aconitum spicatum*, *Anaphalis triplinervis*, *Bistorta affinis*, *Geranium donianum*, *Geranium pratense*, *Iris* spp., *Ligularia* spp., *Meconopsis paniculata*, *Pedicularis* spp., *Podophyllum hexandrum*, *Sedum* spp, and *Stellera chamaejasme*.

Pastures of the lower belt are dominated mostly by different species of *Agrostis*, *Arundinella*, *Cymbopogon*, *Deschampsia*, and *Festuca*. Species such as *Morina polyphylla*, *M. nepalensis*, and *Rumex nepalensis* are indicators of pasture quality, as they dominate heavily-grazed and more disturbed habitats. Along streams and riverbeds, the vegetation characteristically consists of *Myricaria rosea* and *Salix doltoniana*. Above these scrub communities, the vegetation consists of vast stretches of open, moist or semi-arid, alpine meadows, mainly comprised of *Kobresia seticulmis* and *K. trinervis*. Associated species in these meadows are *Agrostis munroana*, *Androsace strigillosa*, *Carex* spp., *Cortia depressa*, *Geranium donianum*, *Iris* spp., *Lagotis kunawurensis*, *Potentilla pedunculosa*, and *Primula* spp. Above 4800m, plant



**Figure 3:** Sub-pastures in the Kunasa area; arrows show the rotational pattern (Source: Parajuli 1998)

associations diminish and appear scattered on the exposed rocky screes and stony slopes. Cushions and dense mats of flowering plants are mostly crowded together in rock crevices or close to boulders, where they are sheltered against the daily substratum movement. The most common pioneer species are *Rhodiola himalensis*, *Saussurea gossypiphora*, and *S. graminifolia*. Some associated species are *Androsace robusta*, *A. tapete*, *Arenaria polytrichoides*, *Primula minutissima*, *Saxifraga macrophylla*, and *Saxifraga stenophylla*. In the drier parts, species of *Arenaria*, *Cortiella*, and *Tanacetum* form multi-species cushions. These alpine herbs remain quite prominent up to 5300m.

The medicinal plants present in Kunasa occupy a large range of habitats and micro-habitats. The local people do not intentionally manage medicinal plants, possibly due to their very large accessibility. Knowledge about the precise distribution of all medicinal species is mainly held by the lamas, especially those who are professional 'amchi'. However, women, who spend more time in the pastures than do men, can identify a large number of species and are often asked by amchi to collect certain medicinal plants. Lay people use only a small range of species compared to amchi and lamas, who collect some 400 species of plants for medical uses. The main species collected by lay people are those with multiple uses.

Analysis of the species richness and dominance of medicinal plants in different sub-pastures shows that the ratio of medicinal plant density to associated species density is lowest on south-facing slopes, such as in Upper Gonyour, where there is a very low dominance of medicinal plants compared to other species. This tendency is reversed on north-facing slopes such as in Talgera. Although these results are only indicative, they suggest that since south-facing areas are under higher grazing pressure, communities may have evolved in these areas with higher proportions of graminoids – which are possibly less vulnerable to trampling and which grow back readily after grazing – and lower proportions of other herbs. However, after examining the distribution of medicinal plants in the various sub-pastures with different altitudes and aspects, one may also argue that it is the very high diversity of habitats and micro-habitats provided by rugged terrain, in addition to low grazing pressure, which have contributed to the long-term maintenance of the great diversity of medicinal plants in these high pastures (Table 3).

**Table 3: Distribution of medicinal plants in different sub-pastures of Kunasa**

Pastures	Elevation/ Aspect	Species richness		Density (No./m <sup>2</sup> )			Dominance		
		Total	Med. Plants	Total	Med. Plants	Ratio Mp:As	Med. Plants	Other Plants	Ratio MP:Oth
Talgera	4250m NF	35	28	53.3	44.2	4.9	84.8	15.2	5.6
Pushing-tong	4200m NF	18	13	95.7	57.9	1.53	61.1	39.0	1.6
Shotoriya	4300m EF	16	14	43.2	24.9	1.35	81.7	18.3	4.5
Upper Gonyour	4500m SF	34	27	77.9	26.5	0.51	40.0	60.0	0.67

NF = north-facing; EF = east-facing; SF = south-facing; Med. = Medicinal

Source: Ghimire et al. 2000

Looking at the overall conservation status of two major medicinal plants, *Nardostachys grandiflora* and *Neopichrorhiza scrophulariiflora*, Ghimire (2000, 2001) found that the two species occupy different habitats in the pastures. *N. grandiflora* prefers south-facing slopes, while *N. scrophulariiflora* prefers more moist, northeast-facing slopes. Densities of *N. grandiflora* varied from 30.4 per sq.m in the remotest sites to 4.7 per sq.m. It is also notable that *N. grandiflora* was completely absent from all areas with very high grazing pressure. Since no large scheme of commercial collection is conducted at either of these sites, and the two habitats are relatively similar, one could say that *N. grandiflora* is affected by low grazing pressure and might completely disappear under high grazing pressure. Comparison of densities of *N. scrophulariiflora* at two sites showed that they are higher in Talgera (1.90 per sq.m), characterised by relatively high grazing pressure, than in Phushingtong (1.80 per sq.m). However, the frequency of *N. scrophulariiflora* is higher in Phushingtong. Both sites are characterised by relatively rugged terrain and high coverage of *Rhododendron* bushes. The maintenance of *N. scrophulariiflora* in these areas could be interpreted as being a result of vegetation structure and rocky terrain, which offer small micro-habitats for this plant. Moreover, Ghimire (2000) interprets the difference between these two species as being a result of the different vegetative growth patterns of the two species.

### ***Management of medicinal plants in relation to pastoral activities***

Most of the medicinal plants collected in Kunasa are collected in very small quantities by the amchi. Management of medicinal plants by amchi – including quantities of various plant parts collected – is based on knowledge of plant life cycles, distributions, variations in population size, and regeneration abilities. The amchi tend to collect medicinal plants with care, avoiding over-exploitation of specific populations and changing harvest sites when they consider populations to be losing vigour. Other harvesting pressures may be due to collection by lay people, either for self-medication or for incense, fodder, firewood, or dye.

No particular regulatory system exists to protect medicinal plants from damage caused by herding activities, which are based on rotational grazing, deferred grazing in certain pastures, and the spreading out of herds in the largest possible area to avoid over-stocking. These activities are important to maintain the local livelihood system. A few general rules exist, such as the use of the religious calendar to determine the best periods for harvesting underground parts of medicinal plants. However, such rules are usually followed only by amchi. For example, the rule that entails leaving younger bulbs of species such as *Dactylorhiza hatagirea* in the ground and collecting only old bulbs, which are bound to rot during winter, is not followed by lay people. Although amchi may spell out these rules regularly, it seems that lay people do not pay much attention. This is probably because these rules are not very formal, and people only collect these species occasionally.

Because of this lack of a management system for medicinal plants, and within the context of the Traditional Health Care Centre (THCC) built in Phoksundo VDC upon the request of the amchi, a rapid vulnerability assessment (RVA) was undertaken (Tripathi and Schmitt 2001). Species absolutely necessary for the clinic (136 species) were filtered on the basis of amounts used, parts collected (collection of underground parts or whole plants is considered the most damaging), distribution (highly site-specific species are under higher levels of threat), and number of user groups (the more diverse the user groups, the more difficult it is to ensure control

over the resources). Twenty-four species were found to be potentially vulnerable to over-harvesting (Tripathi and Schmitt 2001) and to require development of very specific harvesting practices and a clearly defined monitoring system. The amchi of the THCC were asked to reconsider these 24 species in June 2003, and to further short-list these species based on habitat specificity (endemism, rarity), possible impact from illegal trade, regeneration potential, and parts used. Precise localities of occurrence for species on the resulting list of ten were established, and scores of occurrence were assigned based on local categories of availability. These ten species are listed in Table 4. The amounts found during the vulnerability assessment were the amounts that a group of amchi gave as needed by the clinic.

**Table 4: Species found to be potentially vulnerable and currently monitored by the THCC and the MPMC (Tripathi and Schmitt in Ghimire et al. 2001)**

Scientific Name	Parts <sup>1</sup>	Amount required by THCC (kg/yr) based on the RVA <sup>2</sup>	Harvesting Season (English and Nepali months)
<i>Dactylorhiza hatagirea</i>	Rt	1	Oct.–Nov. (Kartik)
<i>Nardostachys grandiflora</i>	Rh	4	Sept.–Nov. (Ashoj-Mangsir)
<i>Arnebia benthamii</i>	Rt	4	Nov.–Dec. (Kartik-Mangsir)
<i>Incarvillea mairei</i>	Fl, Lf, Rt	0.5	June-July (Ashad) – fl, lf Oct.–Nov. (Kartik) – rt
<i>Neopicrorhiza scrophulariiflora</i>	Rh	4	Sept.–Nov. (Ashoj-Mangsir)
<i>Corydalis megacalyx</i>	Fl, Lf	1	June-July (Ashad)
<i>Corydalis cashmeriana</i>	Fl, Lf	0.5	Aug.–Oct. (Shrawan-Bhadra)
<i>Meconopsis horridula</i>	Lf, Fl, Fr	0.25	July-Sept. (Shrawan-Bhadra)
<i>Gentiana robusta</i>	Lf, Fl	3	July-Aug. (Shrawan)
<i>Halenia elliptica</i>	Lf, Fl, St	2	Aug.–Sept. (Bhadra)

<sup>1</sup> Fl = flower, Fr = fruit, Lf = leaf, Rh = rhizome, Rt = root, St = stem

<sup>2</sup> rapid vulnerability assessment

These ten species will be monitored by the Medicinal Plants Management Committee (MPMC), a body set up in Phoksundo in 2000 and composed of lay people from the village, generally young people interested in learning from the amchi and from the project. This body also includes representatives of the dratsang and the yuldigothe, the institutions previously responsible for these matters. The MPMC's role is to monitor the impacts of use of these species in close collaboration with the THCC. The THCC is also responsible for closely monitoring the amounts of potentially vulnerable species used at the clinic. Both the THCC and the MPMC may play important roles in the future in warning villagers of possible signs of over-harvesting.

## Conclusions

The very large pasture areas available, along with a sophisticated rotational system, seem to have thus far ensured the maintenance in Kunasa of high-quality rangelands with diverse medicinal plants. However, based on the data available so far from this project, it appears that each species of medicinal plant reacts differently to different grazing pressures. For example, many species are perennial herbs, whose underground parts regenerate even though the upper part may have been grazed. Moreover, some species may not be grazed because of toxic chemical components or specific morphological characteristics, such as spiny leaves or twigs, which deter

animals. Resistance of these medicinal plants to grazing may well depend on the period during which they are grazed or trampled. No studies exist to date that have analysed in detail the reactions of particular medicinal plants to different grazing pressures and timings. In Kunasa, according to the amchi, none of the major species has yet significantly declined, although species such as *Nardostachys grandiflora* are found in the largest quantities in the remotest areas.

This paper attempts to place medicinal plant management in the overall context of pastoral life, seen here as a social unit. It stresses the need to fit any new management system into the local social and cultural dynamics and to try to articulate these new management systems into the larger context – in this case, the overall management system of the national park. The model of THCC and the functioning of the MPMC have been proposed for inclusion in the management plan of Shey Phoksundo National Park. The park, with its low number of guards and lack of precise knowledge about medicinal plants, cannot protect these species without a close association with the people living in the area. This work also attempted to highlight the importance of man-environment relationships in this high pasture area, as well as in many other areas in Dolpo and throughout the Himalayas. Such landscapes can be interpreted as cultural landscapes, carved over time during the very long process of interaction among societies, livestock, and the environment.

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