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CONSERVATION AND UTILIZATION OF INDIGENOUS CATTLE AND LIVESTOCK AMONG THE TRANSHUMANT PASTORALISTS OF KUMAUN HIMALAYA (INDIA)

NEHAL A. FAROOQUEE, PH.D.

K. S. RAO, PH.D.

G. B. Pant Institute of Himalayan Environment and Development, India

ABSTRACT

Transhumant pastoral production in the high altitudes of the Kumaun region of Indian central Himalaya is oriented toward guaranteeing a subsistence livelihood by efforts to attain food production and to reduce environmental risks. Production strategies involve the simultaneous use of several ecological zones each year to utilize the available resources in a judicious manner. This form of human adaptation has led to the conservation and utilization of indigenous cattle and livestock for centuries. This article tries to highlight some of the indigenous methods of livestock conservation through cross breeding and sustainable management practices of the indigenous animal resources. Now, the construction of roads in the region and introduction of communication and other developmental infrastructures threatens the traditional way of life and indigenous cattle and livestock management practices.

INTRODUCTION

The Bhotiya pastoralists of central Himalaya have practiced a system of migration and vertical transhumance for grazing their livestock and cattle over many centuries. These people utilize a wide range of biological resources in diverse ways, serve as integral components of high altitude ecosystems, and have so

conserved the biological diversity through their diverse culture resource utilization techniques [1]. The production systems in this society have been increasingly agropastoral rather than strictly agriculture- or livestock-based. Livestock and animal husbandry made these people more dependent on their immediate environment, and accordingly they diversified their resource use practices [2]. Due to seasonal movements between their summer settlements in the higher altitudes (around timber line; 3000-4000 m) and winter settlements in the river valleys (1200-1600 m) they have learned to utilize their domestic animal resources for different purposes [3]. The fragility of the high altitude resource base and the remoteness of the settlements had compelled these communities to utilize their livestock and cattle resources for their diversified needs, and conserve them for the future.

Indigenous people with a historical continuity of resource use practices often have distilled a broad practical knowledge of the behavior of complex ecological systems in their own localities [4]. Indigenous ecological knowledge of the Bhotiyas of Kumaon pertaining to agriculture, animal husbandry, and livestock management is unique and distinct from the rest of Kumaon region. Over the centuries, the transhumant herders have bred yaks and developed numerous local yak types, often recognized as distinct breeds with different characteristics. However, as Gerald Wiener [5] has pointed out, there is little scientific evidence available about the genetic variation among these breeds. Similarly, the existence of different breeds of cattle, sheep, and goats may be the solution to developing suitable genetic conservation policy and a new genetic program for raising commercial livestock. Different cattle and livestock breeds exist, for the most part, in different areas in the Himalaya [6]. No proper genetic comparison has ever been made between the breeds in terms of their performance and general attributes. It is necessary, therefore, to measure performance, survival, and reproductive capacities among different breeds to help people dependent on them.

This study examines how the subsistence economies of transhumant people of central Himalaya have utilized the diversified animal resources of the region, and have protected them from eradication by domestication. The objectives of this study were: 1) to document the diversified uses of cattle and livestock, 2) inventory sustainable management practices, 3) document the various conservation strategies, and 4) identify factors responsible for the reduction in the domesticated animal diversity of the region.

THE BHOTIYAS, STUDY AREA, AND PASTORAL MOVEMENT

The agropastoral Bhotiyas, an ethnic community numbering over 6000 people, migrate with their varieties of cattle, sheep, and goats between their summer villages near alpine meadows of the Himalaya and winter settlements in the lower valley (1200 m) of the Dharchula sub-division of the Pithoragarh district in the Kumaon Himalaya (Figure 1). These transhumant pastoralists are scattered in

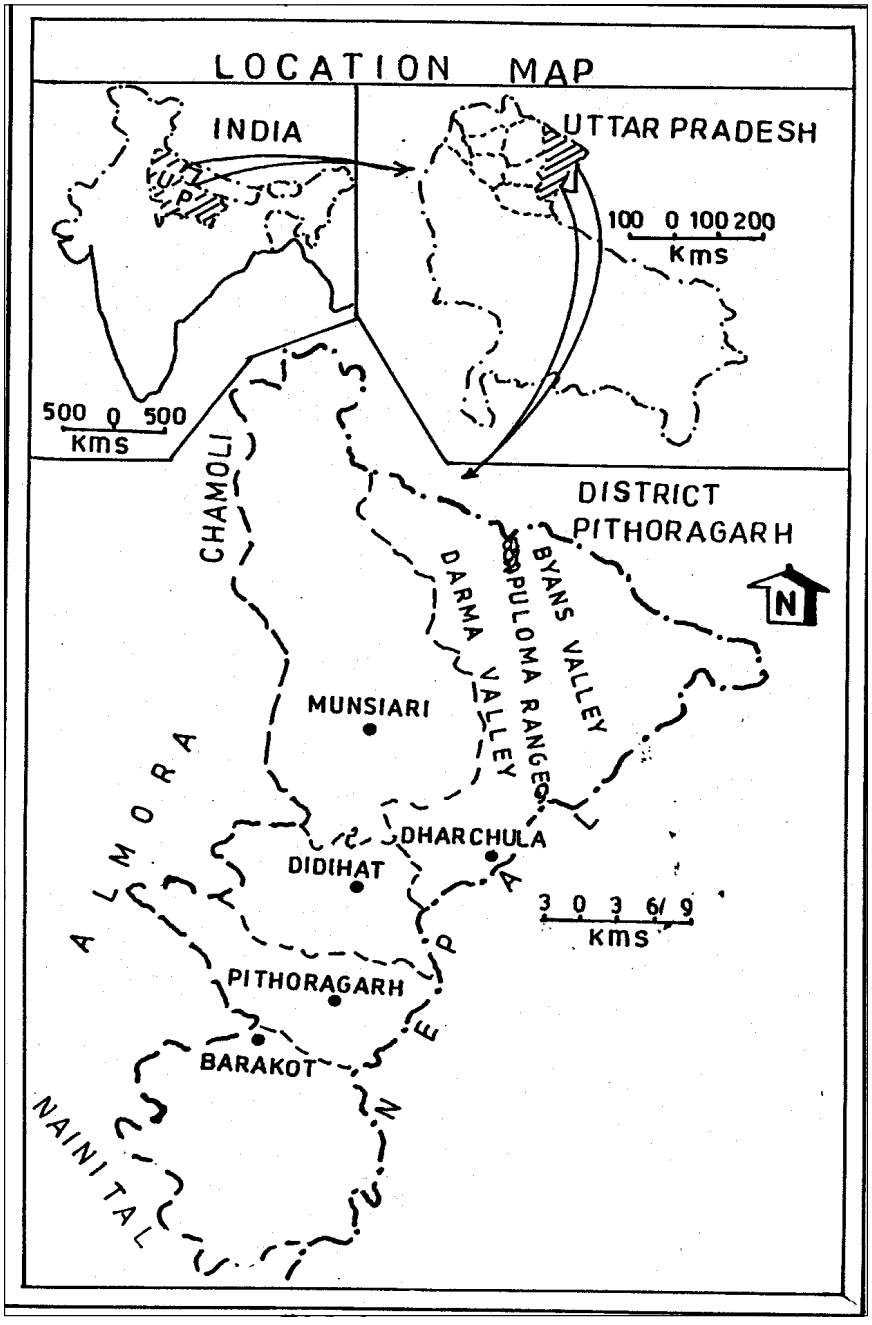

Figure 1. Location Map

nineteen villages spread over in Darma and Byans valleys. The two settlements are around 50 to 85 km apart. Such transhumance is practiced throughout the Himalaya by such diverse groups as the Lepchas and Bhotiyas of Sikkim in the Eastern Himalaya [7], the Bakarwals of Jammu and Kashmir [8], and the Gaddis of Himachal Pradesh in the Western Himalaya [9-11]. Migration enables these herders to access the highly nutritious forage of the High Himalayan ranges after the snow melts in the summer.

The economy of the Bhotiyas is a mixture of subsistence agriculture, pastoral grazing, animal husbandry, and sale of medicinal plants. Agriculture is characterized by subsistence cultivation of crops like ogal (*Fygopyrum esculentum*), phaphar (*Fygopyrum tataricum*), barley (*Hordeum vulgare*), (often mixed with bean (*Phaseolus vulgaris*) and mustard (*Brassica compestris*)), and potato (*Solanum tubersum*). Livestock holdings of sheep, goats, and cattle are sold for cash when required by the herding family. The livestock holdings vary according to landholding size, but an average household owns tow bullocks, one cow, fifteen to twenty sheep, and ten to twelve goats [3].

Livestock is grazed openly in the forests nearby and in the alpine meadows during the summer season. The alpine meadows of the western Himalaya are known for their high floral diversity [12]. Bhotiya access to grazing resources is uniform to all, and there are no specific tracts of land for any family, unlike the Gaddis in Himachal Pradesh who have formal rights to graze in particular tracts passed on for generations [9, 10]. Bhotiya grazing resources have declined substantially, chiefly due to the demarcation, appropriation, and possession by the border forces at the international boundaries between India and China. The declaration of a major portion of traditional grazing forests as the Askote Wildlife Sanctuary in 1992 has further restricted entry into these forests, further curtailing the traditional grazing resource base.

METHODS

The villages highlighted in this study were selected to represent the cultural, political, and ecological diversity of the region. A number of techniques have been utilized in the field work, ranging from participant observation and group interactions to more conventional household surveys over a period of four years (1992-95). A list was drawn up of those persons who were identified by their community to have knowledge of livestock management and animal husbandry. These persons were interviewed in depth and were called for discussions a number of times in order to obtain the required information. They provided detailed information on village access to resources (land, water, trees, grazing lands, meadows, livestock, and forests). In addition, they rated the utility of various cattle and livestock for various purposes; this was verified and cross checked with different persons and with common users in different villages. An inventory was also developed in each village to record family structure, agricultural output, cropping

patterns, animal husbandry and livestock management techniques, monetary values of farm produce, and all other sources of income. All households in each village were covered, to fully elicit local knowledge.

SUBSISTENCE ECONOMY AND THE ROLE OF DOMESTICATED ANIMAL

Traditional high altitude societies live in the biodiversity-rich regions of the Himalaya, and are dependent upon the harvest of biological resources with their own labor from a diversified area along the altitudinal gradient. Their economy is based on consistent income from sources such as agriculture, woolen- and livestock-based products, and sale of medicinal plants, as noted. Income from agriculture accounted for 32 to 36 percent of total earnings; woolen products, 18 to 24 percent; sale of livestock, 28 to 38 percent; and sale of medicinal plants, 12 to 13 percent [1]. Thus, livestock-based earnings account for 46 to 62 percent of total earnings from all sources. The uncertain high-altitude geographical conditions has entailed the distribution of production risks among subsistence techniques (agriculture, animal husbandry, sale of medicinal plants, etc.). The very words "subsistence economy" explains the impoverished nature of their economy.

Agropastoral production systems depend on complementarities between crop and livestock sectors. Livestock manure, an animal byproduct and an agroecological input, is one crucial complementarity. Lack of irrigation has compelled hill farmers to depend on manure as the only source of soil fertility. According to Jackson [13], at least eight cattle units are required to support 0.02 ha of agricultural land. The acute shortage of animal feed in the area has forced farmers to use smaller breeds of cattle. Due to the small and scattered land holdings, uneven and terraced fields, and low investment capacity of the farmers, there is no possibility of any mechanization of the high altitude farming system. Bullocks are the only source of draught animal energy. The total availability of bullock power for raising crops in the hilly farms ranged from 1205.36×10^4 kcal to 1795.20×10^4 kcal per ha per year [14]. Thus, domestic cattle and livestock play a vital role in the traditional subsistence agriculture of the Himalaya.

Most transhumant families have little (if any) agricultural land, and little livestock, one or two Jhupu (a male crossbreed of Yak and local cow), and one or two mules. They use these animals as pack animals, and earn their total livelihood from them as transporters. People are hired by various individuals and agencies (government and private). They are required year-round and are in great demand. At least 10 to 15 percent of households in each high-altitude village have been found to depend upon transportation as the major source of their livelihood [15].

TRADITIONAL PASTORALISM AND ANIMAL HUSBANDRY

In the traditional system of pastoralism and animal husbandry, agricultural land use is closely related to the interaction of altitude, climate, soil fertility, and vegetation. Crop production is subject to considerable variation in yields due to a number of factors. Similarly, pastoralism and animal husbandry involves losses of animals from predation, accidental straying, and diseases. Traditional rearing of livestock is an integral part of the overall agricultural system and is a major source of livelihood for most residents. The livestock provide wool, milk, meat, hide, organic manure, draught power, and local transportation. The fragility of the resource base and the subsistence nature of their economy have resulted in the diversified use of domesticated livestock and animal husbandry (Table 1). These animals are local breeds developed over a long period of time, and are adapted to the severe cold conditions of the high altitude.

The constraints of grazing resources and availability of agricultural residue during winter season make these domestic animals dependent on the available fodder resources from the trees and bushes. They are collected by the pastoralists and stored for stall feeding on a day-to-day basis. Table 2 gives the names of major and commonly available fodder resources from the forests in the region. These fodder resources are tapped in a systematic way found traditionally to last longer, and shared by other villagers during exigencies. Livestock numbers are kept low because they are mainly used for subsistence; it would be difficult to feed large numbers during winter. Thus, there is some kind of rough balance between livestock and feed resources.

SUSTAINABLE MANAGEMENT PRACTICES

The extreme climatic conditions of high altitudes, with great variations in day and night temperature, low oxygen, dry air, high wind velocities, and sudden high precipitation, does not permit common lowland cattle to survive. Yak is the most important and well adapted species for the highlanders. It feeds on grass barely an inch long at high altitudes in the summer. It is an excellent pack animal for snowbound areas; its cup-shaped hooves create a vacuum that allows it to walk easily on ice; it can also walk around 25 to 30 km per day, carrying loads up to 125 to 150 kg [16]. The yak is a voracious eater and requires a huge quantity of feed which is not available in this region. Hence, the yak in the Indian central Himalaya is simply used for breeding purposes. Yaks are used only as studs by these tribals.

Due to their movement between their summer and winter settlements, inhabitants required a livestock that could adapt itself in both conditions, could be used as pack animals, and which would be immune to lowland cattle diseases. Thus, they have diversified their livestock holdings and developed indigenous cattle by breeding yak and local cow. The level to which these

Table 1. Domestication of Diversified Livestock and Animal Husbandry

Name	Breed/Variety	Purpose
Yak (*Bos grunniens*)	Tibetan	Breeding
Cow (*Bos indicus*)	Local	Milk, procreation
Ox (*Bos indicus*)	Local	Draught animal
Jhupu (sterile)	Cross breed of yak and local cow	Draught and pack animal
Jumo (fertile)	Cross breed of yak and local cow	Milk
Garu (sterile)	Cross breed of yak and jumo	Draught and pack animal
Garmo (fertile)	Cross breed of yak and jumo	Milk
Talbu	Cross breed of yak cow and local bull	Draught and pack animal
Talbuni	Cross breed of yak cow and local bull	Milk
Sheep (*Ovis aries*)	Local	Wool, meat and pack animal
Goat (*Capra hirtus*)	Local	Wool, meat and pack animal
Tibetan sheep	Tibetan	Procreation, wool and meat
Tibetan goat	Tibetan	Procreation, wool and meat
Horse	Local	Transportation and pack animal
Mule	Local	Transportation and pack animal
Dog	Tibetan	Watch and guard
Cat	Local	To check rodents
Hen	Local	Eggs and meat

people have perfected their sense of livestock husbandry is remarkable (Table 3). The new offspring has the required characteristics to adjust in extreme cold conditions of high altitude, survive on the meager availability of grazing resources, and tolerate the warm conditions of lower altitudes [17]. These indigenous breed of jhupu, jumo, garu, garmo, talbu, and talbuni (*Bos indicus*) can be classified into four sub-types based on their utility, i.e., dairy breeds, dual purpose breeds (used for draught with medium milk yield), draught cattle, and pack animals. The production of cross-breeds is by no means exclusive to Bhotiyas; yak and cattle of various sorts are crossed in many areas of domestic yak distribution, as in Ladakh, Lahul Spiti, Sikkim, and Arunachal Pradesh in India [18-20].

The uncertainties of high altitude environmental conditions have entailed that mobility is an important precondition in the management of livestock. As a matter

Table 2. Common Fodder Trees Preferred by Bhotiya Livestock

Botanical Name	Local Name	Altitude in Meters
Salix elegans	Bhoksya	1600-1800
Betula utilis	Bhojpatra	2000-3200
Rhododendron sp.	Burans	1800-3200
Quercus floribunda	Telaunj	2200-2700
Acacia catachu	Khair	up to 1300
Prinsepia utilis	Bhenkula	up to 1800
Arundinaria falcata	Ringal	1800-2500
Bauhinia variegata	Kweral	up to 1400
Cotoneaster offinis	Ruins	1800-2200
Albizia lebbek	Siris	500-1600
Cedrela serrata	Dauri	1500-2600
Quercus leucotrichophora	Banj	1700-2000
Quercus semicarpifolia	Kharsu	2500-4000
Grewia optiva	Bhimal	up to 1800

Table 3. Achievements in Breeding Cow (*Bos indicus*) with Yak (*Bos grunniens*)

Male	Female	Offspring Female	Offspring Male
Yak	Cow	Jumo	Jhupu (sterile)
Yak	Jumo	Garmo	Garu (sterile)
Yak	Garmo	Yak	Yak
Local bull	Yak cow	Dumjo	Dumju
Local bull	Jumo	Talbuni	Talbu
Local bull	Garmo	Talbuni	Talbu
Yak	Talbuni	Garjo	Garju

of fact, animals of small body size like sheep and goats are the most suited. They can move faster to a safer place in case of exigencies, and consume. They also conserve energy and other essential nutrients by collecting nutrients from sparse forage. By replenishing their body reserves, they stabilize the resources available to the human population as the best source of available protein. Thus, larger numbers of sheep and goats are preferred for grazing in remote alpine meadows. The large herd sizes are safety mechanisms, because even after heavy loss of livestock due to natural calamity, predation, or disease, enough animals will remain for subsistence and for rebuilding the herd.

CONSERVATION STRATEGIES

For the sustainable utilization of the available grazing resources, and for better management of the livestock required for the survival (and to produce better stock), locals have divided their entire sheep and goat population into four categories: those used for procreation, wool production, pack animals, and meat consumption (Table 4). These four categories of animals accordingly get preferential treatment, nutrition, and care. The first category gets utmost care, and are fed with most nutritive grasses. The Tibetan varieties of sheep and goats are used for wool production and get second-highest attention [17]. A variety of Tibetan goats also yield pashmina, a very soft, downy hair that grows at the base of long hair. Since the yield of pashmina is minimal and requires oversight, people find it hard to maintain such livestock.

Table 5 gives the average rate of wool production by breed and type of livestock. The regulation and management of alpine meadows and other village grazing land is done by the village council, whose concern is equal distribution and prevention of over-exploitation. The council decides what lands will be grazed when.

The extremely cold conditions of this region have made residents regular meat-eaters. Ewes and female goats are never killed for meat unless they are too old to procreate or are injured. Table 6 gives the yearly disposition of livestock for various purposes in the villages studied.

Table 4. Classification of Livestock for Conservation and Better Management

Livestock	Purpose	Treatment
Sheep and goats	Procreation	Most preferential treatment
Sheep and goats	Wool production	Second grade treatment
Sheep and goats	Transportation	Less cared
Sheep and goats	Consumption	Least cared

Table 5. Yearly Disposal of Sheep and Goats in Two Bhotiya Villages

Type of Disposal	Boondi	Nabi
Sold	79	80.5
Consumed for meat	8.5	9.0
Gifted during marriage	2.5	2.0
Ritual sacrifice	1.5	1.5
Killed by wild animals	5.5	4.0
Accidental death	0.5	1.0
Other	2.5	2.0

Table 6. Average Yearly Wool Production by Sheep and Goats

Livestock	Type	No. of Shearing	Average Yield of Wool (gm)/yr.
Sheep	Tibetan	Thrice	1050 gm
Sheep	Local	Twice	750 gm
Goat	Tibetan	Twice	900 gm
Goat	Local	Twice	700 gm

IMPACT OF DEVELOPMENT ON TRADITIONAL RESOURCE USE PRACTICE

The development initiatives planned by the government of India since 1950 aimed at providing basic infrastructural facilities, such as roads, communications, electricity, health care facilities, and subsidized foodgrains in the remote Himalayan areas. Construction of roads began after 1962, and by 1980 had connected most remote Himalayan regions. Infrastructural development followed the roads, and provided the foundation for the process of commercialization, trade, and commerce. This resulted in a change in the food habits, dressing pattern, attitude, exposure, and behavior of the rural people. Local commodities such as food grains and minor forest products began to be traded to the outside region.

Construction of roads in remote areas, though, provided avenues for further infrastructural development [21] and allowed frequent movements to other urban centers. The tremendous exposure to outside lifestyles and values led many tribals to consider themselves inferior and backward, and the modernized urban dwellers as superiors. Thus, prejudices among both the local population and the government functionaries at large has favored modernization over the preservation of the traditional system.

In the name of development and modernization, some highly productive breeds of livestock were promoted to increase the economic return from the domestic livestock, and to meet the rising demand for animal products in India in

general. The semen (or germplasm) of these "elite" breeds was used extensively for crossing with indigenous breeds, leading to large-scale propagation of a few exotic breeds at the cost of the native breeds. Domestic animal breeds developed over the years were seen as traditional and backward in nature, and were discouraged in the overall production and fast changing economic environment. Events similar to these have led to the near or total extinction of many breeds of domestic animals throughout the world [22].

Concern is expressed within and outside the country regarding the danger of losing its vital livestock gene pool. Indigenous breeds of livestock adjust productivity to adverse climatic conditions and availability of food. They are also resistant to diseases peculiar to the region in which they have evolved.

The changes result at least partly from decisions which economic actors choose freely. Unfortunately, their impacts are often discovered too late, when their negative effects appear distinctly. Although cultural and religious traditions do resist the complete abandonment of traditional institutions and knowledge, they cannot preserve the traditional knowledge and utility of diversified plant and animal resources. Such changes have taken place in a number of places in the foothills of central Himalayan region. As a result, there has been a loss of a huge quantity of traditional knowledge of wild and domesticated plant and animal resources. Realizing the long term implications of the prevalent development, planning, and government programs, many sections of society have voiced support for the preservation, conservation, and sustainability of such societies and ecosystems [23-28].

CONCLUSION

This analysis of traditional transhumant society and its conservation practices in the high altitudes of Himalaya suggests that recognition of the environmental context of the societies is a necessary prerequisite of the sustainability of such societies. A strong and vibrant regional ecology will provide the support necessary to maintain strong and vibrant cultures. Traditional societies in general, and the high altitude pastoral Bhotiya communities in particular, still follow the basic morals required for mutual co-existence in nature. These morals, deeply routed in culture, are based on the concepts of collective survival, social equity, and sustainability of society and of the natural system. Thus, there is symbiotic relationship between the ecology of the region and the traditional resource use practice. Though the impact of development has been weakening the social and cultural fabric of transhumant society, there is a strong relationship between plant and animal resources (biological) and cultural impoverishment in the high altitudes. Over a period of time, due to the increasing human populations, more integration of such groups, increasing exposure due to better communication, and increasing aspirations for higher living standards have threatened this way of life. Further, the exponentially-increasing demands for their natural resources by the

market forces has decreased the prospect of conserving their traditional livestock and cattle resources.

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Direct reprint requests to:

Nehal A. Farooquee, M.Phil., Ph.D.
G. B. Pant Institute of Himalayan Environment and Development
Kosi-Katarmal, Almora 263 643
(Uttar Pradesh) India
Fax: 5962 31360/31507