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Pastoralism and Strategies for Strengthening Rangeland Resources of Jammu & Kashmir

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ABSTRACT

There is a great scope for expansion of livestock oriented activities in the state of Jammu & Kashmir due to its varied agro-climatic conditions and rich forage resources. Livestock plays a very vital role in economic development of the state and forms an integral part of state agriculture. A large livestock population cannot be maintained on the fodder produced on arable land alone. The major part (62.2%) of the fodder is extracted from forests (tree/shrub/leaves and herbaceous ground flora). The remaining fodder (37.8%) is derived from low altitude grasslands, degraded lands, high altitude grasslands and crop residues. Rangelands form 55% of the total area in the Himalayan region and comprise diverse vegetation types distributed from the sub-tropical to the temperate and to the alpine regions. These rangelands are important sources of forage and meet over 50-60% of the total requirement of animal fodder. The rangelands of Himalaya are the most neglected ecosystems. These seldom occupy significant place in the research diasporas, institutional policies, plans and development programmes. There is an urgent need of sustainable use and maintenance of rangeland resources in the form of native ranges, forest, pasture and agricultural/orchard lands.

Key words : Pastoralism, rangeland resources, Jammu & Kashmir

INTRODUCTION

Jammu & Kashmir comprises three main physical regions viz., outer Himalayas facing with sub-tropical and intermediate type of climate (Jammu region), lesser Himalayas or temperate zone (Kashmir region) and inner Himalayas or cold arid zone (Ladakh region; Wani and Wani, 2007; Wani *et al.*, 2014). The livestock production system is mainly extensive in Jammu and semi-intensive in Kashmir and Ladakh regions although extensive farming is practised for Changthangi pashmina goat in Ladakh (Taneja, 2009; Wani *et al.*, 2009). The agricultural sector (including livestock) contributes 25.94% to the Gross State Domestic Product (GSDP) at constant prices. The livestock sector alone contributes 11% of the GSDP which is about 40% of the contribution of the agricultural and allied sector. According to 18th livestock census (2007), there were 3.45 million cattle, 1.05 m buffalo, 3.68 m sheep and 2.07 m goats in the state.

Definition : Rangelands, according to the Society of Rangeland Management, are the lands on which the native vegetation—predominantly grasses and grass like plants, forage or shrubs—is suitable for use by grazing and browsing.

“Land on which the indigenous vegetation (climax or sub-climax) is predominantly grasses, grass-like plants, forbs or shrubs that are grazed or have the potential to be grazed, and which is used as a natural ecosystem for the production of grazing livestock and wildlife” (Allen *et al.*, 2011).

These lands encompass approximately half of the earth's land surface. Rangelands form 55% of the total area in the Himalayan region and comprise diverse vegetation types distributed from the sub-tropical to the temperate and to the alpine regions. These rangelands support the livestock industry, accommodate important watershed functions and provide valuable as well as biologically diverse resources. These rangelands are important sources of forage and meet over 50-60% of the total requirement of animal fodder (Sundriyal, 2011). The total fodder production of Jammu & Kashmir is 86.5 lakh tonnes of which green fodder contributes 61.4 and dry fodder 25.1 lakh tonnes. Productivity of natural grasslands is about 1.5 to 2.5 t/ha, which can be increased up to 8.11 t/ha by suitable interventions. Surprisingly, however, rangelands are the most neglected ecosystems in the mountains. These seldom occupy significant place in the institutional policies, plans and development programmes. An investigation into the current status of the rangelands in the Himalaya,

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Table 1. Extent of rangelands in the countries of the Hindu Kush Himalayan region

Country's name	Area (km ²)	Area (%)
Afghanistan	291,880.87	7.57
Bhutan	17,419.636	0.45
China	1,545,542.4	40.09
India	169,381.09	4.39
Nepal	77,826.664	2.02
Pakistan	188,118.4	4.88
Total area (%)	2,290,169	59.41

especially in terms of their floristic composition, herbage productivity, wildlife diversity, factors and processes responsible for their degradation/regeneration, nutritive value of the fodder species flourishing in their environment, linkages with other farming system components in terms of biomass/energy flows, etc. would be of great significance towards a better understanding of these less addressed ecosystems of the Himalayan region (Table 1).

Rangelands mostly comprise sub-alpine and alpine pastures, forest openings and the demarcated forests. Agricultural crop residues are also used extensively during winters to feed the livestock. At lower altitudes, conservation of tree leaf fodder for winters is a common practice. The Himalayan rangelands can be categorized into two types. The first group has temperate grasslands located below the timberline and those remain in seral stages or bio-edaphic disclimax stages controlled mainly by herbivory and fires. The second group includes alpine meadows of western and central Himalaya located in the flatter or gently undulating terrain between the timberline (ca. 3,300 m amsl) and the permanent snowline (ca. 5,400 m amsl). The alpine species e. g. sedges, grasses, forbes and shrubs are highly palatable and not too resistant to over grazing. Studies in alpine meadows of Kashmir have shown considerable loss of vegetation due to excessive grazing and wide presence of weedy species of *Viburnum*, *Stipa*, *Sambucus*, etc. (Shah, 1988).

Rangeland resources display a diverse assortment of plant communities, wildlife species and various distinct cultural groups. Livestock are primarily sustained by vast native rangelands and forests by millions of farmers and pastoralists who rely on these diverse ecosystems for their subsistence.

Rangelands are important for a number of reasons :

- They are the headwaters of the principal river systems of the region;
- They provide habitats for numerous wildlife and

- plant species, many of which are endangered;
- They provide forage for grazing livestock; and
- Many occur within protected areas and are becoming increasingly popular as tourist destinations.

Land Availability for Feed Resources and Grazing Systems

Feed for animals is available from cultivated as well as uncultivated lands. The uncultivated lands, as a source of feed, include two major sources viz., common and private support lands. Common support lands (CPRs) include the barren line forests outside the forest area and the forest area maintained by forest department; barren and uncultivable land; cultivable waste land; land under tree groups; permanent pastures and non-agricultural land. These CPRs constitute the most important input for livestock production and subsistence for the poor.

Private support lands for grazing include grasses from bunds in paddy fields, fallow lands and orchards. The lush green forests in Jammu & Kashmir serve as the most important support land for livestock of the state (Table 2). The majority of the land categorized as the area under common support land lies in Jammu (86%) and the rest is distributed in Kashmir (11%) and Ladakh (3%) regions. Ladakh region also has vast CPRs in the form of main and collateral valleys, mountains and other barren and wastelands which have thin and sparse vegetation but serves as grazing land for large and small ruminants. Local grazing lands (*gascharai*) in each village are available in vicinity with poor grazing quality due to tragedy of commons. The entire population of animals in the state is partly grazed and partly stall fed but only stall fed in urban areas. The animals are more grazed and less stall fed during summer and only stall fed during winter in Kashmir and Ladakh regions, while grazing continues throughout the year in Jammu region. In most of the rural areas, except lactating cows, all other animals (dry cows, draught animals, young stock and sheep and goats) migrate for longer distances (60-300 km) towards high alpine pastures for 4 to 5 months during summer.

Pastoralism in Western Himalaya

Pastoralism can be categorized in number of ways. The most important of these are by degree of movement, species, management strategy, geography

Table 2. Area available for grazing in Jammu & Kashmir

Forests (50% of the total area)	Barren unculturable land	Pastures	Misc. tree crops and groves	Culturable wasteland	Total fallow land	Total reporting area of the state	Total area available for grazing	
1373	295	127	73	138	103	4505	2109	
Forest		Pasture		Misc. tree crops and groves		Culturable wasteland		Total area for grazing
2759		123		94		145		3217
Geographical area (mha)		Total grazing area (mha)		Livestock population (m heads)		Livestock density (No./ha)		Grazing pressure (ACU/ha)
10.14		6.82		10.98		1.08		0.72

Source : Tyagi and Vinod Shankar (1995), Manju Suman (2005) and Mahanta *et al.* (2013).

and ecology. The most common categorization is by degree of movement, from highly nomadic through transhumant to agro-pastoral (Table 3). Pastoralists make substantial contributions to the economy of developing countries, both in terms of supporting their own households and in supplying protein, both meat and milk, to villages and towns. Pastoralism is a successful strategy to support a population with the limited resources of land.

The pastures and forests are utilized for grazing under following traditional livestock rearing/grazing systems :

- I. Transhumance systems
- II. Nomadic systems
- III. Semi-sedentary and
- IV. Sedentary systems

Transhumance systems : Systems that differ from semi-sedentary systems in that the grazing is cyclical beginning at the end of winter with flocks and herds leaving lowland grazing areas where permanent villages are located and moving to mountain pastures for grazing during summer. Latitudinal transhumance occurs in tropical climates where the cyclic movement is under the influence of alternating wet and dry seasons.

Nomadic systems : Systems based on extensive movement of herds and flocks in search of forage, led by human family units with no permanent home base.

Semi-sedentary systems : Systems based on a village permanently occupied by women and children from which herds and flocks, usually tended by men and boys,

are absent for extended periods of time in search of forage.

Sedentary systems : Grazing systems managed at a particular location(s) by resident management. May be managed by either or both extensive and intensive grazing managements and can include rangeland, pastureland, cropland and forestland within the grazing system (Allen *et al.*, 2011).

Transhumant pastoralists migrate continuously from one place to another in search of herbage and moderate climate. The migratory routes are well defined and also the grazing areas are demarcated for different groups. Transhumants that migrate from summer pastures to winter pastures with their flocks have some sort of living arrangement at both the places and use tents as shelters during ascending or descending. Transhumance is the regular movement of herds between fixed points to exploit seasonal availability of pastures. In hills, the transhumant pastoralists follow a cyclical migratory pattern from cool highland valleys in summer to warmer lowland valleys in winter. In the terms of ecological adaptations, the two most significant factors for transhumance are seasonal severity of winters, associated with presence of territorial use of highland and lowland pastures. Nomadism is viable in the extreme hot and cold. Changpas are nomads of Changthang in Ladakh region who raise herds of yak and flocks of sheep and *pashmina* goats. However, their animals are not raised on any cultivated fodder crops but survive exclusively on natural pastures (Table 4).

The sedentary system of livestock rearing is practised by the farmers living between an altitude of 1000 and 2500 m. In this zone all the cultivable land is utilized

Table 3. Myths and realities about pastoralism in the Himalaya

Livestock are the cause of environmental degradation.	1. Nature-livestock interactions are positive. 2. Livestock contribute to ecological integrity in an agroecosystem.
Overgrazing is the major reason of rangeland degradation.	1. Illicit felling, construction works, annexation for non-pastoral uses are the major reasons for rangeland degradation. 2. Grazing is a socio-ecological phenomenon.
Zero grazing is the pre-condition to regenerate forest areas.	1. Natural advantages of moderate grazing are accrued to nature as well as to livestock. 2. Approach to stop grazing is insensitive.
Maintaining rangelands is uneconomic and these areas can be turned into more productive areas.	1. A large chunk of land should be covered with vegetation for ensuring goods and services on sustained basis. 2. Any other use of the rangeland ecosystems would prove detrimental to the fragility-ridden mountains.
Pastoralists are greatly responsible for ecological degradation in the mountains.	For pastoralists, livestock are manures, insurance against losses, cushions against risks, efficient converters, source of social prestige and part and parcel of their culture.
Pastoralists cannot contribute to rangeland improvement.	1. Pastoralists traditional range management strategies are innovative and time-tested. 2. Transhumance (Spatial and temporal).

Source : Singh and Gaur (2008).

for cereal cultivation, while the livestock is let loose in the forests and sub-alpine pastures for grazing. The grazing continues for about 10 months in a year. During peak winter months of December and January crop residues and conserved tree leaf fodder are fed to the livestock.

Semi-sedentary system of livestock rearing is practised by the farmers living below 1000 m altitude. The farmers of this zone generally hire professional graziers who collect the livestock and take these to pastures and forests in sub-alpine and alpine zones during summer (Table 5). The livestock is brought back during autumn and is stall fed on crop residues and conserved tree leaf fodder during winter (Misri, 1988; Grela and Sharma, 1991; Shah, 1992).

Strategies for Strengthening Rangeland Resources

The various issues that impact the strengthening of rangeland resources in the state are due to various gaps that exist in the policy, administrative and research frameworks. Some of the major gaps are :

Policy level : The absence of pasture management and

grazing policy at national/state level have rendered the pasture lands, including village commons and unculturable wastes, open to developmental, societal and grazing pressures. Large chunks of such lands have experienced change in land use due to transfer for developmental projects, land grants to landless, plantations on degraded pastures and bringing of such lands under irrigated cultivation at the expense of traditional agro-forestry practices.

Institutional level : There is no single designated agency to steer the management of grazing lands and fodder resources in the country. It has resulted in the land use agencies and research organizations pursuing their own different agendas towards management of grazing lands in the country.

Resource level : There is acute deficit of fodder in the country with livestock especially that are dependent upon open grazing. No wonder that productivity of the sector is low. Apparently, fodder development on grazing lands has not received due attention over the past.

Management level : Since most of the fodder and

Table 4. Major pastoralists of Jammu & Kashmir

Name of the community	Composition of livestock/animals	Type of pastoralism
Bakarwal	Mainly goats, sheep, horses, dogs	Transhumance
Gujjars	Cattle and buffaloes, sheep, horses, dogs	Semi-sedentary and sedentary
Chopans and Gaddies	Mainly sheep	Semi-sedentary
Changpas	Pashmina goats, sheep and yak	Nomadic

Source : Tyagi and Vinod Shankar (1995), Manju Suman (2005) and Mahanta *et al.* (2013).

grazing resources are available on forests and common lands, a perception has emerged amongst the resource users and resource managers that management of these lands is the sole responsibility of the government. The erstwhile robust village institutions towards community management of such areas have broken down and these have come to be seen as belonging to all with control by none. This has resulted in gradual deterioration of these lands as nobody's baby. The local stakeholders have been, by and large, kept outside whatever little management initiatives taken in respect of these lands. With the growing appreciation about the role of local communities in the management of natural resources, the grazing land management also needs to be undertaken in collaboration with the local communities.

Research level : There are a number of research studies pertaining to the productivity and carrying capacity of the grazing lands. However, most of these studies are fragmented and are difficult to apply on large scale towards grassland ecology. Similarly, there is a need to develop better understanding on the impacts the changing land use, animal husbandry, social and environmental conditions are having on the resource.

The Way Forward

The rangelands of Himalaya are the most neglected

ecosystems (Table 6). These seldom occupy significant place in the research diasporas, institutional policies, plans and development programmes. There is an urgent need of sustainable use and maintenance of forage resources (native range, forest, pasture, and agricultural/orchard lands) in such a manner that :

- incorporates both scientific and indigenous systems of management;
- meets the optimal needs and desires of the households and communities (increased livestock and/or crop production, water availability, and forest products); and
- does not disrupt the integrity of the ecosystem.

There is a need to evolve area specific grazing plans in a participatory manner involving the local and migratory graziers, animal husbandry department, tourism department, forest department, agriculture department, sheep husbandry so that some of the heavily degraded grazing lands could be brought under a recovery plan. Involvement of pastoral communities in the improvement and management of pastures is important. They need to be educated about the better management practices in order to realize twin benefits of sustainable livestock and rangeland production.

Table 5. Fodder resources of Jammu & Kashmir : Constraints and strategies

S. No.	Sources	Constraints	Strategies
1.	Grasses and legumes (from forests, orchards, pastures, agricultural land, grazing lands, wastelands, alpine grasslands)	Low yielding grasses, deterioration of pasturelands, overgrazing and encroachment	Grass production from forest areas can be increased many-folds by introducing higher yielding varieties of grasses, pasture development activities and development of hortipastoral systems.
2.	Cultivated fodder crops (oat, berseem and alfalfa)	Less area under fodder crops	Extra agricultural land should be brought under fodder crop cultivation.
3.	Fodder tree leaves (fodder trees, bushes & perennial herbs)	More emphasis given to poplars, certain trees are lopped for fuelwood only	Establishing silvipastures, screening of top feed resources, farmers should be provided with saplings of popular fodder trees.
4.	Crop residues (rice, wheat and barley straw, maize stover, etc.)	Paddy straw in Kashmir valley used in packaging of fruits. Crop residues are low in forage quality, storage needs more space, wastage due to faulty system of feeding	Chopping of all kinds of fodders before feeding to livestock increases intake, enhanced palatability and zero wastage, using of feeding troughs, baskets or mangers, fortification of straws and other dry fodder with urea, common salt and jiggery, conversion into compact feed blocks to convenient size and weight.

Table 6. Suitable pasture species for different zones

Zone	Grasses	Legumes
Temperate zone	<i>Dactylis glomerata</i> , <i>Festuca arundinacea</i> , <i>Lolium perenne</i> , <i>Phleum pretense</i> , <i>Bromus</i> <i>unioloides</i> , <i>Phalaris</i> spp., <i>Poa pratensis</i> , <i>Lilium multiflorum</i> , <i>Avena sativa</i>	<i>Trifolium pretense</i> , <i>T.</i> <i>repens</i> , <i>Onobrychis</i> <i>viciifolia</i> , <i>Medicago sativa</i> , <i>Trifolium alexandrinum</i>
Intermediate zone	<i>Dactylis glomerata</i> , <i>Festuca arundinacea</i> , <i>Lolium perenne</i> , <i>Dicanthium annulatum</i> , <i>Chloris gayana</i> , <i>Chrysopogon fulvus</i> , <i>Heteropogon contortus</i> , <i>Avena sativa</i>	<i>Trifolium alexandrinum</i> , <i>Stylosanthus hamata</i> , <i>Macroptelium atropurpureum</i>
Sub-tropical zone	<i>Dicanthium annulatum</i> , <i>Chloris gayana</i> , <i>Chrysopogon fulvus</i> , <i>Heteropogon contortus</i> , <i>Cenchrus ciliaris</i> , <i>C. setigerus</i> , <i>Paspalum notatum</i>	<i>Trifolium alexandrinum</i> , <i>Stylosanthus hamata</i> , <i>Stylosanthus scabra</i>
Cold arid zone	<i>Festuca arundinacea</i> , <i>Avena sativa</i> , <i>Phalaris</i> spp.	<i>Medicago sativa</i> , <i>Medicago</i> <i>falcata</i>

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