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Grasslands in India: problems and perspectives for sustaining livestock and rural livelihood

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Abstract. In India, grazing-based livestock husbandry plays an important role in the rural economy as around 50% of these animals depend on grazing. Pasturelands over an area of 12 million ha constitute the main grazing resources that are available. Temperate/alpine pastures are spread across altitudes higher than 2000 m in eastern and Western Himalayas including the Jammu & Kashmir, Himachal Pradesh, Uttaranchal, West Bengal Arunachal Pradesh and Sikkim states. In Himachal Pradesh, Jammu & Kashmir, Meghalaya, Nagaland and Arunachal Pradesh, the grazing land availability is as high as 70 %. The area of pasture lands is lower in Himachal Pradesh (36.4%), Sikkim (13.3%), Karnataka (6.5%), Madhya Pradesh (6.3%), Rajasthan (5.4%), Maharashtra (5.1%), and Gujarat (4.5%), where cropping intensities are higher. Nearly 30 pastoral communities in hilly or arid/semi-arid regions in northern and western parts of India, as well as 20 in temperate/hilly regions, depend on grazing-based livestock production. Based on their migratory habits, the nomadic tribes are classified into 4 groups, viz., (1) total nomadism; (2) semi-nomadism; (3) transhumance; and (4) partial nomadism. Due to overgrazing coupled with poor management and care, these grazing land have deteriorated to a large extent and they need amelioration or rehabilitation. Technologies have been developed, refined and tested in various research and academic institutions. These technologies need to be implemented on a large scale in different parts of the country for augmenting forage resources, enhancing milk production and sustaining livelihood options in eco-friendly manner.

Keywords: Grazing land, pastoralism, nomadic pastoralism, grazing resources, mixed farming.

Introduction

In India, agriculture is characterized by the traditional predominance of a mixed farming system, a well-knit combination of crop production and livestock rearing. Livestock rearing is a major source of income providing employment and livelihoods for rural families. Livestock production is the backbone of Indian agriculture contributing 4% to national GDP and providing a source of employment and the ultimate livelihood for 70% of the population in rural areas.

India's livestock sector is one of the largest in the world. Livestock population is around 623 million and is expected to grow at the rate of 0.55% in the coming years. India has 56.7% of the world's buffaloes, 12.5% cattle, 20.4% small ruminants, 2.4% camel, 1.4% equine, 1.5% pigs and 3.1% poultry. The livestock population, over the years, has shown a steady growth on two broad fronts, namely (i) an increase in the number of stall-fed bovine livestock, including buffaloes and crossbred cows, owned mainly by people with arable land and resources to grow or procure green fodder, and (ii), an increase in the number of small ruminants like goats and sheep surviving mainly by free grazing the available pasture lands and tree foliage.

This latter category is the topic of this paper. Uncontrolled grazing pertains with the grazing systems of resource-poor households, landless pastoralists, nomadic and semi-nomadic tribes and marginal farmers. Between 84 to 100% of poor households gather food, fuel, fodder and fibre items from the 'common property grazing resources' (CPRs). These landless farmers graze their animals as well

as collect fodder from the CPRs. In this paper is described work to survey and update the distribution of the main grassland types of India, to define the current grazing methods, to summarise the overall state of the grassland-livestock systems, and to propose action to rehabilitate grassland areas.

Methods

A reconnaissance survey of the grasslands of India was conducted from 1954 to 1962, revealing 5 major grass covers based on distribution, primarily governed by climatic factors, latitude, altitude, topography and seasonal patterns of soil moisture (Dabadghao and Shankaranarayan, 1973). The five types were *Sehima - Dichanthium* grasslands, *Dichanthium - Cenchrus - Lasiurus* grasslands, *Phragmites - Saccharum - Imperata* grasslands, *Themeda - Arundinella* grasslands, and Temperate - Alpine grasslands.

Several previous studies and reports were used to draw conclusions for this paper. In recent studies, such as the monitoring and mapping of grasslands of the Himalayan region (Himachal Pradesh, Sikkim, Jammu and Kashmir states) during 2007-12, modern tools and techniques viz., GIS, RS, GPS and FSGT, were used in conjunction with ground truthing to assess the extent of grasslands and their productivity.

Grassland areas

Hill region

In Himachal Pradesh (IRSP6L3 2008), grasslands occurred on 16.5% of the total area. Grasslands occupied 15.3%,

21.6%, 18.0% and 15.3% of geo-climatic zones 1 (Low hill sub-tropical), 2 (Mid-hill sub-humid), 3 (Mid-hill temperate wet) and 4 (High hill temperate), respectively. The forage production from high hills was recorded as 4.0 t/ha/year (fresh weight) and 1.1 t/ha/year (dry matter), with an average crude protein content of 11.3%.

In Jammu and Kashmir (IRSP6L3 2009 and 2010 data), 4.3% of the total geographical area was under productive grasslands, whereas the area of other grazing lands, including scrub and other unpalatable swards, was 9.8% of the total. The areas under productive grasslands in Jammu, Kashmir and Ladakh were 3.5%, 13.2% and 5.8% respectively.

In Sikkim, the area under alpine pastures in the High hill zone was 7.4% of total geographical area, whereas it was 6.8% in the Mid-hill zone. About 36.5% of the total pasturelands (14.1% of the total area) were in various stages of degradation. About 44.6% of pasturelands at different altitudes and slopes in the Mid-hill zone were susceptible to soil erosion/depletion and/or landslides.

Temperate/Alpine, Sub-alpine meadows

The Indian Himalaya system comprises various mountain ranges which run parallel to each other. A tremendous diversity in ecology, terrain, altitude, climate, resource availability, ethnicity, agricultural activities, flora and fauna is found in the Indian Himalaya. Steep topography, prolonged and severe cold winter, shallow soil and lack of irrigation, etc., have limited the choice of agricultural activities and resulted in livestock rearing as one of the most important occupations in the region. The temperate/alpine pastures are spread across altitudes higher

than 2000 m in the eastern and western Himalayas including Jammu and Kashmir, Himachal Pradesh, Uttranchal, West Bengal Arunachal Pradesh and Sikkim states. The alpine and sub-alpine meadows suffer from general degradation, with an increasing incidence of non-palatable species and erosion due to overgrazing. These grasslands and pastures, besides being a major source of forage for livestock, also provide habitat for a large variety of wild animals and birds, and for endangered species of plants, many of which have an ethnobotanic value.

Tropical and Sub-tropical Grasslands

These are found mainly from high rainfall areas (Western Ghats) to arid/semi-arid areas including the terai and Gangetic plains. These areas are subjected to heavy grazing, which has resulted in their general degradation and very low productivity. Ecologically they belong to mid-successional/sub-climax type of grasslands.

Grassland management

Nomadic pastoralism, a traditional form of human-livestock-grassland interaction, is still predominant in the drylands of western India, the Deccan Plateau, and in the mountainous reaches of the Himalayas. There are nearly 200 castes engaged in pastoral nomadism. Pastoral nomads in India also specialize in the breeding of traditional animal sub-types. The types of livestock kept in mobile pastoral systems include buffaloes, sheep, goats, camels, cattle, donkeys, and yaks.

In India, pastoralists are integrated into the caste system, representing endogamous (discrete) social units specializing in animal husbandry (Tables 1, 2).

Table 1. Some important pastoralist communities in Indian Himalayan region (Sharma *et al.* 2003).

Pastoral communities	Area	Predominant livestock species
Bakarwal	Jammu and Kashmir	mainly goats
Bhotia	Uttarakhand, Garhwal, Kumaon- upper regions	sheep, goats and cattle
Bhutia	North Sikkim	sheep, goats and cattle
Changpa	Jammu and Kashmir, mainly in Zaskar	yak
Gaddi	Himachal Pradesh, Jammu and Kashmir	sheep and goats
Kinnaura	Kinnaur - Himachal Pradesh	sheep and goats
Gujjar	Jammu and Kashmir, Rajasthan, Himachal Pradesh	mainly buffalo, also cattle
Monpa	Tawang, West Kemeng of Arunachal Pradesh	yak and cattle
Van Gujar	Uttarakhand, Uttar Pradesh	buffalo

Table 2. Some important pastoral communities in Western India (Sharma *et al.* 2003).

Pastoral communities	Area	Predominant livestock species
Bharwad	Gujarat	sheep, goat, cattle
Charan	Gir forest region of Gujarat	cattle
Dhangar	Maharashtra, Karnataka and Madhya Pradesh	sheep
Gavli	Gujarat, Goa, Karnataka and Maharashtra	cattle
Gayri	southern Rajasthan (Mewar)	sheep
Ghosi	Bihar, Rajasthan and Uttar Pradesh	cattle
Golla	Andhra Pradesh and Maharashtra	cattle
Jath	Kutch region of Gujarat	cattle, occasionally camels
Mer	in the Saurashtra region of Gujarat	camels, also some cattle
Rath	western Rajasthan (Ganganagar, Bikaner)	cattle mainly of Rathi breed
Rebari/Raika	Rajasthan and Gujarat	camel, cattle and goats
Sindhi Sipahi or Sindhi Musalman	Marwar and Jaisalmer	mainly camels, also cattle and sheep

These pastoral groups are concentrated in certain regions such as the semi-arid and arid Thar desert region, salty marshy lands of Kutch, and the alpine and sub-alpine zones in the Himalayas. In mountainous areas, nomadic grazing descends in winter to the lower slopes and in summer it progresses up the hills to get the maximum benefit from the good pastures that regenerate after the snow melts. In plateaus, plains and desert areas, the pastorals move according to the alternation of the monsoon and dry seasons, in response to the availability of forage resources including tree fodder. Usually in the dry season they move to the coastal tracts, and leave when the rains come.

These grazing lands are suffering due to management neglect and have been invaded by non-palatable, invasive alien species like *Lantana*, *Eupatorium*, *Parthenium*, *Prosopis juliflora*, *Leucaena* and other species, severely impacting their productivity. The once robust village-level traditional institutions that ensured the sustainable management of grasslands have broken down and there is no responsible agency to look after the management issues (Anonymous, 2011). Neglect, poor maintenance and overgrazing have resulted in most of the grazing resources declining to a poor, degraded condition. In semi-arid areas, the carrying capacity is currently 1.0 adult cattle unit (ACU)/ha, whereas in the arid areas, it is 0.2-0.5 ACU/ha.

Many of the ecologically important, sensitive pasture lands viz. Shola grasslands of Nilgiris; Sewan grasslands of Bikaner, Jodhpur and Jaisalmer; semi-arid grasslands of Deccan; Rollapadu grasslands in the semi-arid tracts of Andhra Pradesh; Banni grasslands of Gujarat and Alpine grasslands of Sikkim and Western Himalaya, are already on the verge of no return.

Issues for consideration to revitalize grasslands

Several factors, including the involvement of multi-stakeholders, a lack of participation of pastoral people in decision-making and in Government initiatives, overgrazing, and a lack of sufficient extension resources have hampered the revitalization of Grasslands or CPRs. Some of the following points require attention, in order to achieve the rehabilitation of grazing lands, which are a source of livelihood for a large population:

- A national policy, involving various stakeholders, is

needed for the targeted rehabilitation and development of grazing resources (fodder and pasture).

- A responsible agency must be designated and funded to carry out and coordinate various research, educational and extension projects on fodder and pasture development for the CPR areas.
- Ecologically sensitive grasslands need to be mapped and appropriate amelioration models/protocols developed, given a priority and implemented
- Fodder conservation strategies need to be explored and implemented to control animal numbers, meet the fodder requirement targets for use during low productivity periods, and prevent overgrazing.
- In the arid and semi-arid zones, the adoption of silvi-pastoral practices could be considered.
- In specific sub-regions, a network of nurseries and seed banks is needed for the rejuvenation of CPRs and grasslands
- The rejuvenation of degraded grasslands will require the best strategies for transferring technologies developed in institutes to the field situation, using participative methods that consult with and educate the pastoralists.

Conclusion

Much work has to be done to coordinate and implement processes and activities to the rehabilitate Indian grasslands. It is hoped that this paper will help create international awareness and support.

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