

Land surface characterization for identification and assessment of potential grazing lands in arid western Rajasthan, India

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Introduction

Grazing lands (non-arable terrestrial ecosystems) play a vital role in the rural economy and environmental conservation. Modern tools in which, GIS, GPS and satellite remote sensing play vital role in the assessment, characterization and management of grazinglands (Paul *et al.*, 2010). The present study aims to assess the physical conditions and distribution pattern of permanent pastures and other grazing lands in arid Rajasthan using remote sensing and GIS techniques. Though grazing lands do occur in a number of habitats, the study has focused on those sites which have water resources for its rational utilization for pasture/grassland development. Rapid advances in the areas of Remote Sensing, Earth Observations systems, data processing techniques and applications have facilitated users for a better understanding of terrain. One of the recent trends in remote sensing is its application in the extraction of terrain related parameters using large scale mapping and DEM generation. GIS and IRS data are used in inventory, assessment, characterization and management of grazinglands and estimation of forage production & supply-demand balance sheets (Singh *et al.*, 1997).

Materials and Methods

The study area, Jaisalmer district ($26^{\circ} 1' N$ to $28^{\circ} 2' N$ and $69^{\circ} 29' 50''$ to $72^{\circ} 20' 50'' E$), Rajasthan, is dominated with rocky plains surrounded by sandy uplands in the heart of eastern side of Thar Desert. IRS (Indian Remote Sensing) Resourcesat-1(IRS-P6) satellite images having Linear Imaging Self-Scanner (LISS-IV) camera in multi-spectral bands (Mx) with a spatial resolution of 5.86 m and a swath of 23 km, was used. Landforms map at a micro-scale (1:10,000) was generated using SOI toposheets and IRSP6L4 data. Elevation map was prepared using SRTM DEM (www.earthexplorer.usgs.gov). Although it represents a coarse resolution (90 m) but the representation at landscape level was found reasonably good. Thematic information on landforms, landuse (Permanent pastures and other grazing lands, land with scrub) and surface water resources has been extracted from available data (maps) and were finally overlaid using ArcGIS software. IRSP6L4 data rectified (radiometric and geometric correction, histogram matching and enhanced), classified and final Land Cover(LC) map generated after intensive GPS linked GT (ground truthing).

Results and Discussion

The study revealed that the region has three major geomorphic zones, viz., (1) the NW dune tract, (2) the central raised plateau and (3) the SE gravelly conglomerate with alluvial tract. It is dominated by terrain having sand dunes over 56.79% areas. There are several inland saline depressions at Lawan, Jhalariya, Pokaran, Mitha Rann, Khara Rann, Kanodwale Rann and Kharariwala Rann; few major ephemeral channels; NW flowing Sukri, SW flowing Lik and Kakani and some well recognized low lying areas called khadins. Water is scarce and depth of groundwater varies from 20-50 m in the north to 35-49m in NW of Pokaran. In comparison to human population density (17/ km², 2011 census), livestock population is higher (83/ km², 2012 census). Sheep and goats account for 84% of total livestock. Grazing lands in the district occur almost in all habitat conditions.

In the present study the selected sites are having khadins (low lying depressions), playas (saline depressions), buried /ephemeral streams, nadis (village ponds) and canal sites. Based on geomorphic characteristics, surface water distribution and LC following potential sites were identified for grazing lands:

- Open scrubs and pasturelands in central and northern rocky/gravelly plains with low lands in Sri Mohangarh-Lanera- Roopsi-Loudarva-Dedha-Kakab-Hada-Joga-Bharamsar (elevation, 150-200 m),
- Saline depressions or playa lands with open scrubs in Lanela-Hadda-Deuga (elevation, 140-150 m),
- Pasture land around buried and ephemeral river system in Chhatrel-Roopsi-Loudarva sector (elevation, 160-170m), and

- Open grazing lands in the North of Ramgarh having canal water facilities. Looking at the high evaporation loss and very low rainfall regimes, available surface runoffs and moisture conditions in these sectors needs to be sustainably used for better health of grazing land resources.

Conclusion

Based on available information on trees-grass-shrubs relationship and GIS based thematic inventory, the above mentioned habitat sites has been found to have great potential for development of pasture and forage resources. Further, these sites can be best utilized for any development plan involving livestock improvement and regeneration / conservation of native vegetation/ biodiversity of the region.

References

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