IDENTIFYING CONSERVATION VALUES: A CASE STUDY IN TRANS-HIMALAYAN REGION OF THANPATTAN, LAHAUL-SPITI, HIMACHAL PRADESH.

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ABSTRACT

The rugged topography, harsh climate and limited livelihood options have resulted in pastoralism being the predominant land use in the Himalayan landscape. To identify the most significant sites in this landscape, we employed the concept of 'High Conservation Value Areas' (HCVAs) in Thanpattan, one of the largest pastureland in Lahaul-Spiti. We have examined this region as a potential HCVA, providing information on biological diversity, pastoralism and related threats. The Gaddi community of Chamba and Bharmour districts relies on these pastures for their livelihoods, and several threatened flora and fauna species also call the area home. We found that Thanpattan fulfils all six criteria for HCVAs and is undoubtedly an HCVA due to its biodiversity values and the dependency of the indigenous communities on the region.

Key words: pastoralism, pastureland, Gaddi community, livestock grazing

INTRODUCTION

Mountainous areas have socio-economic, aesthetic and ecological significance, not only for the people living there but for those living beyond, especially those in the lowlands who benefit from its ecological services (Wester et al., 2019). The Himalayan ecosystem in India is of critical importance for its biodiversity and ecosystems. It also forms an important life-support system for many remote and agro-pastoral communities that depend on it (Ning et al., 2013). The Trans-Himalayan region spanning over 2.6 million km^2, including the Tibetan Plateau and the Tibetan marginal mountains, represents an ecosystem where major parts of the area have been utilised for traditional pastoralism and agro-pastoralism for several millennia (Handa, 1994; Schaller, 1998). This region also harbours wild herbivores, such as the Asiatic Ibex (*Capra sibirica*), Bharal (*Pseudois nayaur*) and predators such as the Snow Leopard (*Panthera uncia*), as well as a unique assemblage of medicinal and aromatic plants. However, these mountainous ecosystems are under severe threat due to the high dependence of local communities. In the Himachal landscape, large tracts of the mountains are heavily grazed by livestock adversely impacting the wild prey population even within the protected areas (Bhatnagar et al., 2008; Suryavanshi et al., 2013). Domesticated herbivores at high densities remove significant quantities of forage (Namgail et al., 2007) and cause inter-specific competition with wild ungulates leading to further decline in their population (Ghoshal, 2017). Negative interaction with humans involving carnivore species like Snow Leopard and Tibetan Wolf (*Canis lupus*) has been reported in the Trans-Himalayan landscape, mainly due to the damage they cause to domestic livestock (Fox et al., 1988; Mallon, 1988; Oli et al., 1994).

Considering the threats prevalent in such a rich yet fragile ecosystem, identification of high conservation value areas (HCVAs) in these vast landscapes is necessary. The HCVA approach demarcates areas based on six criteria, namely species diversity, landscape-level ecosystems, ecosystems and habitats, ecosystem services, community needs and cultural values (Brown et al., 2013). High conservation value (HCV) as a concept focuses on the conservation of biodiversity in its entirety instead of directing all efforts towards conservation of

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one species. This study helps understand the biodiversity values as well as the potential threats prevalent in the region. The HCVA approach is designed to maintain or enhance environmental and social values in production landscapes. The HCVA encompasses regions that are crucial due to their significant ecological, biological, social or cultural significance, as stated by Areendran et al. (2020). The HCVA theory and its evaluation focus on a few critical attributes such as ecological and socio-economic factors (Jennings & Jarvie, 2003) and offer a framework that can be employed by policymakers, landscape conservation planners, conservationists and forest managers (Ibie et al., 2016). This concept can be applied across various ecosystems. HCVAs not only target biodiversity value but also human values, in the form of identifying areas crucial for local communities in a region (HCV 5), as well as the cultural values (HCV 6) of a region. Thus, it involves a continuous process of stakeholder consultation throughout the identification, monitoring and management phases, resulting in a comprehensive outcome (Brown et al., 2013).

In this study we have attempted to identify values and important areas without the need for a resource-intensive study by using few criteria and limited data generated from a questionnaire survey of local communities and rapid surveys across the region.

The study had two objectives (1) to assess the biodiversity values and evaluate the region's potential for HCVAs based on known HCVA criteria and (2) to identify the primary threats in the pastoral landscape.

STUDY AREA

The study was carried out in the Thanpattan pastureland, which spans approximately 570 km² and is located in the Lahaul Valley of Lahaul-Spiti district in Himachal Pradesh (Figure 1). The Lahaul-Spiti district is situated between the Pir Panjal ranges of the Greater Himalayas and the Trans-Himalayas (Aswal & Mehrotra, 1994), covering an area of around 6,700 km². The climate in this region ranges from dry temperate to alpine, and the area is snow-covered for approximately six months each year. The temperature ranges from -19° to 32° C, and the region receives an average snowfall and rainfall of 120–400 cm and 10–300 mm per year, respectively. The landscape is characterised by high, steep and undulating terrain and diverse land cover types, such as coniferous forests, alpine and subalpine vegetation, grasslands and agricultural land (Joshi et al., 2006). The mammalian fauna in the area includes Snow Leopard, Asiatic Ibex and Musk Deer (*Moschus* sp.). The local communities in the area are predominantly Hindus and Buddhists who depend on local biodiversity for subsistence. Agriculture and pastoralism are the primary

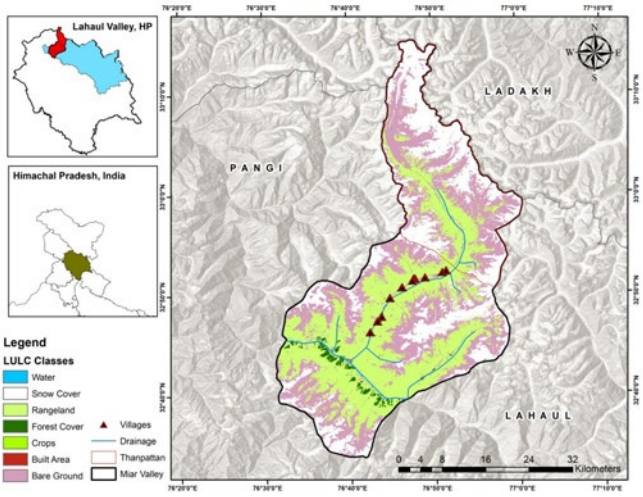


Figure 1. Study Area: Thanpattan pastureland in Miar Valley, Lahaul-Spiti district, H.P.

livelihood activities, with two types of livestock in the Lahaul Valley: non-migratory domestic animals kept by residents in permanent villages in the lower hills, and migratory transhumant herding groups of Gaddi communities, primarily from Chamba and Bharmour districts, who visit the pastures of the valley to graze their livestock at higher elevations during the summer season.

METHODS

Thanpattan is one of the largest known grazing land in the district of Lahaul-Spiti, as well as the state of Himachal Pradesh, however very few studies relate to the area (Dev et al., 2005; Dev et al., 2009). We aimed to evaluate the conservation value of the landscape by utilising the HCVA approach, which considers important aspects of biodiversity conservation. We employed two tools, namely stakeholder consultations through questionnaire surveys and field surveys to validate available environmental data.

Rationale and approach for assessment of the HCVs

Identification and maintenance of the high conservation values (HCVs) of a landscape or a region is the main concept of HCVAs; it encompasses exceptional or critical ecological/biological attributes, ecosystem services and social as well as cultural values (Table 1) (Jennings, 2004). The first three HCV categories, HCV 1: species and diversity, HCV 2: landscape-level ecosystems and HCV 3: rare, endangered and threatened ecosystems and habitat, focus on the ecological and biodiversity values of utmost importance; HCV 4: ecosystem services, focuses on the supporting and regulating services; HCV 5: community needs and HCV 6: cultural values, these criteria emphasise the importance of basic needs of the local communities which might be dependent on the area, as well as the cultural beliefs of the indigenous community.

Table 1 Description of the six HCV criteria used in the current study (from Jennings, 2004)

HCV criteria	Description
HCV 1	Species and Diversity: Regions/areas containing globally, regionally or nationally significant concentrations of biodiversity values. In the current scope of study, the following has been considered as HCV 1: • A high overall species occurrence or diversity within a defined area. • Sites supporting rich biodiversity of high value medicinal and aromatic plants in the landscape.
HCV 2	Landscape-level Ecosystems: Areas with large landscape or ecosystems that are sufficiently large and relatively undisturbed, enough to support viable populations of the naturally occurring species. The following rules have been adapted and considered as HCV 2: • Large areas that are relatively far from human settlement, roads or other access. • Areas that form or are part of a linkage between larger forest/meadow complexes and can thus provide connectivity between fragments for the movement of animals from one complex to another.
HCV 3	Rare, Endangered and Threatened Ecosystem and Habitat: Areas with rare, threatened or endangered ecosystems or habitat. The following rules have been adapted from Jennings & Jarvie (2003) & Brown et al. (2013), and considered as HCV 3: • Naturally rare ecosystems, facing higher risk of extinction and heavy dependency of local communities that may have decreased or would lead to decline in their extent in near future.
HCV 4	Ecosystem Services: Areas which are providing supporting and regulating ecosystem services that are necessary like protection of water catchments and control of erosion. The following rules have been adapted from Jennings & Jarvie (2003), Brown et al. (2013) and considered as HCV 4: • Forests/Meadows that are necessary for maintaining terrain stability and controlling erosion. • Areas providing supporting & regulating services in the form of water catchments & alpine meadows.
HCV 5	Community Needs: Areas with sites and resources fundamental for satisfying the necessities of local communities or Indigenous people. The following rules have been adapted from Brown et al. (2013) & the HCVF Toolkit Bulgaria (2016), and considered as HCV 5: • Areas where livestock raising is done on a small or subsistence scale and there is a presence of permanent or nomadic pastoralists grazing their livestock. • An area from where local communities obtain essential fuelwood, food, fodder, medicines (medicinal and aromatic plants) or building materials.
HCV 6	Cultural Values: Areas with sites, resources, habitats and landscapes of global or national cultural, historical significance, or religious/sacred importance for the traditional cultures of local communities. The following rules have been adapted from Brown et al. (2013) and considered as HCV 6: • Sites recognised as having a high cultural value for the local communities of the region. • Sites with official designation by the national government and/or an international agency like Archaeological Survey of India/UNESCO. • Religious or sacred sites with recognised and important historical or cultural values or that have importance to local or Indigenous people like sacred groves, monastery and/or sacred lake.

Literature review

To gain insights into the ecological and biological diversity of the landscape, we conducted a literature review related to biodiversity in the Trans-Himalayas and north-west Himalayas, as well as the concept of high conservation value (HCV) forests/areas. We searched for keywords such as the Trans-Himalayan landscape, north-west Himalayas, Lahaul Valley, Thanpattan pastureland, HCVAs, biodiversity and conservation. We used data from grey literature that had been collected through standard methods such as species distribution modelling and quadrat vegetation sampling.

Questionnaire survey

To collect data for the study, group discussion sessions were organised, and a semi-structured open-ended questionnaire (Supplementary Online Material 1) was used to gather information. The Thanpattan pastureland is part of the Miar Valley located in the northernmost part of the valley, and 14 villages were identified for the study. Of these, 11 villages were sampled for the group discussion sessions (Supplementary Online Material 2). On average there were 12 participants per session , with representation of varying socio-economic statuses. The exclusion of some areas from the study was due to either a small village population or the unavailability of informants during the survey. A total of 129 informants

Table 2 Criteria used to determine the potential range of various species in the landscape

Species name	Elevation	Habitat type
Himalayan Musk Deer	2800–3800 m	Alpine scrubs & forested areas > 2800 m
Himalayan Brown Bear	3000–4000 m	Sub-alpine and alpine areas
Asiatic Black Bear	1200–3000 m	Open forested areas
Asiatic Ibex	3200–5400 m	Slope >30 degrees, rugged terrains, cliffs
Snow Leopard	3200–5400 m	Alpine regions & snow bound areas

participated in the discussion sessions, representing 129 households. In the sampled villages, a total of 251 households were recorded.

The categories of respondents interviewed included Forest Department officials, livestock herders, former hunters, medicinal plant collectors, tourist guides and community-based organisations such as youth groups and local women's groups. The questionnaire focused on gathering information on wildlife presence in the landscape, human–wildlife interaction, associated impacts, and the dependency of local people on natural resources. To understand the distribution and presence of different plant species of value to communities and biodiversity, a questionnaire-based survey was conducted with key informants, including medicinal plant collectors/cultivators, Forest Department officials, and herbal healers known locally as amchis. The presence of various mammalian species was confirmed by the respondents using pictorial guides (Menon, 2014; Prater, 1965), which showed images of different carnivore and mountain ungulate species that occur in the landscape.

Field validation

To validate and verify the biodiversity values of the Thanpattan pastureland in Miar Valley, a field visit was conducted. The entire study area was surveyed systematically, and rapid surveys were performed to cover maximum areas. Expert knowledge from local informants, encounter trails, interview-based data collection, and available published or grey literature were utilised during the surveys. The presence or absence of different medicinal and aromatic plants was assessed by recording the species present in the region, taking photographic records and collecting plant samples for identification.

A combination of direct and indirect methods was used to understand the distribution of mammalian species, where indirect evidence such as animal faeces (pellet groups, scats, droppings) and tracks (pug marks, hoof marks, scrapes) were recorded, and direct sightings of animals were also observed. Thirteen trails, each approximately 1 km in length, were surveyed in Thanpattan (Supplementary Online Material 3).

Distribution mapping of the mammalian species: To understand the distribution and habitat utilisation of various mammalian species present in the region, rule-based maps for some selected species in the landscape such as Snow Leopard, Asiatic Ibex, Asiatic Black Bear (*Ursus thibetanus*), Tibetan Wolf (*Canis lupus*), Musk Deer and Himalayan Brown Bear (*Ursus arctos*) were prepared. These maps were generated based on factors such as elevation range, slope, land use land cover (LULC), aspect and preferred habitat type for each species, drawing upon information from previous studies (Bhatnagar et al., 2008; Fox et al., 1992; Ghoshal, 2017; Sathyakumar, 2001; Sathyakumar et al., 2015) (Table 2) (Supplementary Online Material 4).

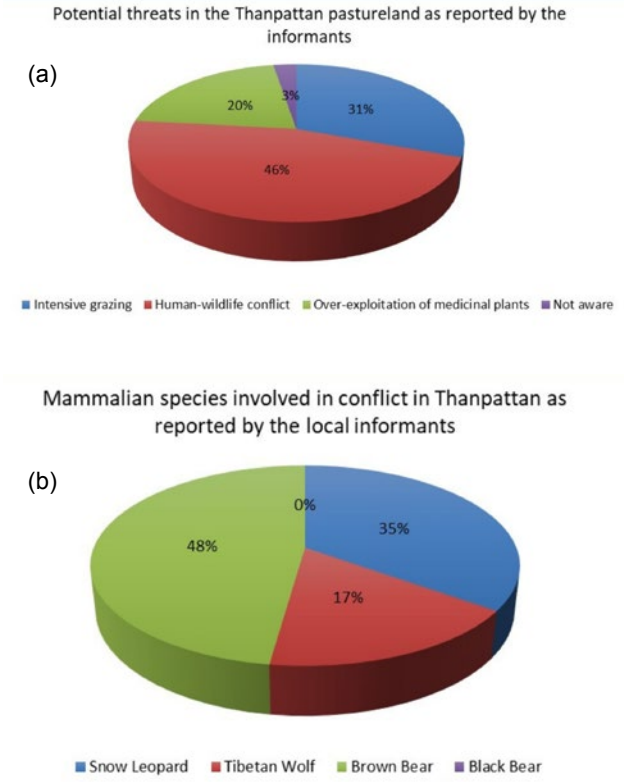


Figure 2 Pie chart representing (a) percentage of potential threats in the pastureland as reported by the informants, and (b) percentage of different mammalian species involved in conflict in the landscape. A total of 129 participants representing 129 households in the valley were consulted, and in the villages sampled for the study, a total of 251 households were recorded in the valley.

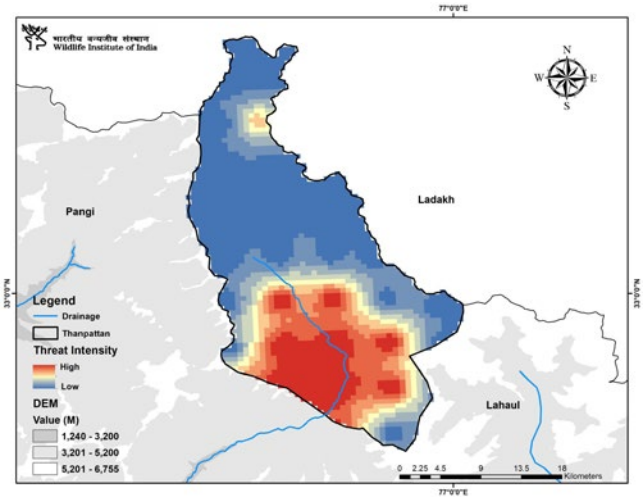


Figure 3. Threat intensity map of the Thanpattan pastureland extrapolated based on threats identified in the landscape. Intensity refers to the severity of the threat. Intensity for human–wildlife conflict has been assessed on the basis of the number of species involved in conflict in the area, and for over-exploitation of medicinal plants, it has been assessed by surveying areas rich with medicinal plants and the most exploited regions for either personal use or trade respectively. For grazing it has been assessed on the number of livestock visiting the pastures as per the consultation with the local community and the Forest Department officials.

Threat evaluation

To evaluate the level of threats in the Thanpattan pastureland, information was gathered on the type and severity of threats such as human–wildlife conflicts, overgrazing and resource exploitation. The study population consisted of local and migratory herders, medicinal plant collectors, residents and Forest Department officials (Figure 2, Supplementary Online Material 5). The intensity of human–wildlife conflicts was assessed based on the number of species involved in conflicts in the area, while the over-exploitation of medicinal plants was evaluated by surveying areas rich in medicinal plants and identifying the most exploited regions for personal use or trade. Grazing pressure was estimated by consulting with the local community and Forest Department officials on the number of livestock visiting the pastures.

To map the threats in the Thanpattan pastureland, grids of 5 x 5 km size were generated along with their respective centroids. The centroids were assigned numeric values based on the intensity of threats, which were rated on three levels – high, medium and low, or as no data. The rating was done in consultation with key informants. To calculate the threat level in the landscape, the Kernel density tool was used with an output raster cell size of 500 x 500 m, and the relative threat level attribute was used as the weighting function (Figure 3).

RESULTS AND DISCUSSION

Biodiversity values in the landscape

Lahaul is home to a diverse range of 23 mammal species, of which six are considered threatened, with two species classified as vulnerable (VU), one as critically endangered (CR), two as endangered (EN) and one as near threatened (NT) (Joshi et al., 2020). Among the notable species found in this region are predators such as the Snow Leopard, Himalayan Brown Bear, Tibetan Wolf and Himalayan Red Fox, as well as herbivores like the Asiatic Ibex and Himalayan Musk Deer. The Thanpattan pastures are located in close proximity to the Sechu Tuan Wildlife Sanctuary of Pangi, Chamba, and the Union territory of Ladakh, serving as a crucial corridor for species with extensive range requirements. This area plays a vital role in maintaining connectivity and home ranges for the Snow Leopard and other key species within the landscape. Prominent avifaunal species and medicinal plants found in the region have been listed in Table 3.

Migratory herders of Thanpattan valley – the Gaddi community

In northern and western regions of India, seasonal and migratory pastoralism is a common practice among transhumant tribes who typically graze their livestock, mainly sheep and goats, in higher altitudes of alpine ranges during the summer months (Bhasin, 2011; Saberwal, 1996). The Gaddi community, comprising over 100,000 people, have a long-standing tradition of practising transhumant pastoralism in the Himalayan region of Himachal Pradesh, where they move up to alpine pastures during the summer and descend to lower

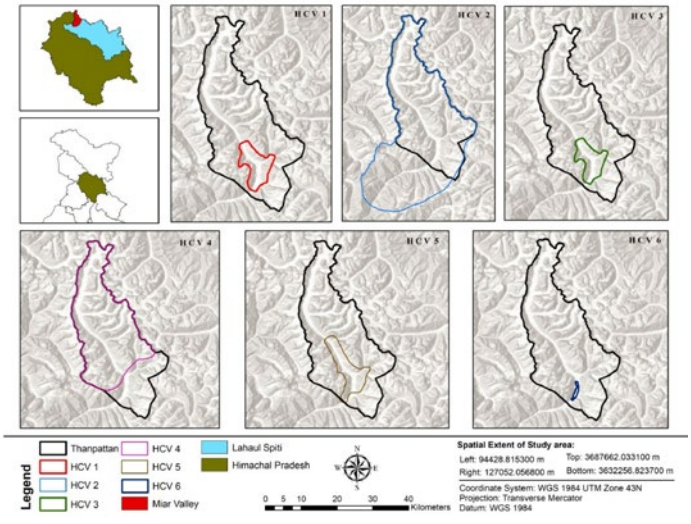


Figure 4. Map representation of various potential HCV areas as identified in the Thanpattan – Miar Valley of the Lahaul Valley, Himachal Pradesh

Table 3 The biodiversity and socio-cultural values associated with the pastureland of Thanpattan as per the six HCV criteria

HCV criteria	Description
HCV1 – Species and Diversity	1. Faunal species, as reported by key informants, in the area are Snow Leopard, Asiatic Ibex, Himalayan Musk Deer, Himalayan Brown Bear, Tibetan Wolf, and Royle's Pika. 2. A few of the important medicinal plant species recorded in the area are *Picrorhiza kurroa*, *Meconopsis betonicifolia, Aconitum violaceum, Betula utilis, Caragana sp., Aconitum heterophyllum, Rheum sp., Podophyllum hexandrum* and *Zurinea dolomiaea.* 3. *Alectoris chukar* (Chukar), *Tetraogallus himalayensis* (Himalayan Snowcock), C*uculus canorus* (Common Cuckoo), *Pyrrhocorax pyrrhocorax* (Red-billed Chough), *Pyrrhocorax graculus* (Yellow-billed Chough), *Eremophila alpestris* (Horned Lark), *Troglodytes troglodytes* (Eurasian Wren), *Cinclus cinclus* (White-throated Dipper), *Phoenicurus leucocephalu* (White-capped Redstart), *Phoenicurus ochruros* (Black Redstart) and *Motacilla citreola* (Citrine Wagtail) are a few of the avifaunal species reported from the region (Ebird, 2018).
HCV2 – Large Landscape-level Ecosystems	1. Thanpattan pastureland lies in the northern extent of the Miar valley, far from human settlement and roads. Khanjar village is the last village of the Miar valley near Thanpattan. 2. The valley shares its boundary with Sechu Tuan Wildlife Sanctuary of the Pangi valley on the western boundary and pastures of Pattan valley (Lahaul valley) on the eastern boundary, and Ladakh in the north and is critical for maintaining connectivity of home ranges for Snow Leopard and associated key prey species.
HCV3 – Ecosystem and Habitat	1. As the region lies adjacent to the Sechu Tuan Wildlife Sanctuary, it is important from an ecosystem and habitat viewpoint as well, as it serves as a habitat for top-predator species including threatened species like Snow Leopard and Himalayan Brown Bear. 2. The large areas of sub-alpine scrubs and forested tracts surrounding the region serve as a habitat for wild-prey species including an endangered species i.e., Himalayan Musk Deer & the undulated terrain supports substantial populations of Asiatic Ibex.
HCV4 – Ecosystem Services	1. In Thanpattan, near Zardong, amidst the meadows lies a grove of around 100 Betula utilis trees. The vast alpine meadows and the sub-alpine scrubs of the pastureland assist in prevention of natural hazards (floods and landslides) and help in carbon sequestration and storage in biomass and soil. 2. Forested areas help in regulating the flow of water within a catchment, prevent soil erosion and provide natural resources (e.g., fodder plants) for energy production and construction. 3. The alpine meadows and the forested patch of the region provide biodiversity values as well as ecosystem services in the form of supporting and regulating services.
HCV5 – Community Needs	1. The resident livestock herders of the adjoining Miar valley, utilise the southern part of the pastureland to graze their livestock in the summer season. 2. Thanpattan, being the largest grazing patch of Lahaul valley, is an area of high importance for herders of the Gaddi community of Chamba and Bharmour districts, who are highly dependent on the pastures for grazing their livestock for two to three months in the summer season. 3. For each herder of the Gaddi community visiting the pastures of Thanpattan during the summers, these grazing permits are issued by the Forest Department for a span of three years.
HCV6 – Cultural Values	1. The demarcated area in the Thanpattan pastureland has a *Gompa* which is of religious significance for the local community of the valley. 2. It is believed by the locals that before entering the pastureland they must pay their respect at this *Gompa* for a safe journey.

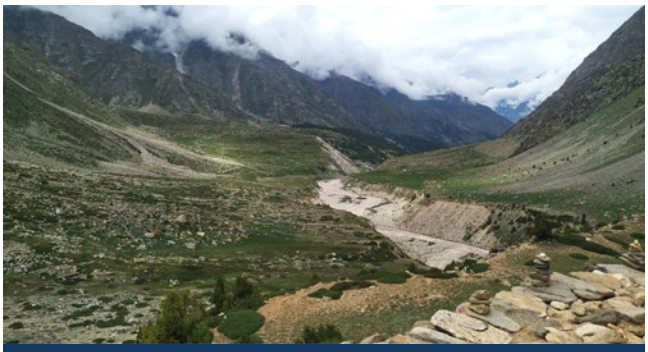
elevations in the winter due to snow cover at higher altitudes (John & Badoni, 2013; Saberwal, 1996). The Thanpattan region is of great significance to the local livestock herders and Gaddi communities of the Chamba and Bharmour districts. The grazing rights were given by British officials to the herders in the 1870s. These rights to pastureland were formalised by issuing grazing permits to the communities (John & Badoni, 2013). For each herder of the Gaddi community visiting the pastures of Thanpattan during the summers, these grazing permits are issued by the Forest Department for three years. The grazing area of the Gaddi community is spread over three ecological zones, with distinct pasture types: subtropical grazing of the lower hills; sub-temperate pastures of the middle hills; and alpine pastures of the high hills (Bhasin, 2011). It is an important source of revenue in the case of the high-altitude ranges of the Himalayas. The land revenue generated as grazing dues is collected from the Gaddi community, and its collection has been entrusted to the Forest Department since 1953 (Pandey, 1991) (Supplementary Online Material 6). The Gaddi community's herders typically use the pastures at lower elevations for around one month before moving up to the adjacent area. The intensive grazing has an impact on the availability and depletion of medicinal plants in the region, but herders also gather rare medicinal plants from the alpine pastures and distant forests. While high-value medicinal and aromatic plants are mainly extracted from the valley for marketing, a portion is also kept for personal consumption (Bhasin, 2011).

Thanpattan as an HCVA

Thanpattan, in Miar Valley is a pastureland of high importance in the district of Lahaul-Spiti, as well as the state of Himachal Pradesh (Dev et al., 2005). The area was assessed against the six HCVA criteria and fits all six. The associated value of the pastureland for each high conservation value category is outlined in Table 3 with the approximate distribution of each given in Figure 4.

Potential threats and challenges

Livestock grazing: The Gaddi community's herders use Thanpattan's pastures for grazing their livestock during the summer season, typically for two to three months. The Forest Department issues grazing permits to these herders, but according to key informants, the number of livestock allowed on each permit often exceeds the permissible limit. This overstocking not only compromises herd production, but also causes weed invasion, rangeland degradation and undermines conservation efforts in areas where livestock and wildlife coexist (Mishra et al., 2001; Tyagi & Singh, 1988).



The landscape of rangeland of Thanpattan © Dharani M

Livestock trends in the Thanpattan pastures also suggest that selective grazing and overstocking are leading to competition for limited resources and the depletion of palatable forage available for wild ungulates. Furthermore, intensive grazing by domestic livestock is causing the destruction of high-value medicinal plants. In the cold deserts of the Trans-Himalayas, domestic livestock is known to deplete the density and diversity of wild herbivores by imposing resource limitations and competitive exclusion of the species (Bagchi et al., 2004). Thirty-one per cent of the total respondents interviewed also identified intensive grazing as an issue in the landscape.

Identifying areas of high conservation value assists in identifying the regions being used the most for grazing, and sensitive regions can be protected to allow regeneration. This information is crucial for taking steps to revive the region and also for yielding information about areas that must not be disturbed by anthropogenic activities.

Disease transmission: As reported by key informants, the presence of transhumant tribes in the region has led to a higher likelihood of contact between domestic and wild animals, resulting in the spread of diseases from domestic livestock to wild ungulates in the valley. This transmission of diseases between wild and domestic animals has become a growing concern over time (Gortázar et al., 2007; Johnsingh et al., 1999).

Human–wildlife conflict: is an inevitable issue that arises from coexistence between wildlife and humans in the same region, and is exacerbated when wildlife is deprived of its natural habitat due to anthropogenic disturbances (Bhatnagar et al., 2008). According to forty-six per cent of the informants, human–wildlife conflict is a pressing issue in the landscape, with livestock depredation by large carnivores, Himalayan Brown Bears and Snow Leopards being the most common.

Over-exploitation of medicinal and aromatic plants: is also a critical issue in the study area, with 20 per cent of respondents reporting it as a concern. This pressure on medicinal plants has increased due to commercialisation

Gaddi herder © Shiv Kumar

and rising demand in the market, driven by the growing human population (Maikhuri et al., 2003). The herders of the region are known to extract medicinal plants from the alpine pastures of Thanpattan and adjoining forests of the valley (Bhasin, 2011). However, premature harvesting of rare and endangered therapeutic medicinal and aromatic plants by both local and migratory herders and outsiders, as well as excessive grazing pressure in high altitude rangelands of Thanpattan, threatens the survival of these species in parts of the region.

CONCLUSION

The high conservation value concept stresses the importance of involving local stakeholders in both the process and systematic survey of proposed sites, as well as making them an integral part of the decision-making process to facilitate participatory management. Thanpattan satisfies all six criteria of HCVAs, making it an area of significant importance for biodiversity values and the dependency of Indigenous communities, particularly the Gaddi community, on the region. Identifying such HCVAs is essential for more innovative and inclusive conservation, including other effective area-based conservation measures (OECMs), and for working towards the Kunming-Montreal Global Biodiversity Framework. Identifying such areas can be useful in fulfilling both the country's and global targets for 30 by 30 (Target 3) that aims for 30 per cent of the world's terrestrial, inland water, and coastal and marine areas to be effectively conserved by 2030 through the systems of protected areas and OECMs.

However, anthropogenic activities have increased pressure on pastures, causing damage to biodiversity and the livelihood of herders. Training forest officials and local communities on new fronts like wildlife monitoring, wildlife law, and legislation is needed to mitigate these pressures. Additionally, implementing pastureland management schemes like demarcation of areas for livestock grazing within the pastures of Thanpattan would avoid competition, regulate pastureland degradation, and prevent the spread of diseases between livestock and ungulates. Medical camps near entry points for the Gaddi community could help with disease surveillance. Achieving primary conservation goals of managing human–wildlife conflict and regulating livestock grazing and resource-use would only be possible with the active participation of the Forest Department and development of a suitable conservation plan.

Although stakeholder consultations were conducted and surveys were carried out in the landscape, there are some limitations to our data because of the inaccessibility of the landscape for most of the year and the small datasets for highly elusive species like the Snow Leopard. Although our study identified connectivity between various areas and regions that species with large home ranges could use, we could not determine the specific wildlife corridors used by species. Despite these caveats, our research reveals that the landscape supports numerous threatened species, and we have identified the intensity of threats in the proposed HCVAs. To plan rangeland management actions for domestic livestock and wild herbivores, we suggest conducting a detailed study and assessment on grazing impacts and their control. We did identify potential areas under HCV 4 – ecosystem services but lacked the data required to properly quantify the areas.

SUPPLEMENTARY ONLINE MATERIAL

1. Questionnaire
2. List of villages where surveys were conducted
3. Map of Thanpattan pastureland showing survey effort
4. Rule-based distribution maps for the selected mammalian species for Thanpattan, Miar Valley, Lahaul.
5. Threats reported for each village
6. Revenue collected and migratory livestock recorded in Lahaul Valley, Himachal Pradesh

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Khanjar Village in Miar Valley of Lahaul Tehsil is the last village in the valley, after this the pastureland of Thanpattan starts © Dharani M

RESUMEN

La accidentada topografía, la dureza del clima y las limitadas opciones de subsistencia han dado lugar a que el pastoreo sea el uso predominante de la tierra en el paisaje del Himalaya. Para identificar los lugares más significativos de este paisaje, hemos empleado el concepto de "Áreas de Alto Valor de Conservación" (AAVC) en Thanpattan, el mayor pastizal de Lahaul-Spiti. Hemos examinado esta región como un AVC potencial, proporcionando información sobre la diversidad biológica, el pastoreo y las amenazas relacionadas. La comunidad Gaddi de los distritos de Chamba y Bharmour depende de estos pastos para su subsistencia, y varias especies amenazadas de flora y fauna también tienen su hogar en la zona. Descubrimos que Thanpattan cumple los seis criterios de los AVC y es sin duda un AVC debido a sus valores de biodiversidad y a la dependencia de las comunidades indígenas de la región.

RÉSUMÉ

La topographie accidentée, le climat rigoureux et les moyens de subsistance limités ont fait du pastoralisme l'utilisation prédominante des terres dans le paysage himalayen. Pour identifier les sites les plus importants de ce paysage, nous avons utilisé le concept de "zones à haute valeur de conservation" (HCVA) à Thanpattan, le plus grand pâturage de Lahaul-Spiti. Nous avons examiné cette région comme une HCVA potentielle, en fournissant des informations sur la diversité biologique, le pastoralisme et les menaces qui y sont liées. La communauté Gaddi des districts de Chamba et de Bharmour dépend de ces pâturages pour sa subsistance, et plusieurs espèces de flore et de faune menacées ont également élu domicile dans la région. Nous avons constaté que Thanpattan remplit les six critères d'une HCVA et qu'il s'agit sans aucun doute d'une HCVA en raison de la valeur de sa biodiversité et de la dépendance des communautés indigènes à l'égard de la région.