



The Kailash Consortium of Academics and Researchers for Experience-sharing (Kailash CAFE)

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Contents

PAGE 5

Introduction

PAGE 5

Objectives

PAGE 6

Abstracts for oral presentation

PAGE 7

Perception of and knowledge on invasive alien plant species in Chandak-Aunlaghat and Hat-Kalika watersheds, Kailash Sacred Landscape-India: A case study

- Alka Chaudhary, Arti Kala, B.S. Adhikari, and G.S. Rawat

PAGE 8

Assessment of green fodder resource diversity, availability, utilization pattern, and women's drudgery: A case study of a representative watershed of the Kailash Sacred Landscape, India

- Bhaskar Ch. Joshi

PAGE 9

Tourism and rural livelihoods: A review of the tourism development programmes in the Khaptad region of Nepal

- Bhoj Raj Pathak and Kishor Aryal

PAGE 10

iHeritage – A citizen science mobile application for collecting the cultural heritage data in the Kailash Sacred Landscape

- Deepak Kumar Shah, Janita Gurung

PAGES 11-12

The trade potential of oils extracted from khabu (*Prunus davidiana*), ritha (*Sapindus mukorossi*), and timmurr (*Zanthoxylum armatum*) in the Kailash Sacred Landscape Area, Nepal

- Dipesh Pyakurel, Bijay Raj Subedee, Chandra Kanta Subedi, Janita Gurung, Ram Prasad Chaudhary

PAGE 13

Wood for thought? The untold consequences of 'Himalayan gold' collection in Kailash Landscape - Kesang Wangchuk, Binaya Pasakhala, Pradyumna Rana, Janita Gurung, Kamala Gurung, Prashant Thapaliya

PAGE 14

The breeding status of the Himalayan Griffon, *Gyps himalayensis*, for a decade in Baitadi District, Nepal

- Krishna Prasad Bhusal and Hiru Lal Dangaura

PAGE 15

Extraction, purification, and characterization of oils from wild apricot (*Prunus davidiana*)

- Meena Rajbandari

PAGE 16

Dendroecological and dendroclimatic study in the Api-Nampa Conservation Area, Nepal Himalaya

- Narayan Prasad Gaire, Ze-Xin Fan, Sanjaya Bhandari, Uday Kunwar Thapa, Santosh Kumar Shah, Dinesh Raj Bhuju

PAGE 17

Integrated landscape approaches to building resilience and multifunctionality in the Kailash Sacred Landscape, China

- *Peili Shi, Cheng Duan, Li Wang, Ning Wu, Rajan Kotru, Janita Gurung*

PAGE 18

Characterization of 'ritha' (*Sapindus murokossi*) seed oil for medicinal purposes

- *Prasamsha Panta, Chandra Kanta Subedi, Seema Sapkota, Rameshwar Adhikari*

PAGE 19

Mapping the hotspots and coldspots of cultural ecosystem services in the Kailash Sacred Landscape

- *Prashant Thapaliya, Janita Gurung, Gajendra Singh, Ujala Rajbhandari, Sunayana Basnet, Deepak Kumar Shah, Ashish Chaudary, Yubaraj Lama*

PAGE 20

An architectural reflection of the shared cultural heritage of the transhumance routes in Pithoragarh, India

- *Samiksha Srichandan, Ram Sateesh Pasupuleti, Anindya Jayanta Mishra*

PAGE 21

Forest-cover change in the north-western border districts of far-west Nepal

- *Sushila Rijal, Bhagawat Rimal, Pramod Pandey, Amar S. Dhami, and Ripu M. Kunwar*

PAGE 22

Building the resilience of women traders in the Kailash Sacred Landscape

- *Veena Vidyadharan and Chetna K. Rathore*

PAGE 23

Understanding the visual image of the Kailash Sacred Landscape: A GIS and computer vision perspective

- *Zhang Yucheng and He Jie*

PAGE 24

Abstracts for poster presentation

PAGE 25

Transforming livelihoods through agribusiness promotion: A case study from Pulan County, China

- *Siteng Jia*

PAGE 26

Essential oil of timmur (*Zanthoxylum armatum* DC): Chemical profiling and bio-activities

- *Achyut Adhikari*

PAGE 27

An assessment of the traditional techniques used by communities in the Kailash Sacred Landscape for minimizing human-wildlife conflict

- *Ajaz Hussain, B.S. Adhikari, S. Sathyakumar, G.S. Rawat*

PAGE 28

Religion as an entry point to communicate climate knowledge in the Kailash Sacred Landscape

- *Alice Millington*

PAGE 29

Local communities' perceptions and attitudes towards a transformed ecosystem: A case study from the Kailash Sacred landscape-India

-*Arti Kala, Alka Chaudhary, B.S. Adhikari and G.S. Rawat*

PAGE 30

'Invisible' indigenous beings: Sketching the exclusionary lifeworld of the Raji tribe

-*Bhawesh Pant*

PAGE 31

Climate change, natural hazards, and the relocation of human settlements: A case from Limi Valley in Humla, Nepal

-*Jan Kropáček and Astrid Hovden*

PAGE 32

Taking Nepal's utility-scale solar plants higher

-*Kushal Gautam*

PAGE 33

Infrastructural construction in western Nepal and its repercussions on human health

-*Saurav Dev and Ashhrik Pahari*

PAGES 34

Indigenous communities in sustainable eco-tourism: A case from Munsyari village, Pithoragarh, India

-*Zia Ul Haque, and Zulnoorain Khairoowala*

PAGE 35

Human-wildlife conflict in the lower Namkha region, Humla, Nepal

-*Tenzing Lama, Pema Tsoijom Lama, Rinzin Phunjok Lama*

PAGES 36-37

Knowledge Committee

Introduction

The Kailash Sacred Landscape Conservation and Development Initiative (KSLCDI) promotes transboundary cooperation and sustainable development in the Kailash landscape. This landscape is spread over 31,000 square kilometres across parts of China, India, and Nepal, around the sacred Mt Kailash. KSLCDI is currently in its second phase of this implementation with a focus on three components: transboundary cooperation; ecosystems management at scale; and resilient livelihoods.

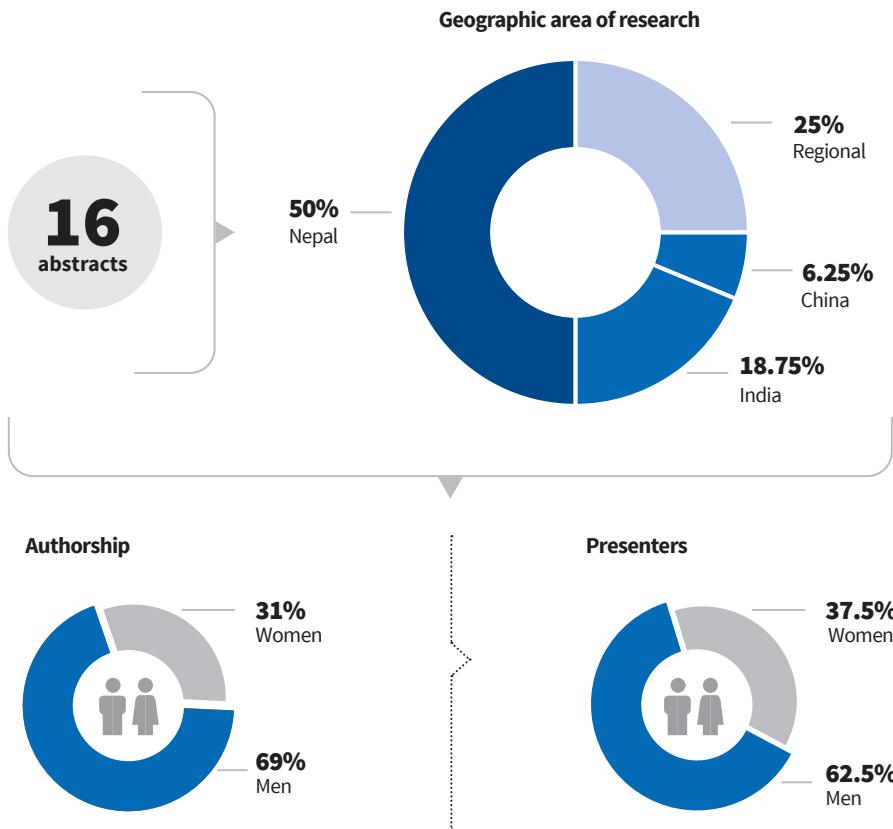
The COVID-19 pandemic has proven that physical distancing is no obstacle to interactions – exchange of information and ideas can be effectively achieved through digital platforms. These innovative platforms are low cost, time saving, and have a low carbon footprint. The Kailash Consortium of Academics and Researchers for Experience-sharing (Kailash CAFE) is a digital platform that brings together researchers working across multiple disciplines within the Kailash Sacred Landscape. It provides them an opportunity to share their findings with peers and other interested stakeholders, exchange ideas and methodologies, and explore research collaboration and networking opportunities. Researchers will also be able to assess ongoing research in the landscape, avoid duplication, and explore possibilities for joint research.

Objectives

The Kailash CAFE 2021 aims to achieve the following objectives:

- Share knowledge, research findings, and expertise
- Establish a platform for people-to-people exchange
- Identify regional research gaps to determine areas for future interventions

Abstracts for oral presentation



Perception of and knowledge on invasive alien plant species in Chandak-Aunlaghat and Hat-Kalika watersheds, Kailash Sacred Landscape-India: A case study

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Abstract

Invasive Alien Plant Species (IAPS) are the second most deleterious agents, after habitat destruction, in terms of species endangerment and extinction. Although there are 190 invasive plant species in the Indian Himalayan region, information on their distribution and perceived impact is lacking in the western part of the Himalaya. As many as 701 households from 45 villages of Chandak-Aunlaghat (329 households) and Hat-Kalika (372 households) watersheds were randomly selected under the Kailash Sacred Landscape (KSL-India) Initiative to get to know about the views of the residents on the issues associated with IAPS and the attitudes towards their management; this was done through questionnaire surveys. The knowledge, perception, use, and management strategies of different IAPS were analysed. Only 66 per cent of the inhabitants (39 per cent female and 27 per cent male) knew about IAPS. The respondents cited 14 different IAPS in the study area, of which *Ageratina adenophora* had the highest Relative Frequency of Citation (RFC) value; the informants from Hat-Kalika showed less knowledge and shared less with the members of their families in comparison to Chandak-Aunlaghat. Most of the respondents in the study area perceived IAPS negatively and rated biological invasion and habitat loss as one of the major environmental problems. Besides, most of the respondents (70 per cent) agreed that controlling IAPS would be necessary to conserve the environment and protect biodiversity. Restoration of habitat, eradication, education, and information were reported to be the major management strategies. Our findings have implications for stakeholders and policymakers for the management of IAPS as they highlight that informal education activities help in raising public awareness about invasive species.

Keywords: Citation frequency; Invasive; Perception; Knowledge Richness Index; Management strategies

Assessment of green fodder resource diversity, availability, utilization pattern, and women's drudgery: A case study of a representative watershed of the Kailash Sacred Landscape, India

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Abstract

In hilly regions, fodder plays a significant role in various areas like crop, livestock, manure, the soil nutrient cycle in traditional smallholdings, and in supporting the goods and services of the ever-growing needs of farmers. In this region, the people are highly dependent on the fodder extracted from forests, grasslands, agriculture, and agroforest land. With the resource of fodder being so significant to the hilly regions, the present study was attempted at the Hat-Kalika Watershed district (Pithoragarh) of Uttarakhand, India; the watershed was also selected as a pilot site under the Kailash Sacred Landscape Conservation and Development Initiative. During the study, nine villages were selected which were located at an altitude of 800–1800 masl. A total 57 fodder species were recorded, of which 29 were trees, nine shrubs, six climbers/ lianas, and 13 forbs/grass. Most of the fodder species (66.84 per cent) were being sourced from the forests and through the agroforestry system by local community members. Information on the diversity of green fodder, availability and utilization pattern, and women's drudgery assessment will be helpful in designing appropriate strategies and a management plan for the watershed in the future.

Keywords: Fodder diversity; PU; RUI; Nativety; Watershed

Tourism and rural livelihoods: A review of the tourism development programmes in the Khaptad region of Nepal

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Abstract

The consideration of both cultural and economic factors is crucial for the sustainable development of mountain people. Tourism is one of the major economic sectors of countries like, which that possesses pristine landscapes and unique cultural endemism. In the case of the Khaptad region, despite being a culturally unique and potentially powerful economic region of Nepal, it has rarely been studied from the perspective of tourism and rural livelihoods. While various policy and programme interventions have been carried out to promote tourism development, the livelihoods of the mountain people living in the Khaptad region have not changed substantially. In this context, we aim to review the tourism development programmes in the Khaptad region and their impact on the livelihoods of the local people. Based on policy review, the review of tourism development programmes, and key informant interviews, we analyse the impact of tourism on rural livelihoods. Despite the enormous potential for tourism in the region, we found weaknesses in the existing institutional arrangement and a lack of strategic programmatic intervention to tap the potential. The share of tourism activities in enhancing the livelihoods of the mountain people was found to be sparse compared to other means of livelihood. The tourism activities driven by the private sector seem to have potential, but their real benefits have not penetrated into the rural households. Although the private sector is crucial to tourism development, procedural relaxation and strategic interventions from the government are mandatory to uplifting tourism activities and redistributing the benefits from tourism to the local households.

Keywords: Impact; Livelihoods; Mountain people; Nepal; Tourism development

iHeritage – A citizen science mobile application for collecting the cultural heritage data in the Kailash Sacred Landscape

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Abstract

The Kailash Sacred Landscape is rich in cultural heritage, which is one of its significant features. Mount Kailash, sacred to at least four religions, is the defining cultural feature of the landscape, but there, are also several cultural and spiritual heritage sites located there, which have received less attention. Documenting such sites is important, and engaging “citizen scientists” in this process can be an effective method of acquiring information. The iHeritage mobile application was developed to acquire local-level data on cultural and heritage sites. The application was developed for Android OS using Dart language and Flutter framework. It has three main components: mobile application; application programming interfaces (APIs); and database. The APIs connect the mobile application to the database by sending the collected data to the server. The iHeritage application has been prepared in three languages – English, Hindi, and Nepali – in order to engage the community-level citizen scientists. The first field application version was based on the Survey123 Connect for ArcGIS and deployed in Pithoragarh, India, in December 2018 and Dharchula, India, and Gokuleshwor and Khalanga, Nepal, in February 2019. More than 68 points were collected during this period. Some learnings from the field implementation included difficulties in finding the GPS signal, coarse location, a lack of knowledge to interact with maps, old versions of Android OS, and confusion in the labels of the text fields. Moreover, Survey123 Connect is confined in terms of limited customization; hence, many users faced difficulties while installing and accessing the iHeritage application on Survey123. Based on these learnings, a stand-alone application is currently being developed with simple, icon-based, and responsive features to ease the data collection. Citizen science can play an important role in bridging the data gap in the area of cultural heritage in the landscape.

Keywords: Android; Citizen science; Cultural heritage; Mobile application; Technology

The trade potential of oils extracted from khabu (*Prunus davidiana*), ritha (*Sapindus mukorossi*), and timmur (*Zanthoxylum armatum*) in the Kailash Sacred Landscape Area, Nepal

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Abstract

There is potential to expand the trade in medicinal and aromatic plants (MAPs) from Nepal. Currently, 80–90 per cent of Nepali MAPs are exported to more than 50 countries worldwide in their crude form. The prospects of export of secondarily processed MAPs have been discussed but the progress is slow, both in Nepal and across the Kailash Sacred Landscape (KSL). This paper analyses the trade and prospects or secondary processing of vegetables oils like ‘khabu’ (*Prunus davidiana*) and ‘ritha’ (*Sapindus mukorossi*), and the essential oil of ‘timmur’ (*Zanthoxylum armatum*) in the KSL area. A wide range of literature was referred to and telephonic interviews were conducted with traders and exporters in order to collect information on the traded value, volume, and prospects of trade in these three species. Khabu is a non-native species found abundantly in Humla district of KSL. Khabu oil is traded along with ‘chuli’ (*Prunus armeniaca*) at the market price of NPR 3,000/kg and the estimated traded volume was between 2–3 tons in 2020. Ritha is native to Nepal, mostly domesticated, and found predominantly in Baitadi, followed by Darchula and Bajhang of the KSL area. Crude rittha is one of the highly traded MAPs of Nepal (1,225–2,520 tons per annum), but the trade in ritha oil has, till date, not commenced in Nepal. Timmur is also native to Nepal, mostly domesticated and cultivated. The estimated annual volume of trade in crude timmur in and from Nepal was 1,400–1,700 tons and about 25–30 tons per annum from the KSL area. The oil extracted from timur fruits are exported to India and European countries. The market price of *Zanthoxylum* oil ranges between NPR 13,000–16,000/kg. There are no records of processing of *Zanthoxylum* oil in the

KSL area as all are traded in the crude form. The study concludes that there are prospects for khabo oil in cosmetics and ritha oil in biofuel, but a few issues need to be addressed, such as the inclusion khabo in the royalty list to legalize the trade in khabo oil and further research on the yield and trade potential of ritha oil as well as developing an efficient technology to process it. Likewise, for *Zanthoxylum* oil, technological advancement in terms of low-cost and efficient technology is needed to extract superior quality oil with a higher yield.

Keywords: Bajhang; Baitadi; Darchula; Essential oils; Humla; Medicinal and Aromatic Plants; Vegetable oils

Wood for thought? The untold consequences of ‘Himalayan gold’ collection in the Kailash Landscape

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Abstract

Yartsa gunbu or the caterpillar fungus is a highly valued resource in the Hindu Kush Himalayan (HKH) countries of Bhutan, China, India, and Nepal. Every year, the caterpillar fungus collectors harvest fuelwood from the alpine shrublands to meet their energy needs for cooking and heating. The fuelwood harvesting continues unabated and its long-term impact on the alpine ecology is still less understood. A questionnaire survey and fuelwood measurements were conducted during the summer of 2019 at “open” and “closed” collection sites in the Kailash Sacred Landscape of Nepal. The objectives were to estimate the fuelwood consumption by collectors and the key factors influencing fuelwood consumption in the two sites. Thirty collectors at each collection site were selected randomly for the study. The open site had a greater number of people in a tent, a longer length of stay, and a greater amount of fuelwood consumption. The length of stay at the open site far exceeded the recommended length of about a month for collecting the caterpillar fungus, while the length of stay at the closed site corresponded to one month. The open site also had a daily consumption of over six kilograms of fuelwood and the closed site had a daily consumption of about four and a half kilograms of fuelwood. A greater number of people in a tent positively correlated with more women, which positively correlated with a greater amount of fuelwood consumption. The study results suggest that the current practices could deplete the alpine shrublands and could harm the caterpillar fungus. There is a need to introduce an alternative fuel, along with strict reinforcement of regulations on fuelwood harvesting.

Keywords: Caterpillar fungus; Fuelwood; Hind Kush Himalaya; Kailash Landscape; Natural resources

The breeding status of the Himalayan Griffon, *Gyps himalayensis*, for a decade in Baitadi District, Nepal

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Abstract

The Himalayan Griffon (*Gyps himalayensis*) is a globally threatened vulture species found in the cliffs of the mid-hills and Himalaya of Nepal. This species has faced a moderately rapid decline in its population due to the impacts of the use of Diclofenac in livestock treatment, a drug that has caused drastic decline in other *Gyps* species and appears to be fatal to this species when ingested. We studied the breeding status of the Himalayan Griffon at its prominent nesting sites in Khodpe, Siddheswor, in Baitatdi district from 2010 to 2020 and also monitored its nests during its breeding season from October to May each year, visiting them at least three times every season. The number of active nests correlated with the number of “success nests”; however, the rate of breeding success varied from 60 per cent in 2018 to 90 per cent in 2011. The highest number of active nests, 13, was recorded in 2012 and the lowest of 8 was recorded in the years 2013 and 2019 during the study period. The number of active nests declined steadily from 2017 (n=12) to 2020 (n=9). With the aim to conserve vultures, Baitadi district was declared a Diclofenac-free district on 20 December 2012 and there have been community and school awareness programmes around the nesting sites. However, the number of active nests has not increased perhaps because of the limited number of nesting places in the cliff. The poisoning of carcasses, electrocution, forest fires, and the general cruelty of people were observed as threats to the vultures in the area. This colony is one of the few remaining breeding sites that can provide baseline information about vultures in the Kailash Sacred Landscape. Thus, we recommend the conservation and continuous monitoring of this species so as to understand their breeding biology, the changing patterns in their population, and the effect of climate change in the Himalaya.

Keywords: Active nests; Breeding success; Diclofenac; Himalayan Griffon; Monitoring

Extraction, purification, and characterization of oils from wild apricot (*Prunus davidiana*)

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Abstract

Vegetable oil plays a significant role in pharmaceutical and cosmeceutical industries. Traditionally, the oil of wild apricot (*Prunus davidiana*) is extracted manually; it is first ground using a pestle and mortar and then hand-pressed into a paste. The oil thus obtained is used as a traditional cure for arthritis and joint pain. In this research, the finely crushed kernels of *Prunus davidiana* were successively extracted with n-hexane, ethyl acetate, and methanol. The extracts were investigated for their specific gravity, saponification value, acid value, iodine value, antioxidant activity, and antibacterial activity. The hexane extract was analysed for fatty acid composition by using the gas chromatography–flame ionization detection method. The results of this investigation revealed that the yield of apricot-fixed oils were quite low than that reported in literature. Other physical and chemical parameters were comparable with the reported data. However, for quality assessment, a detailed investigation is needed.

Keywords: Antioxidant; Antibacterial; Chemical composition; Oil extracts; Physico-chemical parameters

Dendroecological and dendroclimatic study in the Api-Nampa Conservation Area, Nepal Himalaya

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Abstract

The Nepal Himalaya is experiencing rapid climate change with adverse impacts on multiple sectors. The Api-Nampa Conservation Area (ANCA), part of the Kailash Sacred Landscape, is also experiencing rapid climate change; however, there is limited knowledge on how the diverse forest ecosystems of the region are responding to this rapid change in climate. Therefore, we carried out a dendroecological and dendroclimatic study in ANCA in Darchula district with an aim to explore the impacts of climate change on the forest ecosystem and to reconstruct the past, long-term climate of the region. Tree-core samples were collected along the elevation transect (1,400–3,800 masl) by selecting more than 10 tree species, including both conifer and broad leaf species, and their climatic sensitivity was analysed. The treeline dynamics study revealed species-specific regeneration and the recruitment pattern of treeline-forming species, indicating stand densification as well as possible upward shifting of the treeline position. We developed tree-ring width chronologies spanning 200 to 567 years. The climate-growth response analysis revealed that the growth of the studied species was mainly limited due to moisture stress during spring or spring summer seasons, thereby revealing a positive relationship with precipitation and a negative one with temperature. However, there were some differences in climatic sensitivity among the studied species, indicating differential vulnerability of the species to climate change. Our three-century-long spring season drought index reconstructions indicate increasing drought over time. Further studies, involving multiple tree species and using multi proxy tree-ring parameters, will give a better picture of the climatic sensitivity and vulnerability of the diverse forest ecosystems in the Kailash region in the context of climate change.

Keywords: Climate change; Climate reconstruction; Dendroecology; Growth-climate relationship; Tree rings

Integrated landscape approaches to building resilience and multifunctionality in the Kailash Sacred Landscape, China

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Abstract

Climate warming-induced rangeland degradation in arid and semi-arid steppes imposes substantial threats to the livelihoods of people. This threat can be addressed by combining all sectors of agriculture, animal husbandry, and tourism through their complementarity, i.e., by adopting an integrated landscape–ecosystems-based approaches. A number of experiences and lessons have been imbibed in a specific sector for its successful development, but not in the multiple social, economic, and ecological systems. In this study, we use the perspective of integrated ecosystems management to strengthen crop–livestock integration and innovative livelihoods, and propose a multifunctional Kailash landscape to activate the interlinkages among agriculture, animal husbandry, and heritage pilgrimage and tourism in order to achieve a multifunctional socio-ecological system. A case study of the Kailash Sacred Landscape Conservation and Development Initiative in China was quantitatively and qualitatively analysed on the basis of land-use and land-cover change and its consequences on multiple ecosystem services. Integrated landscape management was found to be effective in building the resilience of socio-ecosystems by reducing the vulnerability of traditional agriculture in terms of improving crop production and animal husbandry. A multifunctional landscape is expected to be integrated so as to build a resilient sectoral complementarity that includes farming, pastoralism, and environmental and socio-economic functions. The analyses show that integrated landscape approaches provide an effective perspective for sustainable socio-economic development in this landscape. It highlights the importance of landscape-scale ecosystem-based adaptation to environmental change.

Keywords: Building resilience; Ecosystem-based adaptation; Integrated landscape management; Kailash Sacred Landscape; Multifunctional landscape

Characterization of ‘ritha’ (*Sapindus murokossi*) seed oil for medicinal purposes

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Abstract

Sapindus mukorossi is one of the valuable medicinal plants found in the tropical and subtropical regions of Asia. Its nuts are commonly called ‘ritha’, ‘aritha’, soapnut, and washnut, and obtained from a deciduous tree found in altitudes ranging from 200–1,500 masl in Nepal. The highest concentration of oleic acid (a triglyceride) that is present in soapnut enhances its property as an emulsifier. One kernel of soapnut contains 25–30 wt.-% of fatty acid and approximately 85 wt.-% of triglyceride and sterol. For centuries, soapnut oils have been used in the hilly regions of the Hindu Kush Himalaya for different cosmetic, pharmaceutical, and medicinal purposes. In this study, fixed oil of soapnut was prepared via the Soxhlet extraction method using hexane as a solvent and characterized by gas chromatography and mass spectroscopy. For the antioxidant assay, the IC₅₀ value of the soapnut oil was found to be 0.39607 µL/mL. The oil was finally utilized to formulate skin-care products, namely cream and shampoo. In our paper, we discuss the potential of the soapnut ingredients in developing local, small-scale enterprises.

Keywords: Antioxidant; Bioprospecting; GC-MS analysis; Skin-care product; Soapnut

Mapping the hotspots and coldspots of cultural ecosystem services in the Kailash Sacred Landscape

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Abstract

Cultural ecosystem services (CES) are derived from landscape features that have cultural, spiritual, religious, or recreational values. Understanding the distribution of CES can contribute to their management. However, as CES are intangible and non-material, mapping their spatial distribution is a challenge. The hotspots and coldspots of CES were mapped in the Kailash Sacred Landscape (KSL) using a combination of field data and geospatial analysis. CES were categorized into nine components following its definition by the Millennium Ecosystem Assessment, and each component was further characterized by indicators that were mapped as either point, line, or polygon data. These indicators were collected using a combination of Google Earth/Maps, literature review, field data, OSM, and iHeritage application. Geo-statistical analyses were conducted using Moran's I and Getis-Ord Gi* statistics to identify CES hotspots. CES in the KSL have a clustered pattern ($Z\text{-score}=14.20$ and $P\text{-score}=0.001$) where 19 per cent of the area fell under CES hotspot and 26 per cent fell under CES coldspot with a 95–99 per cent confidence level. The major hotspot areas are located around Mount Kailash in the Tibet Autonomous Region of China and the town of Pithoragarh in India, whereas the major coldspot areas are located in Baitadi and Bajhang districts of Nepal. These results are a function of the current availability of ground data and indicate the need for a more systematic process of acquiring field data, especially from the coldspot areas mapped through this study. The spatial distribution of CES can be used to prioritize research and management interventions for a lesser studied ecosystem service in the landscape.

Keywords: Ecosystem services; Getis-Ord Gi*; Mapping; Non-material benefits; Spatial clustering

An architectural reflection of the shared cultural heritage of the transhumance routes in Pithoragarh, India

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Abstract

Known as the land of the Bhotiyas, the Johar, Darma, Chaudans, and Byans valleys of Pithoragarh once formed the cultural confluence between the Tibet and the Terai regions. Seasonally moving between two sets of residences in the lower and upper valleys, the Bhotiyas people created routes in the challenging mountainous terrains that became major socio-cultural and economic drivers over the years. Through centuries, these transhumant routes shaped the relationships between people, animals, and the ecosystem, and facilitated cross-border cultural exchanges. All such complex associations reflect through the architectural transformations of the shared cultural heritage of these internally displaced migrant communities. This paper aims to provide an insight into the architectural reflections of shared cultural heritage and the diverse relationships developed by the Bhotiyas with the ecosystem along the transhumance routes. This work is based on archival research, primary field visits, oral history narratives, and architectural documentation. It also attempts to place these “transhumant routes” within the framework of “cultural routes” in order to establish their cultural significance by highlighting their capacity to connect and create interrelationships.

Keywords: Heritage; Cultural routes; Transhumant route; Shared heritage

Forest cover change in the north-western border districts of far-west Nepal

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Abstract

Forests are an integral part of human livelihoods as they provide multiple ecosystem services; however, they are affected by climate change, anthropogenic pressures, and management practices. Therefore, investigating the change in forest cover is imperative to balanceing human–environment interactions. This study has analysed and-use change patterns with a particular focus on forest-cover change in four north-western border districts of Nepal using Landsat satellite images collected between 1986 and 2018. The results show that the study area is witnessing a gradual expansion of forest cover, settlement, and grassland at the expense of cultivated land and waterbodies. However, the change is disproportionate at the district level. Indigenous communities such as the Byansi and Raute were found living in the remote areas where the forest cover is high. We found that the increase in forest cover was the result of indigenous forest management practices coupled with the consequences of outmigration, agroforestry, and reduced consumption of firewood and fuelwood.

Keywords: Byansi; Darchula; Forest area; Land-use change; Remote sensing

Building the resilience of women traders in the Kailash Sacred Landscape

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Abstract

Women traders in the Hindu Kush Himalaya are involved in the informal sector and also take part in cross-border trading. They are often exposed to various problems like natural calamities, geo-political tensions prevailing in cross-border trade, inadequate institutional support, and suboptimal infrastructural facilities. The situation got aggravated in the aftermath of COVID-19 when the borders were closed, the production units were shut down, and travel restrictions were imposed. This paper presents the findings of a study conducted in the Kailash Sacred Landscape. About 57 respondents took part in the survey conducted in Pittoragarh and Dharchula (India), and Lipulekh and Darchula (Nepal); this included women entrepreneurs and traders. The survey results have been supplemented with literature review, key informant interviews, and focus group discussions at the field level. The findings revealed that more than 90 per cent of the respondents were working in the informal sector; and that climatic shocks, natural disasters, and geopolitical tensions were the major factors affecting their business. The closure of the border markets and the lack of supply of raw materials were the major challenges faced during the pandemic. Strengthening the supply and value chains of niche products, organizing training programmes on financial literacy and digital technology, and promoting border markets are some of the measures that could build the resilience of women traders.

Keywords: Border; Informal sector; Resilience; Shocks; Women

Understanding the visual image of the Kailash Sacred Landscape: A GIS and computer vision perspective

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Abstract

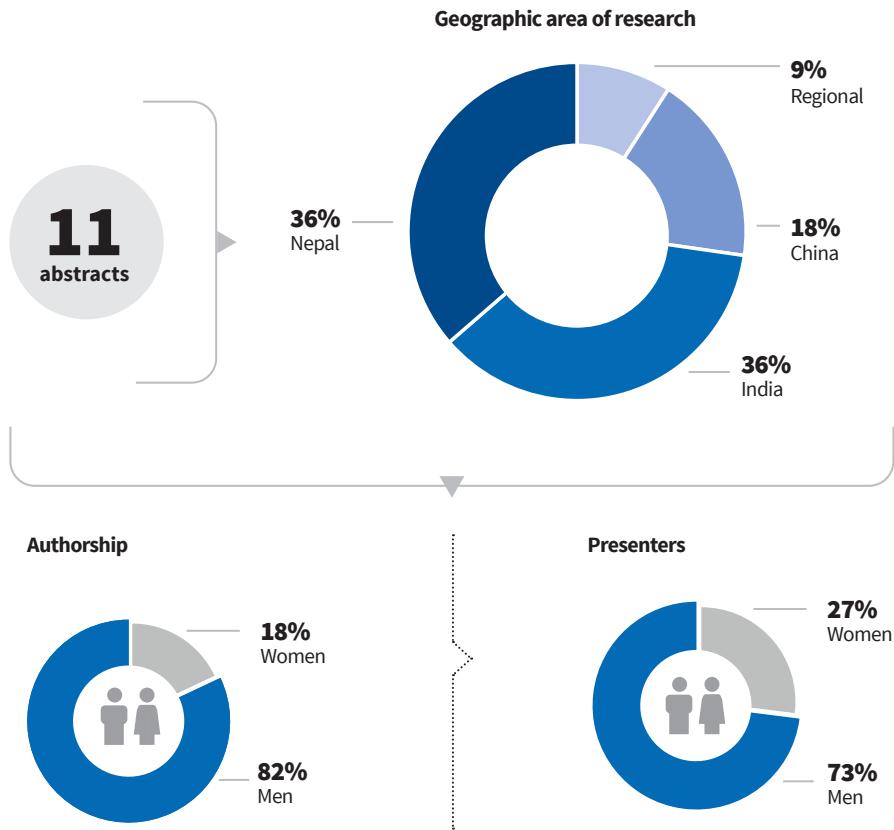
The Kailash Sacred Landscape is one of the most important sacred landscapes in the trans-Himalayan region and is worshipped by people belonging to multiple nationalities and religions. The formation of this sacred landscape has been a complex process involving a coming together of cultural practices, and, in the era of the Internet and big data, the burgeoning of photo-sharing websites and social media, which has further piqued people's interest in this sacred mountain region.

Our research focuses on people's visual perception of the Kailash region and supposes that its image is a product of viewers, selection of iconic symbols from the landscape, which are then reconstructed through visual media. The research mainly consists of two parts. The first focuses on a geographical information system (GIS) spatial analysis of the complex visual environment of the Kailash region. A viewshed analysis reveals the visual prominence of Mt Kailash. It also captures the changes in people's visual perception of this mountain during the Kora trek. The second part focuses on a content analysis of the geo-tagged photos collected from social media. A semantic image segmentation method, a technique in computer vision which can identify every pixel of the image in its different elements, was adopted to extract the visual elements of the geo-tagged photos. The result shows sky, mountain, and earth are the three most frequently appearing elements in photos. Most visual elements can be integrated into a higher level set of eight perception types. According to the ratio of each type, the system of hierarchical clustering was adopted to describe the similarity between each photo. A dendrogram of the clustering result shows that all the photos can generally be divided into eight groups, which reflect the different paradigms of people's visual expressions regarding Kailash.

In conclusion, this research reveals how Kailash is represented through filtered images in a web-based context. Also, it explores and extends the way of applying GIS and artificial intelligence technology in cultural landscape research.

Keywords: Computer vision; GIS; Image content analysis; Kailash; Visual landscape

Abstracts for poster presentation



Transforming livelihoods through agribusiness promotion: A case study from Pulan County, China

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Abstract

Since 2013, China has taken targeted measures to alleviate poverty. Among different strategies implemented locally, the development of rural competitive industries has played a crucial role in making up for the challenges presented by traditional farming – a lack of opportunities for farmers to gain a stable income.

This phenomenon is not uncommon in the remote upland regions of China. In Pulan County, for instance, which is a typical farming–pastoral region, a majority of local farmers' livelihoods rely on food crop cultivation and livestock raising. To promote the local economy and reduce poverty, the local government built a complete industrial chain based on the cultivation of highland barley. A variety of processed barley food and wine products are now generated from local factories. The foundations of this barley-based industry have been built on a combination of private investment – also including investment from individual, local families – and public financial support from the government. It is structured as a special management cooperative that provides both employment and business profit returns to local farmers.

This study aims to examine the transformation of farmers' livelihoods in Pulan County as a result of the implementation of this strategy. Concurrently, it will explore the effectiveness of this poverty-reduction strategy, currently used in the mountainous region, by embedding local, natural, and social contexts into analysis. To do so, the research will build on the sustainable livelihood framework developed by DFID (2000). A qualitative method has been adopted for the study to analyze possible changes in the livelihoods of the farmers. The study area is located in Xide, a village in Pulan. The sample was selected using a purposive sampling method ensuring the reliability and quality of data collection.

Keywords: Barley plantation; Industrial chain; Off-farm work; Poverty alleviation, Sustainable livelihood

Essential oil of timmur (*Zanthoxylum armatum* DC): Chemical profiling and bio-activities

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Abstract

Zanthoxylum armatum, also known as timmur, is a small xerophytic tree usually found in the hilly regions of Nepal. The leaves, bark, and fruits of this plant are used in different herbal products. Plant essential oil has a high market value since it is used as a fragrance, a flavouring agent for food, and in cosmetics. In this work, the essential oil of timmur was extracted through hydro-distillation using a Clevenger apparatus. The extractive value of the essential oil from the seeds of timur is around 0.1 per cent. A gas chromatography–mass spectrometry analysis of the essential oil showed 19 compounds in them where linalool (48.39 per cent), d-limonene (20.36 per cent), cinnamate (E)-Methyl (12.67 per cent), and myrcene (2.45 per cent) are the major constituents. An antimicrobial test of the essential oil showed a very attractive zone of inhibition against *Klebsiella pneumonia* (58 mm). The essential oil of the timmur seed also showed effective radical scavenging activity with DPPH. The IC₅₀ value of the essential oil was found to be 8.859149 µL/ML. The essential oil of the pericarp of the *Zanthoxylum* seed is predicted to work as a herbal medicine against pneumonia.

Keywords: Essential oil; Linalool; Pneumonia; Timur; *Zanthoxylum armatum*

An assessment of the traditional techniques used by communities in the Kailash Sacred Landscape for minimizing human–wildlife conflict

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Abstract

Traditional practices have been effective in human–wildlife conflict management. Communities living in KSL-India are often at the receiving end of wildlife attacks in the form of property damage, crop loss, and livestock depredation. Here, we assess the use and effectiveness of traditional practices for minimizing human–wildlife conflict in KSL-India. The four forest ranges in the Indian part of KSL were taken to form the strata wherein 584 respondents were interviewed. The entire study area was divided into $1 \times 1 \text{ km}^2$ grids and 10 per cent of the households from each accessible grid were surveyed. There are 16 types of traditional methods used by communities in the area. As much as 61 per cent of the respondents in KSL-India felt that human vigilance was effective, while 14 per cent of the people were not satisfied with it; 36 per cent of the respondents said the use of watchdogs was effective, while 47 per cent of the respondents stated that it was not entirely effective. Only about 20 per cent of the respondents were of the opinion that fencing was an effective way to control human–wildlife conflicts. It was also found that lack of awareness and negative perceptions about wildlife among the locals were also reasons for the decreasing use of traditional knowledge to tackle human–wildlife conflict in KSL-India. Still, the traditional knowledge to minimize human–wildlife conflict was found to be preserved in many of the study villages. The elderly and the less educated had higher levels of this traditional knowledge which included techniques like guarding, fencing, animal guards, and creating a racket.

Keywords: Deterrents; Fencing; Watchdogs; Human vigilance; Traditional practices

Religion as an entry point to communicate climate knowledge in the Kailash Sacred Landscape

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Abstract

This study outlines the fact that enhanced knowledge of the religious beliefs across the Kailash Sacred Landscape (KSL) can serve as a tool to communicate climate knowledge through secondary research at the landscape scale.

Across the KSL, we came across the widespread perception that features of the landscape were animated by a host of local gods, deities, and spirits. To the believers in the KSL, the moods of these spirits were connected with the daily flux of weather; so, bad weather would be attributed to the deities being offended by the sins committed on their territory. Since the KSL is increasingly threatened by climate change and associated hazards, it is vital to ensure that these risks are communicated effectively to the residents. This study proposes that outsider parties (academics, NGOs, and policymakers) should heighten their understanding of religious beliefs across the KSL. As local beliefs offer an allegory to climate change causes and consequences, the scientific understandings of climate could be adapted and retold in this framework. Doing so may foster a common language of understanding through which climate risks and causalities may be communicated more effectively than is possible in the pure language of science. The benefits of this approach are threefold:

- Disaster management: Enhanced understanding of how risk perception is framed by local people for climate change-related hazards such as glacial lake outburst floods and earthquake.
- Promotion of cultural and ecological resilience: Strengthening the climatic and ecological knowledge of residents whilst preserving their religious beliefs
- Mutual knowledge exchange: By understanding the sacred landscape, outsider parties become better informed about local practices and preferences when planning interventions; so, climate science can be communicated to the residents in terms that are more widely understood

Keywords: Climate change; Communication; Hazards; Religion; Resilience

Local communities' perceptions and attitudes towards a transformed ecosystem: A case study from the Kailash Sacred landscape-India

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Abstract

Himkhola, a micro-watershed, was selected as sample unit in Chaundas Valley, a block in Dharchula, Pithoragarh district of Uttarakhand state, India. The micro-watershed falls exclusively within the upper part of the Kailash Sacred Landscape (KSL)-India.

The present study sought to recognize and assess the local communities' perception, awareness, and attitude towards changes taking place in high-altitude ecosystems. It was conducted through a survey method aimed at identifying and recognizing the conditions of major ecosystems on a comparative scale – from past to present – on the basis of social exchange theory. Respondents were asked to provide feedback on the perceived positive and negative impacts of changes in their surroundings and ecosystems. Response percentages were calculated, and the inclusion of perceptions of both groups – the elderly and the youth – was ensured through a random sampling technique for comparison.

A total of 130 locals were interviewed and almost all the assumed factors for transformed ecosystems were studied individually and analyzed. Results obtained from the study are in consonance with previous studies – the communities are suffering even as they adapt to changes.

Keywords: Kailash Sacred Landscape (KSL), local communities' perception, transformed ecosystems

‘Invisible’ indigenous beings: Sketching the exclusionary lifeworld of the Raji tribe

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Abstract

The Raji tribe, a Particularly Vulnerable Tribal Group (PVTG), resides sparsely in the hilly terrains of Pithoragarh district in Uttarakhand, India. The author was a witness to their appalling plight during his field immersion. On inquiring, it was revealed that this tribal community scantily receives any state assistance. The tribal individuals as well as the key informants (like the *gram pradhan* and drivers) were of the opinion that it was the “minuscule population” of the Raji tribe that was the reason behind it being neglected by the state. The author took this reason as the premise to frame this paper.

The paper makes an attempt to critically analyse the notion of “tribe” as discussed in the Indian Constitution Assembly Debate as well as the Constitution and in contemporary policy documents related to tribes. The author incorporated his field insights to make this analysis more empirically sound.

The paper unravels how the term “tribe” constituted in politico-administrative documents has a “signified” value which manifestly or latently represents certain tribal cosmologies and not all tribal world views in India. The manifestation of this neglectful stance is clearly reflected in the policy formulations. It appears that the Indian Constitution framers and the present policy formulators have had a limited definitional horizon about the concept of “tribe”. The notion largely revolves around the indigenous communities residing in the Scheduled Areas or the tribes that were or are vocal about their rights. There remain many communities that find it really difficult to attract direct state affirmative action schemes as well as the attention of non-state actors. Tribal policy documents that “number/population” and “spatial location” play a significant role in getting tribal rights to be administratively sanctioned. The author argues that the concept of tribe in critical literature and policy documents is immensely inconclusive; they construct a discourse whereby several tribes with meagre population and weak agency are excluded.

Keywords: Engaged governance; Information asymmetry; Mainstream discourse; Passive

Climate change, natural hazards, and the relocation of human settlements: A case from Limi Valley in Humla, Nepal

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Abstract

Limi is a high-altitude, deeply incised valley located at the transition between the Main Himalayan Ridge and the Tibetan Plateau. Its high altitude, its access via high passes, and its marginal position in north-western Nepal have resulted in a remarkable isolation. The valley features extremely harsh climate with freezing winters and low precipitation. The settlements of the local Tibetan community are exposed to a range of natural hazards.

We prepared an inventory of debris flows, rockfalls, landslides, earthquakes, and flash floods using remote sensing, historical records, and interviews. We investigated the impact of past and present natural hazards on the settlements. We also discussed their relocations and abandonment in the context of a changing climate.

Keywords: Climate change; Limi Valley; Natural hazards; Relocation of settlements; Remote sensing

Taking Nepal's utility-scale solar plants higher

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Abstract

When it comes to accelerating the development of renewable energy in Nepal, utility-scale solar plants are a major source. This study explores the need for utility-scale solar plants to be implemented in higher altitudes (ranging from Darchula, Baitadi, and Bajhang districts to Rukum-East, Mustang, and Dolpa districts). The potential gain in energy due to higher irradiance levels is between 13 and 40 per cent compared to the Terai region and the potential revenue gain is between NPR 33.2 million and NPR 104.2 million over 25 years. The regions suitable for utility-scale solar power plants are evaluated based on parameters such as solar resource, available area, topography, land use, environmental designations, geotechnical conditions, accessibility, and ease of grid connection. For each parameter, the challenges in the regions are evaluated. Firstly, in the High Himalaya, the cost of long transmission lines can be justified by constructing large-scale solar plants where the transmission line cost is less than 10 per cent of the cost of a solar plant. For example, a 62.7-km 33-kV transmission line can only be justified if the capacity of the solar plant is above 25 MWp. Secondly, utility-scale solar plants can be targeted 4,000-m above treeline altitude because agricultural productivity decreases while moving north from the Terai belt to the High Himalaya. However, forest areas should be avoided, and implementation in protected areas needs effective mechanisms of consultation with government and local bodies. Lastly, ground screws could be a potential solution to the challenge of mounting solar modules on high slopes because of manual and machine drilling options, immediate load-bearing capacity, and minimum environmental effects. This exploratory study calls for further detailed research on each of the potential solutions to the challenges. It also calls for the assessment of an aesthetic relationship between utility-scale solar plants and the hills and mountains.

Keywords: Ground screws; High altitude; High Himalaya; Renewable energy; Utility-scale solar plants

Infrastructural construction in western Nepal and its repercussions on human health

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Abstract

In Nepal, the formation of seven provinces has been seen as a driving force in promoting the development of civil engineering structures in remote parts of the nation. Although aimed to improve the livelihoods of people residing in such areas, these infrastructural activities have been unplanned and unsustainable, leading to a backlash in terms of the health of communities and the neighbouring forests. In our study, bridges in Barjugad, Guigad, Dhangadhi, Kapadi Nadi, Patharaiya, and Thado Khola were taken as references. Some of these bridges are in close proximity to the Kaptad National Park. Likewise, the Makarigad hydropower project is also cited. Various American Society for Testing Materials (ASTM) and Indian Standard (IS) codes have been validated and an Environmental Impact Assessment (EIA) has been made. The consequences of boring, field tests, ground water table monitoring, and liquefaction have been assessed. After referring to the construction activities and its emissions (in the form of gas and liquid) in the surrounding region, their effects on the cardiovascular and respiratory systems have been analysed. Case studies from around the world have been cited. Additionally, our paper provides some suggestions for people living in these areas and how they should deal with the hazards. It also issues some substantial guidelines to the construction workers so that there is no degradation of the environment in terms of the fauna and flora in these areas.

Keywords: ASTM; Boring; Cardiovascular; EIA; IS; Respiratory system

Indigenous communities in sustainable eco-tourism: A case from Munsyari village, Pithoragarh, India

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Abstract

The communities in Uttarakhand's Kumaon Greater Kailash region have had self-evolving ecosystems for ages. This mountain civilization has inherited the outcomes of long-term ecosystem sustainability. Since the settlements are remote and off-grid, self-sustenance is all about resilience-led development.

The Uttarakhand government has initiated a policy of homestay-based ecotourism in the Munsyari village of Pithoragarh, Kumaon. This is an endeavour to promote both culture and livelihoods. The households in this village are rich in architectural heritage, which is a valuable asset for the community. The tourists who come here have been appreciative of the region's biodiversity; they have also been impressed by the indigenous art of the local community. This area's handicraft is also a major asset.

The ecotourism policy in this region lays great stress on gender-inclusive development, which has enhanced the aesthetic and cultural values of the region's tourism programme. A research was conducted in Kumaon to assess the impact of this homestay ecotourism policy of the Uttarakhand government. The selected region for the study was Munsyari, and surveys on homestays and investigations into livelihood opportunities were conducted. This study was primarily conducted in the field with a sample of 50–75 homestay families.

Keywords: Biodiversity; Community; Ecotourism; Heritage; Homestay

Human-wildlife conflict in the lower Namkha region, Humla, Nepal

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Abstract

The Namkha region in Humla district is rich in highland wildlife and is home to some of the most threatened species of mammals: snow leopard, Himalayan wolf, wild yak, Himalayan black bear, and musk deer. The region is located outside the network of protected areas in Nepal and thus largely overlooked in terms of research and conservation priorities. During August and September 2019, we conducted a first-ever survey to assess the status of human–wildlife conflict and the locals' attitudes using a semi-structured questionnaire in the lower Namkha region. The average livestock holding was found to be 15.08 animals per household; the overall proportion of dzo was the highest (32.16 per cent) and of yak was the least (7.82 per cent). A total of 222 livestock were reported lost to different causes between July 2018 and June 2019, of which 89.64 per cent were non-predatory losses and 10.36 predatory losses attributed to different carnivorous species. Among the carnivores, the Himalayan black bear was reported to be the most problematic species, causing both human casualties and damages to crops. It was also found that crop raiding by the common langur and porcupine has become more widespread. The majority of the respondents showed a positive attitude towards the animals that were not threatening and a negative attitude towards those which were. Our study suggests the need for a more intensive community-level conservation education, awareness-raising programmes, the capacity building of the local communities, and the promotion of local conservation initiatives.

Keywords: Buddhism Endangered species; Highland; Local conservation; Namkha

Knowledge Committee

The Knowledge Committee is composed of subject experts specializing in topics pertaining to the theme of the Kailash CAFE. The main purpose of the Knowledge Committee is to ensure the scientific rigour of research submitted to the CAFE.

Dr Amina Maharjan

Dr Amina Maharjan works as a Senior Specialist in Livelihood and Migration, and leads the Resources, Capabilities, and Institutions group within the Livelihoods Theme at the International Centre for Integrated Mountain Development (ICIMOD). She started her career as a development practitioner and has experience in sustainable development, human mobility and migration, sustainable agriculture, gender equity and social inclusion, and vocational skills development. At ICIMOD, she works in the broad field of human mobility and migration in the Hindu Kush Himalayan region and its linkages with sustainable development and climate change adaptation. Her other interests include interdisciplinary and transdisciplinary research looking at science–society linkages, with the objective of building the resilience capacities of communities.

Dr Bharat Babu Shrestha

Dr Bharat Babu Shrestha is a plant ecologist working at the Central Department of Botany, Tribhuvan University, Kathmandu, Nepal. His areas of research interests include biological invasions, forest ecosystems, and the mountain environment. Currently, he is working on plant invasions in Nepal with a particular focus on the distribution patterns of the invasive alien plant species, their impacts, and management options. Dr Shrestha has also been one of the Lead Authors in the Assessment of Invasive Alien Species and Their Control (2019–2023) which is being undertaken by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).

Dr Kamala Gurung

Dr Kamala Gurung is currently working as a Gender and Natural Resource Management (NRM) Specialist at the International Centre for Integrated Mountain Development (ICIMOD), Nepal. She is a gender focal person for the Air Pollution Solutions Initiative, Kailash Sacred Landscape Conservation and Development Initiative and the SERVIR-HKH Initiative at ICIMOD. She has more than 15 years of experience in the fields of “Gender and Social Equity” in agriculture and natural resource management. She has worked with women and marginalized groups at the grass-roots level and has also been part of international research and development organizations in South Asia. She got her PhD degree from James Cook University, Australia, and her master’s from Clark University, USA.

Dr Kesang Wangchuk

Dr Kesang Wangchuk is working as a Biodiversity Specialist at the International Centre for Integrated Mountain Development (ICIMOD). His main responsibilities include biodiversity conservation, research, development of conservation strategies, and building policy recommendations to mainstream sustainable biodiversity management in the HKH. Prior to joining ICIMOD, he worked as Deputy Chief Research Officer for the Ministry of Agriculture and Forests in Bhutan. He completed his PhD in 2013 from the University of Natural Resources and Life Sciences, Vienna, Austria.

Dr Pasang Yangjee Sherpa

Dr Pasang Yangjee Sherpa is an anthropologist and a Programme Director of the Nepal Studies Initiative (NSI) at the University of Washington. She was a lecturer at the Department of Anthropology in Pennsylvania State University (2013–2015) and a postdoctoral fellow at The New School (2015–2016) before joining the Nepal Studies Initiative, initially as a visiting scholar. She previously served as an executive council member of the Association for Nepal and Himalayan Studies (ANHS), and was a board member of the Resources Himalaya Foundation in Kathmandu. She has a decade of field-based research experience studying human dimensions of climate change, indigeneity, and development in the Himalaya. She is the recipient of the 2014 Senior Fellowship award from ANHS.

Dr Rajesh Bahadur Thapa

Dr Rajesh Bahadur Thapa is a Remote Sensing and Geoinformation Specialist at the International Centre for Integrated Mountain Development (ICIMOD). His work focuses on radar applications to monitor and assess terrestrial environments, and capacity building on Earth observation and geoinformation technologies in the region.

Dr Sanjeev Bhuchar

Dr Sanjeev Bhuchar has been serving as a Watershed Management Specialist at the International Centre for Integrated Mountain Development (ICIMOD). His role has been to provide strategic, thematic, and capacity building inputs to ICIMOD's collaborative programmes and initiatives. He has worked with G.B. Pant National Institute of Himalayan Environment and Development in India, and Helvetas Swiss Intercooperation in Afghanistan. He has experience working in all the eight HKH countries. He holds a PhD in botany with specialization in ecology from Kumaun University (India).

Dr Smriti Gurung

Dr Smriti Gurung holds a Ph.D in high-altitude limnology and freshwater biodiversity. Currently an Assistant Professor at the Department of Environmental Science and Engineering, Kathmandu University, she has 20 years of experience teaching in Nepal and India. Her research involvements have included work on projects related to water-quality assessment and freshwater biodiversity with a particular focus on diatoms, macroinvertebrates, and fish. Gurung's articles have appeared in several national and international peer-reviewed journals. She is a member of the International Development Peer Review College.

Dr Vikram Singh Negi

Dr Vikram Singh Negi is working as Scientist E at G.B. Pant National Institute of Himalayan Environment and Development. He has also worked as Scientist D and as a fast-track young scientist and research associate at G.B. Pant National Institute of Himalayan Environment and Development. He completed his PhD in botany from Hemwati Nandan Bahuguna Garhwal University, Srinagar, Garhwal, in 2009.

Dr Wang Jinniu

Dr Wang Jinniu is working as Associate Professor at Chengdu Institute of Biology, Chinese Academy of Sciences. His main research interests lie in: alpine plant functional ecology; vegetation patterns and its drivers in the forest and grassland ecotone; and sustainable development in mountainous areas. He is also a Deputy Secretary of a specialized committee on Alpine Ecology and Ecological Society of China.

Dr Yan Zhaoli

Dr Yan Zhaoli holds a PhD in restoration ecology from the University of Chinese Academy of Sciences. She has 30 years of experience in natural resource management and rural development in China and the neighbouring Himalayan countries. Her research interests lie in natural resources and the ecosystem, especially rangeland management, sustainable rural development, and environmental changes and its reflections on ecosystem services and human well-being.



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