

# Headlines Himalaya

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For the 657<sup>th</sup> – 658<sup>th</sup> issues of Headlines Himalaya, we reviewed researches from 10 sources and selected 11 researches from five countries. We selected three researches from Nepal and eight researches from other Himalayan countries (India, China, Bhutan and Pakistan).

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## LIVESTOCK DEPREDEATION BY LEOPARDS AND TIGERS NEAR BARDIA NATIONAL PARK, NEPAL

Raj Kumar Sijapati, Hari Prasad Sharma, Sandhya Sharma, Janak Raj Subedi, and Jerrold L. Belant

*Animals* 11: 1896

Wildlife attacks on livestock near human settlements are increasing due to the proximity of humans to protected areas. These attacks are often severe due to depredations of livestock adversely affecting the livelihoods of people. The nature of carnivore depredations on livestock can differ based on the carnivore species, animal husbandry practices, season, and deterrent technique. We surveyed people living near Bardia National Park (BNP), Nepal, to compare hooved livestock depredations by leopards (*Panthera pardus*) and tigers (*P. tigris*) near (<1 km) and far (>1 km) from this protected area. Overall, 1476 hooved livestock were reportedly depredated by leopards, and 209 by tigers, during 2015–2019. The number of hooved livestock killed by leopards each season was, at least, 86% higher than the number killed by tigers. More livestock were killed at BNP irrespective of carnivore deterrent techniques used. Due to severe effects created by livestock depredations near BNP, we recommend using more efficacious deterrent techniques when practical, in addition to improved livestock husbandry practices such as night penning.

Further reading: <https://doi.org/10.3390/ani11071896>

## COVID-19 LOCKDOWN FREES WILDLIFE TO ROAM BUT INCREASES POACHING THREATS IN NEPAL

Narayan Prasad Koju, Ram Chandra Kandel, Hari Bhadra Acharya, Bed Kumar Dhakal, and Dinesh Raj Bhujju

*Ecology and Evolution* 11: 9198-9205

To contain transmission of COVID-19, lockdowns or strict restrictions of people's mobility outside their residences were instituted in a majority of countries worldwide, including Nepal, where the first phase of nationwide lockdown was observed from 24 March to 21 July 2020. This sudden halt in human outdoor activities brought positive and negative impacts on forests and wildlife. We undertook a study to learn the impact of the COVID-19 lockdown on wildlife and forests in the protected areas (PAs) of Nepal. Between July and September 2020, data on illegal activities recorded by the staff of PAs and also those reported by media were collected and analyzed. Key informant interviews (KII) were done with the park officers and security personnel by virtual communication (telephone, messenger app, and video call) to collect detailed information and for corroboration. The collected data were categorized into four groups: (a) wildlife killed, (b) wildlife injured, (c) arrest incidents related to forest crime, and (d) arrest incidents related to wildlife crime. Data from the fiscal year 2019–2020 were analyzed, comparing before lockdown and after. Among 20 PAs investigated during the lockdown, the study found substantial increases in wildlife death in two PAs, Banke National Park, and Bardia National Park. Similarly, Chitwan National Park (CNP) and Shivapuri Nagarjun National Park (SNNP) witnessed a rise in wildlife poaching. CNP and SNNP are located close to densely populated cities and also have human settlements in their peripheries. Wildlife was sighted freely roaming inside PAs during the lockdown, presumably because the absence of visitors and human activities during the lockdown decreased disturbance. Thus, the wildlife was enjoying the freedom of movement on the one hand, and on the other hand was threatened by poachers, many of whom were laid off from other activities and were taking advantage of the lapse in security.

Further reading: <https://doi.org/10.1002/ece3.7778>

## FACTORS AFFECTING LIVESTOCK DEPREDATION BY SNOW LEOPARDS (*PANTHERA UNCIA*) IN THE HIMALAYAN REGION OF NEPAL

Ajay Karki and Saroj Panthi

*PeerJ* 9: e11575

The snow leopard (*Panthera uncia*) found in central Asia is classified as vulnerable species by the International Union for Conservation of Nature (IUCN). Every year, large number of livestock are killed by snow leopards in Nepal, leading to economic loss to local communities and making human-snow leopard conflict a major threat to snow leopard conservation. We conducted formal and informal stakeholder's interviews to gather information related to livestock depredation with the aim to map the attack sites by the snow leopard. These sites were further validated by district forest office staffs to assess sources of bias. Attack sites older than 3 years were removed from the survey. We found 109 attack sites and visited all the sites for geo location purpose (GPS points of all unique sites were taken). We maintained at least a 100 m distance between attack locations to ensure that each attack location was unique, which resulted in 86 unique locations. A total of 235 km<sup>2</sup> was used to define livestock depredation risk zone during this study. Using Maximum Entropy (MaxEnt) modeling, we found that distance to livestock sheds, distance to paths, aspect, and distance to roads were major contributing factors to the snow leopard's attacks. We identified 13.64 km<sup>2</sup> as risk zone for livestock depredation from snow leopards in the study area. Furthermore, snow leopards preferred to attack livestock near livestock shelters, far from human paths and at moderate distance from motor roads. These identified attack zones should be managed both for snow leopard conservation and livestock protection in order to balance human livelihoods while protecting snow leopards and their habitats.

Further reading: <https://doi.org/10.7717/peerj.11575>

### India -Himalaya

#### ETHNOBOTANICAL UTILIZATION OF FOREST RESOURCES IN SINDH FOREST OF KASHMIR HIMALAYA, INDIA

Muneesa Banday, M. A. Islam, Nazir A. Pala, Megna Rashid, Zubair A. Malik, Peerzada Ishtiyak, M. Maqbool Rather, Rainer W. Bussmann

*Ethnobotany Research and Applications* 21: 49

This study was focused on the ethnobotany of Manasbal range of the Sindh Forest Division of Jammu and Kashmir (India) to assess, document and to provide a comprehensive inventory of plants used by the people of this rural area. Such an investigation and documentation along with the associated traditional knowledge are crucial to raise the socio-economic status of underprivileged population in this rural area and for the conservation of biological resources. Multi-stage random sampling technique was employed in the selection of villages and respondents for the household survey. Interview schedules for both village as well as respondents' survey were prepared based on literature referred, reconnaissance survey of the study area, and discussion with local people/ consultation with the experts. A total of 135 plant species belonging to 121 genera and 58 families were being utilized as forest resources. The family Compositae had the highest representation with 13 species followed by Leguminaceae (11) and Poaceae (10). Fourteen different use categories of forest resources were reported. The forest species collected

by the people were mostly herbs (103) followed by trees (18), shrubs (12) and climbers (2). The maximum number of species (54) was utilized as medicine, followed by fodder (51), vegetables (18), fuelwood and (16) edible fruits. The present study confirmed that the Manasbal range of the Sindh Forest Division is an interesting area for the study of traditional plant use. This study further suggests that the local denizens have an in-depth knowledge of use of local plant resources and that these exploit diverse NTFPs substantially to support their day-to-day needs. Hence, livelihood diversification through forestry interventions using existing resources is needed as important strategy of poverty reduction and socioeconomic development of backward local people. The study has documented the baseline data for further studies in the field of ethnobotany, medicinal plants, and ethno-pharmacology.

Further reading: <http://www.ethnobotanyjournal.org/index.php/era/article/view/2523>

**THE PHYLOGENETIC POSITION OF THE ENIGMATIC ASSAM DAY GECKO *Cnemaspis cf. assamensis* (SQUAMATA: GEKKONIDAE) DEMONSTRATES A NOVEL BIOGEOGRAPHIC CONNECTION BETWEEN NORTHEAST INDIA AND SOUTH INDIA-SRI LANKA**

Ishan Agarwal, Rachunliu G. Kamei, and Stephen Mahony

*Amphibia-Reptilia* 1: 1-13

Northeast Indian biodiversity has long been considered to have a stronger affinity to Southeast Asian rather than Peninsular Indian fauna, however, few molecular phylogenetic studies have explored this hypothesis. In Asia, the polyphyletic gekkonid genus *Cnemaspis* sensu lato is comprised of two distantly related groups; one primarily from South Asia with some members in Southeast Asia, and the other exclusively from Southeast Asia. *Cnemaspis assamensis* is a systematically obscure and geographically isolated species (>1400 km from its nearest congeners) from the Brahmaputra River Valley in Northeast India. We provide the first molecular phylogenetic assessment of this species based on a partial ND<sub>2</sub> gene fragment. *Cnemaspis assamensis* is determined to be a deeply divergent (Oligocene) member of the South Asian radiation and is sister to the *podihuna* clade which is endemic to Sri Lanka. The biogeographic implications of this find are discussed and this is suspected to represent a rare example of true disjunction between the wet zones of Northeast India and southern India/Sri Lanka. These results further emphasise the importance of Northeast India as a refuge for unique ancient faunal lineages.

Further reading: <https://doi.org/10.1163/15685381-bja10062>

**PERSISTENCE OF TRACHYPITHECUS GEEI (MAMMALIA: PRIMATES: CERCOPITHECIDAE) IN A RUBBER PLANTATION IN ASSAM, INDIA**

Joydeep Shil, Jihosuo Biswas, Sudipta Nag, and Honnavalli N. Kumara

*Journal of Threatened Taxa* 13: 18679-18686

Non-human primates are highly threatened as a result of habitat destruction, agricultural expansion, industrial development, large-scale build-ups and wildlife trafficking. Nearly 60% of all primates are threatened and many are found in habitats with some form of human modifications (e.g., croplands and plantations). The adaptability of primates to survive in human-modified habitats is thus a key to determine their persistence in anthropogenic landscapes. In this study, we examined the population number and age-sex composition of the 'Endangered' Golden Langur *Trachypithecus geei* in a rubber plantation in the Kokrajhar District in Assam, India in 2016, and

compared with past data of the langur population and demographics from the same location to better understand the population dynamics, demographic characters and persistence of the Golden Langurs in the rubber plantation. In 2016, we recorded six groups of Golden Langurs totaling 78 individuals with a mean group size of  $13.00 \pm 4.00_{SD}$ . Of the total population, 10.29% were adult males, 41.18% were adult females, 32.35% were juveniles and 16.18% were infants. The overall population growth from 1997 to 2016 was estimated to be 5.54% per year. Habitat matrices of rubber plantations with natural forest patches are important in the fragmented landscape for the persistence of Golden Langur populations. They may also act as a corridor for the langurs to move between the fragments and as food resources, highlighting the importance of such matrices for the langurs outside protected areas. Population monitoring and ecological studies in such matrices would therefore be needed for the successful implementation of targeted management strategies for the conservation of these threatened langurs.

Further reading: <https://doi.org/10.11609/jott.7273.13.7.18679-18686>

## China Himalaya

### RESPONSES OF HABITAT QUALITY AND ANIMAL BIODIVERSITY TO GRAZING ACTIVITIES ON THE QINGHAI-TIBET PLATEAU

Yixuan Liu, Shiliang Liu, Fangfang Wang, Yongxiu Sun, Mingqi Li, Qingbo Wang, and Lu Yu

*Frontiers in Ecology and Evolution* 9: 349

Grazing activities perhaps lead to habitat quality degradation and animal biodiversity loss while the effects on the Qinghai-Tibet Plateau (QTP) is still relatively poorly studied. Based on the Integrated Valuation of Ecosystem Services and Tradeoffs model, geographical detector model and generalized linear mixed model, the responses of habitat quality and animal biodiversity to grazing activities at 5 km grid scale were analyzed. Results showed that the overall habitat quality on the QTP was high with 76.43% of the total area, and poor level accounted for 19.56%. High level habitat was mainly distributed in the southern part, while the poor level in the northern part. The mean grazing activity explanatory ability to habitat quality, bird species richness and mammal richness were 0.346, 0.430, and 0.354. The interaction effects between slope and grazing activities on habitat quality, bird species richness and mammal richness were the most important interaction effects, and the area affected by the interaction was 73.82, 46.00, and 46.17% of habitat quality, bird species richness and mammal richness, respectively. The interaction effects on habitat quality, bird species richness and mammal richness all showed “low in the northwest and high in the southeast”. Grazing activities and habitat quality had a positive correlation while bird species richness, and mammal richness negative correlations. The spatial relationship of grazing activities of habitat quality was “higher in the middle and lower around the periphery”, while the spatial distribution of grazing activities of bird species richness and mammal richness was “higher in the east and lower in the west”. This study explicitly revealed the responses of habitat quality and animal biodiversity to grazing activities, thus providing references for biodiversity conservation on the QTP.

Further reading: <https://doi.org/10.3389/fevo.2021.681775>

### CURRENT STATUS AND FUTURE PROSPECTS OF LHALU WETLAND ON THE TIBETAN PLATEAU

Hui Wang, Dong Xie, Wen Xiong, Wei Tang, Zhigang Wu, Keyan Xiao, and Qiang Wang

Lhalu wetland, located in the northwest of Lhasa city, Tibet, is the highest and largest urban natural wetland in the world. Due to its specific climate and the unique plateau ecosystem, it is a hotspot of endemic and endangered species. Lhalu wetland is an important wetland for Lhasa city for its biodiversity and for enhancing human well-being. However, due to global warming, over-exploitation and the presence of non-native species, it has suffered serious ecosystem damage and biodiversity loss. To protect biodiversity and the functioning of the ecosystem, new measures are needed, and current measures should be better enforced. This study is important for biodiversity conservation and the management of Lhalu wetland in the Qinghai Tibet plateau.

Further reading: [10.1553/eco.mont-13-2s58](https://doi.org/10.1553/eco.mont-13-2s58)

## **Bhutan-Himalaya**

### **TRANSBOUNDARY SOURCES DOMINATED PM<sub>2.5</sub> IN THIMPHU, BHUTAN**

S. Sharma, R. Sharma, S. K. Sahu, and S. H. Kota

*International Journal of Environmental Science and Technology* 18: 245

This study estimates the potential source regions contributing to PM<sub>2.5</sub> in the capital city of Thimphu, Bhutan, during the years 2018–2020 using the ground-based data, followed by the HYSPLIT back trajectory analysis. The average PM<sub>2.5</sub> concentration in the entire study period was 32.47 µg/m<sup>3</sup> which is three times of the World Health Organization recommended limit of 10 µg/m<sup>3</sup>. Less than half of the days in pre-monsoon (43.47%) and post-monsoon (46.41%), and no days in winter were within the 24-h average WHO guideline of 25 µg/m<sup>3</sup>. During the COVID-19 lockdown imposed from August 11 to September 21 in Bhutan, only a marginal reduction of 4% in the PM<sub>2.5</sub> concentrations was observed, indicating that nonlocal emissions dominate the PM<sub>2.5</sub> concentrations in Thimphu, Bhutan. Most back trajectories in the analysis period were allocated to south or south-west sector. India was the major contributor (~ 44%), followed by Bangladesh (~ 19%), Bhutan itself (~ 19%) and China (~ 16%). This study confirms that there are significant contributions from transboundary sources to PM<sub>2.5</sub> concentrations in Thimphu, Bhutan, and the elevated PM<sub>2.5</sub> concentrations need to be tackled with appropriate action plans and interventions.

Further reading: <https://doi.org/10.1007/s13762-021-03505-w>

### **ASSESSMENT OF CLIMATE CHANGE IMPACT ON HYDROLOGY OF A TRANSBOUNDARY RIVER OF BHUTAN AND INDIA**

Phub Zam, Sangam Shrestha, and Aakanchya Budhathoki

*Journal of Water and Climate Change* 2021: 338

Assessing the impacts of climate change on a transboundary river plays an important role in sustaining water security within as well as beyond the national boundaries. At times, the unilateral decision taken by one country can increase the risk of negative effect on the riparian countries and if the impact is felt strongly by the other country, it can lead to international tension between them. This study examines the impact of climate change on

hydrology between a shared river which is Wangchu river in Bhutan and Raidak river in India. The river is mainly used to produce hydropower in the two largest hydropower plants on which the majority of Bhutan's economic development depends and is mainly used for agriculture in India. The Soil and Water Assessment Tool (SWAT) was used for future flow simulation. Future climate was projected for near future (NF) from 2025–2050 and far future (FF) from 2074–2099 using an ensemble of three regional climate models (ACCESS, CNRM-CM5 and MPI-ESM-LR) for two RCPs (Representative Concentration Pathways), RCP 4.5 and RCP 8.5 scenario. The ensemble results indicated that, in future, the study area would become warmer with temperature increase of 1.5 °C under RCP 4.5 and 3.6 °C under RCP 8.5. However, as per RCP 4.5 and RCP 8.5, rainfall over the study area is projected to decrease by 1.90% and 1.38%, respectively. As a consequence of the projected decrease in rainfall, the flow in the river is projected to decrease by 5.77% under RCP 4.5 and 4.73% under RCP 8.5. Overall, the results indicated that the degree of hydrological change is expected to be higher, particularly for low flows in both Wangchu and Raidak River. Since transboundary water is shared for economic growth, climate change adaptation and opportunities should also be considered by both the nations for better water management.

Further reading: <https://doi.org/10.2166/wcc.2021.338>

## Pakistan -Himalaya

### Testing the Role of Waste Management and Environmental Quality on Health Indicators Using Structural Equation Modeling in Pakistan

Tanzila Akmal and Faisal Jamil

*International Journal of Environmental Research and Public Health* 18: 4193

Improper management of municipal waste has become a growing concern globally due to its impact on the environment, health, and overall living conditions of households in cities. Waste production has increased because households do not adopt waste management practices that ensure sustainability. Previous studies on household waste management often considered socio-economic aspects and overlooked the environmental and behavioral factors influencing the disposal practices and health status. This study adopted four constructs, defensive attitude, environmental knowledge, environmental quality, and waste disposal, by employing a structural equation modeling approach to explore research objectives. Data from 849 households of the Islamabad-Rawalpindi metropolitan was collected by using a multi-stage sampling technique. The structural model results showed that the two constructs, environmental knowledge and defensive behavior, positively affect household health status. The most significant health-related considerations are waste disposal and environmental quality, both of which negatively impact health status and do not support our hypothesis. The results provide valuable perspectives to enable households to engage actively in waste management activities. The findings indicate that understanding the intentions of household health status drivers can assist policymakers and agencies in promoting an efficient and successful community programmes related to sustainable solid waste management by allowing them to foster how the desired behavior can be achieved.

Further reading: <https://doi.org/10.3390/ijerph18084193>