For the 739-740th issues of Headlines Himalaya, we reviewed research papers from four sources and selected eleven research papers from four countries. We selected three papers from Nepal and eight from other Himalayan Countries (India, China and Pakistan).

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ECOLOGICAL FACTORS ASSOCIATED WITH HISPID HARE (*CAPROLAGUS HISPIDUS*) HABITAT USE AND CONSERVATION THREATS IN THE TERAI ARC LANDSCAPE OF NEPAL

Bijaya Dhami, Bijaya Neupane, Nishan K.C., Tek Maraseni , Chitra Rekha Basyal , Laxmi Raj Joshi, and Hari Adhikari

The hispid hare (*Caprolagus hispidus*) is one of the most elusive mammals and is listed as an endangered species both globally by the International Union for Conservation of Nature (IUCN) and nationally by National Red list series, Nepal. The species is experiencing a continuous decline across its distribution range due to increasing anthropogenic activities in its habitats. Limited information on the species distribution and the factors affecting its habitat use have restricted site-specific conservation actions. In this study, we aim to identify the current distribution pattern, factors associated with the habitat use of the hispid hare, and prevalent conservation threats in Shuklaphanta National Park (ShNP) of Nepal. We conducted a strip transect-based survey in January and February 2021 across 12 sampling grids of 0.5 km × 0.5 km. The presence of hispid hare was assigned to 1 if any indirect sign of its presence was observed "used plots," otherwise to 0 if any indirect sign of its presence was not observed ("habitat availability plot"). We next measured six habitat predictors (i.e., nearest distance to a water source, ground cover, ground condition, habitat type, dominant plant species, and presence/absence of anthropogenic disturbance) from both types of plots ("used" and "habitat availability plot"). We found that the overall distribution of hispid hare was clumped. Confirming a new distribution location around the Baba Tal area in ShNP will alert conservation managers to the need of a rapid assessment of its presence–absence across the lowlands of Nepal. Except for the nearest distance to a water source, all other five habitat factors influenced the probability of encountering a hispid hare. Out of six threats, four threats (i.e., grassland burning during the breeding season, grassland succession, habitat loss and fragmentation, and thatch collection from woodland) were determined as the most severe for the hispid hare. Our findings will enable park managers and local government to formulate and plan suitable conservation measures to protect this threatened and endangered species and its habitats. In addition, our results will act as a baseline for further research in ShNP and other similar regions.

Further reading : https://doi.org/10.1016/j.gecco.2023.e02437

CLIMATE CHANGE-DRIVEN AGRICULTURAL FRONTIERS AND THEIR ECOSYSTEM TRADE-OFFS IN THE HILLS OF NEPAL

Krishna Bahadur KC , Edan Tzadok, and Anil Kumar Manda

Climate change will create warmer temperatures and greater precipitation in mountainous regions, making agriculture increasingly possible in these areas. To determine the potential of agricultural expansion, this paper approximated how much new land could become suitable for cropping maize, rice, wheat, millet, buckwheat, and barley in Nepal by 2041–2060 and 2081–2100 periods under climate change projection. Additionally, this paper estimates the potential environmental trade-offs of agricultural expansion in Nepal by evaluating how carbon stores, protected areas, tree cover, and river systems would be traded for agriculture. Results show that under climate change projected by WorldClim under three different climate change scenarios, up to ~36,983km^2 of land may become available for agriculture by 2100 in the high mountains of Nepal. If all this area is utilized for agriculture, up to 3.1 GtC (Gigaton Carbon) would be released from soil carbon and 0.12 GtC from above ground carbon stores, 11,129 km^2 of tree cover would be impacted, 9934 km^2 of protected areas would be impacted, and

river systems will be impacted as 4446 km^2 of climate-driven agricultural frontiers identified in this study lie within 200m of a river. These results highlight that agricultural frontiers will emerge in northwestern part of Nepal, which would have very important food security implication as this region of Nepal has been suffering from a very high level of food insecurity. However, before moving toward any potential development of agricultural activities, in-depth analysis about the potential food production benefit of developing frontiers against their potential ecosystem service trade-offs is needed.

Further reading: https://doi.org/10.1007/s10113-023-02043-0

India-Himalaya

EVALUATION OF PHYSICOCHEMICAL AND MICRIBIOLOGICAL PARAMETERS, AND THEIR CORRELATION IN HIMALAYAN SPRING WATER SYSTEMS: A CASE STUDY OF DISTRICT KULGAM OF KASHMIR VALLEY, INDIA, WESTERN HIMALAYA

Fahim Un Nisa and Rashid Umar

Environmental Monitoring and Assessment 195: 441

Total coliforms, *E. coli*, and fecal streptococci are the important indicators linked to the human health. This study investigated presence of these indicator bacteria in the Himalayan springs at various locations in the district Kulgam of Kashmir valley. A total of 30 spring water samples were collected from rural, urban, and forest areas during post-melting season 2021 and pre-melting season 2022. The springs in the area originate from the alluvium deposit, Karewa, and hard rock formations. The physicochemical parameters were found within the acceptable limits. However, nitrate and phosphate were found above the permissible limit at few sites, thus indicating the presence of anthropogenic activities in the area. Majority of the samples during both the seasons were found highly loaded with total coliforms with maximum limit of greater than 180 MPN/100 ml. *E. coli* and fecal streptococci were found in the range of less than 1 to more than 180 MPN/100 ml. The results of Pearson correlation of physicochemical parameters with indicator bacteria showed that chemical oxygen demand, rainfall, spring discharge, nitrate, and phosphate are the main factors affecting the concentration of indicator bacteria in the spring water at each site. Principal component analysis showed the most influencing factors of water quality in most of the spring sites are total coliforms, *E. coli*, fecal streptococci, rainfall, discharge, and chemical oxygen demand. The results of this study showed that the spring water is unfit for drinking purpose because of high concentration of fecal indicator bacteria.

For further reading: https://doi.org/10.1007/s10661-023-11025-y

SPATIOTEMPORAL EVALUATION OF DROUGHT CHARACTERISTICS BASED ON STANDARD DROUGHT INDICES AT VARIOUS TIMESCALES OVER UTTAR PRADESH, INDIA

Shivani Gond, Nitesh Gupta, Jitendra Patel, and P. K. S. Dikshit

Environmental Monitoring and Assessment 195: 439

Prolonged and repeated drought, as seen in India and other parts of South Asia, is a symptom of climate change, which is partially the result of human interventions. The performance of the widely used drought metrics Standardized Precipitation Index (SPI) and Standardized Precipitation Evapotranspiration Index (SPEI) are evaluated for 18 stations in Uttar Pradesh state for the period 1971 to 2018 in this study. Drought characteristics such as

intensity, duration, and frequency of different categories are estimated and compared based on SPI and SPEI. In addition, station proportion is estimated at a different timescale, providing a better insight into temporal variability drought of a specific category. Spatiotemporal trend variability of SPEI and SPI was investigated at a significance level of 0.05 using the non-parametric Mann–Kendall (MK) test. SPEI adds the effect of temperature rise and deficit change on the drought occurrences of different classes. SPEI provides a better estimation of drought characteristics due to its consideration of temperature change in the drought severity. The more significant number of drying events accounted for a timescale of 3 months and 6 months, reflecting the higher variability of the seasonal fluctuation of water balance over the state. At 9-month and 12-month timescales, SPI and SPEI fluctuate gradually with considerable differences between the duration and severity of the drought event. This study reveals that there have been a substantial number of drought events over the state during the last two decades (2000 to 2018). The results conclude that the study area is at risk of erratic meteorological drought conditions where the western part of the study is worst affected compared to the eastern part of Uttar Pradesh (India).

For further reading: https://doi.org/10.1007/s10661-023-10988-2

PLASTIC POLLUTION AND THE OPEN BURNING OF PLASTIC WASTES

Gauri Pathak, Mark Nichter, Anita Hardon, Eileen Moyer, Aarti Latkar, Joseph Simbaya, Diana Pakasi , Efenita Taqueban, and Jessica Love

The open burning of plastic wastes is a practice that is highly prevalent across the globe, toxic to human and environmental health, and a critical—but often overlooked—aspect of plastic pollution. Most of the countries where such burning is widespread have laws and policies in place against it; open burning continues nevertheless. In this article, using data from ethnographic fieldwork in urban and rural sites in India, Indonesia, the Philippines, and Zambia, we examine local practices of open burning and investigate why regulations to tackle it have proven largely ineffective. Adopting a harm reduction approach, we then suggest preliminary measures to mitigate the health risks of open burning by targeting those plastics and packaging types that are most toxic when burned.

For further reading**:** https://doi.org/10.1016/j.gloenvcha.2023.102648

China-Himalaya

GRAZING DISTURBANCE SIGNIFICANTLY DECREASED SOIL ORGANIC CARBON CONTENTS OF ALPINE GRASSLANDS ON THE TIBETAN PLATEAU

Hua Yang, Yonggang Zhang, Wei Li1, Qingmin Xu, Huakun Zhou, and Yangong Du

Ecological security barriers on the Tibetan Plateau are threatened by climate change and human activities, such as grassland degradation and reduction of carbon fixation capacity. Understanding the influence of grazing on soil organic carbon (SOC) content and its regulating factors is important for improving the ecological barrier function of alpine grasslands. In this meta-analysis, we analysed the effects of grazing on SOC. The results indicate that grazing disturbance significantly reduced the SOC content by 13.93%, with an effect size of −0.15 ± 0.04 ($p < 0.001$). The

effect of light grazing was not significant. The reduction range gradually increased with increasing grazing intensity. The effect of grazing activity on SOC content was driven mainly by pH and total nitrogen through a structural equation model. Future nitrogen deposition scenarios would significantly increase alpine meadow SOC on the Tibetan Plateau

For further reading: https://doi.org/10.3389/fenvs.2023.1113538

HIGH-RESOLUTION EARLY TRIASSIC AMMONOID BIOSTRATIGRAPHY OF SOUTH TIBET, CHINA AND IMPLICATIONS FOR GLOBAL CORRELATIONS

Xu Dai, Arnaud Brayard, David Ware, Shouyi Jiang, Mingtao Li, Fengyu Wang , Xiao kang Liu, and Haijun Song

Earth-Science Reviews 239: 104384

Ammonoids are key fossil indexes for Triassic biochronology, as all Triassic stages and substages were initially defined on ammonoid faunas. In recent decades, the temporal resolution of ammonoid biostratigraphical scales for the Early Triassic has been greatly improved. However, many uncertainties in zones correlation and superpositions remain, mainly due to sampling heterogeneities, preservation biases, and faunal endemicity. In this work, we present the first comprehensive Early Triassic ammonoid zonation from South Tibet, China, a previously poorly investigated region. Ammonoids were sampled from the Kangshare Formation at four sections (Selong, Paizi, Qubu and Xialong), representing a total of 140 species, ranging from the Griesbachian to the Smithian. These new robust data allow the construction of a high-resolution biostratigraphy using the Unitary Association (UA) method. A total of 22 Unitary Association zones (UAZs) were recognized, including two UAZs for the Griesbachian, nine for the Dienerian, and 11 for the Smithian. Then, we integrated data from neighboring basins, i.e., Spiti (India) and the Salt Range (Pakistan), and the new data from South Tibet to construct synthetic, laterally reproducible Dienerian-Smithian ammonoid UAZs, which include 12 UAZs for the Dienerian and 16 UAZs for the Smithian. Based on the newly obtained data and high-resolution biostratigraphic scales, we revised global correlations known for the ammonoid biostratigraphy in the Griesbachian, Dienerian and Smithian. Finally, the high-resolution ammonoid zones are generally in agreement with conodont zones in defining stage/substage boundaries. They also provide a robust and accurate time calibration for Early Triassic carbon isotope trends and temperature changes.

For further reading: https://doi.org/10.1016/j.earscirev.2023.104384

OCCURRENCE AND RISK ASSESSMENT OF MICROPLASTICS IN THE LHASA RIVER – A REMOTE PLATEAU RIVER ON THE QINGHAI-TIBET PLATEAU, CHINA

Amei Zhou, Yuhong Zhao, Minxia Liu, Bongkotrat Suyamud, Wenke Yuan, and Yuyi Yang

Environmental Monitoring and Assessment 195: 433

Microplastics (MPs) are ubiquitous in the aquatic environment and have received widespread attention worldwide as emerging pollutants. Urbanization and anthropogenic activities are the main sources of MPs in rivers; however, the MPs in plateau rivers with less human activities are not well understood. In this study, the pollution of MPs in the surface water and shore sediment of the Lhasa River from the Qinghai-Tibet Plateau was investigated, and a risk assessment was conducted. The abundance of MPs in the surface water and shore sediment of Lhasa River were 0.63 n/L and 0.37 n/g, respectively. MPs in surface water were mainly dominated by films (43.23%) and fibers (31.12%) in shape, transparent (54.25%) in color, and 0–0.5 mm (75.83%) in size, while MPs in the shore sediment

were mainly fibers (43.69%) and fragments (36.53%), transparent (71.91%), and 0–0.5 mm (60.18%). PP and PE were the predominant polymer types, accounting for 44.55% and 30.79% respectively in the surface water and 32.51% and 36.01% respectively in the shore sediment. More notably, the polymer pollution index (H) of MPs in the Lhasa River was at hazard level III due to the high risk caused by PVC, but the pollution load index (PLI) was low at hazard level I. This study reveals that the remote river in the Qinghai-Tibet Plateau are polluted by MPs, and their potential risks to the vulnerable ecosystem deserve attention.

For further reading: https://doi.org/10.1007/s10661-023-11040-z

Pakistan-Himalaya

IDENTIFYING STABLE AND OVERLAPPING HABITATS FOR A PREDATOR (COMMON LEOPARD) AND PREY SPECEIS (HIMALAYAN GREY GORAL & HIMALAYAN GREY LANGUR) IN NORTHERN PAKISTAN

Babar Zahoor, Melissa Songer, Xuehua Liu, Qiongyu Huang, and Yunchuan Dai

Global Ecology and Conservation 43: e02418

Global warming due to anthropogenic activities has alarming effects on biodiversity. It could negatively impact the interactions between predators and their prey by shifting or eliminating their suitable habitats. The predator common leopard (*Panthera pardus*) and two prey species, Himalayan grey goral (*Naemorhedus goral*) and Himalayan grey langur (*Semnopithecus ajax*) play important roles in balancing the forest ecosystem in northern Pakistan. The common leopard is listed as a Vulnerable species on the IUCN Red List, while grey goral and grey langur are listed as Near Threatened and Endangered respectively. For this study, we used Maximum Entropy Model (MaxEnt) to model the current (average for 1950–2000) and future (in 2070) suitable habitat for each of these species using three General Circulation Models [GCMs; i.e. Beijing Climate Center Climate System Model (BCC-CSM1–1), Community Climate System Model (CCSM4), and Hadley Global Environment Model 2 (HadGEM2-AO)]. We used two climate change emission scenarios, i. e., a moderate carbon emission scenario (RCP4.5) and an extreme carbon emission scenario (RCP8.5). Our results indicated that an area of 18,360 km2, 34,142 km2 and 10,636 km2 are currently suitable for the common leopard, grey goral, and grey langur, respectively. In the future, common leopard, grey goral and grey langur were predicted to lose over 11%, 43%, and 44% of currently inhabited areas under the most severe climate scenario (RCP8.5), respectively. Overall, 56–89% of the current suitable habitat area was predicted as stable suitable habitat for all the species. The study projected that currently, 14,321 km2 is suitable for both common leopard and grey goral. Whereas, 7096 km2 of current habitat is suitable for both common leopard and grey langur. Overlapping areas were predicted to be reduced in the future (due to fluctuations in temperature and precipitation), ranging from 2% (under RCP8.5) to 8% (under RCP45) for areas suitable for common leopard and grey goral, and from 30% (under RCP4.5) to 47% (under RCP8.5) for areas suitable for common leopard and grey langur, respectively. Most of the overlapping areas that remained suitable were projected between the altitudinal range of 1000 m – 3000 m for common leopard and grey goral, and from 2000 m to 4000 m for common leopard and grey langur. Our results inform management plans and conservation strategies (e.g., establishment of new or improving the status of existing protected areas) for mitigating the impacts of climate change on endangered predator and prey species in the northern Pakistan.

For further reading: https://doi.org/10.1016/j.gecco.2023.e02418