

Headlines Himalaya

August 15– August 30 (2020)

No. 615-616

Editorial Team: SurakshyaBaskota and SarmilaKhanal

For the 615th-616th issues of Headlines Himalaya, we reviewed journal articles from nine sources and selected fourteen researches from five countries. We selected four researches from Nepal and ten researches from other Himalayan countries (India, China, Bhutan and Pakistan).

Headlines Himalaya, a weekly research based information fact file is an attempt to keep our global readers abreast with the happenings in the Himalaya. Please share it with your colleagues and friends. Also, subscription is free. Enjoy!

NEPAL

SMALLHOLDER MECHANIZATION INDUCED BY YIELD-ENHANCING BIOLOGICAL TECHNOLOGIES: EVIDENCE FROM NEPAL AND GHANA

UTILIZATION PATTERN AND INDIGENOUS KNOWLEDGE OF WILD MEDICINAL PLANTS AMONG THREE ETHNIC GROUPS IN MAKAWANPUR DISTRICT, CENTRAL NEPAL

AN EMPIRICAL METHOD FOR SEISMIC VULNERABILITY ASSESSMENT OF NEPALI SCHOOL BUILDINGS

EFFECTIVENESS OF HYDROPOWER DEVELOPMENT FINANCE: EVIDENCE FROM BHUTAN AND NEPAL

INDIA

ASSESSING THE ROLE OF ADVANCED COOKING TECHNOLOGIES TO MITIGATE HOUSEHOLD AIR POLLUTION IN RURAL AREAS OF SOLAN, HIMACHAL PRADESH, INDIA

AN EMERGING PEST OF RADISH, STRIPED FLEA BEETLE PHYLLOTRETA STRIOLATA (FABRICIUS), FROM NORTHERN INDIA: INCIDENCE, DIAGNOSIS AND MOLECULAR ANALYSIS

ESTIMATION OF STRESS AMPLIFICATION FACTOR (SAF) AND GEOLOGICAL STRUCTURES IN TUNNEL: AN EXAMPLE FROM LESSER HIMALAYA, JAMMU AND KASHMIR, INDIA

CHINA

SHARP CHANGES IN PLANT DIVERSITY AND PLANT-HERBIVORE INTERACTIONS DURING THE EOCENE–OLIGOCENE TRANSITION ON THE SOUTHEASTERN QINGHAI-TIBETAN PLATEAU

THE INFLUENCE OF SOIL DROUGHT STRESS ON THE LEAF TRANSCRIPTOME OF FABA BEAN (VICIA FABA L.) IN THE QINGHAI–TIBET PLATEAU

INTERACTIVE EFFECTS OF ELEVATION AND LAND USE ON SOIL BACTERIAL COMMUNITIES IN THE TIBETAN PLATEAU

SPECIES MONITORING USING UNMANNED AERIAL VEHICLE TO REVEAL THE ECOLOGICAL ROLE OF PLATEAU PIKA IN MAINTAINING VEGETATION DIVERSITY ON THE NORTHEASTERN QINGHAI-TIBETAN PLATEAU

SPATIO-TEMPORAL VARIATIONS OF WATER VAPOR BUDGET OVER THE TIBETAN PLATEAU IN SUMMER AND ITS RELATIONSHIP WITH THE INDO-PACIFIC WARM POOL

BHUTAN *HABITAT REQUIREMENTS OF THE HIMALAYAN RED PANDA (AILURUS FULGENS) AND THREAT ANALYSIS IN JIGME DORJI NATIONAL PARK, BHUTAN*

PAKISTAN *CONTEMPORARY EARTHQUAKE HAZARDS IN THE WEST-NORTHWEST HIMALAYA: A STATISTICAL PERSPECTIVE THROUGH NATURAL TIMES*

Nepal-Himalaya

SMALLHOLDER MECHANIZATION INDUCED BY YIELD-ENHANCING BIOLOGICAL TECHNOLOGIES: EVIDENCE FROM NEPAL AND GHANA

Hiroyuki Takeshima and Yanyan Liu

Agricultural Systems 184: 102914

Recent agricultural transformation in Asia and Africa has witnessed the gradual spread of mechanization in agricultural areas that are still largely made up of smallholder farming. While the literature has often characterized mechanical technologies as being complementary to land, knowledge gaps exist with regard to the process of adoption of mechanization by smallholders for whom the scope for exploiting its complementarity with land is limited. We test a hypothesis that yield-enhancing biological technologies—which potentially raise total factor productivity and returns to more intensive farm-power use—are important drivers of the adoption of agricultural mechanization among smallholders. To enhance the external validity of evidence, we empirically analyze this hypothesis by applying the same methodologies in two countries, lowland (Terai) Nepal and Ghana. We employ nationally representative, repeated, cross-sectional data from both countries, as well as unique tractor-use data from Ghana; we also employ multidimensional indicators of agroclimatic similarity in the respective plant breeding locations. We show that in both lowland Nepal and Ghana, the adoption of tractors and agricultural equipment has been induced by yield-enhancing biological technologies, particularly improved varieties and high-yielding production systems, when these biological technologies are instrumented by agroclimatic similarity to plant breeding locations, which is measured accounting for the multidimensional characteristics of agroclimatic conditions, and thus proxies spillover potentials of the public sector developed biological technologies. In general, these effects are particularly strong among smaller farms, and the effect holds for the adoption of mechanization both at extensive margins (whether to adopt) and at intensive margins (how much to adopt). In Ghana, partly due to improved efficiency in supply-side factors of mechanization, these linkages have strengthened in the 2010s. The results suggest that in both countries, mechanization support strategies for smallholders can potentially improve their targeting by utilizing the information of agroclimatic similarity with plant breeding locations. In Ghana, further public investments in plant-breeding system in strategic locations may broadly enhance smallholders' demand for mechanization. In lowland Nepal where tractor adoptions have grown fairly high, it is now important

to more carefully evaluate the trade-off between smallholder-based growth strategies and other strategies, for example, promoting scale-expansions of farming, which also involves mechanization.

For further reading: <https://doi.org/10.1016/j.agsy.2020.102914>

UTILIZATION PATTERN AND INDIGENOUS KNOWLEDGE OF WILD MEDICINAL PLANTS AMONG THREE ETHNIC GROUPS IN MAKAWANPUR DISTRICT, CENTRAL NEPAL

Nirmala Joshi, AbdolbasetGhorbani, Mohan Siwakoti, and KatjaKehlenbeck

Journal of Ethnopharmacology 262: 113219

In Nepal, wild plant resources play an important role in local communities' health care. However, this role and its patterns are poorly studied in many regions of the country. This study aimed at documenting the indigenous knowledge on the use patterns of medicinal plants of three ethnic groups from Makawanpur district, Central Nepal. Ethnobotanical information was collected through interviews with 165 respondents from the Bankaria, Newah and Tamang ethnic groups across five locations of different altitude levels. Botanical voucher samples were collected for scientific identification. Informant consensus factor (ICF) and relative frequency of citation (RFC) were calculated and relationships between knowledge on medicinal plants and location, ethnic group, gender and age of the respondents were analysed. Altogether, 189 plant species were reported by the respondents. Medicinal plants were mostly collected from forest (130 spp.) and fallow land (49 spp.). Only few species such as *Acorus calamus* L., *Cheilocostus speciosus* (J. Koenig) Sm. and *Mentha spicata* L. were cultivated in homegardens. ICF values highlighted that common diseases treated were disorders of the digestive system, the skin and the respiratory system. Highest RFC values were found for *Urtica dioica* L., *Terminalia chebula* Retz. and *Swertia chirayita* (Roxb. ex Fleming) Karsten. Gender of the respondent had no influence on medicinal plant knowledge while a higher knowledge was detected in rural than urban locations and in those located in the lowlands. Respondents from the Newah ethnic group had significantly lower knowledge on medicinal plants than those from the Bankaria and Tamang ethnic groups. Age of respondents was significantly positively correlated with the reported use number of medicinal plants ($r = 0.450$; $p < 0.001$), species number ($r = 0.468$, $p < 0.001$) and number of illnesses treated ($r = 0.468$, $p < 0.001$). The knowledge and use patterns of medicinal plant species were related to the location as well as to the ethnic group and age of the respondents. This shows that it is important to cover a wide range of respondents in such a study to cover the different socio-cultural backgrounds and age classes. The presented study can help to identify those medicinal plant species with the highest importance and the highest utilization potential by integrating ethnobotanical information from the different ethnic groups and age classes. The most important medicinal plant species should be considered for pharmacological testing and for domestication.

For further reading: <https://doi.org/10.1016/j.jep.2020.113219>

AN EMPIRICAL METHOD FOR SEISMIC VULNERABILITY ASSESSMENT OF NEPALI SCHOOL BUILDINGS

DipendraGautam, RabindraAdhikari, Rajesh Rupakhety, and PushkarKoirala

Bulletin of Earthquake Engineering 18: 1-18

The 2015 Gorkha earthquake in Nepal damaged more than 28,000 school buildings across the affected areas. Nepali school buildings can broadly be categorized into special moment-resisting frame, brick masonry, stone masonry, timber, and composite construction (steel and masonry). This paper proposes a new methodology to designate seismic vulnerability of these building categories. The proposed methodology is based on the field study of around 3389 school buildings in central Nepal. Structural, non-structural, architectural, site conditions, seismic enhancement and retrofitting, and multi-hazard parameters are incorporated to develop a scoring system. Indexed based system is introduced using sensitivity analysis which allows the designation of total vulnerability scores to individual buildings. The scores are modified based on the level of seismic strengthening/retrofitting. Based on the total vulnerability score, a qualitative vulnerability level is assigned to the individual building. The results highlight that more than 90% of Nepali school buildings are moderate to very highly vulnerable.

For further reading: <https://doi.org/10.1007/s10518-020-00922-z>

EFFECTIVENESS OF HYDROPOWER DEVELOPMENT FINANCE: EVIDENCE FROM BHUTAN AND NEPAL

Kaoru Ogino, Jongmi Son, and Mikiyasu Nakayama

International Journal of Water Resources Development 36: 1-17

Bhutan benefits from surplus power generation and associated export revenues, whereas Nepal suffers from power shortages and import deficits. They have contrasting hydropower development, taking different approaches and relying on different sources of development finance in hydropower projects. This study analyzed effective financing approaches for feasible hydropower projects under geopolitical constraints. The lesson learned from their comparison is strategic prioritization to select and consolidate international funds. Bhutan has attracted external finance to large projects for power export. However, Nepal failed to plan and use external funds from donors and private investors, resulting in small projects for only domestic consumption.

For further reading: <https://doi.org/10.1080/07900627.2020.1790342>

India-Himalaya

ASSESSING THE ROLE OF ADVANCED COOKING TECHNOLOGIES TO MITIGATE HOUSEHOLD AIR POLLUTION IN RURAL AREAS OF SOLAN, HIMACHAL PRADESH, INDIA

Pooja Arora, Ibrahim HafeezurRehman, R. Suresh, Ajay Sharma, Deepti Sharma, and Anirudh Sharma

The problem of household air pollution (HAP) due to the use of inefficient cooking devices continues to affect the rural population of India. With the ongoing efforts to improve indoor air quality (IAQ) through intervention of clean cooking options it is imperative to assess these interventions in real world conditions before large scale rollouts. The present study is an attempt to assess the impact of three clean cooking solutions - induction stove (IS), forced draft cookstove (FDC) and a traditional cookstove with hood (TCH) in rural area of Solan, Himachal Pradesh in India. Using a cross-sectional study design mean 24 h kitchen area concentration of $PM_{2.5}$ and PM_{10} , carbon monoxide (CO) along with cooking time black carbon (BC) were measured. A significant ($p < 0.05$) reduction of $> 70\%$ in mean 24 h and cooking time concentrations of all the pollutants was observed in all three clean cooking interventions compared to the traditional cookstove. However, in case of IS the reduction in mean 24 h $PM_{2.5}$ and PM_{10} concentrations were 72% and 74% respectively which were much lower than nearly 100% reduction in CO and BC. Low cost interventions such as TCH were also found to improve IAQ significantly. However, higher BC fraction in PM in FDC indicated a scope for technological improvement in design of such stoves and a need for integrating BC as a stove performance indicator was also realized. Additionally, a comparative analysis using IAQ data from related studies highlighted the role of kitchen geometry and ambient air quality in causing variation in IAQ. So, for large scale community programs and initiatives that aim to mitigate HAP it is important to have multi-pronged approach that takes into cognizance factors other than cookstove which impact IAQ

For further reading: <https://doi.org/10.1016/j.eti.2020.101084>

AN EMERGING PEST OF RADISH, STRIPED FLEA BEETLE *PHYLLOTRETA STRIOLATA* (FABRICIUS), FROM NORTHERN INDIA: INCIDENCE, DIAGNOSIS AND MOLECULAR ANALYSIS

S. S. Anooj, K. V. Raghavendra, P. R. Shashank, C. Nithya, H. R. Sardana, and V. Vaibhav

Phytoparasitica 48: 1-11

Severe incidence of striped flea beetle, *Phyllotreta striolata* (Fabricius) (Coleoptera: Chrysomelidae) in radish is being reported from Delhi National Capital Region and Haryana. The larvae and adult of this species were found to damage both roots and leaves of radish, respectively. Overall there was an average 63.02 percent leaf infestation and 53.96 percent root infestation in the radish fields surveyed, which was above the economic threshold level (25% infestation). Infestation was also observed on other cruciferous crops like turnip, mustard, cabbage and cauliflower in National Capital Region and Haryana. In the present study, we have furnished the species diagnosis, sexual dimorphism, nature of damage and illustrations of various stages of the pest. DNA barcoding was employed to confirm the species identity and molecular phylogenetic studies based on mt CO I sequences from across the

world showed that there were two clusters; the Old World and the New World. The biology of the pest and the importance of studies on area specific population dynamics for formulating management strategies are discussed.

For further reading: <https://doi.org/10.1007/s12600-020-00825-4>

ESTIMATION OF STRESS AMPLIFICATION FACTOR (SAF) AND GEOLOGICAL STRUCTURES IN TUNNEL: AN EXAMPLE FROM LESSER HIMALAYA, JAMMU AND KASHMIR, INDIA

Pratap Chandra Dhang

Indian Geotechnical Journal 50: 1-11

Stresses on ground depend upon regional as well as local geological factors. However, the local geological factors are considered more important in controlling the stresses during tunneling activities. These stresses sometimes get amplified (overstressed condition) due to several factors (geological and/or non-geological), known as stress amplification factor (SAF), and if the same has been plotted along the longitudinal geological profile, it will be variable throughout. Here, an attempt has been made to quantify the SAF and correlate the same with the encountered geology in KohliAdit Tunnel (KAT) located at lesser Himalayan range of Jammu and Kashmir, India. KAT is at the close vicinity of the Murree Thrust (equivalent to the Main Boundary Thrust). Several collapses and significant deformations due to oversteering occurred during the construction phase. Even there were expected very poor ground condition ahead as emancipated from probing. Therefore, heavier supports have been used than the envisaged support systems. The SAF has been calculated on the basis of differences between the actual and envisaged support systems pressure and other variables. 830 m long KAT has been subdivided into 31 SAF zones, where the values range from 1.05 to 1.25. It has been found that the amplification of stresses was due to factors like, thrust, faults and shear zones, different geomechanical behavior around lithological contacts, low overburden zones and high pore-water pressure zones. Further, it has also been inferred that the combinations of these factors have higher influence on oversteering.

For further reading: <https://doi.org/10.1007/s40098-020-00448-w>

China Himalaya

SHARP CHANGES IN PLANT DIVERSITY AND PLANT-HERBIVORE INTERACTIONS DURING THE EOCENE–OLIGOCENE TRANSITION ON THE SOUTHEASTERN QINGHAI-TIBETAN PLATEAU

Weiyudong Deng, Tao Su, TorstenWappler, Jia Liu, Shufeng Li, Jian Huang, He Tang, Shook Ling Low, Tengxiang Wang, He Xu, XiaotingXu, Ping Liu,andZhekun Zhou

Herbivore damage patterns on fossil leaves are essential to explore the evolution of plant-herbivore interactions under paleoenvironmental changes and to better understand the evolutionary history of terrestrial ecosystems. The Eocene–Oligocene transition (EOT) is a period of dramatic paleoclimate changes that significantly impacted global ecosystems; however, the influences on plant-herbivore interactions during this period are largely unknown. We identified taxonomic composition of the flora, and investigated well-preserved herbivore damage on fossil leaves from two layers of the Lawula Formation in Markam County, southeastern Qinghai-Tibetan Plateau (QTP), China. Besides, paleoclimate conditions were reconstructed using fossil plant assemblages. The plant assemblage from the latest Eocene layer (MK-3, ~34.6 Ma) was dominated by Fagaceae and Betulaceae, whereas Rosaceae and Salicaceae were the most abundant in the earliest Oligocene layer (MK-1, ~33.4 Ma). In MK-3, 932 out of 2428 fossil leaves were damaged and presented 41 damage types (DTs). The richest functional feeding groups (FFGs) in this layer were hole feeding, margin feeding, and galling. In MK-1, 144 out of 599 leaves were damaged and presented 20 DTs, with the major FFGs being hole feeding, margin feeding, and skeletonization. Generally, MK-3 had a significantly higher damage frequency (DF) and more DTs compared to MK-1. The decline in temperature, accompanied by the mountain uplift during the EOT on the QTP margin, led to changes in plant composition, with a consequent decrease in herbivory quantity and diversity. Our results shed new light on the influence of paleoenvironmental changes in shaping the evolution of biodiversity as well as the ecosystem on the plateau.

For further reading: <https://doi.org/10.1016/j.gloplacha.2020.103293>

THE INFLUENCE OF SOIL DROUGHT STRESS ON THE LEAF TRANSCRIPTOME OF FABA BEAN (*Vicia faba* L.) IN THE QINGHAI–TIBET PLATEAU

Xuexia Wu, Youcun Fan, Lanping Li, and Yujiao Liu

3 Biotech 10: 381

Water deficit has a significant impact on growth, development and yield of fava bean (*Vicia faba* L.) in arid and semi-arid climates. The aim of this study was to identify differentially expressed genes in the Qinghai 13 genotype under soil drought through leaf transcriptome analysis. A total of 256.95 M clean reads were obtained and assembled into 176334 unigenes, with an average length of 766 bp. A total of 9126 (4439 upregulated and 4687 downregulated) differentially expressed genes (DEGs) were identified in faba bean leaves under soil drought. In total, 324 putative transcription factors were identified and classified as belonging to different transcription factor families. According to GO and KEGG analysis, the soil drought stress-inducible DEGs encoded proteins mainly involved in regulating photosynthesis, osmotic adjustment, detoxification, autophagy and other functions. In addition, a large portion of DEGs appeared to be novel because they could not be annotated in any functional databases, therefore, suggesting a specific response to soil drought in faba bean. Finally, RNA-seq analysis was

validated by quantitative reverse-transcription PCR analysis. This work provides comprehensive and valuable information for understanding the molecular mechanisms which faba bean uses to respond to soil drought.

For further reading: <https://doi.org/10.1007/s13205-020-02374-3>

INTERACTIVE EFFECTS OF ELEVATION AND LAND USE ON SOIL BACTERIAL COMMUNITIES IN THE TIBETAN PLATEAU

Yuanyuan Yang, Yin Zhou, Zhou Shi, Raphael A.ViscarraRossel, Zongzheng Liang, Haizhen Wang, Lianqing Zhou, and Wu Yu

*Pedosphere*30: 817-831

The Tibetan Plateau of China is uniquely vulnerable to the global climate change and anthropogenic disturbances. As soil bacteria exert a considerable influence on the ecosystem function, understanding their response to different climates and land-use types is important. Here, we characterized the bacterial community composition and diversity across three major ecosystems (cropland, forest, and grassland) in the Sygera Mountains of Tibet, along a typical elevational gradient (3300–4600 m). The abundance of taxa that preferentially inhabit neutral or weak alkaline soil environments (such as Actinobacteria, Thermoleophilia, and some non-acidophilus Acidobacteria) was significantly greater in the cropland than in the forest and grassland. Furthermore, the diversity of soil bacterial communities was also significantly greater in the cropland than in the forest and grassland. We observed a unimodal distribution of bacterial species diversity along the elevation gradient. The dominant phyla Acidobacteria and Proteobacteria exhibited consistent elevational distribution patterns that mirrored the abundance of their most abundant classes, while different patterns were observed for Acidobacteria and Proteobacteria at the class level. Soil pH was the primary edaphic property that regulated bacterial community composition across the different land-use types. Additionally, soil pH was the main factor distinguishing bacterial communities in managed soils (i.e., cropland) from the communities in the natural environments (i.e., forest and grassland). In conclusion, land use (particularly anthropogenic disturbances such as cropping) largely controlled soil environment, played a major role in driving bacterial community composition and distribution, and also surpassed climate in affecting bacterial community distribution.

For further reading: [https://doi.org/10.1016/S1002-0160\(19\)60836-2](https://doi.org/10.1016/S1002-0160(19)60836-2)

SPECIES MONITORING USING UNMANNED AERIAL VEHICLE TO REVEAL THE ECOLOGICAL ROLE OF PLATEAU PIKA IN MAINTAINING VEGETATION DIVERSITY ON THE NORTHEASTERN QINGHAI-TIBETAN PLATEAU

Yu Qin, Yi Sun, Wei Zhang, Yan Qin, Jianjun Chen, Zhiwei Wang, and Zhaoye Zhou

Plateau pika (*Ochotonacurzoniae*, hereafter pika) is considered to exert a profound impact on vegetation species diversity of alpine grasslands. Great efforts have been made at mound or quadrat scales; nevertheless, there is still controversy about the effect of pika. It is vital to monitor vegetation species composition in natural heterogeneous ecosystems at a large scale to accurately evaluate the real role of pika. In this study, we performed field survey at 55 alpine grassland sites across the Shule River Basin using combined methods of aerial photographing using an unmanned aerial vehicle (UAV) and traditional ground measurement. Based on our UAV operation system, Fragmentation Monitoring and Analysis with aerial Photography (FragMAP), aerial images were acquired. Plot-scale vegetation species were visually identified, and total pika burrow exits were automatically retrieved using the self-developed image processing software. We found that there were significant linear relationships between the vegetation species diversity indexes obtained by these two methods. Additionally, the total number of identified species by the UAV method was 71, which was higher than the Quadrat method recognition, with the quantity of 63. Our results indicate that the UAV was suitable for long-term repeated monitoring vegetation species composition of multiple alpine grasslands at plot scale. With the merits of UAV, it confirmed that pika's disturbance belonged to the medium level, with the density ranging from 30.17 to 65.53 ha⁻¹. Under this density level, pika had a positive effect on vegetation species diversity, particularly for the species richness of sedge and forb. These findings conclude that the UAV was an efficient and economic tool for species monitoring to reveal the role of pika in the alpine grasslands

For further reading: <https://doi.org/10.3390/rs12152480>

SPATIO-TEMPORAL VARIATIONS OF WATER VAPOR BUDGET OVER THE TIBETAN PLATEAU IN SUMMER AND ITS RELATIONSHIP WITH THE INDO-PACIFIC WARM POOL

Deli Meng, Qing Dong, Fanping Kong, Zi Yin, Yanyan Li, and Jingyi Liu

The water vapour budget (WVB) over the Tibetan Plateau (TP) is closely related to the large-scale atmospheric moisture transportation of the surrounding mainland and oceans, especially for the Indo-Pacific warm pool (IPWP). However, the procession linkage between the WVBs over the TP and its inner basins and IPWP has not been sufficiently elucidated. In this study, the relationship between the summer WVB over the TP and the IPWP was quantitatively investigated using reanalysis datasets and satellite-observed sea surface temperature (SST). The results show that: (1) the mean total summer vapor budget (WVB_t) over the TP in the period of 1979–2018 was $72.5 \times 10^6 \text{ kg s}^{-1}$. Additionally, for the 13 basins within the TP, the summer WVB has decreased from southeast to northwest; the YarlungZangbo River Basin had the highest WVB (33.7%), followed by the Upper Yangtze River Basin, Ganges River Basin and Qiangtang Plateau. (2) For the past several decades, the WVB_t over the TP has

experienced an increasing trend ($3.81 \times 10^6 \text{ kg s}^{-1} \text{ decade}^{-1}$), although the southern boundary budget (WVB_s) contributed the most and is most closely related with the WVB_t , while the eastern boundary budget (WVB_e) experienced a decreasing trend ($4.21 \times 10^6 \text{ kg s}^{-1} \text{ decade}^{-1}$) which was almost equal to the interdecadal variations of the WVB_t . (3) For the IPWP, we defined a new warm pool index of surface latent heat flux (WPI-slf), and found that an increasing WPI-slf would cause an anticyclone anomaly in the equatorial western Indian Ocean (near 70° E), resulting in the increased advent of water vapor to the TP. (4) On the interdecadal scale, the correlation coefficients of the variation of the summer WVB_t over the TP with the WPI-slf and Indian Ocean Dipole (IOD) signal were 0.86 and 0.85, respectively (significant at the 0.05% level). Therefore, the warming and the increasing slhf of the IPWP would significantly contribute to the increasing WVB of the TP in recent decades.

For further reading: <https://doi.org/10.3390/atmos11080828>

Bhutan-Himalaya

HABITAT REQUIREMENTS OF THE HIMALAYAN RED PANDA (*AILURUS FULGENS*) AND THREAT ANALYSIS IN JIGME DORJI NATIONAL PARK, BHUTAN

PemaDendup, Tatyana Humle, DambarBista, UgyenPenjor, ChokiLham, and JigmeGyeltshen

Ecology and Evolution

Understanding the influence of anthropogenic disturbances on species' habitat use and distribution is critical to conservation managers in planning effective conservation strategies and mitigating the impact of development. Few studies have focused on the Himalayan red panda (*Ailurusfulgens*) in Bhutan. This study aimed to assess the habitat requirements and threats to this endangered species in the Khamaedsubdistrict of the JigmeDorji National Park, Bhutan. We employed a transect walk and plot-sampling survey design across two seasons, that is, winter and spring. In total, we surveyed $84 \times 50 \text{ m}$ radius circular plots along 51 km of existing trails within a 25.4 km^2 study area. At 500 m intervals, we established plots at random distances and direction from the trail. We recorded direct sightings ($n = 2$) and indirect signs ($n = 14$), such as droppings and footprints as evidence of red panda presence within an altitudinal range of $2,414\text{--}3,618 \text{ m}$. We also noted 21 tree and 12 understory species within plots with red panda evidence; the dominant tree species was the Himalayan hemlock (*Tsugadumosa*) and the Asian barberry (*Berberisasiatica*) as an understory species. Red panda presence showed a significant positive association with distance to water sources and fir forests. Plant disturbance and infrastructure, such as power transmission lines, were identified as prominent anthropogenic threats in the study area. Based on our findings, we recommend the development and implementation of local forest management plans, livestock intensification

programs, and strict application of environmental impact assessment regulations to promote the conservation of the red panda in the region.

For further reading: <https://doi.org/10.1002/ece3.6632>

Pakistan- Himalaya

CONTEMPORARY EARTHQUAKE HAZARDS IN THE WEST-NORTHWEST HIMALAYA: A STATISTICAL PERSPECTIVE THROUGH NATURAL TIMES

SumantaPasari and Yogendra Sharma

Seismological Research Letters(2020)

Himalayan earthquakes have deep societal and economic impact. In this article, we implement a surrogate method of nowcasting (Rundle *et al.*, 2016) to determine the current state of seismic hazard from large earthquakes in a dozen populous cities from India and Pakistan that belong to the west-northwest part of Himalayan orogeny. For this, we (1) perform statistical inference of natural times, intersperse counts of small-magnitude events between pairs of succeeding large events, based on a set of eight probability distributions; (2) compute earthquake potential score (EPS) of 14 cities from the best-fit cumulative distribution of natural times; and (3) carry out a sensitivity testing of parameters—threshold magnitude and area of city region. Formulation of natural time (Varostos *et al.*, 2005) based on frequency–magnitude power-law statistics essentially avoids the daunting need of seismicity declustering in hazard estimation. A retrospective analysis of natural time counts corresponding to $M \geq 6$ events for the Indian cities provides an EPS (%) as New Delhi (56), Chandigarh (86), Dehradun (83), Jammu (99), Ludhiana (89), Moradabad (84), and Shimla (87), whereas the cities in Pakistan observe an EPS (%) as Islamabad (99), Faisalabad (88), Gujranwala (99), Lahore (89), Multan (98), Peshawar (38), and Rawalpindi (99). The estimated nowcast values that range from 38% to as high as 99% lead to a rapid yet useful ranking of cities in terms of their present progression to the regional earthquake cycle of magnitude ≥ 6.0 events. The analysis inevitably encourages scientists and engineers from governments and industry to join hands for better policymaking toward land-use planning, insurance, and disaster preparation in the west-northwest part of active Himalayan belt.

For further reading: <https://doi.org/10.1785/0220200104>

Highlight of the Issue

California in a wildfire disaster

Amidst pandemic situations of COVID-19, Northern California has faced the huge wildfire that started on 17 August, impacting over 1 million acres of forest. It has been assumed that the intense thunderstorms and about 12,000 lightning strikes within 10 days ignited over 600 wildfires. A total of 43 people including the firefighters have been injured and hundreds of houses have been burnt down due to this fire. Importantly, California's oldest state park 'Big Basin Redwoods State Park' that is home to redwood trees including 2,000 years old has been severely destroyed. According to the California Department of Forestry and Fire Protection's statement on 24 August, about 612,972 ha of area has been burned off. Ablaze on steep terrains have been fueled by strong winds which has been threatening the larger cities. The State Governor has appealed for help from Australia and Canada.

Further reading:

<https://edition.cnn.com/2020/08/23/us/california-wildfires-sunday/index.html>

<https://www.bbc.com/news/world-us-canada-53828150>

<https://www.aljazeera.com/news/2020/08/california-wildfires-double-size-tens-thousands-flee-200820214454590.html>

<https://edition.cnn.com/2020/08/24/weather/california-wildfires-climate-change/index.html>