

Headlines Himalaya

August 1-August 15 (2020)

No. 613-614

Editorial Team: Surakshya Baskota and Sarmila Khanal

For the 613rd-614th issues of Headlines Himalaya, we reviewed journal articles from six sources and selected eighteen researches from five countries. We selected four researches from Nepal and fourteen 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 researches in the Himalaya. Please share it with your colleagues and friends. Also, subscription is free. Enjoy!

NEPAL

VARIATION OF BODY TEMPERATURE OF ACTIVE AMPHIBIANS ALONG ELEVATION GRADIENTS IN EASTERN NEPAL HIMALAYA

SOIL MOISTURE & ROADS INFLUENCE THE OCCURRENCE OF FROGS IN KATHMANDU VALLEY, NEPAL

THE IMPACT OF DISASTERS ON A HERITAGE TOURIST DESTINATION: A CASE STUDY OF NEPAL EARTHQUAKES

NON-LINEAR EFFECT OF TEMPERATURE VARIATION ON CHILDHOOD ROTAVIRUS INFECTION: A TIME SERIES STUDY FROM KATHMANDU, NEPAL

INDIA

RECURRENCE OF LARGE PALEO-EARTHQUAKES IN KASHMIR HIMALAYA SEISMIC GAP (RIASI AREA, INDIA)

*GEOGRAPHICAL DISTRIBUTION OF THE GIANT HONEY BEE *Apis laboriosa* SMITH, 1871 (HYMENOPTERA, APIDAE)*

*ON THE SYSTEMATIC STATUS OF *Calliophis macclellandi nigriventer* WALL, 1908 (REPTILIA: SERPENTES: ELAPIDAE)*

CHINA

FIRST MEASUREMENT OF SOIL FREEZE/THAW CYCLES IN THE TIBETAN PLATEAU USING CYGNSS GNSS-R DATA

*PREVALENCE AND GENETIC DIVERSITY OF *Echinorhynchus gymnocyprii* (ACANTHOCEPHALA: ECHINORHYNCHIDAE) IN SCHIZOTHORACINE FISHES (CYPRINIDAE: SCHIZOTHORACINAE) IN QINGHAI-TIBETAN PLATEAU, CHINA*

EFFECT OF INCREASING PRECIPITATION AND WARMING ON MICROBIAL COMMUNITY IN TIBETAN ALPINE STEPPE

COMPOSITION AND DIVERSITY OF SOIL MICROBIAL COMMUNITIES IN THE ALPINE WETLAND AND ALPINE FOREST ECOSYSTEMS ON THE TIBETAN PLATEAU

SEASONAL DYNAMICS OF A TEMPERATE TIBETAN GLACIER REVEALED BY HIGH-RESOLUTION UAV PHOTOGRAMMETRY AND IN SITU MEASUREMENTS

*RISK ASSESSMENT IN THE PLATEAU PIKA (*Ochotona curzoniae*): INTENSITY OF BEHAVIORAL RESPONSE DIFFERS WITH PREDATOR SPECIES*

CONCURRENT AND LAGGED EFFECTS OF EXTREME DROUGHT INDUCE NET REDUCTION IN VEGETATION CARBON UPTAKE ON TIBETAN PLATEAU BEYOND RESOURCE LIMITATION: AN EXPANDED TEST OF THE NICHE DIMENSION HYPOTHESIS FOR MULTIPLE TYPES OF NICHE AXES

BEYOND RESOURCE LIMITATION: AN EXPANDED TEST OF THE NICHE DIMENSION HYPOTHESIS FOR MULTIPLE TYPES OF NICHE AXES

DETECTING PERMAFROST IN PLATEAU AND MOUNTAINOUS AREAS BY AIRBORNE TRANSIENT ELECTROMAGNETIC SENSING

BHUTAN *MAPPING OF GLACIAL LAKES USING SENTINEL-1 AND SENTINEL-2 DATA AND A RANDOM FOREST CLASSIFIER: STRENGTHS AND CHALLENGES*

PAKISTAN *ASSESSING POTABLE WATER QUALITY AND IDENTIFYING AREAS OF WATERBORNE DIARRHEAL AND FLUOROSIS HEALTH RISKS USING SPATIAL INTERPOLATION IN PESHAWAR, PAKISTAN*

Nepal-Himalaya

VARIATION OF BODY TEMPERATURE OF ACTIVE AMPHIBIANS ALONG ELEVATION GRADIENTS IN EASTERN NEPAL HIMALAYA

Janak R. Khatiwada, Tian Zhao, and Jianping Jiang

Journal of Thermal Biology 92: 102653

Understanding the thermal ecology of active amphibians, as well as its relationship with habitat and environmental features, is a central theme in ecology. However, this topic has been poorly studied in eastern Himalaya, which is a global biodiversity hotspot. To bridge this gap, we investigated how the body temperatures of active amphibians varied along an elevation gradient in the Arun and Tamor River catchments in eastern Nepal Himalaya in the present study. Amphibian assemblages were sampled from May to July in both 2014 and 2015 using nocturnal time-constrained visual encounter surveys, and the body temperature of each individual was directly measured using a digital infrared thermometer in the field. A combination of linear regression and hierarchical partitioning analyses was used to determine the effects of elevation and environmental variables on the body temperatures of active amphibians. In total, the body temperatures of 599 amphibian individuals belonging to 28 species from six

families were recorded. Our results indicated that amphibian body temperature exhibited monotonically declining trends with increasing elevations in eastern Nepal Himalaya. Interestingly, this trend was much more pronounced in subtropical (lowland) areas than in warm and cool temperate regions. Inter- and intraspecies variations in body temperature were large, which can be attributed to distinct habitat utilization among species and the change in vegetation cover in different bioclimatic zones. Among all environmental variables, substrate temperature and water temperature were the best predictors of the amphibian body temperature. Overall, this study revealed amphibian body temperature patterns along an elevation gradient in eastern Nepal Himalaya, which were principally driven by temperature-related environmental factors. We believe our results can provide important information on amphibian physiological traits, which may help ecologists predict their responses to future climate change and formulate protection strategies.

For further reading: <https://doi.org/10.1016/j.jtherbio.2020.102653>

SOIL MOISTURE & ROADS INFLUENCE THE OCCURRENCE OF FROGS IN KATHMANDU VALLEY, NEPAL

Prakash Chandra Aryal, Chandramani Aryal, Sandesh Neupane, Bishal Sharma, Man Kumar Dhamala, Dipak Khadka, Subash Chandra Kharel, Pramananda Rajbanshi, and Dinesh Neupane

Global Ecology and Conservation 23: e01197

Urbanization and linear infrastructure are reported to influence amphibian assemblages and populations. In areas undergoing rapid infrastructure development and urbanization, the mounting threats to biodiversity are evident. Although protected area coverage and focus on charismatic species conservation are well recognized, non-charismatic species such as amphibians are far from mainstream conservation actions and policies in Nepal. Studies on pattern and distribution of amphibians are limited, as are the roles of environmental variables in amphibian diversity in the urban landscape. This study was designed to assess the frog species richness and correlates of amphibian occurrence in Kathmandu valley. Visual encounter survey of 161 belt transects was carried out in August 2018. Data analysis used two part or Hurdle regression methods where the richness of frogs was considered a response variable. A total of 10 frog species belonging to six families were recorded. The occurrence of frogs was negatively associated with the dry soil conditions and positively associated with increased distance from roads. Occurrence of frogs along road distance gradient depicts the influence of urban infrastructure in amphibian distribution. This entails consideration of systematic conservation planning for rapidly urbanizing areas.

For further reading: <https://doi.org/10.1016/j.gecco.2020.e01197>

THE IMPACT OF DISASTERS ON A HERITAGE TOURIST DESTINATION: A CASE STUDY OF NEPAL EARTHQUAKES

Jihye Min, Birendra KC, Seungman Kim, and Jaehoon Lee

Sustainability 12: 6115

This study examines the degree of macroeconomic recovery of the Nepal tourism industry after a natural disaster using the autoregressive integrated moving average model (ARIMA). The study investigated the case of Nepal's earthquakes in 2015 and examined the impact of the earthquakes on tourism inflows and GDP using time series data from 1990 to 2018. The results show that the increasing trend in the number of tourists changes in the post-earthquake period. In particular, the excess in tourist demand by age and purpose of visits after the earthquake indicates natural disaster as a potential reason for a tourism demand boost, often described as dark tourism in literature. This research shows the process of a heritage tourist destination assessing macroeconomic recovery from a natural disaster and fills the gap in the literature regarding purpose-based tourism demand and a link between dark tourism and disaster recovery on a heritage tourism destination.

For further reading: <https://doi.org/10.3390/su12156115>

NON-LINEAR EFFECT OF TEMPERATURE VARIATION ON CHILDHOOD ROTAVIRUS INFECTION: A TIME SERIES STUDY FROM KATHMANDU, NEPAL

Dinesh Bhandari, Peng Bi, Meghnath Dhimal, Jeevan Bahadur Sherchand and Scott Hanson-Easey

Science of the Total Environment 748: 141376

This study aimed to investigate the effects of temperature variability on rotavirus infections among children under 5 years of age in Kathmandu, Nepal. Findings may inform infection control planning, especially in relation to the role of environmental factors in the transmission of rotavirus infection. Generalized linear Poisson regression equations with distributed lag non-linear model were fitted to estimate the effect of temperature (maximum, mean and minimum) variation on weekly counts of rotavirus infections among children under 5 years of age living in Kathmandu, Nepal, over the study period (2013 to 2016). Seasonality and long-term effects were adjusted in the model using Fourier terms up to the seventh harmonic and a time function, respectively. We further adjusted the model for the confounding effects of rainfall and relative humidity. During the study period, a total of 733 cases of rotavirus infection were recorded, with a mean of 3 cases per week. We detected an inverse non-linear association between rotavirus infection and average weekly mean temperature, with increased risk (RR: 1.52; 95% CI: 1.08–2.15) at the lower quantile (10th percentile) and decreased risk (RR: 0.64; 95% CI: 0.43–0.95) at the higher quantile (75th percentile). Similarly, we detected an increased risk [(RR: 1.93; 95% CI: 1.40–2.65) and (RR: 1.42; 95% CI: 1.04–1.95)] of rotavirus infection for both maximum and minimum temperature at their lower quantile (10th percentile). We estimated that 344 (47.01%) cases of rotavirus diarrhoea among the children under 5 years of age were attributable to minimum temperature. The significant effect of temperature on rotavirus infection was not observed beyond lag zero week. An inverse non-linear association was estimated between rotavirus incidence and

all three indices of temperature, indicating a higher risk of infection during the cooler times of the year, and suggesting that transmission of rotavirus in Kathmandu, Nepal may be influenced by temperature.

For further reading: <https://doi.org/10.1016/j.scitotenv.2020.141376>

India-Himalaya

RECURRENCE OF LARGE PALEO-EARTHQUAKES IN KASHMIR HIMALAYA SEISMIC GAP (RIASI AREA, INDIA)

Riccardo Vassallo, Jean-Louis Mugnier, Hervé Jomard, Joaquin Cortès Aranda, Manzoor A. Malik, François Jouanne, and Jean-François Buoncristiani

Journal of Asian Earth Sciences 201: 104505

In Kashmir Himalaya, the Medlicott-Wadia Thrust is a main active fault responsible for the crustal accretionary prism building during the Late Quaternary. Because of the long seismic silence during the last five centuries, it is a key structure to be studied in order to estimate the regional seismic hazard. In the Riasi area, the analysis of two paleo seismological trenches allowed us identifying and measuring several seismic ruptures over the last ~3500 years. We determined that the oldest rupture occurred around 1600-1000 BC, while the youngest occurred after 1470 AD. The latest event is compatible with the great 1555 AD ($M_w > 7.5$) Kashmir earthquake, whose evidence at the surface had not yet been recognized. Our results show that despite the long-lasting seismic gap, the Medlicott-Wadia Thrust is a main seismogenic structure in the region, able to produce large earthquakes. Their recurrence interval ranges between 500 and 700 years, implying that a main seismic event could occur in the next decades. These seismic ruptures are localized over gently-dipping fault branches associated with decameter-scale scarps. The morphologies observed are due to a significant non-localized component of the deformation in Quaternary sediments.

For further reading: <https://doi.org/10.1016/j.jseaes.2020.104505>

GEOGRAPHICAL DISTRIBUTION OF THE GIANT HONEY BEE *Apis laboriosa* SMITH, 1871 (HYMENOPTERA, APIDAE)

Nyaton Kitnya, M. V. Prabhudev, Chet Prasad Bhatta, Thai Hong Pham, Tshering Nidup, , Karsing Megu, Jharna Chakravorty, Axel Brockmann, and G. W. Otis

ZooKeys 951: 67-81

Worldwide pollinator declines have dramatically increased our need to survey and monitor pollinator distributions and abundances. The giant honey bee, *Apis laboriosa*, is one of the important pollinators at higher altitudes of the Himalayas. This species has a restricted distribution along the Himalayas and neighboring mountain ranges of Asia.

Previous assessments of its distribution, published more than 20 years ago, were based on museum specimens. Since then, 244 additional localities have been revealed through field trips by the authors, publications, and websites. We present a revised distribution for *A. laboriosa* that better defines its range and extends it eastward to the mountains of northern Vietnam, southward along the Arakan Mountains to west-central Myanmar, into the Shillong Hills of Meghalaya, India, and northwestward in Uttarakhand, India. This species is generally found at elevations between 1000–3000 m a.s.l.. In northeastern India *A. laboriosa* colonies occur during summer at sites as low as 850 m a.s.l. and some lower elevation colonies maintain their nests throughout the winter. Finally, we report three regions in Arunachal Pradesh, India, and nine locations in northern Vietnam, where we observed workers of *A. laboriosa* and *A. dorsata* foraging sympatrically; their co-occurrence supports the species status of *Apis laboriosa*.

For further reading: [10.3897/zookeys.951.49855](https://doi.org/10.3897/zookeys.951.49855)

ON THE SYSTEMATIC STATUS OF *CALLIOPHIS MACCLELLANDI NIGRIVENTER* WALL, 1908 (REPTILIA: SERPENTES: ELAPIDAE)

Zeeshan A. Mirza, Vishal Varma, and Patrick D Campbell

Zootaxa 4821: 105–120

Sinomicrurus macclellandi (Reinhardt, 1844) is a species of coral snakes distributed across the forests of Southeast Asia and the Himalayas. The species exhibits distinct forms across its range, and it has been classified into four subspecies. *Calliophis macclellandi nigriventer* Wall, 1908 a population from Western Himalayas, which was described as a variety, has not been attended to until now. Our study of a recently collected specimen from near Solan, Himachal Pradesh, India and existing museum material has allowed us to assess the validity of this population based on molecular and morphological data and has given us enough evidence to suggest its elevation to a species rank. *Sinomicrurus nigriventer* **comb. Nov.** was found to be embedded within a clade comprising *S. peinani*, but not *S. macclellandi* s. l., with a genetic distance of 7–16% from its congeners. Morphologically, it differs from its congeners in having a reddish brown dorsum and a mid-dorsal black vertebral strip extending from the nape to the vent and with three thin bands on the tail, belly white with black smear up to the vent, tail dorsum with a few band-like blotches, and males with 230–235 ventral scales.

For further reading: <https://doi.org/10.11646/zootaxa.4821.1.5>

FIRST MEASUREMENT OF SOIL FREEZE/THAW CYCLES IN THE TIBETAN PLATEAU USING CYGNSS GNSS-R DATA

Xuerui Wu, Zhounan Dong, Shuanggen Jin, Yang He, Yezhi Song, Wenxiao Ma, and Lei Yang

Remote Sensing 12: 2361

The process of soil freezing and thawing refers to the alternating phase change of liquid water and solid water in the soil, accompanied by a large amount of latent heat exchange. It plays a vital role in the land water process and is an important indicator of climate change. The Tibetan Plateau in China is known as the “roof of the world”, and it is one of the most prominent physical characteristics is the freezing and thawing process of the soil. For the first time, this paper utilizes the spaceborne GNSS-R mission, i.e., CYGNSS (Cyclone Global Navigation Satellite System), to study the feasibility of monitoring the soil freeze-thaw (FT) cycles on the Tibetan Plateau. In the theoretical analysis part, model simulations show that there are abrupt changes in soil permittivities and surface reflectivities as the soil FT occurs. The CYGNSS reflectivities from January 2018 to January 2020 are compared with the SMAP FT state. The relationship between CYGNSS reflectivity and SMAP soil moisture within this time series is analyzed and compared. The results show that the effect of soil moisture on reflectivity is very small and can be ignored. The periodic oscillation change of CYGNSS reflectivity is almost the same as the changes in SMAP FT data. Freeze-thaw conversion is the main factor affecting CYGNSS reflectivity. The periodical change of CYGNSS reflectivity in the 2 years indicates that it is mainly caused by soil FT cycles. It is feasible to use CYGNSS to monitor the soil FT cycles in the Tibetan Plateau. This research expands the current application field of CYGNSS and opens a new chapter in the study of cryosphere using spaceborne GNSS-R with high spatial-temporal resolution.

For Further reading: <https://doi.org/10.3390/rs12152361>

PREVALENCE AND GENETIC DIVERSITY OF *ECHINORHYNCHUS GYMNOCYPRII* (ACANTHOCEPHALA: ECHINORHYNCHIDAE) IN SCHIZOTHORACINE FISHES (CYPRINIDAE: SCHIZOTHORACINAE) IN QINGHAI-TIBETAN PLATEAU, CHINA

Meng-Tong Lei, Jin-Zhong Cai, Chun-Hua Li, Yong Fu, Jian Sun, Dou-Dou Ma, Yao-Peng Li, and Yan-Ming Zhang

Parasites Vectors 13: 357

The schizothoracine fishes, an excellent model for several studies, is a dominant fish group of the Qinghai-Tibet Plateau (QTP). However, species populations have rapidly declined due to various factors, and infection with *Echinorhynchus gymnocyprii* is cited as a possible factor. In the present study, the molecular characteristics of *E. gymnocyprii* in four species of schizothoracine fishes from the QTP were explored. We investigated the

infection status of *E. gymnocyprii* in 156 schizothoracine fishes from the upper Yangtze River, upper Yellow River, and Qinghai Lake in Qinghai Province, China. The complete internal transcribed spacer (ITS) of the ribosomal RNA (rRNA) gene and part of the mitochondrial cytochrome *c* oxidase subunit 1 (*cox1*) gene of 35 *E. gymnocyprii* isolates from these fishes were sequenced and their characteristics analyzed. In addition, we inferred phylogenetic relationships of the *E. gymnocyprii* populations based on the rRNA-ITS and *cox1* sequences. The total prevalence of *E. gymnocyprii* in schizothoracine fishes was 57.69% (90/156). However, the prevalence among different species as well as that across the geographical locations of the schizothoracine fishes was significantly different. The results of sequence analysis showed that the four *E. gymnocyprii* populations from different hosts and regions of Qinghai Province were conspecific, exhibiting rich genetic diversity. Phylogenetic analysis based on rRNA-ITS and *cox1* sequences supported the coalescence of branches within *E. gymnocyprii*; the *cox1* gene of *E. gymnocyprii* populations inferred some geographical associations with water systems. In addition, three species of schizothoracine fishes were recorded as new definitive hosts for *E. gymnocyprii*. To the best of our knowledge, this is the first molecular description of *E. gymnocyprii* populations in schizothoracine fishes from the Qinghai-Tibet Plateau that provides basic data for epidemiological surveillance and control of acanthocephaliasis to protect endemic fish stocks.

For Further reading: <https://doi.org/10.1186/s13071-020-04224-w>

EFFECT OF INCREASING PRECIPITATION AND WARMING ON MICROBIAL COMMUNITY IN TIBETAN ALPINE STEPPE

Yilun Hu, Shang Wang, Bin Niu, Qiuyu Chen, Jian Wang, Jingxue Zhao, Tianxiang Luo, and Gengxin Zhang

Environmental Research 189 : 109917

Soil microorganisms play an important role in regulating the feedback of Alpine steppe ecosystems to future climate change. However, the interaction effect of warming and increasing precipitation on soil microorganisms remains unclear, in the face of an ongoing warmer and wetter climate on the Tibetan Plateau. In this study, we investigate the multi-factorial effects on soil microbial diversity, community structure, and microbial interactions in a three-year climate change experiment established in an Alpine steppe on the Tibetan Plateau, involving warming (+2 °C), +15% increasing precipitation and +30% increasing precipitation. Compared to warming, warming plus increasing precipitation alleviated the decrease in microbial diversity, and increased the dissimilarities in microbial community structures, largely influenced by water and substrate availability. We further observed differences in moisture increased the differences in microbial diversity and dissimilarities in microbial community structures across different precipitation levels under ambient temperature. Interestingly, warming plus increasing precipitation could create more ecological niches for microbial species to coexist but may lessen the strength of microbial interactions in contrast to increasing precipitation alone. Collectively, our findings indicate that microbial

responses to future climate change in Alpine steppe soils will be more complex than those under single-climate-factor conditions.

For Further reading: <https://doi.org/10.1016/j.envres.2020.109917>

COMPOSITION AND DIVERSITY OF SOIL MICROBIAL COMMUNITIES IN THE ALPINE WETLAND AND ALPINE FOREST ECOSYSTEMS ON THE TIBETAN PLATEAU

Xiaojie Wang, Zhichao Zhang, Zhiqiang Yu, Guofeng Shen, Hefa Cheng, and Shu Tao

Science of the Total Environment 747 : 141358

While the composition and diversity of soil microbial communities play a central and essential role in biogeochemical cycling of nutrients, they are known to be shaped by the physical and chemical properties of soils and various environmental factors. This study investigated the composition and diversity of microbial communities in 48 samples of seasonally frozen soils collected from 16 sites in an alpine wetland region (Lhasa River basin) and an alpine forest region (Nyang River basin) on the Tibetan Plateau using high-throughput sequencing that targeted the V3-V4 region of 16S rRNA gene. The dominant soil microbial phyla included Proteobacteria, Acidobacteria, and Actinobacteria in the alpine wetland and alpine forest ecosystems, and no significant difference was observed for their microbial composition. Linear discriminant analysis Effect Size (LEfSe) analysis showed that significant enrichment of Hymenobacteraceae and Cytophagales (belonging to Bacteroidetes) existed in the alpine wetland soils, while the alpine forest soils were enriched with Alphaproteobacteria (belonging to Proteobacteria), suggesting that these species could be potential biomarkers for alpine wetland and alpine forest ecosystems. Results of redundancy analysis (RDA) suggest that the microbial community diversity and abundance in the seasonally frozen soils on the Tibetan Plateau were mainly related to the total potassium in the alpine wetland ecosystem, and available potassium and soil moisture in the alpine forest ecosystem, respectively. In addition, function prediction analysis by Tax4Fun revealed the existence of potential functional pathways involved in human diseases in all soil samples. These results provide insights on the structure and function of soil microbial communities in the alpine wetland and alpine forest ecosystems on the Tibetan Plateau, while the potential risk to human health from the pathogenic microbes in the seasonally frozen soils deserves attention.

For Further reading: [10.1016/j.scitotenv.2020.141358](https://doi.org/10.1016/j.scitotenv.2020.141358)

SEASONAL DYNAMICS OF A TEMPERATE TIBETAN GLACIER REVEALED BY HIGH-RESOLUTION UAV PHOTOGRAMMETRY AND IN SITU MEASUREMENTS

Wei Yang, Chuanxi Zhao, Matthew Westoby, Tandong Yao, Yongjie Wang, Francesca Pellicciotti, Jianmin Zhou, Zhen He, and Evan Miles

The seasonal dynamic changes of Tibetan glaciers have seen little prior investigation, despite the increase in geodetic studies of multi-year changes. This study compares seasonal glacier dynamics (“cold” and “warm” seasons) in the ablation zone of Parlung No. 4 Glacier, a temperate glacier in the monsoon-influenced southeastern Tibetan Plateau, by using repeat unpiloted aerial vehicle (UAV) surveys combined with Structure-from-Motion (SfM) photogrammetry and ground stake measurements. Our results showed that the surveyed ablation zone had a mean change of -2.7 m of ice surface elevation during the period of September 2018 to October 2019 but is characterized by significant seasonal cyclic variations with ice surface elevation lifting ($+2.0$ m) in the cold season (September 2018 to June 2019) but lowering (-4.7 m) in the warm season (June 2019 to October 2019). Over an annual timescale, surface lowering was greatly suppressed by the resupply of ice from the glacier’s accumulation area—the annual emergence velocity compensates for about 55% of surface ablation in our study area. Cold season emergence velocities (3.0 ± 1.2 m) were ~ 5 -times larger than those observed in the warm season (0.6 ± 1.0 m). Distinct spring precipitation patterns may contribute to these distinct seasonal signals. Such seasonal dynamic conditions are possibly critical for different glacier responses to climate change in this region of the Tibetan Plateau, and perhaps further afield.

For further reading: <https://doi.org/10.3390/rs12152389>

**RISK ASSESSMENT IN THE PLATEAU PIKA (*OCHOTONA CURZONIAE*): INTENSITY OF BEHAVIORAL RESPONSE
DIFFERS WITH PREDATOR SPECIES**

Wanrong Wei, Qiaoyan Zhen, Zhongmin Tang, and Maria K. Oosthuizen

BMC Ecology 20: 1-8

The ability of a prey species to assess the risk that a predator poses can have important fitness advantages for the prey species. To better understand predator–prey interactions, more species need to be observed to determine how prey behavioral responses differ in intensity when approached by different types of predators. The plateau pika (*Ochotona curzoniae*) is preyed upon by all predators occurring in its distribution area. Therefore, it is an ideal species to study anti-predator behavior. In this study, we investigated the intensity of anti-predator behavior of pikas in response to visual cues by using four predator species models in Maqu County on the eastern Qinghai-Tibetan Plateau. The behavioral response metrics, such as Flight Initiation Distance (FID), the hiding time and the percentage of vigilance were significantly different when exposed to a Tibetan fox, a wolf, a Saker falcon and a large-billed crow, respectively. Pikas showed a stronger response to Saker falcons compared to any of the other predators. Our results showed that pikas alter their behavioral (such as FID, the hiding time and the vigilance) response intensity to optimally balance the benefits when exposed to different taxidermy predator species

models. We conclude that pikas are able to assess their actual risk of predation and show a threat-sensitive behavioral response.

For further reading: <https://doi.org/10.1186/s12898-020-00309-3>

CONCURRENT AND LAGGED EFFECTS OF EXTREME DROUGHT INDUCE NET REDUCTION IN VEGETATION CARBON UPTAKE ON TIBETAN PLATEAU

Chongchong Ye, Jian Sun, Miao Liu, Junnan Xiong, Ning Zong, Jian Hu, Yong Huang, Xingwu Duan, and Atsushi Tsunekawa

Remote Sensing 12: 2347

Climatic extremes have adverse concurrent and lagged effects on terrestrial carbon cycles. Here, a concurrent effect refers to the occurrence of a latent impact during climate extremes, and a lagged effect appears sometime thereafter. Nevertheless, the uncertainties of these extreme drought effects on net carbon uptake and the recovery processes of vegetation in different Tibetan Plateau (TP) ecosystems are poorly understood. In this study, we calculated the Standardised Precipitation–Evapotranspiration Index (SPEI) based on meteorological datasets with an improved spatial resolution, and we adopted the Carnegie–Ames–Stanford approach model to develop a net primary production (NPP) dataset based on multiple datasets across the TP during 1982–2015. On this basis, we quantised the net reduction in vegetation carbon uptake (NRVCU) on the TP, investigated the spatiotemporal variability of the NPP, NRVCU and SPEI, and analysed the NRVCUs that are caused by the concurrent and lagged effects of extreme drought and the recovery times in different ecosystems. According to our results, the Qaidam Basin and most forest regions possessed a significant trend towards drought during 1982–2015 (with *Slope* of SPEI < 0 , $P < 0.05$), and the highest frequency of extreme drought events was principally distributed in the Qaidam Basin, with three to six events. The annual total net reduction in vegetation carbon uptake on the TP experienced a significant downward trend from 1982 to 2015 ($-0.0018 \pm 0.0002 \text{ PgC year}^{-1}$, $P < 0.001$), which was negatively correlated with annual total precipitation and annual mean temperature ($P < 0.05$). In spatial scale, the NRVCU decrement was widely spread (approximately 55% of grids) with 17.86% of the area displaying significant declining trends ($P < 0.05$), and the sharpest declining trend ($\text{Slope} \leq -2$) was mainly concentrated in southeastern TP. For the alpine steppe and alpine meadow ecosystems, the concurrent and lagged effects of extreme drought induced a significant difference in NRVCU ($P < 0.05$), while forests presented the opposite results. The recovery time comparisons from extreme drought suggest that forests require more time (27.62% of grids ≥ 6 years) to recover their net carbon uptakes compared to grasslands. Therefore, our results emphasise that extreme drought events have stronger lagged effects on forests than on grasslands on the TP. The improved resilience of forests in coping with extreme drought should also be considered in future research.

For further reading: <https://doi.org/10.3390/rs12152347>

BEYOND RESOURCE LIMITATION: AN EXPANDED TEST OF THE NICHE DIMENSION HYPOTHESIS FOR MULTIPLE TYPES OF NICHE AXES

Xuebin Yan, Jeffrey Diez, Kailing Huang, Shaopeng Li, Xi Luo, Xinyu Xu, Fanglong Su, Lin Jiang, Hui Guo, and Shuijin Hu

Oecologia 193: 689-699

The niche dimension hypothesis predicts that more species can coexist given a greater number of niche axes along which they partition the environment. Although this hypothesis has been broadly supported by nutrient enrichment experiments, its applicability to other ecological factors, such as natural enemies and abiotic stresses, has not been vigorously tested. Here, we examined the generality of the niche dimension hypothesis by experimentally manipulating both resource and non-resource niche dimensions—nitrogen limitation, pathogens and low-temperature stress—in a Tibetan alpine meadow. We found that decreases in niche dimensions led to a significant reduction in species richness, consistent with results from nutrient addition studies. However, different niche variables uniquely affected the plant communities. While nitrogen had largest effects on both community biomass and species richness, pathogens and low-temperature stress, in combination with nitrogen, had synergistic effects on them. Our results provide direct evidence demonstrating that both resource and non-resource niche dimensions can influence species coexistence. These findings suggest that other non-resource factors need to be taken into consideration to better predict the community assembly and control over biodiversity, particularly under the future multifaceted global change scenarios.

For further reading: <https://doi.org/10.1007/s00442-020-04713-w>

DETECTING PERMAFROST IN PLATEAU AND MOUNTAINOUS AREAS BY AIRBORNE TRANSIENT ELECTROMAGNETIC SENSING

Benyu Su, Rongfu Rao, Zhixiong Li, Lei Song, and Jianhua Yue

Electronics 9: 1229

Transportation has become a key bottleneck which restricts economic development in Western China. However, during the construction of the western railway, the permafrost problem has plagued railway construction on the Qinghai–Tibet Plateau, and has not yet been resolved. Accurately identifying permafrost by geophysical method is the most effective means to solve this problem. However, the mountainous and plateau terrain in Western China impose huge challenges in collecting geophysical data. To address this issue, this paper proposes an airborne transient electromagnetic method to collect geophysical electromagnetic data to identify permafrost in the mountains and plateaus of Western China. Based on Maxwell's equations, the forward model of the airborne electromagnetic was derived, and the finite element method was used to calculate the two-dimensional (2D) space

electromagnetic responses of different permafrost geo-electrical models. Furthermore, a coupling function was constructed to estimate the distribution of the resistivity of the permafrost by the least-squares fitting algorithm. Comparison between inversion resistivity distribution and the geo-electrical model showed that the proposed airborne transient electromagnetic method was valid for exploring the permafrost in the mountains and the Qinghai–Tibet Plateau in Western China.

For further reading: <https://doi.org/10.3390/electronics9081229>

Bhutan-Himalaya

MAPPING OF GLACIAL LAKES USING SENTINEL-1 AND SENTINEL-2 DATA AND A RANDOM FOREST CLASSIFIER: STRENGTHS AND CHALLENGES

Sonam Wangchuk and Tobias Bolch

Science of Remote Sensing 2: 100008

Glacial lakes pose a serious threat to downstream areas and significantly impact glacier melt. The number and area of lakes has grown in most regions during the last decades due to the ongoing atmospheric warming and retreating glaciers. It is therefore important to identify and monitor these lakes. However, mapping of glacial lakes in alpine regions is challenged by many factors. These factors include the small size of glacial lakes, cloud cover in optical satellite images, cast shadows from mountains and clouds, seasonal snow in satellite images, varying degrees of turbidity amongst glacial lakes, and frozen glacial lake surfaces. In our study, we have developed a fully automated method for mapping glacial lakes across alpine regions including the Python package called “GLakeMap”. The method uses multi-source data such as Sentinel-1 Synthetic Aperture Radar and Sentinel-2 Multi-spectral Instrument data, a digital elevation model, and a random forest classifier model. We use multi-source datasets as inputs for rule-based segmentation of images, mainly aiming at extracting glacial lake objects from satellite images using a set of rules. Segmented objects are then classified either as glacial lake or non-glacial lake objects by the random forest classifier model. The method was tested in eight sites across alpine regions mainly located in High Mountain Asia but also in the Alps and the Andes. We show that the proposed method overcomes a majority of the aforementioned challenges to detect and delineate glacial lakes. The method performs efficiently irrespective of geographic, geologic, and climatic conditions of glacial lakes.

For further reading: <https://doi.org/10.1016/j.srs.2020.100008>

ASSESSING POTABLE WATER QUALITY AND IDENTIFYING AREAS OF WATERBORNE DIARRHEAL AND FLUOROSIS HEALTH RISKS USING SPATIAL INTERPOLATION IN PESHAWAR, PAKISTAN

Mahmood Ahmad, Arshad Jamal, Xiao-Wei Tang, Mohammed A. Al-Sughaiyer, Hassan M. Al-Ahmadi, and Feezan Ahmad

Water 12: 2163

Waterborne diseases have become one of the major public health concerns worldwide. This study is aimed to investigate and develop spatial distribution mapping of the potable water quality parameters in the city of Peshawar, Pakistan. A total of 108 water samples collected across the entire study area were subjected to physio-chemical and biological analyses. Tested parameters included pH, turbidity, temperature, fluoride concentration levels, and bacterial counts (faecal coliforms). Inverse distance weighting (IDW) interpolation in geographic information systems (GIS) was used for spatial analysis. Test results revealed that 48% of water samples had faecal coliforms count (per 100 mL) greater than World Health Organization (WHO) minimum limits, while 31% of samples had fluoride concentrations in excess of the WHO maximum guide values. Spatial distribution mapping was developed for faecal coliforms count and fluoride ion concentration using ArcGIS to highlight the high-risk settlements in the study area. Results showed that around 20% area under faecal coliforms and approximately 33% area based on fluoride concentrations fall under the need for treatment category. The pH and turbidity were found in compliance with WHO desirable limits. The sanitary inspection score significantly depicted that ineffective multi-barrier approaches consequently deteriorated the water quality at the consumer's end. Findings from the present study shall be useful to policymakers for adopting necessary remedial measures before it severely affects public health.

For Further reading: <https://doi.org/10.3390/w12082163>

Highlight of the Issue

Mauritius Oil Spill: An Environmental Disaster

The Japan-owned ship *MV Wakashio*, went aground at Pointe d'Esny, began spilling on August 6, 2020 which was believed to have been carrying 4,000 tonnes of fuel oil. The ship has been spilled off in the pristine environment that forced the government to announce a state of environmental emergency in Mauritius. According to the UN Convention on Biological Diversity, the marine environment of the Mauritius is the home of the 1700 species

including 800 types of fishes, 17 kinds of marine mammals and two species of turtles with the endangered coral reefs, sea grasses and mangroves. Soluble compounds from the oil dissolve in the water and heavy residues reside on the bottom which will affect the marine ecosystem. The France Government has dispatched the military craft with the pollution control equipment while the Japan has conveyed a six member team to assist in response to an appeal from Mauritius Government for the international help.

Source: <https://www.bbc.com/news/world-africa-53754751>

<https://www.aljazeera.com/news/2020/08/mauritius-pm-brace-worst-case-scenario-oil-spill-200810153025032.html>