An Environmental Research Abstract

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For the 681[1st] – 682[nd] issues of Headlines Himalaya, we reviewed researches from two sources and selected eight researches from five countries. We selected three researches from Nepal and five researches from other Himalayan countries (India, China, Bhutan and Pakistan).

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Nepal-Himalaya

EXPLORING OPTIONS FOR A PES LIKE SCHEME TO CONSERVE RED PANDA HABITAT AND LIVELIHOOD IMPROVEMENT IN WESTERN NEPAL

Manoj Bhatta, Stephen T. Garnett, and Kerstin K. Zander

Ecosystem Services 53: 101388

Mountain ecosystems in western Nepal provide critical habitats for the endangered red panda. These habitats also need to satisfy the daily livelihood requirements of local communities. High levels of resource dependence and unsustainable resource use are creating pressure on the provision of ecosystem services in the region. Un□derstanding the views of local villagers about their willingness to constrain the use of forest resources is the first step towards helping them realise sustainable environmental management. We conducted a survey among vil□lagers to determine their willingness to participate in a potential PES-like scheme to help the conservation of the red panda habitat through reduced use of forest resources. Choice experiment results indicate that a high pro□portion of respondents (87%) were willing to accept payments in return for reducing the use of the high pastures for animal grazing while a reduction in the harvest of medicinal plants would require more compensation. People living inside a protected area were willing to accept a lower compensation than those outside. Respondents indicated that they would prefer communal over personal compensation payments. The findings could support design and implementation of a PES-like scheme that concurrently manages the nexus between effective conservation, sustainable resource utilisation and livelihoods improvement.

For Further Reading: https://doi.org/10.1016/j.ecoser.2021.101388

POPULATION STATUS, HABITAT OCCUPANCY AND CONSERVATION THREATS TO MUGGER CROCODILE (*CROCODYLUS PALUSTRIS*) IN GHODAGHODI LAKE COMPLEX, NEPAL

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Global Ecology and Conservation 33: e10777

Mugger crocodile is a keystone species of slow flowing fresh water ecosystem. Few studies regarding status and distribution of Vulnerable Mugger have been conducted in Nepal. However, studies on ecology and other aspects of the species are limited. The goal of this study was to determine the Mugger crocodile's population status, habitat occupancy, and conservation threats in the Ghodaghodi lake complex, located in the western lowlands of Nepal. A detailed survey was conducted on 18 lakes of the lake complex in February, 2021. The population status of the Mugger was surveyed by walking along the entire boundary line of each lake. For habitat survey, perimeter of all the lakes of the complex was divided into the number of stations spaced at 500 m intervals. Habitat factors associated with the presence and absence of the Mugger were analyzed using Generalized Linear Model under binary logistic regression and likelihood ratio test was performed to test predictors for statistical significance. During the survey, 26 muggers were recorded. The probability of sighting Mugger in the lake complex was significantly differ by distance to settlement, distance to river, and human disturbances, among the nine habitat variables examined. Similarly, habitat modification and illegal fishing were ranked as most severe threats to Mugger crocodile in the lake complex. The concerned authorities, responsible for managing the lake complex shall pay attention on controlling the major identified threats like habitat modification, illegal fishing, unmanaged infrastructure development, and pollution in the lake complex in order to support future conservation of Vulnerable Mugger population in the area. Furthermore, a detailed and extensive study is suggested to investigate the movement of Muggers between different lakes of the complex as well as from Ghodaghodi lake complex to the nearby rivers during breeding season in order to support effective planning and execution of habitat management activities of this Vulnerable species.

For Further Reading: https://doi.org/10.1016/j.gecco.2021.e01977

TRENDS IN THE DIURNAL TEMPERATURE RANGE OVER THE SOUTHERN SLOPE OF CENTRAL HIMALAYA: RETROSPECTIVE AND PROSPECTIVE EVALUATION

Kalpana Hamal, Shankar Sharma, Rocky Talchabhadel, Munawar Ali, Yam Prasad Dhital, Tianli Xu, and Binod Dawadi

Atmosphere 12: 1683

The Diurnal Temperature Range (DTR) profoundly affects human health, agriculture, eco-system, and socioeconomic systems. In this study, we analyzed past and future changes in DTR using gridded Climate Research Unit (CRU) datasets for the years 1950–2020 and an ensemble means of thirteen bias-corrected Coupled Model Intercomparison Project Phase 6 (CMIP6) models under different Shared Socioeconomic Pathways (SSP1-2.6, SSP2-4.5, and SSP5-8.5) scenarios for the rest of the 21st century over the southern slope of Central Himalaya, Nepal. Furthermore, the potential drivers (precipitation and cloud cover) of seasonal and annual DTR were studied using correlation analysis. This study found that the DTR trends generally declined; the highest decrease was observed in the pre-monsoon and winter at a rate of 0.09 ◦C/decade ($p \leq 0.01$). As expected, DTR demonstrated a significant negative correlation with cloudiness and precipitation in all four seasons. Further, the decreased DTR was weakly related to the Sea Surface Temperature variation (SST) in the tropical Pacific and Indian Oceans. We found that the projected DTR changes in the future varied from a marginal increase under the SSP1-2.6 (only pre-monsoon) scenario to continued significant decreases under SSP2-4.5 and SSP5-8.5. Insights based on retrospective and prospective evaluation help to understand the long-term evolution of diurnal temperature variations

For further study: https://doi.org/10.3390/atmos12121683

India-Himalaya

AEROSOL CHARACTERISTICS AND THEIR IMPACT ON THE HIMALAYAN ENERGY BUDGET

Kesar Chand, Jagdish Chandra Kuniyal, Shruti Kanga, Raj Paul Guleria, Gowhar Meraj, Pankaj Kumar, Majid Farooq, Suraj Kumar Singh, Mahendra Singh Nathawat, Netrananda Sahu, and Raj Kumar

Sustainability 14:179

The extensive work on the increasing burden of aerosols and resultant climate implications shows a matter of great concern. In this study, we investigate the aerosol optical depth (AOD) variations in the Indian Himalayan Region (IHR) between its plains and alpine regions and the corresponding consequences on the energy balance on the Himalayan glaciers. For this purpose, AOD data from Moderate Resolution Imaging Spectroradiometer (MODIS, MOD-L3), Aerosol Robotic Network (AERONET), India, and Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation (CALIPSO) were analyzed. Aerosol radiative forcing (ARF) was assessed using the atmospheric radiation transfer model (RTM) integrated into AERONET inversion code based on the Discrete Ordinate Radiative Transfer (DISORT) module. Further, air mass trajectory over the entire IHR was analyzed using a hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model. We estimated that between 2001 and 2015, the monthly average ARF at the surface (ARFSFC), top of the atmosphere (ARFTOA), and atmosphere (ARFATM) were −89.6 ± 18.6 Wm^{-2}, −25.2 ± 6.8 Wm^{-2}, and +64.4 ± 16.5 Wm^{-2}, respectively. We observed that during dust aerosol transport days, the ARFSFC and TOA changed by −112.2 and −40.7 Wm^{-2}, respectively, compared with low aerosol

loading days, thereby accounting for the decrease in the solar radiation by 207% reaching the surface. This substantial decrease in the solar radiation reaching the Earth's surface increases the heating rate in the atmosphere by 3.1-fold, thereby acting as an additional forcing factor for accelerated melting of the snow and glacier resources of the IHR.

For further Reading: https://doi.org/10.3390/su14010179

AVIAN SPECIES COMPOSITION AND DISTRIBUTION ALONG ELEVATIONAL ZONE IN FOREST HABITAT OF NAINITAL DISTRICT (WESTERN HIMALAYA) OF UTTARAKHAND, INDIA

Kamal Joshi and Deepak Kumar

Trees, Forests and People 7: 100177

The present study was conducted to understand the avian species distribution pattern along the elevational zone in forest habitat of Nainital district of Uttarakhand. The study was conducted during January 2017 to January 2020. Total 132 species belonging to 43 families, Diversity indices and non-parametric estimators (Chao1, Chao2, and Jackknief) values were high at 1500 m asl (mid elevation) along the study range. Avian composition indicates a significantly positive correlation with vegetation structure (tree diversity and shrub density). The current study provides supportive data to understand the species distribution pattern at the local level. The occurrence of vulnerable Cheer Pheasant *(Catreus wallici)* and endangered species Egyptian vulture (*Neophron percnopterus*), indicates the rich avian diversity in the forest and it is suggested that more focus on the conservation efforts in the forest habitat.

For Further Reading: https://doi.org/10.1016/j.tfp.2021.100177

China Himalaya

QUANTIFYING THE CONTRIBUTIONS OF CLIMATE CHANGE AND HUMAN ACTIVITIES TO WATER VOLUME IN LAKE QINGHAI, CHINA

Guoqing Yang, Miao Zhang, Zhenghui Xie, Jiyuan Li, Mingguo Ma, Peiyu Lai, and Junbang Wang

Remote Sensing 14: 99

Lake Qinghai has shrunk and then expanded over the past few decades. Quantifying the contributions of climate change and human activities to lake variation is important for water resource management and adaptation to climate change. In this study, we calculated the water volume change of Lake Qinghai, analyzed the climate and land use changes in Lake Qinghai catchment, and distinguished the contributions of climate change and local human activities to water volume change. The results showed that lake water volume decreased by 9.48 km^3 from 1975 to 2004 and increased by 15.18 km^3 from 2005 to 2020. The climate in Lake Qinghai catchment is becoming warmer and more pluvial, and the changes in land use have been minimal. Based on the Soil and Water Assessment Tool (SWAT), land use change, climate change and interaction effect of them contributed to 7.46%, 93.13% and −0.59%, respectively, on the variation in surface runoff into the lake. From the perspective of the water balance, we calculated the proportion of each component flowing into and out of the lake and found that the contribution of climate change to lake water volume change was 97.55%, while the local human activities contribution was only 2.45%. Thus, climate change had the dominant impact on water volume change in Lake Qinghai.

For Further Reading: https://doi.org/10.3390/rs14010099

Bhutan-Himalaya

DISCRIPTION OF ARISAEMA (ARACEAE) FOUND IN BHUTAN AND NEW ADDITIONS TO THE FLORA OF BHUTAN

Phub Gyeltshen, Dendup Tshering , and Phuentsho Phuentsho

Bhutan Journal of Natural Resource and Development 8:12-20

The seven sections of the genus Arisaema found in Bhutan are described based on the morphological evidences of 16 species of Arisaema known from the Bhutan Himalaya: sect. Anomala Gusman and L. Gusman, sect. Arisaema, sect. Dochafa (Schott) H. Hara, sect. Nepenthoidea (Engler) H. Hara, sect. Sinarisaema Nakai and sect. Tenuipistillata Engler, sect. Tortuosa (Engl.) Nakai. of the seven recog□nised sections, sect. Arisaema is the most diverse section with eight species recorded from Bhutan. In this paper Arisaema petiolulatum Hook.f. and Arisaema anatinum Brugg. are documented as new records for Bhutan.

For Further Reading: https://doi.org/10.17102/cnr.2021.2.65

Pakistan- Himalaya

EVALUATION OF ANTIMICROBIAL AND ANTICANCER ACTIVITIES OF SELECTED MEDICINAL PLANTS OF HIMALAYAS, PAKISTAN

Farzana Kausar, Kyung-Hwan Kim, Hafiz Muhammad Umer Farooqi, Muhammad Awais Farooqi, Muhammad Kaleem, Rooma Waqa, Atif Ali Khan Khalil, Fazli Khuda, Chethikkattuveli Salih Abdul Rahim, Kinam Hyun, Kyung-Hyun Choi, and Abdul Samad Mumtaz

Plants 11:48

Medicinal plants are known for their diverse use in the traditional medicine of the Hi□malayan region of Pakistan. The present study is designed to investigate the anticancer and antimi□crobial activities of *Prunus cornuta* and *Quercus semicarpifolia*. The anticancer activity was performed using cancerous human cell lines (HepG2, Caco-2, A549, MDA-MB-231, and NCI-H1437 carcinoma cells), while the antimicrobial activity was conducted with the agar-well diffusion method. Furthermore, toxicity studies were performed on alveolar and renal primary epithelial cells. Initially, different extracts were prepared by maceration techniques using *n*-hexane, chloroform, ethyl ac□etate, butanol, and methanol. The preliminary phytochemical screening showed the presence of secondary metabolites such as alkaloids, tannins, saponins, flavonoids, glycosides, and quinones. The chloroform extract of *P. cornuta* (PCC) exhibited significant inhibitory activity against *Acinetobacter baumannii* (16 mm) and *Salmonella enterica* (14.5 mm). The *A. baumannii* and *S. enterica* strains appeared highly susceptible to n-hexane extract of *P. cornuta* (PCN) with an antibacterial effect of 15 mm and 15.5 mm, respectively. The results also showed that the methanolic extracts of *Quercus semecarpifolia* (QSM) exhibited considerable antibacterial inhibitory activity in *A. baumannii* (18 mm), *Escherichia coli* (15 mm). The QSN and QSE extracts also showed good inhibition in *A. baumannii* with a 16 mm zone of inhibition. The *Rhizopus oryzae* strain has shown remarkable mycelial inhibition

by PCM and QSN with 16 mm and 21 mm inhibition, respectively. Furthermore, the extracts of *P. cornuta* and *Q. semicarpifolia* exhibited prominent growth inhibition of breast (MDA-MB-231) and lung (A549) carcinoma cells with 19–30% and 22–39% cell viabilities, respectively. The gut cell line survival was also significantly inhibited by *Q. semicarpifolia* (24–34%). The findings of this study provide valuable information for the future development of new antibacterial and anticancer medicinal agents from *P. cornuta* and *Q. semicarpifolia* extract.

For Further Reading: https://doi.org/10.3390/plants11010048

Highlight of the Issue

Remembering Dr. Stephen Hawking

Stephen Hawking, a greatest scientist (born: January 8, 1942; death: March 14, 2018) was an English theoretical physicists, who was also considered as one of the best physicists after Einstein. He has written a book named "A Brief History of Time" that describes the universe from big bang to black holes.

Hawking suffered from the motor neuron disease from the early twenties which paralyzed him with age. He also lost his speech and he used to communicate through a speech-generating device. He continued his work even with such impairment, with a strong determination and hard work, and became a great inspiration to the whole world. He proved that strong determination and trust in yourself cannot stop anyone from reaching destination.

https://www.space.com/15923-stephen-hawking.html