

Headlines Himalaya

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Editorial Team: Tika Maya Shrestha and Rita Thapa

For the 587-588th issues of Headlines Himalaya, we reviewed journal articles from two sources and selected seven happenings from three countries. We selected three happenings from Nepal and four happenings from other Himalayan countries (India and China). The overall coverage of this issue is wildlife, indigenous knowledge, genetics, climate change, and environment.

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!

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MAPPING GROUNDWATER RESILIENCY UNDER CLIMATE CHANGE SCENARIOS: A CASE STUDY OF KATHMANDU VALLEY, NEPAL

Sangam Shrestha, Sanjiv Neupane, Shanmugam Mohanasundaram, and Vishnu P. Pandey

Environmental Research 183 (2020): 109149

Groundwater resources of Kathmandu Valley in Nepal are under immense pressure from multiple stresses, including climate change. Due to over-extraction, groundwater resources are depleting, leading to social, environmental and economic problems. Climate change might add further pressure by altering groundwater recharge rates and availability of groundwater. Mapping groundwater resilience to climate change can aid in understanding the dynamics of groundwater systems, facilitating the development of strategies for sustainable groundwater management. Therefore, this study aims to analyse the impact of climate change on groundwater resources and mapping the groundwater resiliency of Kathmandu Valley under different climate change scenarios. The future climate projected using the climate data of RCM's namely ACCESS-CSIRO-CCAM, CNRM-CM5-CSIRO-CCAM and MPI-ESM-LR-CSIRO-CCAM for three future periods: near future (2010–2039), mid future (2040–2069) and far future (2070–2099) under RCP 4.5 and RCP 8.5 scenarios were bias corrected and fed into the Soil and Water Assessment Tool (SWAT), a hydrological model, to estimate future groundwater recharge. The results showed a projected decrease in groundwater recharge in future ranging from 3.3 to 50.7 mm/yr under RCP 4.5 and 19–102.1 mm/yr under RCP 8.5 scenario. The GMS-MODFLOW model was employed to estimate the future groundwater level of Kathmandu Valley. The model revealed that the groundwater level is projected to decrease in future. Based on the results, a groundwater resiliency map of Kathmandu Valley was developed. The results suggest that groundwater in the northern and southern areas of the valley are highly resilient to climate change compared to the central area. The results will be very useful in the formulation and implementation of adaptation strategies to offset the negative impacts of climate change on the groundwater resources of Kathmandu Valley.

For further reading: <https://doi.org/10.1016/j.envres.2020.109149>

INDIGENOUS KNOWLEDGE OF TRADITIONAL FOODS AND FOOD LITERACY AMONG YOUTH: INSIGHTS FROM RURAL NEPAL

Hom Gartuala, Kirit Patel, Shailesh Shukla, and Rachana Devkota

Journal of Rural Studies 73 (2020): 77-86.

Food literacy among children and youth is configured by two knowledge domains: an *informal* community-based knowledge, and a *formal* curriculum-based knowledge. This paper examines how these two domains contribute to food literacy and strengthen food security among rural youth in Nepal. In consultation with schoolteachers and local farmers, a knowledge test was developed and administered to 226 high school students. Scores were collected on agro-ecological, cultivation and consumption-related knowledge on a locally grown staple crop, as contributor to food literacy. Sociocultural factors like age, gender, level of education, migration of household members, level of student interest, and spatial factor like location of school all have an influence on food literacy. While formal school-based education and community-based informal knowledge oppositely interact, there is space for these two domains to synergistically interact to enhance food literacy. Rural students have potential to enhance food literacy in the schools, provided the schools create supportive space for experiential learning that weaves community-based Indigenous knowledges of local foods. However, an effective promotion of food literacy

can only be ensured by adopting a holistic approach that includes a wide range of actors such as students, parents, teachers, schools, community organizations and government institutions.

For further reading: <https://doi.org/10.1016/j.irurstud.2019.12.001>

CLIMATE CHANGE AND INFECTIOUS DISEASE RESEARCH IN NEPAL: ARE THE AVAILABLE PREREQUISITES SUPPORTIVE ENOUGH TO RESEARCHERS?

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

Acta Tropica 204 (2020): 105337.

Although Nepal has been identified as a country highly vulnerable to adverse health and socioeconomic impacts arising from climate change, extant research on climate sensitive infectious diseases has yet to develop the evidence base to adequately address these threats. In this opinion paper we identify and characterise basic requirements that are hindering the progress of climate change and infectious disease research in Nepal. Our opinion is that immediate attention should be given to strengthening Nepal's public health surveillance system, promoting inter-sectoral collaboration, improving public health capacity, and enhancing community engagement in disease surveillance. Moreover, we advocate for greater technical support of public health researchers, and data sharing among data custodians and epidemiologists/researchers, to generate salient evidence to guide relevant public health policy formulation aimed at addressing the impacts of climate change on human health in Nepal. International studies on climate variability and infectious diseases have clearly demonstrated that climate sensitive diseases, namely vector-borne and food/water-borne diseases, are sensitive to climate variation and climate change. This research has driven the development and implementation of climate-based early warning systems for preventing potential outbreaks of climate-sensitive infectious diseases across many European and African countries. Similarly, we postulate that Nepal would greatly benefit from a climate-based early warning system, which would assist in identification or prediction of conditions suitable for disease emergence and facilitate a timely response to reduce mortality and morbidity during epidemics.

For further reading: <https://doi.org/10.1016/j.actatropica.2020.105337>

India-Himalaya

DECIPHERING THE MEIOTIC BEHAVIOUR IN SPECIES OF GENUS *ARTEMISIA* FROM COLD DESERTS OF LADAKH (JAMMU AND KASHMIR)

Younas Rasheed Tantray, Vijay Kumar Singhal, and Raghbir Chand Gupta

Flora 262 (2020): 151520.

Present study reports the chromosome counts and meiotic analysis including microsporogenesis and pollen fertility in 10 species of the genus *Artemisia* from the cold deserts of Ladakh in the state of Jammu and Kashmir for the first time. We here add the chromosome record for species, *A. desertorum* for the first time from India which also includes the new intraspecific hexaploid cytotype ($2n = 54$) for *A. desertorum*. The study also reports the presence of B-chromosomes for *A. gmelinii*. The course of meiosis in most of the accessions was observed to be regular except for some individuals of *A. absinthium*, *A. desertorum*, *A. gmelinii*, and *A. sieversiana* which showed certain meiotic abnormalities in meiocytes involving cytotoxicity, chromatin stickiness, chromatin bridges, lagging chromosomes and late segregation of bivalents and consequently irregular sporads and sterile pollen grains. The genus *Artemisia* shows a considerable heterogeneity in chromosome numbers varying from $2n = 14$ to $2n = 144$. The genus exhibits several base numbers ($x = 7, 8, 9, 11, 17$) but $x = 9$ is regarded as the most common and favoured basic number. The next favoured base number is $x = 8$. On the otherhand, other basic numbers, $x = 7, 11$

and 17 are rather less common. The effect of polyploidy in genus evolution seems to be quite significant as 52.12 % of the species exists at various ploidy levels (3x, 4x, 5x, 6x, 8x, 10x, 12x, 14x). Aneuploidy causing chromosome variation in the genus is equally important from the existence of intraspecific aneuploid/ dysploid cytotypes.

For further reading: <https://doi.org/10.1016/j.flora.2019.151520>

CONCRETING THE FRONTIER: MODERNITY AND ITS ENTANGLEMENTS IN SIKKIM, INDIA

Duncan McDuie-Ra and Mona Chettri

Political Geography 76 (2020): 102089.

Sikkim is a geopolitically sensitive frontier state in India sharing borders with Bhutan, China and Nepal. As distinctions between urban and rural dissolve across the Himalaya, concrete narrates the transformation of these landscapes and the assemblages that hold them together. Using Cloke and Jones's (2001) notion of 'dwelling' we explore Sikkim's concrete manifested in tourism, hydropower and housing to make four arguments. First, concrete is central to the way development is conceived and enacted in Sikkim and offers a critical reading of the ways landscape is imagined, reproduced and politicised. Second, concrete foregrounds the ways peoples' aspirations are materialised in the built environment of a 'remote', yet geopolitically significant territory. Third, concrete is an integral component of Sikkim's political culture, part of the assemblage of incongruent elements that undergird the state's dependency. Finally, concrete has further entangled Sikkim within India, producing a loyal border state out of a recently independent polity.

For further reading: <https://doi.org/10.1016/j.polgeo.2019.102089>

China Himalaya

POLLUTION, SOURCES AND ENVIRONMENTAL RISK ASSESSMENT OF HEAVY METALS IN THE SURFACE AND WATER, SEDIMENTS AND SURFACE SOILS AROUND UNEXPLOITED RONA CU DEPOSIT, TIBET, CHINA

Donghai Qiao, Gaoshang Wang, Xiaosai Li, Song Wang, and Yuanyi Zhao

Chemosphere 248 (2020): 125988.

The pollution by heavy metals (HMs) of mining is a widespread problem in the world. However, the pollution by HMs around unexploited deposits (virgin fields) has been studied rarely, especially in Tibet, China. Water, sediments and surface soils were collected to investigate the concentrations of HMs around unexploited Rona Cu deposit in Tibet, China. Furthermore, geochemical fractions of these elements were also analyzed. Pollution and environmental risk introduced by HMs accumulation were assessed using pollution indices, geo-accumulation (I_{geo}), potential ecological risk index and risk assessment code (RAC). Results indicated that the pH values of Rona tributary river ranged from 2.70 to 3.08, and the average concentrations of Cu and Zn were 2114.00 ± 65.89 and $1402.14 \pm 27.36 \mu\text{g L}^{-1}$, respectively, exceeding their standard limits. The concentrations (mg kg^{-1}) of Cu, Zn and As ranged in 19.01–1763.10, 62.00–543.06 and 11.12–61.78 for sediments, respectively, and 154.60–1489.35, 55.38–344.74 and 10.05–404.03 for surface soils, respectively, exceeding their standard limits. According to RAC, almost all Cu, Zn and As near low risk status. However, Cd ranged from medium to very high risk in sediments, and low to high risk in surface soils. Statistical analysis suggested that Cu, Pb, Zn, As and Cd in sediments and surface soils may mainly derive from Rona deposit, whereas Cr and Hg may primarily originate from lithogenic sources. The results indicated that very high concentrations of HMs could be occurred in surface water, sediments and surface soils around unexploited deposits. Especially at high-altitude Tibet, the high environmental risk of HMs deserves more attention.

For further reading: <https://doi.org/10.1016/j.chemosphere.2020.125988>

**EPIDEMIOLOGICAL SURVEY OF FASCIOSIS IN YAKS AND SHEEP LIVING ON THE QINGHAI-TIBET PLATEAU,
CHINA**

Xing Gao, Lihong Zhang, Xiaole Tong, Hui Zhang, Khalid Mehmood, Xiong Jiang, and Jiakui Li

Acta Tropica 201 (2020): 105212.

Fasciolosis is one of the biggest threats to livestock and human population. For this purpose, the seroprevalence of *Fasciola hepatica* was investigated in yaks and sheep living on the Qinghai-Tibet plateau, China by piloting commercial ELISA kits. A total of 3276 yaks and 1092 sheep were incorporated in this study. The prevalence of the parasite in yaks and sheep was 38.3% and 26.4%, respectively. The serological results revealed a relatively high prevalence of *F. hepatica* infection in yaks and sheep, respectively. The present study may greatly contribute to the prevention of this parasitic zoonosis and great importance should be given to the potential threat caused by *F. hepatica* in this special plateau.

For further reading: <https://doi.org/10.1016/j.actatropica.2019.105212>