

# Headlines Himalaya

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Editorial Team: Rashmi Tachamo and Sabita Nepal

For the 576<sup>th</sup> issue of Headlines Himalaya, we reviewed journal articles from four sources and selected six happenings from four countries. We selected three happenings from Nepal and three happenings from other Himalayan countries (China, Bhutan and Pakistan). The overall coverage of this issue is biodiversity, wildlife, disaster, pollution, invasion, 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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### GROWTH PATTERN OF *PINUS ROXBURGHII* UNDER DIFFERENT REGIMES OF INVASIVE SPECIES IN PANCHASE, NEPAL HIMALAYAS

Nita Dyola, Dinesh Raj Bhujju, Deepak Kumar Kharal, Sugam Aryal, Narayan Prasad Gaire, and Louis Hitler

*Pakistan Journal of Botany* 52 (2020): 261-270

Invasive alien species have taken attention as one of the significant threats to biodiversity worldwide. The ongoing climate change is likely to exaggerate the problem by opening up favorable environment Invasive alien species have taken attention as one of the significant threats to biodiversity worldwide. The ongoing climate change is likely to exacerbate the problem by opening up favorable environments for invasion, putting the ecological, environmental and socio-economic state into stake. The assessment of potential impacts of invasive species on native species is crucial for prevention and mitigation measures. Thus, the current study aimed to assess the impact of invasive species (i.e., *Ageratina adenophora Sprengel*) on the growth of ecologically important native tree species (i.e., *Pinus roxburghii Sargent*) in Panchase, Nepal Himalaya. Furthermore, it explored the dendroecological approach of *Pinus roxburghii* to assess the potential impacts of invasive species on its growth. The growth pattern was focused on regeneration, tree radial growth and inter-nodal growth rate of saplings and seedlings of *Pinus roxburghii* under two different classes of invasion i.e., low and high-density. The study revealed that the density and inter-nodal growth rate of seedlings of *Pinus roxburghii* declined significantly whereas no significant decline occurred in its saplings with the increase in invasion. However, the saplings showed significant increment in its inter-nodal growth rate with the increase in invasion. In the case of its tree, no such significant impact in the radial growth rate was observed. The novel study using dendroecological approach revealed that the invasive species have differential impacts on the growth of nearby native tree species with higher impacts during the seedling stage compared to the saplings and tree stage.

For further details: [http://dx.doi.org/10.30848/PJB2020-1\(33\)](http://dx.doi.org/10.30848/PJB2020-1(33))

### WHAT FACTORS BEST EXPLAIN ATTITUDES TO SNOW LEOPARDS IN THE NEPAL HIMALAYAS?

Jonathan H. Hanson, Maurice Schutgens, and Nigel Leader-Williams

*PLOS ONE* 14 (2019): e0223565

The snow leopard *Panthera uncia* is a vulnerable wild felid native to mountainous regions of 12 Asian countries. It faces numerous overlapping threats, including killings by herders retaliating against livestock losses, the illegal wildlife trade, loss of prey and habitat, infrastructure, energy and mining developments, and climate change. The species ranges over large territories that often lie outside of protected areas (PA), so coexistence with human populations across its range is key to its persistence. Human attitudes to snow leopards may be an important factor to consider in reducing overlapping threats to this species. However, this nexus has not been widely studied to date. Attitudes to snow leopard conservation, including actors and interventions, may also be a significant aspect of coexistence. These have also received limited empirical attention. This study therefore explored human attitudes to snow leopards and to snow leopard conservation, the motivations for these attitudes and the individual factors that best explained them. Using systematic sampling, a quantitative questionnaire was administered to 705 households at two sites in the Nepal Himalayas: Sagarmatha National Park, with a less decentralised governance model, and Annapurna Conservation Area, with a more decentralised model. Linear regression models were the main form of analysis. Based on these, attitudes to snow leopard conservation emerged as the strongest influence on local attitudes to snow leopards, and vice versa. This was true in both PAs, despite their differing management regimes. Other important explanatory factors included numbers of livestock

owned, years of education, household livelihoods and age. Furthermore, a positive intrinsic motivation was the most common reason given by respondents to explain their attitudes to both snow leopards and snow leopard conservation. These findings demonstrate that, in addition to the usual suite of factors that influence attitudes to a species, the way in which its conservation is pursued and perceived also needs consideration. How the snow leopard is conserved may strongly influence its coexistence with local communities.

For further details: <https://doi.org/10.1371/journal.pone.0223565>

### **INSTITUTIONAL STRATEGIES FOR ADAPTATION TO WATER STRESS IN FARMER-MANAGED IRRIGATION SYSTEMS OF NEPAL**

Bhuwan Thapa and Christopher A. Scott

*International Journal of the Commons* 13 (2019): 892-908

Institutions governing common-pool resources have survived decades of global change with mixed performance. However, we have limited knowledge on how local institutions cope with and adapt to combined environmental and socio-economic changes. Using the case of 12 farmer-managed irrigation systems (FMIS) in Central and Western Nepal, this paper explores the institutional coping and adaptation mechanisms to water stress. We find that local irrigation institutions manage water stress using diverse and integrated approaches broadly categorized as structural and operational measures. Structural measures include water-source expansion and infrastructure rehabilitation works whereas water re-allocation and drought contingency rules are examples of operational measures. We find that integration of structural and operational measures is more prevalent in highly water-stressed irrigation systems than in less stressed ones. The choice of adaptation strategies has direct implications for agricultural productivity. FMIS that implemented structural measures harvested more crops per year than those systems that adopted only operational strategies or no adaptation strategies. However, the marginal benefit of adopting adaptation measures is particularly pronounced in water-stressed systems. Climate variability and change act as a threat multiplier because they compound the existing threats the FMIS face from social and economic changes. The key to effective integration of structural and operational measures that help FMIS to maintain their productivity during water stress are collective action and governance to overcome biophysical limitations.

For further details: <http://doi.org/10.5334/ijc.901>

## **China Himalaya**

### **SEASONAL DYNAMICS AND CONTROLS OF DEEP SOIL WATER INFILTRATION IN THE SEASONALLY-FROZEN REGION OF THE QINGHAI-TIBET PLATEAU**

Licong Dai , Xiaowei Guo, Fawei Zhang , Yangong Du , Xun Ke , Yikang Li , Guangmin Cao Qian Li, Li Lin, Kai Shu, Cuoji Peng

*Journal of Hydrology* 571 (2019): 740-748

Deep soil water infiltration is a key hydrological process in seasonally frozen regions, and displays a distinct behavior from that in other unfrozen regions; however, the seasonal dynamics and key controls of deep soil water infiltration in the seasonally frozen region of the Qinghai-Tibet plateau (QTP) are still poorly understood. In this study, we examine the seasonal dynamics of deep soil water infiltration, and attempt to quantitatively assess the relative influences of several driving factors by applying a random forests statistical analysis. The following key results were obtained. Deep soil water infiltration shows marked seasonal variation. Rainfall intensity exerts little effect on the seasonal dynamics of deep soil water infiltration as almost all rainfall returns to the atmosphere via

evapotranspiration. No infiltration occurred when the depth of lower layer frozen soil reached 29 cm, whereas deep infiltration increased during the thawing of soil frost, suggesting that deep infiltration is impeded by soil freezing. Overall, the observed seasonal dynamics of deep soil water infiltration and volumetric soil moisture content were similar during the freeze-thaw process. Furthermore, deep soil water infiltration was more strongly influenced by deep volumetric soil moisture than by shallower volumetric soil moisture. Our results suggest that the topsoil Mattic Epipedon, soil organic matter content, and root systems' role in vertical moisture movement should be taken into consideration when modeling hydrological processes in alpine meadows.

For further details: <https://doi.org/10.1016/j.jhydrol.2019.02.021>

## **Bhutan-Himalaya**

### **WASTEWATER MANAGEMENT IN URBAN BHUTAN: ASSESSING THE CURRENT PRACTICES AND CHALLENGE**

Ugyen Dorji, Ugyen M. Tenzin, Pema Dorji, Ugyen Wangchuk, Gem Tshering, Cheki Dorji, Hokyong Shon, Kwabena Biritwum Nyarko, Sherub Phuntscho

*Process Safety and Environmental Protection* 132 (2019): 82-93

This study reviews the current wastewater management practices and their challenges in urban Bhutan. The study data was collected from the local authorities of 35 classified towns, and the field survey was conducted for the two representative towns of Thimphu City and Khuruthang town. The study observed that only eight of the 35 classified towns (22.8%) have public sewerage systems, with an average coverage of 19.7% of Bhutan's total urban population, or 7.4% of Bhutan's entire population. The imported modular wastewater treatment technology was significantly more expensive than alternative options; however, approximately six towns have already adopted this technology, due to a lack of space for a much cheaper waste stabilisation pond. Currently, over 80% of Bhutan's urban population depends on the on-site sanitation system for their domestic wastewater disposal; however, over 40% of these properties lacked a soak-pit system for the safe disposal of septic tank effluent. Therefore, this study indicates that urban settlements in Bhutan are potentially subjected to overflow of significant amount of hazardous septic tank effluents directly into the environment posing significant risk to public and the environment. A critical urban plot space analysis indicates that the current system of on-site sanitation is inadequate and unsuitable for the current urban settings. Since it is impractical for the government to provide public sewerage system to all the towns, a low-cost public sewerage system, or an alternative and improved on-site treatment system, needs to be explored and promoted to achieve long-term environmental objectives.

For further details: <https://doi.org/10.1016/j.psep.2019.09.023>

## **Pakistan-Himalaya**

### **FLOOD HAZARD ASSESSMENT OF THE KASHMIR VALLEY USING HISTORICAL HYDROLOGY**

M. Sultan Bhat, Bashir Ahmad, Akhtar Alam, Hakim Farooq, Shabir Ahmad

*Journal of Flood Risk Management* 12 (2019): e12521

Studies aimed at reconstructing the chronology of historical floods in a region assume an important role in flood hazard assessment, especially for flood prone regions like the Kashmir Valley. This is usually done through the review of historical documents and/or palaeohydrological studies; the latter allows access far beyond historical records. While as, archival scribes offer particularly valuable insights into attributes of hydrological extremes in the recent past. The Kashmir Valley has contours of its own in the field of historical hydrology, hitherto scattered across multiple textual scribes, making them obscure. Nevertheless, information collated and analysed made these

contours visible in a specific way. The critical evaluation of historical flood records revealed that the Kashmir Valley was beleaguered with a series of catastrophic inundations. In addition, calibration of historical records against instrumental data spanning for ~1400 years were linked to quantifiable attributes to simulate their discharge, water surface elevation, and spatial extent using the Hydrologic Engineering Center's (HEC) River Analysis System (RAS) program. The deliverables of this study are expected to be valuable for flood hazard mitigation in the Kashmir Valley and for further research in this direction.

For further details: <https://doi.org/10.1111/jfr3.12521>