Headlines Himalaya

For the 568th issue of Headlines Himalaya, we reviewed journal articles from four sources and selected 11 happenings from five countries. We selected five happenings from Nepal and six happenings from other Himalayan countries (India, China, Bhutan and Pakistan). The overall coverage of this issue is agriculture, wildlife, invasive species, climate change, and environment.

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FARMERS' PERCEPTIONS OF AGRICULTURAL LAND USE CHANGES IN NEPAL AND THEIR MAJOR DRIVERS

Basanta Poudel, Yili Zhang, Jianzhong Yan, Raju Rai, and Lanhui Li

Journal of Environmental Management 235 (2019): 432-441.

The total area of agricultural land in Nepal has expanded rapidly since 1910, more intensively in the southern (Terai) and central (Hill) ecological regions of the country, and has decreased slightly near large cities in recent decades. This study utilizes historical agricultural area, population, and climate data for 1910–2010, combined with a series of applied household surveys and focus group discussions to assess farmers' perceptions of these changes and identifies the major drivers. Farmers' perceptions show that socioeconomic variables were considered to be the crucial drivers of changes in agricultural land use. The three other major drivers were grouped as: neighborhood, climate–topography, and policy drivers. The interplay between the drivers should be emphasized in developing plans for sustainable agricultural land use management.

For further details: https://doi.org/10.1016/j.jenvman.2019.01.091

ECONOMICS OF CLIMATE ADAPTIVE WATER MANAGEMENT PRACTICES IN NEPAL

Rajesh Kumar Rai, Kaustuv Raj Neupane, ᶦRoshan Man Bajracharya, Ngamindra, Dahal Suchita Shrestha, and Kamal Devkota

Heliyon 5 (2019): e01668.

This study analyzes costs and benefits of the selected climate adaptive and equitable water management practices and strategies (CAEWMPS) in Dhulikhel Municipality and Dharan Sub-metropolitan cities of Nepal. The CAEWMPS adopted the construction of water recharge pit at household level in Dharan and recharge ponds at community level in Dhulikhel. The results of household survey reveal that households have employed different coping strategies including minimizing consumption, purchasing from market, harvesting rain water and installing equipment for storing and pumping in both cities. In Dhulikhel, a significant number of households (18.56%) minimize consumption during the dry season but this is not the case in Dharan. Rather, around one-fifth (19.27%) of the households harvest rainwater in Dharan.

For further details: https://doi.org/10.1016/j.heliyon.2019.e01668

COMMUNITY PERCEPTION AND PRIORITIZATION OF INVASIVE ALIEN PLANTS IN CHITWAN-ANNAPURNA LANDSCAPE, NEPAL

Bharat Babu Shrestha, Uttam Babu Shrestha, Krishna Prasad Sharma, Resham Bahadur Thapa-Parajuli, Anjana Devkota, and Mohan Siwakoti

Journal of Environmental Management 229 (2019): 38-47.

Ageratum houstonianum was the top-ranked worst invasive species in agroecosystems while *Chromolaena odorata* and *Ageratina adenophora* were the top-ranked worst species in natural ecosystems. A total of 32 focus group discussions (FGDs) with 218 participants in Chitwan-Annapurna Landscape (ChAL) of central Nepal was conducted to assess knowledge and perceptions of agrarian and forest-dependent communities about invasive alien plants (IAPs), document the efforts of the community management of IAPs and prioritize IAPs for management. Biodiversity loss, livestock poisoning, reduced agricultural production and forage supply, and negative impact on forest regeneration were reported as major negative impacts of IAPs. Communities also

reportedly utilized IAPs for medicinal purposes, making compost by using biomass, and controlling floods and landslides. Findings will be useful for guiding community education programs as well as the management of IAPs through formal policy and management plans, such as Nepal's National Biodiversity Strategy and Action Plan.

For further details: https://doi.org/10.1016/j.jenvman.2018.06.034

LIVESTOCK DEPREDATION BY LEOPARDS AROUND CHITWAN NATIONAL PARK, NEPAL

Rajendra Dhungana, Babu Ram Lamichhane, Tommaso Savini, ' Maheshwar Dhakal, Buddi Sagar Poudel, and Jhamak Bahadur Karki

The study examines spatiotemporal patterns, correlates, as well as economic losses and compensation paid for livestock depredation by leopards in buffer zone of Chitwan National Park, Nepal during 2007–2016. Records of compensation applications filed by livestock owners with the park and buffer zone authorities were collected and then triangulated through a questionnaire survey. Depredation of livestock makes leopards vulnerable to retaliatory killings and reduces public support for conservation. Of the 424 livestock that were reportedly killed by leopards, goats were disproportionately represented (87.3%), 20% more than expected from their relative livestock population, followed by pigs (8.7%) and cattle (4%). There was a general decrease in livestock killings during the ten-year period. The killings varied significantly among years and months, but not among seasons.

For further details: https://doi.org/10.1016/j.mambio.2019.03.006

IMPACT OF CLIMATE CHANGE ON AGRICULTURAL PRODUCTIVITY AND FOOD SECURITY IN THE HIMALAYAS: A CASE STUDY IN NEPAL

D. Bocchiola, L. Brunetti' A. Soncini, F. Polinelli, and M. Gianinetto

This study investigated food security in Dudh Koshi river basin under climate change scenario. The study explored food security using a nutritional index, given by the ratio of the caloric content from our target cereals, to daily caloric demand through remote sensing. They investigated here the present, and future (until 2100) patterns of productivity of three main rain-fed crops in the catchment (wheat *Triticum* L, rice *Oryza* , and maize *Zea Mais L).* The use of caloric index shows potential decrease of foodnsecurity under all scenarios. Large expansion of a single crop (maize) may make food security more unstable. Potential for adaptation is given by crop lifting upward, pending topographic constraints.

For further details: https://doi.org/10.1016/j.agsy.2019.01.008

India-Himalaya

SOIL CARBON AND NUTRITION STOCKS ALONG THE ALTITUDINAL GRADIENT OF THE DARJEELING HIMALAYAS, INDIA

Samjetsabam Bharati Devi and Suratna Sur Shan Sher Sherpa

Eastern Himalayas, in spite of having higher biodiversity and endemicity, have been understudies for soil carbon and nitrogen dynamics. This study was designed to assess the patterns and determinants of soil carbon stock, soil organic carbon stocks, nitrogen stocks, and carbon/nitrogen (C:N) ratio along the altitudinal gradients, forest type, and depth in Darjeeling Himalayas, India. This research followed standard protocol for soil sampling and analysis.

The soil carbon stocks (257.02 to 527.79 MgC ha^{-1}), SOC stocks 152.55 to 398.88 MgC ha^{-1}), and soil nitrogen stocks (15.10 to 32.38 MgN ha^{-1}) increased (but C:N ratio 15.13 to 19.12 declined) along the altitudinal gradient (154 to 3170 m), forest types (tropical moist deciduous forest: MWLS < East Himalayan temperate forest: NVNP < East Himalayan sub-alpine forest: SNP) and annually (year 1 < year 2); however, opposite pattern was observed with increase in depths. It was concluded that the different forests types with wide elevation gradient have high levels of soil carbon stocks, SOC stocks, soil nitrogen stocks, and C:N ratio, and hence must be properly managed to maximize their soil carbon sequestration potential.

For further details: **https://bit.ly/2kciGAT**

China Himalaya

DYNAMICS AND SPATIAL PATTERN PREDICTION OF LAKES IN THE NORTHERN TANGGULA MOUNTAINS, TIBET, CHINA

Zhang L, Li BZ, Guo KJ, Liu F, Zong G, Li XY, Lyu YL, and Ouyang ZY.

This study assessed the dynamics of lakes in the north Tanggula (NT) Mountains in Tibet and predicted the spatial changes. They used object-oriented classification and a spectral-angle vector change detection method to generate ecosystem distribution data at five-year interval between 2000 and 2015. The results showed that the area of lakes increased by 14.2% between 2000 and 2015, which was one of the main forms of ecosystem change in the area. Following the trend of the last 15 years, lakes in the NT area would increase by 119 km^2 by 2030, with the main form of lake expansion changing from inundation of area around large lakes to area around smaller sites.

For further details: DOI: 10.13287/j.1001-9332.201908.035

Bhutan-Himalaya

ESTIMATING RAINFALL THRESHOLDS FOR LANDSLIDE OCCURRENCE IN THE BHUTAN HIMALAYAS

Abhirup Dikshit, Raju Sarkar, Biswajeet Pradhan, Saroj Acharya, and Kelzang Dorji

Geohazards in Bhutan during monsoon season are causing enormous damage to human lives, property, and road networks. This paper focused on defining event rainfall–duration thresholds for Chukha Dzongkhag area where the landslide frequency is high. The method revolved around the use of a power law equation to determine event rainfall–duration thresholds from 2004- 2014. The results showed that a rainfall event of 24 h with a cumulated rainfall of 53 mm could cause landslides. Later on, the outcome of antecedent rainfall varying from 3–30 days was also analyzed based on cumulative event rainfall. These can be used as an early warning system along the Phuentsholing–Thimphu Highway to prevent any disruptions of trade.

For further details: DOI: 10.3390/w11081616

FLOOD HISTORY AND RIVER FLOW VARIABILITY RECORDED IN TREE RINGS ON THE DHUR RIVER, BHUTAN

James H. Speer, Santosh K. Shah, Charles Truettner, Arturo Pacheco, Matthew F. Bekker, Dorji Dukpa, Edward R. Cook, and Karma Tenzin

Most villages are located along streams, so knowing the flood history will enable managers to prepare for future events. To know the flood history, scarred partial cross sections from 29 trees was collected along a two km stretch of the Dhur River, and two cores per tree from 29 other trees from six species. We identified large flood events in 2009, 1989, and 1967 from at least two trees with flood scars or traumatic rings. The oldest flood scar occurred in 1967. The 2009 flood scar was recorded in most of our streamside samples. This work demonstrateed the successful use of density fluctuations in Pinus to reconstruct past flood events and identifies the effects of Cyclone Aila, as an extreme event for this area.

For further details:

Pakistan- Himalaya

ASSESSMENT OF TRACE ELEMENTS IN URBAN TOPSOILS OF RAWALPINDI-PAKISTAN: A PRINCIPAL COMPONENT ANALYSIS APPROACH

Muhammad Tahir Shehzad, Ghulam Murtaza, Muhammad Shafeeque, Muhammad Sabir, Haq Nawaz, and Muhammad Jamal Khan

Assessment of trace elements is inevitable to reduce stress on environment due to urbanization and industrialization. In the present study, the urban area of Rawalpindi was divided into five parts: Gawal Mandi, Pir Wadhai, Soan Adda, Chah Sultan, and Central Ordinance Depot to determine distribution of trace elements. Concentrations of heavy metals were determined using atomic absorption spectrophotometer (AAS). Mean concentrations of all the heavy metals in urban area soil were higher than the WHO permissible limits. Correlation coefficient analysis showed positive correlation among Cd, Co, Ni and Pb whereas no obvious correlation for Cr and Mn. Results showed that Pir Wadhai and Central Ordinance Depot were the most and least contaminated parts of the city respectively, and this is attributes to the presence and absence of heavy traffic loads and industrial effluents.

For further details: