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Editorial Team: Anupa Sharma and Sumana Chhetri

For the 723rd – 724th issues of Headlines Himalaya, we reviewed research papers from five sources and selected 15 research papers from four countries. We selected four researches from Nepal and 11 researches from other Himalayan Countries (India, China, and Pakistan).

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FLOOD RISK MODELING IN SOUTHERN BAGMATI CORRIDOR, NEPAL (A STUDY FROM SARLAHI AND RAUTAHAT, NEPAL)

Bitu Babu Shreevastav, Krishna Raj Tiwari, Ram Asheshwar Mandal, and Bikram Singh

Progress in Disaster Science 16: 100260

Flooding is underlying major natural hazard of Nepal and hence socio-economic loss has been paid annually by this hazard. Planning and management of flood based on study is still lack in Nepal. So, the particular study is carried out to assess the flood risk modeling in lower Bagmati river region in Eastern Terai. In this study, total 10 geospatial environment layers and past flood inventory from field were used to run the machine learning model i.e., MaxEnt for risk modeling of flood. The past flood data were separated into 75% for model building and 25% for model validation. The land use land cover change showed the highest contribution (40.8%) to the flood while the lowest contribution was of slope only 0.2%. 9% of total population were in high risk of flood while 39% population were in very low risk. Figure no. 13 shows that 5% of total household were in high risk, 55% were in moderate risk and 20% were in very low risk of flood. Out of total study area about 2.66% of the total area is in very high-risk zone to flood. High risk zone is found to be 4.89%, where as 9.48%, 20.61% and 62.36% are moderate, low, and very low risk zone area. In terms of AUC values, acceptable results were obtained for the test data with 0.931 and the standard deviation 0.019. The values of Area Under Curve (AUC) range from 0.7 to 0.8 and interpreted as fair or good. Finally, this research could directly help in policy, planning, framework, and programming of development intervention to tackle with flood hazard.

For further reading: <https://doi.org/10.1016/j.pdisas.2022.100260>

A SYSTEMATIC SCOPING REVIEW OF TIGER CONSERVATION IN THE TERAI ARC LANDSCAPE AND HIMALAYAS

Pramod K. Yadav, Matthew T.J. Brownlee, and Mohnish Kapoor

Oryx 56: 888 - 896

In the last decade the tiger *Panthera tigris* population in the Terai Arc Landscape and Himalayas has increased, while populations in other countries have remained below their conservation targets. Although there has been some research on tiger conservation in the Terai Arc Landscape and the Himalayas, scientists and managers have not catalogued and characterized tiger research in the region, with empirical findings scattered among disparate document types, journals and countries. Without a review of the tiger research in the Terai Arc Landscape and Himalayan region, it is difficult to analyse or change conservation policies, develop adaptation strategies, prioritize research, allocate resources or develop conservation strategies potentially employable elsewhere. We therefore conducted a systematic scoping review to identify focal research areas, the spatial and temporal distribution of study sites, general publication trends, the extent of empirical studies, and gaps in tiger conservation research in this region (which spans Bhutan, India and Nepal). Since 2000, 216 studies have been published on issues

associated with tiger conservation in the Terai Arc Landscape and Himalayas, with an increasing number over time. Most empirical studies have focused on tiger habitat, ecology and conflicts in protected areas in the region's foothills. There are research gaps in high-altitude landscapes, social science investigations, conservation economics, and policy and institutional analyses.

For further reading: <https://doi.org/10.1017/S0030605322001156>

REFRAMING GENDERED DISASTER: LESSONS FROM NEPAL'S INDIGENOUS WOMEN

Ayusha Bajracharya, Krishna K. Shrestha, Anthony B. Zwi, and Eileen Baldry

International Journal of Disaster Risk Reduction 83: 103422

Disaster impacts are gendered. Women are often disproportionately vulnerable to and affected by disasters. However, little research exists on how Indigenous women from the Global South experience disasters and how they respond and contribute to the post-disaster recovery. This paper examines the experience of Indigenous women in the disaster recovery process with a case study of Indigenous Guthi in Nepal's Kathmandu Valley. Nepal provides an interesting case as it was devastated by the 2015 earthquakes, and the recovery process continues till today, with many Indigenous peoples at the forefront of the recovery. This paper demonstrates that Indigenous women experience fear and anxiety and have limited capacity and leverage to influence the disaster recovery process. The government response has been unsatisfactory because they were too focused on materials and physical reconstructions, ignoring the social and cultural recovery. On the other hand, the Indigenous knowledge, institutions, and cultures have tried to combine physical and social recovery, addressing the needs and aspirations of many Indigenous women. However, Indigenous efforts remain insufficient and exclusionary of Indigenous women. Indigenous women are marginalised, and this marginalisation persists with continuing adverse effects on the life and livelihoods of Indigenous women. The paper highlights three ways to reframe gendered disasters: understanding knowledge hegemony, challenging tokenistic participation, and changing the misguided DRR policies and practices of gender mainstreaming.

For further reading: <https://doi.org/10.1016/j.ijdrr.2022.103422>

HUMAN DIMENSIONS OF PANGOLIN CONSERVATION: INDIGENOUS AND LOCAL KNOWLEDGE, ETHNOZOOLOGICAL USES, AND WILLINGNESS OF RURAL COMMUNITIES TO ENHANCE PANGOLIN CONSERVATION IN NEPAL

Tulshi Laxmi Suwal, Sabita Gurung, Manoj Bakhunchhe Shrestha, Daniel J. Ingram, and Kurtis Jai-Chyi Pei

Journal of Ethnobiology 42: 1 - 18

Understanding local knowledge about wildlife, local uses, and local people's willingness to support conservation activities are crucial factors in formulating wildlife conservation strategies. We conducted a semi-structured questionnaire survey of 1017 people from 105 villages located in different ecological regions across all seven Provinces of Nepal. We performed generalized linear mixed modeling (GLMM) to investigate the key drivers influencing respondents' knowledge about pangolins, based on a questionnaire score. We identified provinces, ethnicity, occupation, gender, and age group as strong predictors influencing local ecological knowledge about pangolins. The respondents from provinces in the western part of Nepal represented significantly lower knowledge scores than the respondents from the eastern and central provinces. Similarly, respondents belonging to non-Indigenous groups, students, females, and people aged between 18–30 years had the lowest knowledge scores

about pangolins. A range of uses and beliefs about pangolins were reported across Nepal, and 48% of respondents believed that pangolin scales and meat were used for traditional medicines. The majority of respondents (71.1%) were willing to support pangolin conservation in their local areas. Our study suggests that awareness programs, alternative livelihood, and income-generating trainings for local communities could be helpful in enhancing the long-term conservation of pangolins in Nepal. Increased efforts are needed in western Nepal and across the country with non-Indigenous communities, females, young people, and students. Thus, this study offers an important baseline to help design and execute effective community-based conservation actions and management decisions for pangolin conservation.

For further reading: <https://doi.org/10.2993/0278-0771-42.3.7>

India-Himalaya

LANDSLIDE SUSCEPTIBILITY MAPPING OF KINNAUR DISTRICT IN HIMACHAL PRADESH, INDIA USING PROBABILISTIC FREQUENCY RATIO MODEL

Nishtha Gautam

Journal of the Geological Society of India 98: 1595 - 1604

Landslides are a recurring phenomenon in hilly areas that destroy the natural environment, causing enormous property damage and human loss every year. Geological rock structure plays an important role in the occurrence of landslides. Concentration of dolomite, phyllite, schist and quartzite make this area more susceptible to failure. Landslides are prompted with the aid of using aggregate of things like slope, soil type, lithology, land use, land cover, drainage density, relative relief, curvature, etc. The main aim of this study is to delineate landslide susceptibility zone. In the study, the primary concern was to evaluate the contribution of controlling factors to landslides and to produce a landslide susceptibility map of the examination area. This study uses the landslide susceptibility model using frequency ratio in Kinnaur district, Himachal Pradesh, India. A landslide inventory was prepared with the help of Landsat, google earth images from 2010–2020 period. Digital elevation model (DEM) was used to prepare slope, aspect, curvature, and relative relief maps. Other maps like soil, land use land cover, was prepared using LISS-iii and LISSiv data to analyze landslide controlling factors. An aggregate of 379 landslide polygons was digitized and then divided into a preparation set (70%) with 265 polygons and a test set with 114 polygons (30%). The connection between landslides and controlling factors was statistically assessed with FR analysis. Values were utilized to create the landslide susceptibility index (LSI) and the investigation region was divided into five zones of relative landslide susceptibility which were divided as very high, high, moderate, low, and very low. The findings of the analysis were validated by calculating the area under curve (AUC), which reveals a success rate accuracy of 73.01% and a prediction rate curve accuracy of 0.73%, indicating a high-quality susceptibility map derived from the FR model.

For further readings: <https://doi.org/10.1007/s12594-022-2216-6>

ASSESSING GREEN SOLUTIONS FOR INDOOR AND OUTDOOR ENVIRONMENTAL QUALITY: SUSTAINABLE DEVELOPMENT NEEDS RENEWABLE ENERGY TECHNOLOGY

Muhammad Imran, Shiraz Khan, Khalid Zaman, Haroon ur Rashid Khan, and Awais Rashid

Atmosphere 13: 1904

The survival of humans depends on both natural and manufactured surroundings. Though most people spend their time indoors, there are constantly new challenges to address, and air pollution is one of them. This research considered both outdoor and indoor factors that affected green development agendas. Outdoor factors include fossil fuel combustion, renewable energy supplies, and carbon emissions, whereas indoor factors include industrial waste management, chemical use in production, and green technologies. Against the backdrop of the Indian economy, plagued by severe environmental problems from 1995Q1 to 2020Q4, this research evaluated green alternatives for indoor and outdoor environments. Carbon emissions rise with the use of chemicals in production, with the burning of fossil fuels, and with economic expansion, as shown by the Autoregressive Distributed Lag (ARDL) testing method employed. In contrast, emissions fall when a nation invests in renewable energy technologies and appropriately manages its industrial waste. Granger causality estimations validated the feedback link between industrial chemical usage and carbon emissions while demonstrating a unidirectional causality from chemical use to green energy demand and fossil fuel combustions. Moreover, burning fossil fuels and energy demand causes carbon emissions. Carbon emissions and fossil fuel combustion are produced due to industrial waste handling. The scale of the use of chemicals is expected to have the greatest impact on carbon emissions over the next few decades, followed by industrial waste, renewable energy supply, fossil fuel combustion, and renewable energy technologies. In order to achieve environmental sustainability via emissions reduction, this study proposed policies for a low-carbon economy, renewable energy source encouragement, and sustainable management. Close attention should be paid to clean energy and environmental sustainability by investing in research and development (R&D) to create a long-term sustainable energy strategy that is environmentally benign.

For further readings: <https://doi.org/10.3390/atmos13111904>

DESIGNING RESOURCE-EFFICIENT AND ENVIRONMENTALLY SAFE CROPPING SYSTEMS FOR SUSTAINABLE ENERGY USE AND ECONOMIC RETURNS IN INDO-GANGETIC PLAINS, INDIA

Sohan Singh Walia, Subhash Babu, Roopinder Singh Gill, Tamanpreet Kaur, Noopur Kohima, Azad Singh Panwar, Dinesh Kumar Yadav, Meraj Alam Ansari, Natesan Ravishankar, Sanjeev Kumar, Karmjeet Kaur, and Majhrool Hak Ansari

Sustainability 14: 14636

Achieving an economically feasible and environmentally robust model in agriculture while satisfying the expanding population's food demands is a global challenge. Hence, a three-year (2014–2017) study was conducted at Punjab Agricultural University, Ludhiana to design environmentally clean, energy-efficient, and profitable cropping systems. Twelve cropping systems viz., rice-wheat (CS₁), basmati rice-hayola (transplanted)-mung bean (CS₂), basmati rice-radish-maize (CS₃), maize-potato-maize (CS₄), maize + turmeric-barley + linseed (CS₅), maize + turmeric-wheat + linseed (CS₆), maize + radish-wheat + linseed-mung bean (CS₇), groundnut + pigeon pea (5:1)-wheat + sarson (9:1) (CS₈), maize + black gram-pea (bed) + celery (furrows) (CS₉), maize + pigeon pea-chickpea (bed) + gobhi sarson (furrows) (CS₁₀), maize (green cobs) + vegetable cowpea + dhaincha (*Sesbania* spp.)-chickpea + gobhi sarson (CS₁₁) and sorghum + cowpea (fodder)-wheat + gobhi sarson (9:1) (CS₁₂) were tested in a four-times-replicated randomized block design. CS₁₁ had the maximum system productivity (28.57 Mg ha⁻¹), production efficiency (78.27 Kg Day⁻¹ ha⁻¹), irrigation water use efficiency (2.38 kg m⁻³), system net returns (4413.3 US\$ ha⁻¹), and benefit to cost (B:C) ratio (2.83) over others. In comparison to the CS₁ system, this cropping system required ~78% less irrigation water for a unit economic production. However, the cultivation of CS₁₂ registered the highest energy use efficiency (49.06%), net energy returns (6.46 × 10³ MJ ha⁻¹), and global warming potential (GWP) (Mg CO₂ e ha⁻¹) at spatial scale. Among all the intensified systems, CS₁₁ had the lowest GHGI (0.29 kg CO₂ e kg⁻¹). Furthermore, cultivation of CS₆ resulted in the maximum bacterial and actinomycetes population in the soil, while

CS₅ yielded the highest fungal count (23.8×10^3 cfu g⁻¹ dry soil) in soil. Our study suggests that the cultivation of CS₁₁ is a resource-efficient, economically viable, and environmentally clean production system and could be a potential alternative to rice-wheat systems for developing a green economy policy for agricultural development in the Indo-Gangetic Plains (IGP) of India.

For further readings: <https://doi.org/10.3390/su142114636>

PASTORALISM IN THE HIGH HIMALAYAS: UNDERSTANDING CHANGING PRACTICES AND THEIR IMPLICATIONS FOR PARASITE TRANSMISSION BETWEEN LIVESTOCK AND WILDLIFE

Munib Khanyari, Sarah Robinson, E.J. Milner-Gulland, E.R. Morgan, Rashmi Singh Rana, and Kulbhushansingh R. Suryawanshi

Pastoralism 12: 44

Rangelands are increasingly being affected by climatic variations, fragmentation and changes in livestock management practices. Along with resource competition between livestock and wildlife, disease transmission has implications for people and wildlife in these shared landscapes. We worked with two pastoral communities in the Western Indian Himalayas: the migratory *Kinnauras* that travel to the Trans-Himalayan Pin valley in summer and the resident herders of Pin Valley. Asiatic ibex (*Capra sibirica*) is the predominant wild herbivore in Pin. The pastures in Pin are grazed by both livestock (migratory and resident) and ibex, with the potential for disease transmission. We investigate the effects of herding practices on livestock health and disease transmission, while focusing on gastro-intestinal nematodes (GINs) as they can spread by sharing pasture between wild and domestic ungulates. Surveys were carried out between June and August 2019, the period when migratory *Kinnauras*, local herders and Asiatic ibex are found in Pin Valley. We found that the *Kinnaura* flocks share pasture with ibex during their time in Pin, exhibiting significantly higher endo-parasite burdens than sedentary livestock, and the *Kinnaura* flocks are increasing in number. This suggests GIN cross-transmission is possible, as GINs have low host specificity and a free-living, environmental stage that is trophically acquired. As local (sedentary) sheep and goats rarely share pasture with ibex, have low endo-parasite burdens and are few in number, they are unlikely to transmit parasites to ibex. However, increasingly large local stock numbers may be contributing to pasture degradation which could cause nutritional stress and resource competition, exacerbating GIN impacts. We also find evidence for transhumance persisting, in spite of signs of pasture degradation that are seemingly affecting livestock productivity and potentially disease transmission. It is critical that proactive measures are taken, like participatory disease management with the *Kinnauras*, to align livelihoods with wildlife and rangeland conservation.

For further readings: <https://doi.org/10.1186/s13570-022-00257-1>

China Himalaya

THE EFFECT OF ENVIRONMENTAL FACTORS ON THE DIVERSITY OF CRANE FLIES (TIPULIDAE) IN MOUNTAINOUS AND NON-MOUNTAINOUS REGIONS OF THE QINGHAI-TIBET PLATEAU AND SURROUNDING AREAS

Qicheng Yang, Wei Chen, Lishan Qian, Ding Yang, Xiaoyan Liu, and Manqun Wang

Insects 13: 1054

Tipulidae, one of the most diverse families of Diptera, is widely distributed in the world. The adults have weak flight ability, making it an ideal model for studying the formation of insect diversity. This study aims to explore the species diversity and endemism of Tipulidae in the Qinghai-Tibet Plateau and the surrounding areas, as well as analyze the relationships between the diversity pattern and 25 environmental factors in mountainous and non-mountainous regions. To this end, we collected 2589 datasets for the distribution of 1219 Tipulidae species, and found three areas with high diversities of Tipulidae around the QTP, including the Sikkim-Yadong area, Kamen River Basin, and Gongga Mountain. Further R, generalized additive model (GAM), and stepwise multiple regression analysis indicated that the richness and endemism of Tipulidae is mainly influenced by the warmest quarter precipitation and topographic heterogeneity in mountainous regions, but in non-mountainous regions, the richness is mostly affected by the precipitation seasonality, while there is no regularity in the relationship between endemism and environmental factors. In addition, the richness model in mountainous regions was in conformity with the results of GAM.

For further readings: <https://doi.org/10.3390/insects13111054>

RESPONSES OF WATER TEMPERATURE AND LEVEL TO LARGE EARTHQUAKES IN TIBET

Zhuoma Gesang, Ye Zhu, Yingfeng Ji, Weiling Zhu, Rui Qu, Duoqi Ciren, and Chaodi Xie

Applied Sciences 12: 11584

Well water levels can reflect the stress placed on a confined subsurface aquifer system in a similar manner to a strain meter. Based on observations of the geophysical field in Lhasa combined with digital data recorded at an underground fluid well at the Lhasa geomagnetic station in recent years, we comprehensively analyzed the characteristics of co-seismic changes caused by 14 different-magnitude $M \geq 5$ earthquakes recorded in the well. The results show that (1) the co-seismic changes in water temperature and water level are different; the water level exhibits oscillation-type changes, while the water temperature variations indicate first heating and subsequent recovery. (2) The co-seismic changes are related to the epicentral distance, magnitude and focal depth of the earthquake. The closer the epicenter is to the well, the earlier the co-seismic responses occur, but the time interval between the co-seismic changes in the water level and temperature differs. (3) The co-seismic ratio of the water temperature is higher than that of the water level; this may be related to faulty water level instrumentation or segmented records.

For further readings: <https://doi.org/10.3390/app122211584>

CLIMATIC VARIABILITY CAUSED BY TOPOGRAPHIC BARRIER PREVENTS THE NORTHWARD SPREAD OF INVASIVE AGERATINA ADENOPHORA

Yi Zhang, Ziyao Liao, Han Jiang, Wenqin Tu, Ning Wu, Xiaoping Qiu, and Yongmei Zhang

Plants 11: 3108

Ageratina adenophora (Spreng.) R.M.King & H. Rob. is one of the most threatening invasive alien plants in China. Since its initial invasion into Yunnan in the 1940s, it spread rapidly northward to southern Mount Nyba in Sichuan, which lies on the eastern edge of the Qinghai-Tibet Plateau. During fieldwork, we found an interesting phenomenon: *A. adenophora* failed to expand northward across Mount Nyba, even after the opening of the 10 km tunnel, which could have served as a potential corridor for its spread. In this work, to explore the key factors influencing its distribution and spread patterns, we used a combination of ensemble species distribution models with the MigClim model. We found that the temperature annual range (TAR), precipitation of driest month (PDM),

highway density (HW), and wind speed (WS) were the most predominant factors affecting its distribution. The north of Mount Nyba is not suitable for *A. adenophora* survival due to higher TAR. The spatial–temporal dynamic invasion simulation using MigClim further illustrated that the northward invasion of *A. adenophora* was stopped by Mount Nyba. Overall, Mount Nyba may act as a topographic barrier that causes environmental differences between its south and north sides, preventing the northward invasion of *A. adenophora*. However, other suitable habitats on the northern side of the mountain still face challenges because *A. adenophora* is likely to invade via other routes. Therefore, long-term monitoring is needed to prevent human-induced long-distance spread events.

For further readings: <https://doi.org/10.3390/plants11223108>

SHRINKING LAKES OF RIFT VALLEY SYSTEM IN SOUTHERN TIBET: IS IT THE CLIMATE?

Xiangmei Liu, Jiaqi Chen, Jiansheng Chen, and Haixia Jin

Science of The Total Environment 858: 160016

In the context of global warming, the plateau lakes generally expand, but some lakes in the southern Tibetan Plateau appear to shrinkage, such as Duoqing Co Lake. We analyzed Duoqing Co which is located on the Yadong-Gulu Rift zone and two surrounding lakes using satellite and meteorological data. Optical and radar images were used to construct a time series of these lakes from 1988 to 2021. By comparing the area changes of surrounding lakes, it is found that Como Chamling Lake has shrunk, while Puma Yum Co Lake has shown an expansion trend. The interference deformation results show that both sides of the Yadong-Gulu Rift zone where the Duoqing Co Lake is located have experienced strong uplift and subsidence, sinking in the east and uplifting in the west. Under the northward compression of the Indian plate, the blocks on both sides of the Yadong-Gulu Rift zone have been relatively displaced. The disappearance of Duoqing Co Lake could be attributed to the existence of leakage channels in the Yadong-Gulu Rift zone. The north-south rift zones of the Tibetan Plateau pass through the Qiangtang Basin, and some lakes in this basin are shrinking, which could be related to the leakage of these rift zones. This work provides a new perspective for studying lake changes on the Tibetan Plateau and is a good reference for studying the lake water cycle on the plateau.

For further readings: <https://doi.org/10.1016/j.scitotenv.2022.160016>

DISTRIBUTION AND CONSERVATION OF PLANTS IN THE NORTHEASTERN QINGHAI-TIBET PLATEAU UNDER CLIMATE CHANGE

Fei-Xue Zhang, Ling-Hua Yang, Chun-Jing Wang, Chun-Hui Zhang, and Ji-Zhong Wan

Diversity 14: 956

Climate change is causing unprecedented alterations in the spatial pattern of global biodiversity, imposing severe challenges for biodiversity conservation. In particular, alpine biomes are sensitive to a variety of environmental changes. Therefore, understanding the distribution and conservation of alpine plant biodiversity is vital. In this study, we used species distribution modeling and 20,650 high-resolution occurrence coordinates of 1224 plant species to evaluate the potential distribution of plants in the northeastern Qinghai–Tibet Plateau (Qinghai Province, China) under different future climate scenarios, through an integrative analysis of species distribution probabilities, species richness, and priority conservation areas. Under current and future climate scenarios, the plant species are predicted to be mainly distributed in eastern and southern Qinghai Province, with the suitable conditions for plant species gradually extending from the southeast to the northwest of Qinghai Province under the effects of climate change. The priority conservation areas in Qinghai national nature reserves are predicted to

expand, with this expansion being greater for herbaceous plants than woody plants, under future climate scenarios. However, the priority conservation areas outside nature reserves in Qinghai Province remain approximately three times larger than those inside nature reserves. Thus, there were great differences between the existing nature reserve area and the priority conservation areas, with nature reserves insufficiently covering priority conservation areas in Qinghai Province. Therefore, the original nature reserve areas should be expanded, according to the predicted plant habitat hotspots in Qinghai Province. Our research provides valuable information for biodiversity protection in the northeastern Qinghai–Tibet Plateau, reasonable strategies for addressing the future protection challenges associated with climate pressure, and new insights for improving nature reserves in the Qinghai–Tibet Plateau.

For further readings: <https://doi.org/10.3390/d14110956>

MAPPING THE DISTRIBUTION, TRENDS, AND DRIVERS OF SOIL ORGANIC CARBON IN CHINA FROM 1982 TO 2019

Ren-MinYang, Lai-Ming Huang, Xin Zhang, Chang-Ming Zhu, and Lu Xu

Geoderma 429: 116232

The evaluation of soil organic carbon (SOC) dynamics and its driving factors is important for developing sustainable soil C sequestration practices. A key challenge is the lack of a time series of spatially explicit SOC estimates; most previous SOC estimates are static. In this study, we applied a digital soil mapping framework to model the relationship between SOC and environmental factors based on a combined dataset of 4695 soil samples collected in China from the early 1980 s and during the 2000–2014 period. We predicted the annual SOC distribution at a depth of 0–100 cm at a 1 km resolution for China between 1982 and 2019. We mapped trends of SOC change and identified change hotspots. To obtain the pixel-level association between SOC change and environmental factors, we used a linear function to quantify the contribution of individual predictors to SOC change. The results show that the accuracy of SOC prediction is acceptable, with a mean R² value of 0.58 for validation. SOC storage in China was estimated to range from 89.03 to 97.41 Pg C and showed a slight increase (slope = 0.024 Pg C/yr) from 1982 to 2019. Specifically, two distinct phases of SOC were identified as follows: (1) from 1982 to 2004, a considerable decline occurred, which was mainly driven by increased temperature; (2) from 2004 to 2019, SOC increased slowly, resulting from the contribution of greening to sustaining C sequestration in soils under warming conditions. Approximately 17 % of all areas have been characterized by a significant decrease in SOC since 1982, predominantly in central and western China. Environmental controls exhibited large spatial variation, where approximately 69 % of all areas were predominantly controlled by climate factors. For grasslands, the SOC losses in northern China were largely driven by temperature and precipitation, while the SOC losses were primarily attributed to decreased organic inputs driven by grassland degradation on the Tibetan Plateau. Policy-driven land use change has led to an increase in SOC in some cropland areas (e.g., northeast and east China). The implementation of ecological restoration has shown a positive influence on SOC sequestration. This study highlights the diverse spatial patterns and heterogeneity of SOC changes and their controls. Given this spatial differentiation, spatially explicit assessments of soil C dynamics are important for the formulation of regional soil-based mitigation strategies and guidance for effective restoration interventions based on geographic location.

For further readings: <https://doi.org/10.1016/j.geoderma.2022.116232>

HIGH CONCENTRATION OF BLACK CARBON IN NORTHERN PAKISTAN: CHARACTERISTICS, SOURCE APPORTIONMENT AND EMISSION SOURCE REGIONS

Ehtiram ul Haq, Khan Alam, Samina Bibi, and Arindam Roy

Atmospheric Environment 293: 119475

Atmospheric Black Carbon (BC) is one of the absorbing components of solar radiation which potentially affects human health and regional climate. In the current study, BC mass concentrations were regularly observed for pre-monsoon and monsoon seasons using the seven-channel aethalometer (AE-33) over Peshawar, Pakistan. The scarcity of BC measurement in this region is critical for air quality assessment, hence providing much importance to this article for control policy recommendations. The monthly mean BC showed a maximum value of $12.1 \pm 5.4 \mu\text{g}/\text{m}^3$ during March and a minimum value of $6.4 \pm 3.1 \mu\text{g}/\text{m}^3$ during July. The bimodal diurnal BC concentration was observed in between 05:00–08:00 and 20:00–24:00 LST having a maximum night/day ratio of 3.4 during April. Furthermore, the weekdays BC concentration was higher than weekend days having the highest weekdays concentration during March ($12.9 \pm 5.6 \mu\text{g}/\text{m}^3$) and the lowest concentration during July ($6.9 \pm 0.9 \mu\text{g}/\text{m}^3$). Moreover, BC contributed maximum of 22% to $\text{PM}_{2.5}$ during April and minimum of 7% during June. The source apportionment of BC revealed that maximum value of BC emitted from fossil fuel (BC_{FF}) and biomass burning (BC_{BB}) were $9.90 \pm 0.50 \mu\text{g}/\text{m}^3$ and $2.61 \pm 0.49 \mu\text{g}/\text{m}^3$ during March showed a clear dominancy of BC_{FF} over BC_{BB} emission. Further the highest percentage contribution of BC_{FF} and BC_{BB} were found to be 80.45% and 22.27% to total BC during May and April, respectively. Finally, the cluster trajectory analysis showed that majority of the air pollutants were due to local emission rather than long range transport.

For further readings: <https://doi.org/10.1016/j.atmosenv.2022.119475>