ABSTRACT

Current rates of climate change will affect the structure and function of community assemblages on Earth. However, the long-term ramifications of these changes remain opaque. In recent decades, advances in modelling techniques, like MaxEnt (Maximum Entropy Modelling), can illuminate the answers to many management queries including threatened and sensitive taxa such as Himalayan Pheasant in biodiversity hotspots like Himalaya. Using MaxEnt prediction distribution model, an attempt was given to better understand the potential distribution of Himalayan Pheasants of Khangchendzonga Biosphere Reserve (Blood Pheasant, *Ithaginis cruentus*; Himalayan Monal, *Lophophorus impejanus*; Kalij Pheasant, *Lophura leucomelanos*; and Satyr Tragopan, *Tragopan satyra*) in Eastern Himalaya, Sikkim Himalaya, and Khangchendzonga Biosphere Reserve, respectively.

A total geo-reference datasets of the point location of the Himalayan Pheasant was identified based on primary and existing records (133 point locations of the Blood Pheasant, 106 for the Himalayan Monal, 75 for the Kalij Pheasant, and 91 for the Satyr Tragopan) reflects the current distribution point locations of the species in the Eastern Himalayas. Then study modelled potential distribution of the Himalayan Pheasants in the Eastern Himalayas, Sikkim Himalaya, and KBR by selecting potent environmental predictors using Principal Component Analysis and quantified the potential habitat area of the Pheasants.

Abstract

For projecting distribution of the Blood Pheasant, among the environmental predictors, the Climatic parameter (44.2%) had the highest contribution to the model followed by Physical parameter (41.5%), Biophysical parameter (8.5 %), Topography (5.6%), and Human-modified mosaic landscape (0 %). Similarly, the Climatic parameter (46.5%) had the highest contribution to the model for Himalayan Monal followed by Physical parameter (32.7%), Bio-physical (15.7), Topography (4.5%), and Human-modified mosaic landscape (0.4%). The Physical parameter (39.7%) had the highest contribution to the model for Kalij Pheasant followed by Climatic parameter (37.2%), Bio-physical parameter (17 %), Topography (3.1%), and Human-modified mosaic landscape (2.8%). Among the environmental predictors, the Biophysical parameter (34.1%) had the highest contribution to the model for Satyr Tragopan followed by Topography (24.7%), Climatic parameter (20.4%), Physical parameter (18.1%), and Human-modified mosaic landscape (2.6%). The results showed that the Himalayan pheasants are found in very limited pockets of most of the high slope mountain regions of the landscape.

The Himalayas provide high altitudinal gradients and extreme slopes which may cause rapid changes in the climatic zone over a small distance which reflects noticeable alterations in the forest community composition structures, which may affect the habitats of

the Himalayan Pheasants. Study identified and analyzed various aspects of forest community composition with the effect of climate variables and altitudes in the Khangchendzonga Biosphere Reserve (the core zone, Khangchendzonga National Park was recently inscribed by the UNESCO as world heritage site in July 2016), taking two altitudinal transects (c. 1800-4300 m asl altitudinal gradient) covering western (Yuksom-Black Kabru transect) and northern parts (Tholung-Kisong transect) of the biosphere reserve.

A total of 107 and 95 woody species were encountered in Yuksom-Black Kabru and Tholung-Kisong transects, respectively. Based on the Importance Value Index (IVI), the forests of Khangchendzonga Biosphere Reserve are classified broadly into as sub-tropical mixed broad-leaved forest, warm temperate Oak- broad-leaved forest, cold temperate coniferous-broadleaved forest, subalpine, and alpine forest. The entire forest reflected a dominance of young trees and the species richness of forest which showed a negative correlation with the altitude.

Climatic variables (Actual evapotranspiration, Potential evapotranspiration, and Moisture index) are the measures of available environmental energies which drive the final shape of forest community structure. The study revealed that these forces showed a significant relationship with woody species richness and altitude of the forest.

Abstract

Himalaya is considered as data deficient region. For the first time, attention was given to the details of ecological interaction and community-level ramifications of the Himalayan pheasants especially focusing upon the Khangchendzonga Biosphere Reserve. Based on the study carried out during the period of 2014-2017, around 3 successive years, covering an altitudinal gradient c. 1700 -5000 m asl, the overall density and encounter rate of the Himalayan pheasant were assessed (for Blood Pheasant, density =11.07/sq. km, encounter rate = 0.78±0.14 /km; Himalayan Monal, density= 1.5±0.33/ sq.km, encounter rate= 0.10± 0.20/ km; Kalij Pheasant, density=1.6±0.45/ sq. km, encounter rate=0.14±0.033/km; Satyr Tragopan, density=0.79±0.35/ sq. km, encounter rate=0.079±0.02/km) in the biosphere reserve, by using Distance software 0.7 version.

Climate change is the burning issue all across the globe and predicted to alter species distributions, life histories, community composition, and ecosystem function, which adds fuel to various conservation directives. The recent advances in modelling techniques have illuminated the potential effects of various climatic scenarios on biodiversity hotspots, like Himalaya. These methods were utilized to test the effects of Representative Concentration Pathways (RCPs) AR5-2050 based on future greenhouse gases emission trajectories of climate change scenario/year combination.

Abstract

Examining the Himalayan Pheasants, current Bioclimatic variables, Miroc-esm, Hadgem2-AO and Gfdl-cm3 as future climate change scenario models, were used to predict its future distribution and gain-loss of future habitat area in the Eastern Himalayas, Sikkim Himalayas, and Khangchendzonga Biosphere Reserve. The results indicate the future climatic conditions may significantly affect the future distribution of the Himalayan Pheasants. Regions of high risk under climate change scenarios based GIS toolkit, SDM projection of gain and loss of habitat suitability areas of the Himalayan Pheasants were identified. The predicted trend of habitat shifting of the Himalayan pheasants will gradually become more prominent with climate warming boost up.

Indigenous people are closely related with the natural rhythms and processes of their ecosystem. Therefore, their perception of changing ecosystem with the time is crucial for understanding the ongoing biodiversity process and pattern, and climate change trends of the landscape. Based on perception tool, people felt that climate change is more prominent in and around the Khangchendzonga Biosphere Reserve. The factors of range shift significantly influence the overall range of the Himalayan pheasants as revealed by the data obtained from the respondents. This is the first attempt to use the advanced modelling, field study along with perception tool for quantitatively justifying management strategies for the pheasants in the Himalayas.