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Shift in distributional range of plants due to climate change

Priyanka Agnihotri

CSIR-National Botanical Research Institute, India

Abstract

The geobotanical diversity in Indian Himalaya offers major scope for assessing and analyzing spatial distribution of endemic plant taxa. Extent of endemism of dicot angiosperms in Indian subcontinent is 41.5% of which 28.8% are confined to the Himalaya. The Himalaya is abode for immense plant diversity and this diversity is ultimate destination of local communities in various forms such as medicine, edibles, fuel, fodder, timber, agricultural tools etc. Wild edibles and medicinal plants become an important source of supplement and substitute food during scarcity of food. In the Himalayas, climatic conditions are very severe and support unique vegetation types, plants are strongly adapted to the narrow and marginal habitats. Every altitudinal rise in Himalaya generates different conditions, supporting unique and isolated ecosystems with maximum plant diversity. Being a hotspot of biodiversity, these are always matter of great concern and also provides an excellent opportunity to investigate the climatic control on plant distribution. We compared two vegetation surveys to analyse the altitudinal shifting in response to climate change. Species have been shifted upwards during last few decades and is more pronounced at montane zone, However, upward movement of vegetation belt at higher altitude is a overall trend and even moderate warming induces migration but mid altitudinal flora is at greater risk due to habitat destruction and maximum anthropogenic pressure. In Nainital area of Kumaon Himalaya, it has been observed that the record of actual temperature and precipitation are indicating fluctuations over the past decades. These fluctuations may accelerate the growth of some plants at the expense of others and it can be inferred how biota might respond to climate change by observing the present and past distribution pattern of plants, which are heavily determined by temperature and precipitation. When these factors change in a region beyond the tolerance of a species phenotypic plascity, then distributions of the species are inevitable. In a quantitative assessment covering *ca.* 200 species, less than (60%) of these exhibited stable distributions during the last 50 years. Others (15%) show changes that are impossible to correlate to climate change predictions. These observations neither support nor refute a signal of climate change. Some range shifts have been measured directly at range boundaries, whereas others have been inferred from abundance changes within local communities. Overall, of the range and abundance shift data 50 species were categorized as changing over time periods of 40 years. New species have colonized previously empty niches. Those species such as *Berberis asiatica, Marsdenia roylei, Taraxacum officinale, Pyrus pashia, Jasminum officinale*, etc., which were found at an altitudes of above1000-15000 m. i.e., tropical and subtropical zone have shifted their distribution to higher altitudes (about 2000 m) i.e. sub-temperate zone. Over the past 40 years maximum range shifts vary from 200 m to 500 m towards higher elevations.

Key words: Climate change, Himalaya, Vegetation shift, flora.

Biography

Priyanka Agnihotri, Scientist, is working with Plant Diversity, Systematics and Herbarium Division of CSIR-NBRI Lucknow since last 10 years. Her fields of expertise are Angiosperm systematics, Biodiversity conservation, Reproductive biology, and Ecology, Data-basing and Climate change studies. So far, she has published 2 books, 2 chapters in books and 30 research papers in journals of international repute.