

Climate Change and the Future of Medicinal and Aromatic Plants

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Description

Changing climatic scenarios has been recognized as a prominent threat to biodiversity globally. Given the decline in biodiversity, there are more and more local, national and global awareness campaigns as well as legislative initiatives devoted to biodiversity conservation. The present study aims to increase our knowledge and understanding of the distribution of six Medicinal and Aromatic Plants (MAPs) in Jammu Kashmir, India under present and future climatic scenarios using an ensemble species distribution modelling approach. Results of the present study revealed changes in the habitat range of the plant species due to changing climatic scenarios leading to the expansion or contraction of their distribution range. A significant decline in the suitable habitats of *Arisaema jacquemontii*, *Lamium album*, *Phytolacca acinosa* and *Urtica dioica* is predicted. *Podophyllum hexandrum* and *Thymus linearis* are predicted to expand their distribution ranges, however, losing their currently suitable habitats. Thus, the present study recommends that these MAPs should be prioritized for conservation and abrupt appraisal of their present population status and updated IUCN categorization should be carried out. Furthermore, to provide more reliable information for conservation decision-making under future climate scenarios, more thorough models that take into account both the biotic and abiotic factors contributing to species persistence should be used.

Mountain climate impact

Comprehensive data on different biodiversity parameters are essential for maintaining ecological equilibrium and stability. This becomes important when a number of factors endangering species' survival, global biodiversity is going through a critical period. It is well known that any human or natural factor that modifies an ecosystem directly or indirectly is considered a driver. These factors have the potential to reduce biodiversity, raise the likelihood of extinction and reduce population sizes. According to , an indirect driver perturbs one or more direct drivers, resulting in a more diffused impact on ecosystem processes than a direct driver, which has an adverse effect on the system. One of most

rapidly intensifying threat to biodiversity is probably the climate change. Over the past century, the average global temperature has risen by roughly 0.74°C. It is anticipated that this warming trend will pick up speed in the upcoming decades, reaching a maximum temperature increase of 2.8°C-5.3°C. Worldwide, mountain ecosystems are thought to be the most delicate and vulnerable to the consequences of climate change. Mountains have reportedly warmed by 0.65°C over the previous 50 years or 0.13°C every decade. Mountains have been reported to higher warming than the global average over the past century, they seem to be the most vulnerable habitats to altered climate settings thus, an integrated approach for monitoring and managing the impacts of climate change is necessary to cope with its associated risks in mountains.

Climate risks

The present study identified the present climatic envelope and predicted the future distribution of the targeted MAPs. Findings of the present study will be critical to formulate management policies for MAPs in Jammu Kashmir in particular and Indian Himalayan region in general, particularly at a time when the conservation of MAPs from overuse and climate change is important. The area of interest of the present study includes the former state of India, Jammu and Kashmir which has been divided into two union territories is a region of northern India, inhabiting mountain ranges with a broad altitudinal range that extend from the Siwaliks in the south to the Pir Panjal, the Greater Himalaya, the Zaskar range and the Karakoram in the north. The state's three climate zones are the temperate Kashmir in the middle, the frigid Ladakh desert in the east and the subtropical Jammu in the south. J&K is known for its biological resources with 5026 taxa of angiosperms belonging to 1306 genera and 180 families). MAPs represent a foremost part of the flora, which provides raw materials for the pharmaceutical and cosmetics industries. However, a number of human disturbances, including deforestation, habitat loss and fragmentation, land encroachment, biological invasion, fire, overuse of forest resources and overgrazing, are currently having an increasing impact on the forest ecosystems. Thus, a decent section of rich

biodiversity repository of Jammu and Kashmir is currently facing grave threats of extinction at an alarming rate.

Climate impact on medicinal plants

Mountains are widely acknowledged as biological diversity's treasure troves, greatly enhancing the functioning of the world's ecosystem. 10% of the world's population lives in mountainous areas, which are home to half of the world's biodiversity hot spots. In mountainous regions, Medicinal and Aromatic Plants (MAPs) form an important component of livelihood of the people these relationships, as well as the economic benefit of MAPs in the Himalayan region, have been documented for centuries in both ethnographic and field studies the degree to which humanity is able

to preserve the diversity of plant species, particularly the valuable MAPs, will determine how successfully it can adapt to the challenges posed by climate change. In a study demonstrated how the MAPs play an important role in livelihood and toughness of the village communities in western Himalaya. In order to find out the future of biodiversity particularly of MAPs in the current context of global change, it is important to comprehend the distribution, composition and prediction of species collection in space. A growing number of regional, national and international awareness campaigns and policy mechanisms are being implemented in response to the loss of biodiversity, with the goal of preserving biodiversity worldwide. Likewise, many efforts are in place in the Himalayas.