

Ecology, ethnobotany, and potentially suitable habitat of *Arisaema costatum* (Wall.) Mart. under the climate change scenarios in Nepal

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Abstract

The unique landscape of Nepal supports diverse ecological niches that are home to valuable plants, benefiting various ethnic groups. Wild edible plants have been essential for the livelihoods of indigenous peoples and local communities due to their affordability, ease of harvest, and renewable nature. However, climate change is altering the habitat, distribution, ecology, and phenology of plant species in the Himalayas. One such important species in Nepal is *Arisaema costatum*, which has multiple indigenous uses. Unfortunately, deforestation and land use changes have led to continuous changes in the distribution and habitats of wild edible plants. We conducted field research involving 280 quadrats (2×2 meters) and 210 interviews. By utilizing MaxEnt modeling and considering different climate change scenarios (Shared Socioeconomic Pathways 4.5 and 8.5) as well as climatic predictors and species localities, we analyzed 196geospatial data points. This allowed us to evaluate the present suitable environment and predict potential habitats in 2050 and 2070. Our findings revealed that *A. costatum* is used as a vegetable by indigenous and local communities in the Nepal Himalayas. Traditional fermentation and detoxification techniques are employed for its preparation. The plant plays a vital role in household food and nutrition, income generation, and health security. Elevation, annual mean temperature (BIO-1), and precipitation during the warmest and coldest quarters (BIO-18 and BIO-19) were identified as the most influential factors for projecting the future distribution of *A. costatum* in the Nepal Himalayas. Approximately 14% (21121.75 km²) of Nepal's land was found to be suitable habitat for this species, with the Gandaki, Bagmati, and Koshi provinces in the temperate regions particularly well-suited compared to other provinces. Given the anticipated loss of *A. costatum* habitats and the increasing temperatures due to climate change in the Nepal Himalayas, urgent integrated research and development programs are necessary to address this issue.

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