

Study: Temperature is key climatic factor limiting growth of Himalayan silver fir

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A previous dendroecological study of fir growth from the northern

declivity of Mt. Everest found a temperature signal at higher elevations and a moisture signal at lower elevations. However, no study has yet investigated the response of a tree species across its entire elevational distribution range in the southern declivity of the world's highest elevation gradient, the Mt. Everest region.

In a study published in *Agricultural and Forest Meteorology*, researchers from the Xishuangbanna Tropical Botanical Garden (XTBG) of the Chinese Academy of Sciences and their collaborators investigated the growth and climate sensitivity of *Abies spectabilis* (Himalayan silver fir) along an [elevation](#) gradient in the Sagarmatha (Mt. Everest) National Park.

They aimed to identify the main climatic factors limiting the growth of *A. spectabilis* along its elevational distribution range and to assess the changes in long-term tree growth rates at different elevations.

The researchers developed six tree ring width chronologies of *A. spectabilis*, spanning 98 to 310 years, along an elevation gradient (3400-4100 meters above the sea level) in the Mt. Everest region of the central Himalaya.

They found that temperature during and before the growing season was the main limiting factor for growth. Spring moisture availability was the second most important growth factor, especially in lower elevation forest belts. Low spring moisture availability reduced the growth of Himalayan fir at low- to middle-elevations.

They also found a positive growth trend at the treeline in recent decades, which is likely related to the effect of the warming climate. The negative growth trends at low to mid elevations may be related to the recent intensification of drought conditions during the spring season.

"Our results highlight the importance of understanding the vulnerability of forests at middle and low elevations to future climate change," said Fan Zexin of XTBG.

More information: Narayan Prasad Gaire et al, The impact of warming climate on Himalayan silver fir growth along an elevation gradient in the Mt. Everest region, *Agricultural and Forest Meteorology* (2023). [DOI: 10.1016/j.agrformet.2023.109575](https://doi.org/10.1016/j.agrformet.2023.109575)

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