

EME International Seminar Series

Signals of Climate Change from the Indian Himalayas

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Abstract:

The Indian Himalayas are undergoing rapid environmental transformations driven by climate change and human activities, with major implications for ecosystems, livelihoods, and water security. This presentation synthesizes findings from three complementary studies examining hydropower development, the upward shift of apple cultivation, and the decline of natural springs. Drawing on long-term meteorological records, field surveys, hydrological modeling, and geospatial analysis, the studies reveal clear signals of a changing mountain environment. Results show decreasing rainfall, rising temperatures, and groundwater depletion, exacerbated by hydropower infrastructure that fragments river systems and increases vulnerability to landslides and flash floods. In agricultural regions, declining winter chilling hours have forced apple orchards to migrate from traditional elevations (1,200–1,500 m) to higher altitudes, while pest outbreaks and soil degradation threaten productivity. Hydrological analyses further indicate that more than 60% of mapped springs have dried up, driven by reduced groundwater recharge, over-extraction, and environmental change. Together, these findings highlight the need for sustainable energy development, climate-resilient agriculture, and integrated water-resource management to strengthen the long-term resilience of the Himalayas.

Keywords: Himalayan hydropower, spring disappearance, water security, climate change

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