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**Evaluating the Effects of Droughts and Floods Caused by Climate
Change on Freshwater Ecosystems and Developing Adaptation
Plans**

Gidde Chandraiah, Research Scholar, (Botany), The Glocal University, Saharanpur, Uttar Pradesh

Abstract

Climate change is intensifying the frequency and severity of extreme hydrological events, particularly droughts and floods, posing significant threats to freshwater ecosystems and the communities that depend on them. This study evaluates the ecological impacts of climate-change-induced droughts and floods on freshwater systems, including rivers, lakes, wetlands, and associated habitats. Prolonged droughts can reduce water availability, increase water temperature, concentrate pollutants, decrease dissolved oxygen, and disrupt aquatic biodiversity and ecosystem functions. In contrast, extreme flooding can cause erosion, sedimentation, habitat destruction, nutrient loading, and the displacement or mortality of aquatic organisms. The study examines how these contrasting disturbances influence water quality, species composition, ecological connectivity, and the resilience of freshwater ecosystems. It further identifies the major environmental and socioeconomic factors that increase ecosystem vulnerability to hydrological extremes. A key objective of the study is to develop practical and ecosystem-based adaptation plans for improving resilience to future climate risks. Proposed measures include wetland restoration, watershed management, protection of riparian zones, sustainable water allocation, restoration of natural floodplains, improvement of early-warning systems, and climate-resilient freshwater monitoring. The study emphasizes the importance of integrating scientific assessment, local knowledge, community participation, and effective policy frameworks into adaptation planning. Overall, strengthening the resilience of freshwater ecosystems is essential for conserving biodiversity, maintaining water security, and supporting sustainable livelihoods under a changing climate.

Keywords: Climate change, drought, floods, freshwater ecosystems, biodiversity, water quality, ecosystem resilience, adaptation strategies, watershed management, wetland restoration, climate resilience.