

## Article

# Ecohydrological Footprint and Climate Trends in Lotic Ecosystems of Central Western Ghats

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**Abstract:** An ecohydrological assessment of lotic ecosystems would provide insights into understanding the symbiotic interactions of hydrological and ecological processes for sustainable catchment management to ensure water security and achieve sustainable development goals (SDG). Global monitoring reveals changing climate patterns due to the unabated anthropogenic activities altering the ecohydrological behavior of waterscapes and thus affecting the sustenance of natural resources. The current research investigates the ecohydrological footprint using a modified water balance method by accounting for climatic and land-use trends across three river catchments in the northern portion of the Central Western Ghats. Assessment of landscape dynamics using temporal remote sensing data indicates the reduction in forest cover in Mahadayi, Ghataprabha, and Malaprabha river basins with increased anthropogenic activities. Evaluation of climate trends shows rising temperatures over 0.4 °C in the last century with increasing rainfall. The consequence of enhanced rainfall is increased overland flows to the extent of 35–80% in all river basins. Water availability in streams during all seasons is evident in the catchment dominated by native forest cover, while streams are intermittent and seasonal at the transition zone and plains. Analyses of temperature and rainfall in the last century indicate higher spatial variations directly influencing surface and subsurface hydrology. The reduced native forest cover has directly affected the variations in the local temperatures and precipitation patterns. This highlights the need for maintaining the ecological integrity of watersheds with native vegetation cover for sustaining the natural resources (water, etc.) that support the livelihood of farmers with socio-economic benefits.

**Keywords:** blue water demand; ecohydrological footprint; climatic change patterns; sustainable development goals

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## 1. Introduction

Ecohydrology provides insights into the understanding of relationships between hydrological and biological processes for prudent management to improve water security and sustain biodiversity with opportunities by lessening the ecological footprint while maintaining balance within catchment processes [1]. The hydrological potential of waterscape and regional weather conditions are altered significantly with climate change [2,3]. Unplanned anthropogenic activities have triggered climate change, thereby increasing hydrological extremes. Additionally, with increasing instances of mismanagement of natural resources, there has been an escalation of vulnerabilities to the ecosystem and its habitants [4]. The ecosystems are being compromised globally, leading to deforestation with the decline and extinction of endemic species [5]. In the recent past, the conservation and management of ecosystems and natural resources have been advocated through global initiatives such as SEEA (System of Environmental-Economic Accounting) [6], MEA (Millennium Ecosystem