

Integrated Urban Water Resource Management in Chennai

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ABSTRACT

Rapid urbanization, population growth, and industrial expansion have placed significant pressure on urban water resources, leading to increasing water scarcity in many Indian states. Growing stress on both surface water and groundwater resources due to rising demand, declining freshwater availability, inefficient water management practices, and inadequate recharge mechanisms. These challenges pose serious risks to urban sustainability and quality of life, particularly in the context of India's Smart City Mission. This study aims to assess the availability, demand, and management of urban water resources in the Chengalpattu district and to identify key factors contributing to urban water stress. The research examines rainfall patterns, runoff, groundwater levels, wastewater generation, and existing water management practices to evaluate gaps between water supply and demand. It also analyses the effectiveness of current conservation and recharge measures and explores opportunities for sustainable water management strategies. Primary data will be collected from urban households using a structured questionnaire, supported by secondary data from government reports, rainfall records, and water department statistics. Quantitative techniques, including the SCS-CN approach, will be used to estimate water demand, storage potential, and groundwater recharge capacity. The study seeks to determine whether improved rainfall management, artificial recharge, and integrated urban planning can reduce long-term water stress. The findings are expected to provide actionable insights for policymakers and urban planners by highlighting sustainable strategies for optimizing water use, strengthening groundwater recharge, and promoting efficient urban water governance. The study aims to contribute to the development of resilient and sustainable urban water management models for rapidly growing cities.

Keywords: Urban Water Management, Water Scarcity, Groundwater Recharge, Urban Sustainability, Smart City Planning

