

A roadmap for implementing integrated asset management for sustainable water Infrastructure in India

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Abstract

Water is a crucial resource for the economic and social development, and its depletion poses significant challenges. A major portion of India is facing high levels of water stress and rapid depletion of groundwater reserves, impacts millions of people. This paper proposes a roadmap for sustainable water resource management in India through an integrated approach, considering water supply and wastewater systems, and highlighting the significant role of civil engineers in balancing cost, risk, and performance. The framework provides guidance for planning, functions, and interactions with flexibility for varied conditions. The study emphasizes need for a wholesome approach to water resources management and highlights the variables that influence the effectiveness. The proposed framework can aid water resource managers and policymakers to make informed sustainable decisions, contributing to improved practices in India.

Keywords: Water resource; Roadmap; Integrated Asset Management; Environmental Sustainability; Water Infrastructure; SDG; Water & Sanitation; IWRM; Civil Engineers

1 Introduction

Water is a crucial constituent of existence and is pivotal to both economic and social progress. Despite the abundance of water on the planet, only a small fraction is of sufficient quality, in the right location, and accessible. The importance of water cannot be overstated as it has a direct impact on all elements of development and is linked to Sustainable Development. It drives economic growth, maintains healthy ecosystems, and is fundamental to life.

Unfortunately, more than 663 million individuals do not have access to safe and clean sources of drinking water, highlighting the need for better planning and management of water resources. Decreased water resources can lead to slower economic growth, as water is a critical component of production. By the year 2050, losses related to water in agriculture, health, income, and overall

prosperity could potentially reduce growth rates by up to 6% of GDP in certain regions [1].

Water insecurity can have a significant drag on global economic growth, as water and water-related hazards have a statistically significant effect on the economy. For example, the Niti Aayog's 2018 Composite Water Management Index (CWMI) study found 21 major cities in India, including Delhi, Bengaluru, Chennai, and Hyderabad, are rapidly depleting their groundwater reserves, and are approaching a state of zero groundwater levels, disrupting the availability of water for 100 million people [2]. By 2030, the nation's water market is predicted to be double the existing supply, leading to catastrophic water shortages for hundreds of millions of people and a 6% loss in GDP.

Initiatives to enhance water resources can also drive developments in various industries, including agriculture, tourism, energy, and health. Ensuring