

Integrated Water Resource Management for Sustainable Development: Global Water Governance, International Policy Frameworks and Indian Perspectives

B. Sudhakar Rao ¹ and J. Anil Kumar ²

¹Government Degree College(A), Bhadrachalam

²NRR Government Degree College(A), Mahabubabad

Email: sudhakar8513@gmail.com

Manuscript details:

Available online on <http://www.ijlsci.in>

ISSN: 2320-964X (Online)

ISSN: 2320-7817 (Print)

Cite this article as:

B. Sudhakar Rao and J. Anil Kumar (2026) Integrated Water Resource Management for Sustainable Development: Global Water Governance, International Policy Frameworks and Indian Perspectives, *Int. J. of Life Sciences*, Special Issue, A22, 99-102.

<https://doi.org/10.5281/zenodo.21312440>

Article published in the Special Issue of the Two-Day National Seminar on **Emerging Frontiers in Multidisciplinary Research in Life Sciences (EFMRLS-2026)**, held on 25th & 26th March 2026. Organized by the Departments of Zoology and Botany, Nukala Ramachandra Reddy (NRR) Government Degree College (Autonomous), Mahabubabad-506101, TS, India.



Open Access This article is licensed under a Creative Commons Attribution 4.0 International License,

which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third-party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/>

ABSTRACT

Water resources constitute one of the most critical natural assets supporting ecological balance, human health, and socio-economic development. Despite the abundance of water on the Earth's surface, freshwater resources suitable for human consumption are limited and increasingly threatened by population growth, climate change, pollution, and unsustainable patterns of consumption. Sustainable management of water resources has therefore become a central priority within global environmental governance and sustainable development frameworks. The present study examines the evolution of global water governance through major international treaties, policy frameworks, and sustainability agreements that emphasize sustainable water resource management. The study also evaluates national water management initiatives in India, including major government policies and programs designed to address water scarcity and ensure equitable access to clean water. The findings indicate that integrated water resource management, strengthened environmental governance, technological innovation, and community participation are essential for ensuring long-term water sustainability. The study concludes that effective implementation of global and national water policies is critical for achieving Sustainable Development Goal 6 (Clean Water and Sanitation) and ensuring water security for future generations.

Keywords: Sustainable Development, Water Governance, Integrated Water Resource Management, SDG-6, Water Policy, India

1. INTRODUCTION

Water is a fundamental natural resource essential for sustaining life and maintaining ecological balance. It plays a vital role in biological processes, agricultural production, industrial activities, and overall human well-being. Although nearly seventy percent of the Earth's surface is covered with water, only a small fraction of this resource is available as freshwater suitable for human consumption.

Over the past century, rapid population growth, urbanization, industrial expansion, and agricultural intensification have significantly increased pressure on global freshwater resources. According to international assessments, water demand has increased more than twofold since the mid-twentieth century, while access to safe drinking water remains limited in several developing regions. Recognizing the importance of water for sustainable development, the international community has increasingly incorporated water resource management into global sustainability frameworks. The United Nations Sustainable Development Goals (SDGs) adopted in 2015 include SDG-6, which focuses on ensuring the availability and sustainable management of water and sanitation for all.

Global water governance has evolved through multiple international agreements and policy frameworks that emphasize the need for coordinated water management strategies. These initiatives highlight the importance of integrated approaches that balance ecological sustainability with socio-economic development.

India represents one of the most important case studies in global water management due to its large population, uneven rainfall distribution, and increasing demand for water resources. The country faces significant challenges in ensuring equitable access to water while maintaining ecological sustainability.

MATERIALS AND METHODS

The present study adopts a qualitative research approach based on systematic analysis of international environmental policy documents, sustainability reports, and peer-reviewed scientific literature related to water resource management. The data sources include global environmental governance frameworks, international water treaties, United Nations sustainability reports, and national policy documents related to water resource management. Major international agreements and policy frameworks analysed in the study include the Dublin Principles, Agenda 21, the Ramsar Convention, and the United Nations Sustainable Development Goals. In addition to international frameworks, the study also examines major water policies and initiatives implemented by the Government of India, including the

National Water Policy, Jal Jeevan Mission, and watershed development programs.

The analytical framework focuses on three key dimensions: global water governance, sustainable water management strategies, and national water policy implementation in India.

RESULTS

The results indicate that freshwater scarcity has become one of the most pressing environmental challenges facing the global community. Increasing population growth, climate change, industrial pollution, and unsustainable water consumption patterns have intensified pressures on freshwater ecosystems worldwide. Many regions of the world now experience severe water stress, while climate change has altered hydrological cycles, leading to increased frequency of droughts and extreme weather events. Pollution from agricultural runoff, industrial discharge, and domestic waste has further degraded water quality in many freshwater systems. These challenges emphasize the need for sustainable water governance frameworks that integrate environmental protection, economic development, and social equity.

International recognition of water as a critical resource for sustainable development has led to the development of several global policy frameworks aimed at promoting sustainable water management. One of the earliest international initiatives addressing water management was the International Drinking Water Supply and Sanitation Decade (1981-1990) launched by the United Nations. This initiative emphasized the importance of providing safe drinking water and sanitation services to populations worldwide. The Dublin Conference on Water and the Environment (1992) introduced the Dublin Principles, which recognized water as a finite and vulnerable resource and emphasized the importance of integrated water management approaches. These principles highlighted the role of participatory governance and recognized water as both an economic and social good.

The Rio Earth Summit (1992) further strengthened international water governance through the adoption of Agenda 21, which contains detailed provisions for

sustainable freshwater management. Chapter 18 of Agenda 21 specifically addresses the protection and sustainable use of freshwater resources. Another significant international agreement is the Ramsar Convention on Wetlands (1971), which focuses on the conservation and sustainable use of wetlands that play a crucial role in maintaining global water cycles and biodiversity. More recently, the United Nations Sustainable Development Goals (2015) have placed water sustainability at the center of global development policy through SDG-6, which aims to ensure universal access to clean water and sanitation by 2030.

India faces significant challenges in water resource management due to its large population and uneven distribution of freshwater resources. Although the country supports nearly eighteen percent of the world's population, it possesses only about four percent of global freshwater resources. To address these challenges, the Government of India has implemented several policy initiatives and development programs aimed at improving water governance.

The National Water Policy (2012) provides a comprehensive framework for sustainable water management in India. The policy emphasizes efficient water use, conservation of water resources, equitable distribution, and protection of aquatic ecosystems. Several national programs have been introduced to improve water access and resource management. The Jal Jeevan Mission, launched in 2019, aims to provide safe and adequate drinking water to all rural households through functional household tap connections. The Atal Bhujal Yojana focuses on sustainable groundwater management in water-stressed regions by promoting community participation and scientific monitoring of groundwater resources. Similarly, watershed development programs such as the Integrated Watershed Management Programme (IWMP) aim to enhance water conservation through soil and water management strategies. These initiatives demonstrate India's commitment to improving water governance and achieving the targets of Sustainable Development Goal 6.

DISCUSSION

The results of this study highlight the growing importance of integrated water resource management in addressing

global water scarcity challenges. International water governance frameworks have increasingly emphasized the need for coordinated management of water resources that considers ecological sustainability, economic development, and social equity. The Dublin Principles and Agenda 21 have played a significant role in shaping global water governance by promoting integrated water management strategies and encouraging international cooperation. These frameworks emphasize that water management must involve multiple stakeholders including governments, local communities, and environmental organizations. India's water management initiatives demonstrate the importance of aligning national development policies with global sustainability frameworks. Programs such as Jal Jeevan Mission and Atal Bhujal Yojana represent significant steps toward improving water access and resource sustainability. However, several challenges remain in ensuring effective implementation of water management policies. Rapid urbanization, groundwater depletion, pollution, and climate change continue to pose major threats to water sustainability. Addressing these challenges requires stronger institutional coordination, improved water infrastructure, technological innovation, and increased public awareness regarding water conservation.

CONCLUSION

Water resources are essential for sustaining life, maintaining ecological balance, and supporting economic development. Increasing pressures on freshwater systems caused by population growth, climate change, and environmental degradation have made sustainable water governance a global priority. International agreements and sustainability frameworks have played a crucial role in promoting integrated water management strategies. The Sustainable Development Goals have further strengthened global commitments toward ensuring universal access to clean water and sanitation. India's water policies and development initiatives demonstrate the importance of integrating sustainable water management into national development planning. Strengthening institutional mechanisms, improving water governance, and promoting community participation will be essential for achieving long-term water sustainability. Ensuring sustainable water management is therefore critical not only for environmental protection but also for social welfare and economic development.

Conflict of Interest: The authors declare no conflict of interest in relation to this research.

Data Availability Statement: Not applicable.

Correspondence and requests for materials should be addressed to **B. Sudgakar Rao**

Peer review information

IJLSCI thanks the anonymous reviewers for their contribution to the peer review of this work. A peer review file is available.

Reprints and permissions information is available at <https://www.ijlsci.in/reprints>

REFERENCES

- Brundtland Commission (1987) Our common future. Oxford University Press.
- Government of India (2012) National water policy. Government of India.
- Ministry of Jal Shakti (2019) Jal Jeevan Mission guidelines. Government of India.
- Ramsar Convention Secretariat (2018) The Ramsar convention on wetlands. Ramsar Convention Secretariat.
- UNESCO (2022) World water development report. UNESCO.
- United Nations (1992) Agenda 21: Programme of action for sustainable development. United Nations.
- United Nations (2015) Transforming our world: The 2030 agenda for sustainable development. United Nations.

© The Author(s) 2026

Publisher's Note

IJLSCI remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.