

**WATER RESOURCES MANAGEMENT: INOVATION AND CHANLLENGE IN A  
CHANGING WORLD****Dr. K.S.Gurupanch**[Kubergurupanch@Gmail.Com](mailto:Kubergurupanch@Gmail.Com)

Professor,

Head Of Dept. Of Geography

Dean

Bharti Vishwavidyalaya ,Durg,

**ABSTRACT**

The prudent management of water resources is essential for human and ecosystem well-being. As a result of ever escalating and competing demands, compounded by pollution and climate change-driven impacts, available freshwater resources are becoming increasingly stressed. This is further compounded by poor management practices and the unsustainable extraction of water. Consequently, many parts of the world, particularly urban areas, are facing water shortages. Therefore, water resources management requires a clear understanding of the ongoing challenges and Innovative approaches. This Special Issue provides the platform for the dissemination of knowledge and best practices to strengthen the management of our precious water resources into the future.

**INTRODUCTION:**

Globally, water resources are becoming increasingly vulnerable as a result of escalating demand arising from population growth, the need for increased food production, expanding industrialization due to rising living standards, pollution due to various anthropogenic activities, and climate change impacts . Due to water scarcity and poor water quality, it has been predicted that by 2050, at least one in four people are likely to live in a country with a shortage of freshwater. Consequently, ensuring availability and sustainable management of water has been adopted as part of the United Nations Sustainable Development Goals, Transforming Our World: the 2030 Agenda for Sustainable Development. The significance of the competition between the water demand for food production and other consumptive uses needs to be viewed in light of the fact that, according to the United Nations, it will be necessary to produce 60% more food globally and 100% more in developing countries by 2050. This needs to be viewed in the context

that currently, about 70% of freshwater resources are used for agriculture, Furthermore, the predicted impacts of climate change on water resources are also significant. Based on long-term weather records and future climate projections, water resources are expected to be highly vulnerable, affecting water availability and quality, and in turn the reliability of supply for various consumptive uses . This situation is further exacerbated by poor management practices and the unsustainable extraction of water . Consequently, many regions around the world,

particularly urban areas, are becoming increasingly water stressed and conflicts over access to water are becoming ever more common . To overcome the significant challenges fundamental to the management of water resources, cutting-edge knowledge, innovative approaches and an in-depth Understanding of the inherent scientific, economic, social and environmental issues is imperative.

This Special Issue has provided the platform for researchers and practitioners to contribute to the wide dissemination of knowledge and best practices to strengthen the management of our precious water resources into the future. The papers contributed to this Special Issue fall into four broad categories: modeling of surface and groundwater resources under complex scenarios including water allocation; understanding soil-water interactions; impacts of climate change on water resources; and water supply.

**KEYWORDS:**

Water resources management; water allocation; soil-water interaction; climate change; Surface water; groundwater

**FUTURE PLANNING:** An important first step in deciding on future directions and therefore the challenges we face is to look closely at what are the key issues which water resources managers must address today and considering how these will evolve with time. For example, Mr. Hofius quite correctly focuses at the end of his paper on the importance of hydrology in the climate change discussion.

I would summarize the key issues today as:

- Climate change: while we have always had to deal with a variable climate, the majority of studies, analyses and management techniques have been based on the belief that the hydrological series was stationary, i.e. while there may be fluctuations, the mean value

would remain roughly the same. There is now mounting evidence of trends in hydrological series. Many areas face a drying and warming climate and thus potentially less water availability;

- Increasing vulnerability to severe weather events: the Intergovernmental Panel on Climate Change Technical Paper on Climate Change and Water highlights the potential for more frequent and more severe weather events. With increasing populations at risk and the potential for a shift in the risk profile in many areas, safety of life and property will remain high on the agenda;
- Growing urban demand: the population of urban centers continues to grow and urban areas continue to spread, thus placing greater pressure on water supply systems as well as reducing the availability of arable land, and, in some cases, placing increased pressure on water supply catchments;
- Over-allocation of existing supplies: the water in many supply systems has been allocated on the basis of past availability or existing demand and has not been kept in line with current or future availability; thus, many systems are over-allocated;
- Unrestricted extractions: in many areas, there are no management plans or restrictions on water extractions (for example, pumping from rivers and groundwater extractions). These have resulted in less water being available and have in some case led to mining of the resource. The expansion of farm dams in some areas also reduces the supply of water entering river systems;
- Land-use change: clear-felling, expanding plantations and the opening of new areas to agriculture all have impacts on the water resource; unintended events, such as bushfires, can lead to a reduction in the availability of water and water-quality problems. Changes to land use, even within agricultural areas, have implications for both water availability and water use;
- Environmental requirements: there has been an increasing emphasis on the requirement for environmental flows to maintain ecosystems such as wetland and in-stream environments. Community expectations are that we should see the environment as a rightful and high-priority user of water.
- These areas of concern will continue to be the drivers for the actions and responses of National Meteorological and Hydrological Services (NMHSs). The mission of NMHSs in

general has been described as the provision of reliable, impartial, timely information that is needed to understand the water resources of their area of responsibility, including:

- Minimizing the loss of life and property as a result of water-related natural hazards, such as floods, droughts and land movement;
- Effectively managing ground-and surface-water resources for domestic, agricultural, commercial, industrial, recreational and ecological uses;
- Protecting and enhancing water resources for human and aquatic health and environmental quality; and
- Contributing to wise physical and economic development of the area's resources for the benefit of present and future generations.

Responding to these drivers will require NMHSs to set in place programmes that lead to the management of the resource in an environmentally and economically sustainable manner. The need for improved water resources information and water-management tools and techniques to deal with a changing climate will therefore be key challenges for the future.

In identifying the challenges, I would like to focus on the four major areas that contribute an end-to-end system for the provision of hydrological services, namely, observations (including measurement, transmission and ingestion), monitoring, analysis and assessment (including modeling), products and services (including their delivery) and supporting research (including blue sky research).