Concept Note for **Special Issue** on
Advanced Tools and Techniques for Modeling Hydro-climatic Variables under Changing Climate

Aims and Scope

Reliable prediction of hydro-climatic variables is of utmost importance to deal with problems of hydro hazards and climatic disasters, and to manage the water resources sustainably.However, accurate prediction of hydro-climatic variables has always been a challenging task for researchers due to inherent complexity and non-linearity of the hydrologic and climatic processesand limitationsin availability of theirrecorded historical databases. Existence of the poor monitoring network due to resource constraints, especially in the developing countries, further hinders precise predictions.On top of it, climate change and variability isposing a serious threat to accurate prediction of hydro-climatic variables, making it imperative to use advanced predictive methodologies and tools. Earlier, traditional methods such as statistical and stochastic time series methods were mainly employed in hydro-climatic predictions. However, with the advancement of computational technologies,several approaches /methods using artificial intelligence (AI), data mining etc. have evolved and applied forhydrological predictions.In recent years, many standalone and hybrid AI methods have been developed, flourished and dealt through their wide applications in a variety of hydro-climatic variables worldwide. Hence, this evolution prompts the introduction ofSpecial Issue on Advanced Tools and Techniques for Modeling Hydro-climatic Variables under the Changing Climate scenarios.

Focus of the Special Issue

This Special Issue (SI) will focus on exploring the potential of novel standalone and hybridAI tools and techniques inunderstandingcomplex hydro-climatic variables/processes. We invite contributions from experienced hydrologists, meteorologists, climatologists and other researchers working actively in the related subjects to contribute high-quality original research, as well as review articles that seek to address the recent developments in integrating the advanced tools and techniques for a better understanding of the hydro-climatology over the globe. This SI will provide a platform to researchers to share the advanced knowledge and communicate the recent developments in AI tools and techniques utilized in optimizing the water resources under the changing environment. The reliable hydro-climatic predictions will lead todeveloping climate-resilient strategies for planning and management of water resources.Potential topics include, but are not limited to:

➢ Simulation of hydro-climatic variablesusing cutting-edge AI methods (artificial neural networks, fuzzy logic, support vector machines/regression, data mining,genetic programming, time-frequency decomposition, model tree, extreme learning machines, deep learning, chaos theory, Markov model, Kalman filter, Gausian process regression, etc.)

➢ Artificial intelligence (AI) and internet of things (IoT) based techniques for managing water resources

- ➤ Application of AI based tools and data mining approaches in identifying multi-station trends, and change points in hydrologic processes at field, watershed and regional scales

- ➤ Exploring interactions of hydro-climatic variables with external factors such as land use, population growth, vegetation and drought indices using advanced AI methods

- ➤ AI-based assessment of groundwater potential, vulnerability to pollution,and hazard risk management

- ➤ Watershed planning, management, and prioritization by applying AI techniques

- ➤ Integration of AI, remote sensing, and geographic information systems for modeling soil moisture, erosion,nutrient dynamics, evapotranspiration and future crop water demands under the changing climate.

In summary, this SI serves as a nexus for the exchange of knowledge, fostering collaboration among researchers to address the complexities of hydro-climatic variables under a changing climate. The outcomes are anticipated to contribute not only to the scientific community but also to policymakers and practitioners engaged in the crucial task of managing water resources in the face of evolving climatic conditions.

IMPORTANT DATES:

Manuscript Due	**: April 2024**
Reviews and Revisions Due	**: May - July 2024**
Publication Date	**: August - September 2024**

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