

# Preface

The present monograph tries to highlight some of the novelties in research and development in mitigation of problems faced by the water and water-based energy industry. The chapters published in the monograph depict innovative application of neural networks, multicriteria decision-making, geographical information systems in solving the different contemporary problems dealt under the area of water and water-based energy.

The solution provides an opportunity and methodology for the provision of technical, political and economic benefit not only for the environment, ecology but also for the socio-economic benevolence of the stakeholders.

Presently, the impact of urbanization and climate change has greatly disturbed the ecological and environmental equilibrium of many countries. Due to the uncontrolled extraction of natural resources and destruction of environment for sustenance of the need and luxury of the population which is benefitted by the technological advancements that is taking place both globally and regionally have induced global warming worldwide which in turn have created change in the regular pattern of climate.

The anomalies like excess sedimentation in surface water bodies, increase in frequency of extreme events, adversities in quality of water and above all these implications have greatly influenced the economic return from not only the water resources but also the energy extracted from such resources.

The water-based energy resources such as hydropower, wave energy must be managed optimally for maximum utilization and return on investment.

The manuscripts published in this dissertation focus on the predicament as well as provide novel solutions with latest technologies to mitigate intricacy of the quandary so that pinnacle return can be possible even under extreme uncertainty.

As for example in the first chapter, Poon and Hwee try to estimate the inflow in reservoirs considering the sedimentation problems of the Teriang Reservoir in Malaysia where as in Chap. 2, the Suryanarayana et al. try to entice the effect of extreme events during the twentieth century in Surat district of India.

In Chap. 3, the quality of water of irrigation waters was analysed by Roy, through a new and alternative water quality index which was developed by the

application of fuzzy logic decision-making (FLDM) method. This type of decision-making procedures was found to be optimal when the importance of two parameters is nearly equal.

The economic connotation of hydro power plant under climatic extremities was examined in the Chap. 4 where novel approaches like cascading of multicriteria decision-making (MCDM) with neuro-genetic modelling systems were used to estimate the financial impact of a small scale hydro power plant in a peri-urban state of Tripura.

In the fifth and sixth chapters, the location selection, which is the major factor for optimal utilization of available wave energy potential against minimum investment, was tried with the help of MCDMs like analytical hierarchy process (AHP) and polynomial neural networks (PNN) by Chakraborty and Ghosh.

In the last two chapters, the cost incurred in hydro power plants for augmenting utilization of potential was minimized by the application of various novel optimization tools; hybridization of wind and water power was practiced, and innovative solution for optimal scheduling was attempted for maximum utilization of energy by Mishra et al. and Dhillon et al., respectively.

The present monograph tried to accentuate the different solution available for reduction of uncertainty in pursuit of water and water-based energy resources which might be extremely beneficial for finding solutions for the problems imposed by uncertainties in the climatic pattern, large scale of urbanization and uncontrolled extraction of natural resources.

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