

Preface

Climate change has an impact on water-based energy power plants. Although various procedures have been adopted to mitigate the vulnerabilities, yet changes in the climatic pattern make hydroelectric power plants vulnerable. The present study proposes that instead of the implementation of sophisticated and expensive but ineffective mitigation measures, it is better to change the way energy is produced from the power plant. This work implements an objective and cognitive tool to estimate the impact of changing the parameters in such a manner that the effect of climatic changes is minimum.

The technological advancements of Multi Criteria Decision Making (MCDM) methods and a new variant of Artificial Neural Networks, Group Method of Data Handling were utilized to forge a relationship between the inputs and outputs. The inputs are the correlated factors, while the outputs are the nonlinear function of the input parameters, which are beneficial and non-beneficial to climatic vulnerabilities. The weight of importance is also a variable in the output function so that the sensitivity of each parameter is encoded in the output function.

Chapter 1 gives an introduction to the problem faced by hydropower plants. The main objective is proposed and brief discussions of the novel methodology are presented.

Chapter 2 provides an opportunity to know about the basics of hydro power plants, while Chap. 3 is a discussion of the popular climatic parameters and their impacts on natural resources. Chapter 5 gives the methodology adopted to achieve the study objective. In this regard, it is noted that for the first time multi-criteria decision making and group method of data handling is applied in a cascade connection to solve the problem. This indicator for representation of plant efficiency under changed climate scenario has not been applied elsewhere.

Chapter 6 is the results and discussion section where the results are given and the possible causes for the results are depicted. The scientific benefits and limitations of the study are discussed. The results from the application of the proposed procedure on Gumti Hydro Power Plant are also summarized.

One of the major results in this study is the identification of the priority parameter that influences the performance efficiency of hydropower plants and is the most sensitive to climatic vulnerabilities. The optimal ratio of the related parameter for which climatic impacts on hydropower plants will be reduced is another important output that was successfully derived from this investigation. In the last chapter of the book some ideas for further research are discussed. A few solutions to limitations such as dependency on methods are also explored.

Minimization of Climatic Vulnerabilities on Mini-hydro
Power Plants

Fuzzy AHP, Fuzzy ANP Techniques and Neuro-Genetic
Model Approach

Majumder, M.

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