

ABSTRACT

Abrupt change in climatic behavior has direct implication on the inflow coming to the dam, thereby affecting efficiency in reservoir operation. The purpose of the study is to understand the changes in meteorological parameters with changing climatic scenario and to evaluate efficiency of the reservoir Rule Curve for power generation. It was observed that high intensity precipitation is going to increase in future. There is a marginal increase in short intensity rainfall in future for all climate scenarios, whereas there has been a six-fold increase in high intensity rainfall for future in SSP5 8.5 scenario. In all temporal scale, rainfall was found to be maximum at catchment I, which is at a close vicinity to the dam. LSTM Model has been utilized to forecast Inflow for projected meteorological conditions for 2024 to 2060. Considering unavailability of a recent rule curve and lack of studies on climate change in the study area, Probability base rule curve has been developed for the Dam and efficiency of the Rule Curve has been evaluated for future emission scenarios such as SSP1 2.6, SSP2 4.5 and SSP5 8.5 for projected sedimentation conditions. The Rule Curve developed performs very efficiently in all three climate scenarios. Considering the uncertainties with the climate models, to make the dam disaster-resilient, Seasonal forecasts have been incorporated to dynamically update the Rule Curve. High skill of Seasonal weather forecasts system (ECMWF- SEAS5) products as justified by the test statistics with observed data has motivated to forecast inflow to dam on a lead time of 1 to 6 month and to utilize it to optimize the rule curve.

Key Words: Reservoir Operation, Climate change, Adaptive Rule curve, Probabilistic rule curve, CMIP6, Seasonal weather forecast, Reliability Index, Deep Learning, LSTM