

Impact analysis of long-term stochastic inflow prediction and its uncertainty on reservoir operation during drought situations

DAISUKE NOHARA¹, HIROKO MIKI² & TOMOHARU HORI¹

1 Disaster Prevention Research Institute, Kyoto University, Gokasho, Uji, 611-0011, Japan

nohara.daisuke.2v@kyoto-u.ac.jp

2 Graduate School of Engineering, Kyoto University, Kyoto Univ. Katsura Campus, Nishikyo, Kyoto, 615-8540, Japan

Abstract Impacts of long-term stochastic inflow predictions (SIPs) and their uncertainties on reservoir operation for water supply under drought situations are analysed and discussed in this study. Multiple sets of SIPs are pseudo-randomly generated with five-day resolution for three months, arbitrarily changing the two kinds of prediction's uncertainty, namely reliability and discrimination, for a comprehensive analysis of the impact of the SIP. Monte Carlo simulations of long-term reservoir operation for water supply under drought situations are then conducted considering generated multiple SIPs with various uncertainties. The proposed analysing method was applied to an assumed reservoir whose data was derived from Sameura Reservoir in Japan, demonstrating expected impacts of SIPs and their uncertainties on the long-term reservoir operation, and giving a suggestion as to what type of uncertainty in SIP is more important in real-time reservoir operation for more effective drought management.

Key words stochastic inflow prediction; reservoir operation; drought management; impact analysis; uncertainty; reliability; discrimination; Monte Carlo simulation