

EGU2020-1990, updated on 04 Jul 2022

<https://doi.org/10.5194/egusphere-egu2020-1990>

EGU General Assembly 2020

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



## Effectiveness Analysis of Multi-purpose Dam: Socio-hydrology Modeling Approach

Sleemin Lee<sup>1</sup> and **Doosun Kang**<sup>2</sup>

<sup>1</sup>Kyung Hee University, Department of Civil Engineering, Korea, Republic of (dltmfals0816@naver.com)

<sup>2</sup>Kyung Hee University, Department Civil Engineering, Korea, Republic of (doosunkang@khu.ac.kr)

Water resources are essential for human life and closely related to various social and economic factors (e.g. land use, population, economic development, environment, etc). Also, such human activities affect hydrological environment conversely. Thus, socio-hydrology interdisciplinary studies that consider both hydro-engineering and socio-economic behavior are needed. Multi-purpose dam is a large water infrastructure mitigating water-related disasters by flood control and stable water supply. However, the effectiveness of multi-purpose dam besides the disaster mitigation has not been well analyzed, such as the social and economic influence to downstream area. This study aims to understand the relationship between the socio- and hydrology-sectors and quantitatively analyze the effects of the multi-purpose dam in target area. The representative components of socio-sector are population, land use, GRDP (gross regional domestic product), and flood/drought damages, and the hydrology-sector includes dam inflow/outflow, precipitation, and water demand. A causal loop was developed to identify the causal relationship between the socio- and hydrology-components, and a socio-hydrology system model was constructed using a system-dynamics technique. Various climate and socio-economic scenarios were applied to analyze the future effects of the multi-purpose dam on the population, regional economy, water supply, and flood damage prevention of the target area. The constructed socio-hydrology model can be used in decision-making for efficient water management and water facility planning.

Keywords: Climate change, Multi-purpose dam, Socio-hydrology, System-dynamics modeling

Acknowledgment: This study is supported by Korea Ministry of Environment (MOE) as "Graduate School specialized in Climate Change".