

# 3D Numerical Modelling of Water Flow and Salinity Intrusion in the Vietnamese Mekong Delta

Taeyoon Lee\*, Van Thinh Nguyen\*\*

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## Abstract

The Vietnamese Mekong Delta(VMD) covers an area of 62,250 km<sup>2</sup> in the lowest basin of the Mekong Delta where more than half of the country's total rice production takes place. In 2016, an estimated 1.29 million tonnes of Vietnam's rice were lost to the country's biggest drought in 90 year and particularly in VMD, at least 221,000 hectares of rice paddies were hit by the drought and related saltwater intrusion from the South China Sea.

In this study, 3D numerical simulations using Delft3D hydrodynamic models with calibration and validation process were performed to examine flow characteristics, climate change scenarios, water level changes, and salinity concentrations in the nine major estuaries and coastal zones of VMD during the 21<sup>st</sup> century. The river flows and their interactions with ocean currents were modeled by Delft3D and since the water levels and saltwater intrusion in the area are sensitive to the climate conditions and upstream dam operations, the hydrodynamic models considered discharges from the dams and climate data provided by the Coupled Model Intercomparison Project Phase 6(CMIP6).

The models were calibrated and verified using observational water levels, salinity distribution, and climate change data and scenarios. The results agreed well with the observed data during calibration and validation periods. The calibrated models will be used to make predictions about the future salinity intrusion events, focusing on the impacts of sea level rise due to global warming and weather elements.

**Keywords :** Vietnamese Mekong Delta, Delft3D, Water Level, Salinity Intrusion, CMIP6, Climate Change, Numerical Simulations

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\* Ph.D Candidate, Dept. of Civil and Environ. Eng., Seoul National University • E-mail : [callmety@snu.ac.kr](mailto:callmety@snu.ac.kr)

\*\* Associate Professor, Dept. of Civil and Environ. Eng., Seoul National University