EGU21-2069
https://doi.org/10.5194/egusphere-egu21-2069
EGU General Assembly 2021

The past and future dynamics of salt intrusion in the Mekong Delta

Sepehr Eslami[1], Maarten van der Vegt[1], Philip Minderhoud[2,3], Nam Nguyen Trung[4], Jannis Hoch[1,5], Edwin Sutanudjaja[1], Dung Do Doc[4], Tho Tran Quang[4], Hal Voepel[6], and Marie-Noëlle Woillez[7]

[1]Utrecht University, Faculty of Geoscience, Physical Geography, Utrecht, Netherlands (sepehr.eslami@gmail.com)
[2]Marine and Coastal Systems Unit, Deltares
[3]Department of Civil, Environmental and Architectural Engineering, Padova University, Padova, Italy
[4]Southern Institute for Water Resources Planning, Ho Chi Minh City, Vietnam
[5]Department of Finance, Imperial College London, London SW7 2AZ, UK
[6]Geography and Environment, University of Southampton, Southampton SO17 1BJ, UK
[7]Agence Française de Développement (AFD), Paris 75598, France

In the context of global rising temperatures, rapid urbanization and excessive demand for natural resources (e.g., freshwater and sand) stress the livelihood of the world deltas. Sea Level Rise, land subsidence, discharge anomalies, floods, drought, and salt intrusion are common challenges facing these ecologically essential and economically crucial coastal landscapes. Climate change projections in deltas regularly isolate climate-driven stressors and disregard anthropogenic environmental drivers. This often leads to insufficient socio-political drive at times when the short window of opportunity to save the world's largest deltas is closing. Here, by integrating both climatic and anthropogenic drivers of exposure and vulnerability, we project salt intrusion within the Mekong mega-Delta for the next three decades. Leveraging modern numerical codes and computation capacity, by applying a high-resolution 3D model we capture the 3D dynamics of saline water intrusion, and by covering the entire delta (from 400 km upstream to 70 km offshore) we eliminate/minimize the boundary effects at the areas of interest. We differentiate the relative effects of various drivers and demonstrate that while sea level rise can increase areas affected by salinity by 5-19%, anthropogenic drivers such as extraction-induced subsidence and riverbed level incisions due to sediment starvation can further amplify that by additional 10-27%. The results are crucial input for climate adaptation policy development in the Mekong Delta and provides a blueprint for systemic assessment of environmental changes and developing environmental pathways at scale of a delta.