2018

Application of a Numerical Model to Evaluate the Impact of Future Sea-level Change in Coastal Inundation around Chester and Delaware Counties

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Project Title: Application of a Numerical Model to Evaluate the Impact of Future Sea-level Change in Coastal Inundation around Chester and Delaware Counties

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Faculty Rank: Assistant Professor

Abstract of Project Results

Coastal inundation caused by severe weather events such as hurricanes was investigated by applying a numerical simulation for the area of eastern Pennsylvania. The study area includes long extension of coastal low-lying lands by the Delaware River, including Philadelphia city as well as Chester and Delaware counties, which is under the risk of coastal inundation when hurricanes hit the mid-Atlantic regions. The SLOSH (Sea, Lake and Overland Surges from Hurricanes) model, initially developed by the National Weather Service (NWS), was implemented to the study area to evaluate the probability of inundation due to combined effect of Hurricane storm surge and the climate change and subsequent sea-level rise. Dr. Yong Hoon Kim and Ms. Dominica DeFelice, an undergraduate student in the Department of Earth and Space Science, collected coastline and topography data of the eastern Pennsylvania, digitized them into proper GIS format, and ran SLOSH simulation with these newly-collected data. The simulation results show that the low land areas around Chester, Philadelphia airport and Philadelphia Naval business area could be inundated even under category 3 hurricanes if we have a sea-level rise of 2.23 ft above the present level at year 2050 (based on IPCC 5th Assessment Report). With category 5 hurricanes, some residential areas in southwestern Philadelphia and oil storage tanks fields along Schuylkill river could also be under influence. This study shows high risk of inundation in lowland coastal areas in eastern Pennsylvania during severe Hurricanes when we have sea-level rise near future. The findings from this project will be used to teach Impact of Climate Change topic in Dr. Kim's ESS 130 Our Coastal Ocean (Gen Ed) and other courses. This study was supported by Sustainability Research and Creative Activities Grant from Office of Sustainability, West Chester University of Pennsylvania.

Period of Activity: March 1 – June 30, 2018

Grant Amount: $1,896.00

Budget Justification.

Faculty Salary: This includes 22 hours of summer salary for Dr. Yong Hoon Kim, including 37% of fringe and benefits ($48.62/hr * 22 hours + 37% fringe and benefit = $1,465). Dr. Kim will work on this project for 11 hours/week during June 2018, and thus will not teach summer classes during this period.

Student Stipend: An undergraduate student in the Department of Earth and Space Sciences, Dominica DeFelice, will work on the collection of GIS data and preparation of model input data during March through May, 2018 ($10/hr * 40 hours + 7.65% fringe and benefit = $431).