MUTHUKUMAR "MUTHU" NARAYANASWAMY, PHD, PE

Director of Coastal and Compound Flood Risk

Narayanaswamy specializes in using computational modeling to develop practical solutions to challenges in coastal flooding, hydrodynamics, waves, fixed and floating structures. Narayanaswamy's background is in ocean and coastal engineering with expertise in complex project development related to coastal flood risk due to extreme weather events, port development megaprojects, modeling and analysis, structural analysis of offshore structures and wave impacts on infrastructure.

His work includes the use of 2D and 3D wave and coastal hydraulics modeling, structural finite elements, tsunami and hurricane modeling, coastal flood risk mapping, extreme value analysis, met-ocean data analysis, coastal and ocean engineering. He has expertise in complex projects related to coastal flood risk due to extreme weather events, port development megaprojects, met-ocean modeling and analysis for pre-FEED and FEED studies, structural finite element analysis of offshore structures, wave loads on piers and trestles, selection of design critical met-ocean criteria, construction management of coastal infrastructure, mooring analyses. He has experience working with clients in the public and private sectors, spanning the coastal, marine, and upstream oil & gas industries.

Narayanaswamy's expertise has been recognized by the National Institute of Building Sciences, where he serves on the Scientific Resolution Panel, an independent group of experts called upon to review challenges to the accuracy of FEMA's flood analysis and mapping. He is also serving on the ASCE Coastal Engineering Sciences Committee.

PROFESSIONAL EXPERIENCE

2023-Present: Director of Coastal and Compound Flood Risk, The Water Institute

2016-2023: Senior Coastal Engineer, Associate Vice President, Director of Operations, Director of Modeling and Data Solutions, Michael Baker International

2012-2016: Senior Consultant, ABSG Consulting

2010-2012: Senior Coastal Engineer, Atkins Global

2009-2010: Coastal Engineer, Halcrow Inc.

COMPANY ROLE

Director of Coastal and Compound Flood Risk

PROJECT ROLE / FOCUS AREAS

Urban and Coastal Resilience

Flood Risk

Compound Flooding

Numerical Modeling

EDUCATION

PhD, Civil (Coastal) Engineering, Johns Hopkins University, 2008

MS Civil (Coastal) Engineering, Johns Hopkins University, 2008

BTech (Hons) Ocean Engineering and Naval Architecture, Indian Institute of Technology Kharagpur, 1999

CERTIFICATIONS

Professional Engineering: LA, TX, FL

SELECTED PROJECTS

Louisiana Watershed Initiative. *Coastal Protection and Restoration Agency (CPRA).* Lead the modeling efforts to address compound impacts of riverine floods, coastal surge, and sea level rise in Region 6. Part of the technical committee to develop the study methodology and to inform the development of a consistent framework to use in the flood transition zones that can be leveraged by the Louisiana Coastal Master Plan

Design of Floodwalls at JBLE-Langley AFB. *NuGlobal Solutions (NGS) (2021-2022).* Project Manager for an effort to design flood walls at five different locations around Langley AFB to mitigate against sunny day flooding through 2080.The floodwalls will be instrumental in preserving the mission of the installation.

NYC Future Flood Risk Maps. *NYC Mayor's Office of Climate and Environmental Justice (Ongoing).* Project Manager for the first initiative across the nation to develop future flood risk maps for New York City through dynamic coupled ADCIRC-SWAN modeling followed by overland wave modeling. The 50th and 90th percentile Sea Level Rise Estimates for 2050, 2080, and 2100 are obtained from the NYC Panel on Climate Change (NPCC) draft 2023 data to develop future flood risk extents and depths to achieve the FEMA FFRD objectives.

Flood Resilience Study, Jekyll Island. Carolina Holdings Group (2019)*. Project Manager.* Led a team to evaluate the impacts of storm surge coupled with sea level rise on the proposed developments at Jekyll Island. The study involved quantification of site-specific current and future flood risk for nuisance and extreme flood events. The quantified flood risk was then used to evaluate risk to assets in the proposed development and provide recommendation on mitigation actions.

Levy Nuclear Plant Flood Resilience. *Levy County, FL, Sargent and Lundy (2012).* Led a team to evaluate the impacts of probable maximum storm surge (PMSS) and associated wave run-up and overtopping at the Levy County Nuclear Power Plant.

Saint Juliens Creek Annex Shoreline Management, Portsmouth, VA
Naval Facilities Command, Mid-Atlantic (2018-2019). Led a team to develop living shoreline alternatives to improve water quality and mitigate the impact of waves from winds and passing vessels along the Elizabeth River. The effort involved site assessment, wave energy quantification, design development, and cost estimation.

Mississippi Coastal Flood Study. *Southern Mississippi Planning and Development District (Ongoing).* Technical Advisor and Subject Matter Expert for the ADCIRC+SWAN hurricane surge modeling and overland wave modeling efforts to estimate the 2%, 1%, and 0.2% annual exceedance probabilities along the entire Mississippi coastline. The project involves performing a coastal flood risk study for the entire Mississippi coastline, including coastal analysis, mapping, DFIRM production, preliminary and post-preliminary process support, community engagement, and public outreach.

Cambridge Flood Mitigation Project, City of Cambridge, MD. *(2020-2021).* Project manager and technical lead to quantify current and future flood risk. Led a team responsible for developing a risk-based strategy to mitigate the impacts of sea level rise and high frequency storms on the city along the Choptank River, the city's highest flood risk area. Developed an innovative hybrid mitigation design combining engineered structures with nature-based systems.

Coastal Hydrodynamics Studies. *Nationwide. FEMA Regions IV, V, X, II,).* Led statistical post-processing to determine 2-, 1-, and 0.2-percent water levels from ADCIRC+SWAN modeling results of more than 300 synthetic storms developed using a JPM-OS approach. Led the storm surge modeling effort for Lake Huron through hydraulics modeling using ADCIRC and wave modeling using WAM. Collaboratively developed a technical approach for extreme value analysis of water level data to determine storm events causing site-specific 1- and 0.2-percent-annual-chance flood elevations.