



Long Xu, P.E., CFM, M.C.E., M.S., B.S.
Coastal Engineer

Expertise

Expertise in modeling of tide, wave, current, storm surge, sediment transport, and water quality. Extensive experience utilizing software packages and programming languages to present, analyze, and solve engineering and scientific problems. Extensive experience in FEMA coastal flood hazard studies, including storm surge modeling, overland wave modeling, and coastal floodplain mapping.

Qualification Summary

- 10+ years of diverse professional experience in the fields of coastal science and engineering, specializing in the areas of numerical modeling, coastal processes, and FEMA coastal flood hazard study
- Implemented technically advanced data collection, analysis, and numerical modeling techniques to assess marine, coastal and oceanographic environments
- Numerical model experience with ADCIRC, BOUSS2D, CHAMP, CMS-Flow, CMS-Wave, CSHORE, EFDC, ECOMSED, GENESIS, POM, RCA, REF/DIF, ROMS, SLOSH, STWAVE, SWAN
- Programming experience with
- FORTRAN and MATLAB, ArcGIS data processing and visualization
- Strong written and verbal communication skills

Work Experience

2015-Present	Coastal Engineer, Woods Hole Group
2006-2015	Coastal Engineer/Task Manager, Dewberry
2003-2006	Research Assistant, University of Delaware

Education

- M.C.E., Coastal Engineering –
2006 University of Delaware
- M.S., Physical Oceanography –
2003 Ocean University of
China
- B.S., Oceanography – 2000
Ocean University of China

Licenses and Registrations

- P.E., Professional Engineer, Maryland,
License # 33174
- CFM, Certified Floodplain Manager,
US, Certificate# US-07-02646

Professional Affiliations

- Member, American Society of
Civil Engineers (ASCE)
- Member, Association of State
Floodplain Managers (ASFPM)
- Member, Coasts, Oceans, Ports,
and Rivers Institute (COPRI)

Publications and Presentations

14

Key Projects

Assessing the Vulnerability of MassDOT's Coastal Transportation System to Future Sea Level Rise and Coastal Storms, and Developing Conceptual Adaption Strategies – Coastal Engineer

Developing a coupled storm surge and wave model (ADCIRC and SWAN) for the entire coastal area of Massachusetts. The probabilistic model will be used to simulate coastal storms and different sea level rise scenarios, and assess risk to transportation assets throughout the State.

Coastal Processes Study and Resiliency Recommendations for Duxbury Beach and Bay – Coastal Engineer

The Town of Duxbury proposes to perform a coastal processes study for Duxbury Beach which will provide the essential technical basis for making decisions for improving the long-term resiliency of the Duxbury Beach system, including both the ocean and bay sides. As part of the project team, developed a comprehensive hydrodynamic, wave transformation, and sediment transport modeling system for the Barrier Beach. The impacts of storms and sea level rise on the existing system will be studied to evaluate restoration alternatives to expand habitat and improve long-term resiliency of the beach system.

Puritan Rd. Flood Mitigation and Ecological Resilience, Weymouth, MA – Coastal Engineer

The tidal exchange between the Puritan Rd. wetland and the Back River is currently limited due to failure of the culvert. A limited GPS survey of critical elevations was conducted, and the water surface elevation, salinity, and temperature data were also collected at the project site. An analytical estuarine culvert and flow model has been set up to evaluate the hydrodynamics in the Puritan Rd. wetland. Different culvert types, dimensions, inverts, and flow control structures have been evaluated under various tidal conditions. Potential alternatives have been simulated for normal tidal conditions and storm conditions. Results of the alternatives analysis will be used to select a preferred alternative that will be used to develop a design for the project.

Evaluation of FEMA FIRMs for South Bethany, DE– Coastal Engineer

Evaluated the preliminary FEMA FIRMs for South Bethany, Delaware, and will file an appeal with FEMA for revisions to the FIRMs. The new collected LiDAR data and USACE survey data were used to construct new profiles for the coastal transects. The coastal models for erosion, overland wave transformation, wave runup were evaluated, and rerun for the new constructed profiles. The model results have been used to update the FEMA FIRMs for South Bethany. An appeal with FEMA for revisions to the FIRMs will be filed.

Evaluation of FEMA FIRMs for City of Quincy, MA – Coastal Engineer

Technically reviewed the FEMA FIRMs for Quincy, Massachusetts. The work included field reconnaissance, evaluation of coastal models and methods for erosion, overland wave transformation, wave setup, wave runup and overtopping, as well as the flood hazard mapping. A Letter of Map Revision (LOMR) was filed with FEMA to revise the effective FEMA FIRMs.

FEMA Region IV Southwest Florida Coastal Risk Map Study – Coastal Engineer

Reviewed IDS #1 report - SW Florida Storm Surge Study, including mesh development, tropical cyclone parameter analysis and synoptic climatology, and validation storm selection.

FEMA Region IV Coastal Flood Risk Study in the Big Bend Study Area – Task Manager/Coastal Engineer

Led FEMA Region IV coastal flood risk study tasks for the Big Bend study area that affects Dixie, Levy and Taylor counties in northwestern Florida. Technically reviewed the coastal modeling and mapping parts for these counties. The results of the study will be incorporated into updated digital Flood Insurance Rate Maps (FIRMs) and Flood Insurance Study (FIS) reports for these counties.

FEMA Great Lakes Coastal Flood Study – Task Manager/Coastal Engineer

Served as task manager for the Great Lakes coastal flood study, and detail-checked the coastal modeling tasks for some coastal counties. The new coastal flood hazard analyses will utilize updated one percent annual

Key Projects (continued)

chance (100-year) flood elevations obtained from a comprehensive storm surge study being developed by the U.S. Army Corps of Engineers.

Oakwood Beach Flood Attenuation Feasibility Study – Coastal Engineer

Implemented a flood attenuation feasibility study for Oakwood Beach, and set up a 2D hydrodynamic model (CMS) to collaboratively develop final conceptual plans and design coastal structures. The integrated water resources study evaluated stormwater detention ponds, freshwater and tidal wetland ecosystem, coastal flood protection, hydraulic structures, and roadway and public access.

FEMA Region III Risk Map – Task Manager/Coastal Engineer

Led FEMA Region III flood insurance study tasks, evaluated flooding risks and potential storm damage to structures, and updated the effective FIRMs by acquiring most updated Topo/bathy data and conducting coastal hazard analysis models (e.g., CHAMP). Technically reviewed the coastal modeling and mapping tasks for many coastal counties.

FEMA Region II Risk Map – Task Manager/Coastal Engineer

Generated ADCIRC meshes for storm surge analysis, updated grid elevation with coastal LiDAR data, and set up the models for tidal calibration, storm verification, and production runs. Conducted independent technical reviews on storm surge analysis, overland wave modeling and coastal flood hazard mapping.

FEMA Advisory Base Flood Elevations (ABFE) for New Jersey and New York Coastlines – Coastal Engineer

Analyzed the latest data after Hurricane Sandy, and provided quality flood hazard information to help communities plan for and reduce the flooding risk. These updated ABFE maps were set to be delivered to state and local officials in mid-2013. Because existing FIRMs for these areas were developed more than 25 years ago, and updated FIRMs are not finalized, FEMA determined it is vital to provide near-term ABFEs to support reconstruction efforts.

Evaluation of Sea Level Rise for FEMA Flood Insurance Studies – Coastal Engineer

Evaluated the impacts of sea level rise on FEMA flood hazard zones in the climate change pilot project. Studied the magnitude and time-frames of relevance due to the long term sea level rise.

North Carolina Storm Surge Study Methodology – Coastal Engineer

In order to perform a storm surge study, a suite of different models is needed to simulate the hydrodynamics and the climatology. The central modeling component of the storm surge study is ADCIRC, currently the best-known storm surge model for flood levels for FEMA NFIP studies. Both tropical storms and extratropical storms were accounted and modeled as part of this study. Two different statistical methods were implemented to perform the frequency analysis. The Joint Probability Method (JPM) was applied to the tropical storm events, while extratropical storms were statistically analyzed with the Empirical Simulation Technique (EST). The results of the two frequency analysis were combined to obtain the final return periods.

FEMA/Northwest Florida Water Management District Flood Map Modernization Program - Coastal Engineer

Performed wave height analysis model (WHAFIS), collaborated with external contractors by reviewing storm surge model (ADCIRC) and wave model (SWAN) meshes and model results, led the task on coastal flood hazard mapping in ArcGIS environment, and wrote the FIS technical report.

Florida Division of Emergency Management Statewide Coastal LiDAR - Coastal Engineer

Built terrain by processing multi-types of data, including contours, raster, survey data, and LiDAR data, and updated the coastal surge modeling tools, SLOSH with most current and accurate elevation data. Run SLOSH model to simulate synthetic reference storms in Florida coastal counties.

Key Projects (continued)

FEMA Flood Zone Remapping on Long Island, NY - Coastal Engineer

Performed overland wave modeling and coastal flood hazard mapping for Nassau and Suffolk counties on Long Island, NY. Conducted field reconnaissance, shoreline erosion, wave setup/runup, wave height analysis, and updated the FIRMs and FIS report.

Sullivan's Island Maritime Forest Conservation Study – Coastal Engineer

Analyzed storm damage and flood inundation with ADCIRC and WHAFIS models for Sullivan's Island accreted land management plan, and provided recommendations to mitigate flood impacts.

Post-Katrina Coastal Restudy of Mississippi - Coastal Engineer

Performed dune erosion analysis with different return periods stillwater elevations, calculated wave setup/runup in coastal regions, and conducted flooding analysis to minimize risks from storm surge and dune erosion.

Numerical Study in Delaware Inland Bays - Research Assistant

Applied coupled models (ECOMSED and RCA) in Delaware Inland Bays to study the hydrodynamics and water quality of the bays. Simulated the short-term and long-term variability of dissolved oxygen in bay and creeks system in terms of primary production and respiration, and coupled with biological model to study the effects on fish behavior. Also, simulated cohesive sediment transport and particle tracking in Delaware Inland Bays.

Coupling Inner Shelf Ocean Model and a Nearshore Community Model for Wave and Current Prediction at Tidal Inlets – Research Assistant

Set up and coupled ocean circulation model (ROMS) with wave model (SWAN) in Delaware Bay in this Sea Grant project.

Publications and Presentation

- Xu, Long, Matt Shultz, and Susan McCormick. 2014. Oakwood Beach Flood Attenuation Feasibility Study – Coastal Analysis, 2014 American Water Resources Association Annual Conference.
- Xu, Long, Matt Shultz, and Susan McCormick. 2014. Incorporating a Blend of Solutions for Flood Mitigation in Hurricane Sandy Recovery Process, 2014 American Shore and Beach Preservation Association National Coastal Conference.
- Xu, Long, Jeff Gangai, Emily Dhingra, and Alan Springett. 2013. FEMA Region II Coastal Flood Hazard Study, 2013 Northeast Beaches Conference.
- Xu, Long, Jeff Gangai, and Alan Springett. 2012. FEMA Region II New Jersey Coastal Flood Hazard Study, 2012 New Jersey Association for Floodplain Management Conference.
- Xu, Long, Jeff Gangai, and Robin Danforth. 2012. FEMA Region III Coastal Risk Study – Overland Wave Modeling, 2012 Virginia Water Conference.
- Gangai, Jeff, Long Xu, and Robin Danforth. 2012. FEMA Region III Coastal Risk Study – Coastal Hazard Mapping, 2012 Virginia Water Conference.
- Xu, Long, Jeffrey Gangai, and Ron Bartel. 2011. Coastal Hazard Study for Franklin, Wakulla and Jefferson Counties, Florida, 2011 Floodplain Management Association Annual Conference.

Publications and Presentation (continued)

- Batten Brian K., Paul Weberg, Mat Mampara, and Long Xu. 2008. Evaluation of Sea Level Rise for FEMA Flood Insurance Studies: Magnitude and Time-Frames of Relevance, Solutions to Coastal Disasters, 62-72.
- Brady, D., Di Toro, D., Kirby, J., Xu, L., and Targett, T. 2007. Water Quality Modeling of Diel-cycling Hypoxia in Delaware's Coastal Bays, Estuarine Research Foundation Meeting, Abstract SCI-019.
- Xu, L., D.M. DiToro, and J.T. Kirby. 2006. Numerical Study in Delaware Inland Bays, CACR-06-04, University of Delaware.
- Shi, F., M. Nayak, W. Qin, L. Xu, and J.T. Kirby. 2004. Coupling of NearCoM, ROMS and SWAN in a MCEL system, Eos Trans. AGU, 85(47), Fall Meet. Suppl., Abstract OS23E-04.
- Lan, J., L. Xu, and P. Guo. 2003. Seasonal variability in the Kuroshio extension current system, Journal of Ocean University of Qingdao, 2(2), 129-133.
- Yin, X., L. Xu, X. Xiong, and A. Liu. 2003. Current conditions in the eastern South China Sea, III. Empirical mode decomposition and Hilbert spectrum property of current, Advances in Marine Science, 21(2), 148-159.
- Li, L. and L. Xu. 2003. Partial averaging of wave data and estimates of spectral moments of wind waves, Advances in Marine Science, 21(2), 142-147.