CHRISTOPHER R. ESPOSITO, PH.D.

Research Geoscientist

Christopher Esposito, Ph.D. is a Research Scientist with The Water Institute. He has nearly 10 years of field and modeling experience studying sediment transport and deposition in river deltas. His research is primarily focused on the connections between river channels and their floodplains, a topic which is closely related to channel management and planned river diversions in deltas. Prior to joining The Water Institute, Christopher obtained his Ph.D. at Tulane University and his master's degree at The University of New Orleans. Before entering graduate school, Christopher taught math and environmental education in public high schools. His interest in coastal zone management in Louisiana was sparked while leading students on field trips throughout the Mississippi River Delta.

ORGANIZATION ROLE

Research Geoscientist

PROJECT ROLE / FOCUS AREAS

Wetland hydraulics and sediment transport

Geomorphological modeling

Sediment transport in channel networks

Coastal zone land use and infrastructure policy

EDUCATION

Ph.D., Earth and Environmental Sciences, Tulane University, 2017

MS, Earth and Environmental Sciences, University of New Orleans, 2011

BS, Mathematics/ Physical Oceanography, State University of New Jersey, 2003

PROFESSIONAL EXPERIENCE

2021–Present: Research Scientist II, The Water Institute

2019–2021: Research Scientist I, The Water Institute

2016–2019: Post-Doctoral Research Scientist, The Water Institute

2017–Present: Adjunct Professor of Earth and Environmental Sciences, Tulane University

2012, 2013: Geomodeling Intern, Conoco Phillips

2011–2016: Teaching and Research Assistant, Tulane University

2004–2009: Math/Environmental Education Teacher, Public High Schools

SELECTED PROJECTS

The Bay Denesse Living Lab. *(Ongoing)*. Founder and Project Director. The Bay Denesse Living Lab is a Landscape-Scale project that facilitates co-production in restoration practice. It consists of physical infrastructure to support monitoring, logistical support for participants, and a community of practice supporting workshops and field trips.

Lowermost Mississippi River Management Program (LMRMP). *(2019–Present).* Task Lead and Research Scientist. The LMRMP program provides science and technical coordination support to CPRA toward meeting the primary objective of providing a technical framework upon which a holistic management strategy for the Lowermost Mississippi River (LMR) can be developed. The Dredging Synthesis task presented an analysis of volumetric dredge production data and the hydrographic dredge support survey data that were collected by the U.S. Army Corps of Engineers (USACE) to support maintenance dredging activities in the Mississippi River. The Neotectonics task coordinated expert opinion on subsidence related hazards to coastal planning efforts in Louisiana. The Environmental Model Implementation task applied a hybrid physics-based and machine-learning model to support the development of long term management strategies and alternatives assessment in the Lowermost Mississippi River.

Partnership for Our Working Coast. *(2020–2022)* Research Scientist, Numerical Modeling. Public-private partnership between The Water Institute and energy industry partners (Chevron, Shell, and Danos) and the Greater Lafourche Port Commission (GLPC). The partnership took a science-based approach to find ways to maximize coastal restoration benefits from sediment that will be generated by a large-scale dredging project to deepen the Port's entrance channel.

Mid- Barataria Engineering Modeling Support, Louisiana. *(Ongoing).* Research Scientist. To address these issues, higher-resolution models focusing on specific outfall regions are needed to capture relevant physical processes of the outfall channels and their interaction with the receiving basins. The main questions being addressed with this work is will the diversion channel be self-sustaining or will dredging be necessary; what the major hydrological and morphological changes in the receiving basins near the diversion are, and what are the adequate dimensions of the outfall channel to convey the desired amount of water.

SELECTED PUBLICATIONS

1. Burgos, M. B., Esposito, C. R., Baustian, M. M., Nepf, H. M., & Di Leonardo, D. Seasonal Changes to Vegetation Determine Deltaic Marsh Sedimentation. (*in revision at Journal of Geophysical Research: Biogeosciences*)

2. Cox, J. R., Paauw, M., Nienhuis, J. H., Dunn, F. E., van der Deijl, E., Esposito, C., et al. (2022). A global synthesis of the effectiveness of sedimentation-enhancing strategies for river deltas and estuaries. Global and Planetary Change, 214, 103796. https://doi.org/10.1016/j.gloplacha.2022.103796

3. Esposito, C. R., Georgiou, I. Y., & Straub, K. M. (2020). Flow Loss in Deltaic Distributaries: Impacts on Channel Hydraulics, Morphology and Stability. Water Resources Research, 56, e2019WR026463. https://doi.org/10.1029/2019WR026463

4. Nienhuis, J. H., Törnqvist, T. E., & Esposito, C. R. (2018). Crevasse Splays Versus Avulsions: A Recipe for Land Building With Levee Breaches. Geophysical Research Letters, 45(9), 4058–4067. https://doi.org/10.1029/2018GL077933

5. Esposito, C. R., Shen, Z., Törnqvist, T. E., Marshak, J., & White, C. (2017). Efficient retention of mud drives land building on the Mississippi Delta plain. Earth Surface Dynamics, 5(3), 387–397. https://doi.org/10.5194/esurf-5-387-2017