**MarTREC UTC Project Information Form**

 USDOT Tier 1 University Transportation Center

Agency ID or Contract Number 69A3551747130

Project Title: Climate Financing for Marine Transport: Analyzing the Impact of Climate Adaptation Investments in Inland Waterways

Project Abstract (Brief Description): The U.S. inland waterways play a vital role in the domestic economy, but extreme weather events (e.g., floods and droughts) perennially threaten to disrupt their operations. Exacerbating these concerns, climate change is expected to increase the frequency and severity of these disruptions in the future. However, despite these known risks, researchers have devoted little attention to evaluating the financial implications of climate change on inland waterway supply chains. Traditional financial valuation methods do not facilitate an accurate quantification of long-term risks associated with investments in climate resilient infrastructure, which leads to a systemic under-investment in resilience and adaptation. Here, we propose to develop a state-of-the-art, data-driven approach to evaluate climate financing strategies for inland waterways based on future costs of inland waterway supply chain disruptions due to climate change. The approach integrates the decoupled net present value (DNPV) with climate modeling, simulation methods, statistical models, and economic models. Using this methodology, we evaluate cases where investments in resilient, water-borne infrastructure can offer cost-effective means of mitigating projected impacts of climate change. Although we demonstrate our methodology for disruptions due to droughts and floods along the Mississippi River, our framework can be easily extended to other regions and sections of the inland waterways as well as other transportation modes and infrastructure sectors. Our project paves the way for researchers being able to quantify the return on investment from climate adaptation strategies based on economic impacts of climate change on inland waterway supply chains and can help policymakers better allocate funding for mitigating future supply chain disruptions.

Describe Implementation of Research Outcomes: Disseminate project results using various media and as discussed below in Technology Transfer Activities to raise awareness among researchers and other pertinent stakeholders.

Impacts/Benefits of Implementation: Our project will establish a baseline methodology for researchers in being able to quantify the benefits and costs of investing in climate resilience in inland waterway supply chains. This achievement will fill a substantial knowledge gap in the scientific literature. Additionally, this work will greatly improve our understanding of the expected economic impacts of droughts and flood along the Mississippi River and help identify key areas where investments in resilient infrastructure can serve as cost-effective mitigation and adaptation strategies. Lastly, this project will also help policymakers better understand future impacts of extreme weather events on inland waterway supply chains and how to plan accordingly.

Web Links: martrec.uark.edu

Budget (Funding) Amounts & Source(s) (US DOT +Match(s) =Total Costs): USDOT (MarTREC) funds: $93,368; matching: $46,684. Total Cost: $140,052.

Project Start and End Dates: October 3, 2022 – June 30, 2023. Complete

Principal Investigator(s) and Contact Information: **Dr. Hiba Baroud** (ORCID No.0000-0003-3641-6449) Assistant Professor of Civil and Environmental Engineering, PMB 351831, 2301 Vanderbilt Place, Nashville, TN 37235-1831, phone: 615-322-0471, email: hiba.baroud@vanderbilt.edu; **Co-Principal Investigator(s): Dr. Paul M. Johnson** (ORCID No. 0000-0002-6585-3034, Postdoctoral Research Fellow, Vanderbilt University School of Engineering, PMB, 351831, 2301 Vanderbilt Place, Nashville, TN 37235-1831; phone: 770-893-7363; email: paul.m.johnson@vanderbilt.edu); Dr. Craig Philip (ORCID No. 0000-0001-9564-6418) Research Professor of Civil and Environmental Engineering, PMB 351831, 2301 Vanderbilt Place, Nashville, TN 37235-1831, phone: 615-322-6013, craig.e.philip@vanderbilt.edu)

Principal Investigator Institution (University): Vanderbilt University