Incorporation of Climatic and Hydrologic Nonstationarity into FDOT Planning and Design Guidelines and Processes

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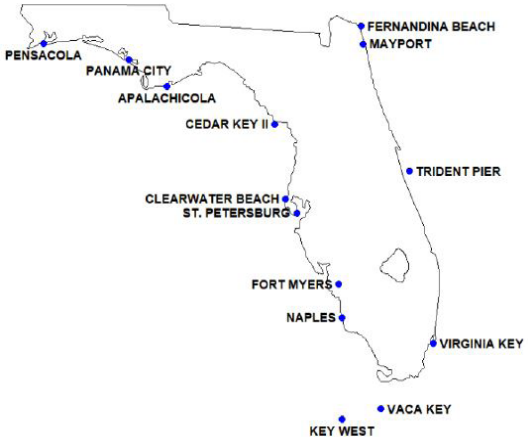
Project Manager
Jennifer Z. Carver, AICP
FDOT Planning

Principal Investigator
Jayantha Obeysekera, Ph.D., P.E.
Florida International University

Current Situation

Until recently, the field of transportation infrastructure planning and design has been based on an assumption of "stationarity" in hydrologic drivers such as rainfall, sea levels, and peak flood discharges --- that the past can be used directly to predict a future state. Due to changing weather patterns and other conditions, a "nonstationarity" approach, where patterns or trends of the past cannot be used directly to predict a future state, is increasingly studied and considered in future transportation infrastructure planning and design. FDOT conducted this research to determine if "nonstationarity" should be incorporated into current planning and design practices.



The sea level scenarios corresponding to these 14 National Oceanic and Atmospheric Administration tide gauge locations were selected for the project.

Research Objectives

The objectives of this research project were to identify potential changes to current FDOT manuals of practice and design standards to account for nonstationarity; develop planning and design methods for dealing with nonstationarity; develop datasets for applying new nonstationarity methods; and develop a technology transfer and training program for FDOT engineering professionals.

Project Activities

Following a literature review and a review of 13 FDOT manuals for relevant guidance, the Florida International University research team reviewed the functions and limitations of the U.S. Department of Transportation Vulnerability Assessment Scoring Tool, which is used to determine which assets are likely to be vulnerable to climate change.

The team then reviewed the USDOT's Assessing Criticality in Transportation Adaptation Planning memorandum to understand the role of criticality and select the types of nonstationarity data that might be useful in assessing criticality.

Next, the team analyzed existing data and developed datasets and methods for detecting nonstationarity, then explored existing tools from federal agencies and customized the applications to locations in Florida. From there, the team developed new methods for incorporating nonstationarity data into specific environmental drivers.

Finally, the team held a one-day recorded technology transfer webinar.

Project Conclusions and Benefits

This research evaluated current nonstationarity trends and identified tools and data sets that FDOT can now use to adjust transportation infrastructure planning and design protocols to increase resiliency if nonstationarity becomes more prevalent.

For more information, please see fdot.gov/research.