



This research initiative is funded under the auspices of the CFIRE Tier 1 University Transportation Center.

Title: Estimating the Effects of Extreme Weather on Transportation Infrastructure

Description:

Climate change, already taking place, is expected to become more pronounced in the future. Current damage assessment models for extreme weather events, such as FEMA's HAZUS, do not take the full impact to transportation systems into consideration. As a result, the consequences of climate change scenarios on freight transportation infrastructure and the system network, including disruption to commodity freight flow and access, are not well characterized.

The objective of this research is to develop and pilot test a methodology that estimates the actual transportation infrastructure cost of a climate change-induced event, with an initial focus on flooding of highway infrastructure. This methodology is an important unmet need in the transportation community for identifying infrastructure that is most threatened, as well for determining the full benefits of candidate adaptation strategies.

The pilot test will focus on a recent flooding event that affected the highway infrastructure at a site in the CFIRE region for which impact data is readily available. The researchers will calibrate model parameters based on a comparison of actual and predicted impacts. This will create a model for forecasting the transportation impacts of extreme weather event scenarios based on anticipated climate changes. The researchers will illustrate how this information can be used to evaluate the benefits and costs of candidate transportation adaptation strategies.

Outcomes:

The proposed research will develop a method for evaluating and prioritizing those elements of the highway infrastructure deemed critical by taking into consideration the risks associated with future flooding events. This method will be applied in a real-world setting to evaluate its utility in supporting climate-related highway infrastructure adaptation decisions. The research results hold promise for potential transferability to the assessment of highway infrastructure in other geographical settings and for other modes of transport.

Deliverables:

A final report will be prepared that summarizes the significant research findings and implications. Additionally, the results will be disseminated through presentation at a major national transportation conference, submittal of a manuscript for publication consideration in a refereed journal, and access to the project results and report through the CFIRE web site.

**Industry Impact:**

Managers of transportation infrastructure in the public and private sector make expensive decisions that have long-term effects for our economy, society, and the environment. The corresponding impacts are felt at the international, national, regional, and local levels. This research will help provide necessary tools and techniques that enable decision-makers to consider future extreme event scenarios, evaluate system vulnerability and resiliency, and identify cost-effective adaptation strategies.

Research Team:

- Mark Abkowitz, Vanderbilt University (Executive Committee Representative & Project Coordinator)
- Tracey Holloway, University of Wisconsin-Madison
- Monica Harkey, University of Wisconsin-Madison
- Janey Camp, Vanderbilt University

Funding:

- Total: \$320,000
- UTC Funds: \$160,000

Duration:

- 15 months

Student Involvement

- Vanderbilt University: One undergraduate for one year