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CEDR ROADAPT and FHWA Frameworks for Vulnerability Assessment in The Netherlands and Washington State - infrastructure climate resilience

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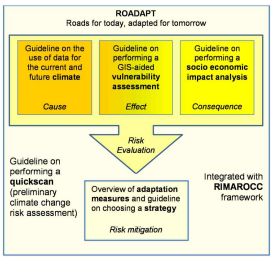
Introduction and background

United States Federal Highway Administration (FHWA) and Rijkswaterstaat, the executive part of the Ministry of Infrastructure and Water Management in The Netherlands, work together on the topic of infrastructure climate resilience. Implementation of climate change resilience tools, developed in the United States and Europe, was tested on infrastructure projects in both countries, InnovA58 in The Netherlands and SR167 in Washington State.
Using these tools is anticipated to result in cost savings, as proactively planning for climate change is generally cheaper than waiting for infrastructure to be damaged.

Climate change adaptation frameworks for road infrastructure

ROADAPT : climate change adaptation framework for road infrastructure, sponsored by the Conference of European Directors of Roads (CEDR).

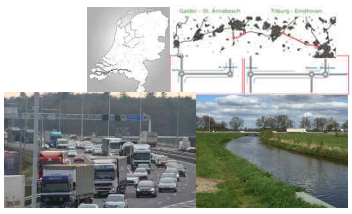


FHWA Climate Change and Extreme Weather Vulnerability Assessment Framework :
Includes three main segments: 1. Define Scope; 2. Assess Vulnerability; 3. Integrate Results into Decision-making.
The Assess Vulnerability segment is compared with the ROADAPT Vulnerability Assessment tool, and contains three tools:

- Sensitivity Matrix to determine how assets like roads, bridges and railways may be negatively affected by extreme weather situations.
- CMIP Climate Data Processing Tool calculates local Temperature and Precipitation projections for transportation planners
- Vulnerability Assessment Scoring (VAST) Tool supports analysis and ranking of multiple assets.

InnovA58 project test area – The Netherlands

The InnovA58 project expands an existing highway in the southern part of the Netherlands from two lanes in each direction to three lanes in each direction. The project area experiences heavy downpours, which are increasing as the climate changes, resulting in localized flooding and need for enhanced stormwater management. The project is currently in the planning phase, and construction is expected to begin in 2020.



SR167 project test area – Washington State

The *SR167 Project* will complete a critical missing link to Interstate 5 near Tacoma, in Washington State. The project includes 10 km of new construction and five new interchanges. It traverses a floodplain of a minor tidal creek affected by sea level rise and is within the floodplain of a major river impacted by sea level rise, channel aggradation due to glacial retreat, and increased peak flows. The project area is experiencing increases in heavy downpours and continued urbanization that results in localized flooding. The project is currently in the design process. WSDOT expects to begin construction in 2019.

Results of comparison of frameworks

- The frameworks have similar approaches and result in comparable outcomes. Each framework has specific qualities and applicability.
- Results of methods are indicative; checking results based on expert judgment is of great importance.
- FHWA Sensitivity Matrix is useful to road managers with less experience in and knowledge of sensitivity to extreme weather and climate change of assets.
- FHWA VAST tool allows more manipulating of factors and weighting than the ROADAPT Vulnerability Assessment approach. This allows users of VAST to understand the sensitivity/robustness of results.
- ROADAPT framework lends itself to sharing information to the public / lay users. FHWA tools are spreadsheet-based and thus less accessible to a wide audience.

Conclusion

- These excellent frameworks can be used and customized by users to effectively identify extreme weather and climate change vulnerabilities, prioritize vulnerabilities, and develop adaption strategies.
- The main benefit of using the tools is that they help users determine the most vulnerable locations in an objective manner. This takes away any personal bias or over representation of well-known locations or assets.
- Testing frameworks in different countries and contexts is of great value.
- Comparison helps future users understand strengths and weaknesses of frameworks to be able to best apply them in projects.
- FHWA has used knowledge from testing in the FHWA Framework update. Rijkswaterstaat uses knowledge and experience for improved implementation of the ROADAPT framework, for benefit of other projects in Netherlands.

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