U.S. Department of Transportation's Vulnerability Assessment Scoring Tool (VAST)

The U.S. Department of Transportation's Vulnerability Assessment Scoring Tool (VAST) is an excel-based tool designed to help transportation planners conduct a quantitative, indicator-based screening of transportation system vulnerabilities to climate stressors.

VAST relies on indicators (such as asset characteristics or changes in temperature or precipitation averages, or frequency or severity of extreme events) that can help agencies assess vulnerability of these assets. Vulnerability is scored as a function of three components:

1. Exposure: potential exposure of assets to climate stressors, using indicators based on climate projections like number of extreme heat days, sea-level rise inundation maps, and 100-year 24-hour rainfall events.

2. Sensitivity: how sensitive the asset is if exposed to particular climate stressors, using indicators related to asset design like bridge height or culvert size.

3. Adaptive capacity: how well the system can adjust to disruption, using indicators such as detour length.

Depending on the desired scope of the vulnerability assessment, transportation agencies select the indicators to use for each of these three components, collect data about those indicators, and then convert the data into vulnerability scores. VAST allows users to adjust scoring to weight the three components differently as desired and appropriate for the scope of their assessment. Vulnerability scores can help prioritize which specific assets or asset types require adaptation measures.

VAST results should be used as a “screen”, identifying what assets deserve a closer look at particular vulnerabilities.

What is an indicator?

An indicator is a characteristic of an asset that suggests whether that asset is likely to be vulnerable to a given stressor, either through being exposed, being sensitive, or having low adaptive capacity.

For example, asset location can be an indicator of exposure. Asset condition can be an indicator of sensitivity, since assets in worse condition may be more likely to be damaged if exposed to a stressor. Traffic volumes (or other usage statistics) can be an adaptive capacity indicator for a roadway, since closure of high volume or otherwise critical routes will have a more severe impact on the overall transportation system network.

How do I choose indicators?

Indicators should be selected based on:

- Whether you think it will serve as a reasonable descriptor of vulnerability for a particular asset in your experience and in your region
- Whether you believe data exists that will inform your rating of that indicator for a given asset or set of assets

Scoring

There are two types of scoring approaches in this tool: indicator scoring approaches and component scoring approaches. Indicator scoring approaches dictate how the raw data collected about each indicator is converted into scores, on a scale of 1-4.

The component scoring approaches dictate how different indicators are weighted when calculating the exposure, sensitivity, or adaptive capacity score. The default scoring approach will weight each indicator equally, but users can adjust the weights as desired. The scoring approach is typically based on professional judgment and/or "ground-truthing" results in previous experience.