

Town of Coupeville Sea Level Rise Vulnerability Assessment

What parts of Coupeville are most vulnerable to sea level rise? Is that vulnerability due to physical conditions or the presence of infrastructure or both? Trying to answer these types of questions motivates this project.

What we are doing

With funding from the Department of Ecology, this project will work to identify which areas of Coupeville are exposed to future flooding and erosion associated with sea level rise, and what the consequences might be of that exposure to existing infrastructure.



Coupeville's downtown and wharf area. Photo from the Washington Department of Ecology Shoreline Viewer, 2016.

How we are doing it

This is a spatial, GIS (Geographic Information Systems) based analysis. We are applying new and easily accessible map products identifying places along the shore that are exposed to coastal flooding. We are developing a framework for identifying and ranking the impacts of SLR on infrastructure and other assets in Coupeville.

The overall methodology for the quantitative estimation of sea level rise vulnerability to be used in this project is generally based on the *Adapting to Climate Change: A Planning Guide for State Coastal Managers* guide (NOAA, 2010).



Eroding bluffs west with the wharf in the background. Photo source CGS, 2004.

These methods include identifying the impacts and consequences of the phenomena, assessing the physical characteristics and exposure, considering adaptive capacities, developing a range of plausible sea level rise scenarios, identifying focus areas, and summarizing vulnerability.

The framework we are using to summarize vulnerability can be simply written as:

$$\text{Vulnerability} = \text{Exposure} + \text{Sensitivity},$$

which we are modifying from the approach described in the *US Climate Toolkit*. This framework is applied to "assets," and for this project we are viewing the central "assets" under consideration to be public infrastructure such as the wastewater treatment plant, roads, and outfalls, within the Town of Coupeville that may be exposed to coastal flooding or erosion by 2100. The project framework lends itself to a three-phase project approach, explained below.

Exposure Assessment

The objective of the first phase (the "Exposure Assessment") is to determine which "assets" are exposed to coastal flooding and erosion, exacerbated by sea level rise using a quantitative approach. We are also estimating when assets will become threatened. The assessment will include an evaluation of significant flood zones as well as an estimation of historic and

future shore erosion rates. Another objective of the first phase is to assign a unique score to each asset, so we can determine which assets are most exposed, and which are less.

Sensitivity Assessment

The second phase is focused on the sensitivity of the chosen assets (the “Sensitivity Assessment”) to the selected hazards. Sensitivity is defined here as the degree to which an asset is susceptible to impacts due to coastal flooding or a combination of flooding and erosion. Put more simply, how much does flooding damage something that we care about that is on or related to the asset?



Coupeville’s wastewater treatment plant. Imagery GoogleEarth.

Vulnerability Assessment

The final phase (the “Vulnerability Assessment”) combines the assessed exposure and sensitivity on each asset to prioritize and rank them according to how likely and how severe direct sea level rise impacts may be. This would highlight the assets and specific areas that are most at risk and point to the assets that will need engineering analysis and future design work/retrofits to maintain access and operations.



Timeline

