Will Your Infrastructure Last?

Catalysis
Adaptation Partners LLC

Many communities, agencies, and utilities concerned about extreme weather events, sea level rise and storm surge are asking these important questions:

"Should we ***fortify*** to keep the water out?"
"Should we ***accommodate*** to allow the water in?"
"Should we ***relocate***?"

Catalysis Uses the "COAST" Approach

As more cities and regions are hit hard by storms, public pressure for better infrastructure planning is growing. A consensus is emerging that just "putting it back the way it was" is <u>not</u> the right answer. Community leaders may be ready to take new actions to adapt to changing conditions, but may also be unsure whether such new ideas are good investments. How much should we pay to lower risks, and where is the line between a wise choice and a foolish one?

COAST (<u>CO</u>astal <u>A</u>daptation to <u>S</u>ea level rise <u>T</u>ool) helps users answer these questions. It is a technical tool, predicting damages from storms of various intensities, and evaluating the benefits of protection strategies. But the primary value of the COAST tool is in *how* it is used. In the COAST approach, the CAP team connects the technical results of its model with the social, political, and economic realities of local adaptation. Stakeholders are drawn in to actively engage in discussions about their future, and set the model's parameters. Being entirely driven by the participants, and using locally derived data on vulnerable assets (real estate, economic activity, infrastructure, natural resources, human health, others) and candidate adaptation actions wherever possible, COAST results generate enthusiasm and buy-in not available through most other approaches. It is not a process where outside experts tell the community what assets are important to them, what the future holds in store for them, or what actions they should plan for. Instead, we use some very different strategies:

1. We don't discuss climate change. The reasons extreme storm damage keeps happening are being discussed at academic and national government levels. Regardless of the cause of these events, at the local level governments need to do what they do best: respond, by fixing and preparing their infrastructure, in ways that will save money in any scenario.

2. Global data is often not useful for local officials. We focus on observed, local data from tide gauges and storm damage experiences of the engaged community.

3. We use visualizations and a scenario-based approach. Citizens and decision-makers need more than tables and spreadsheets to understand problems and make choices. We specialize in innovative graphics and 3D visualizations showing how much risk mitigation different adaptation approaches may offer.

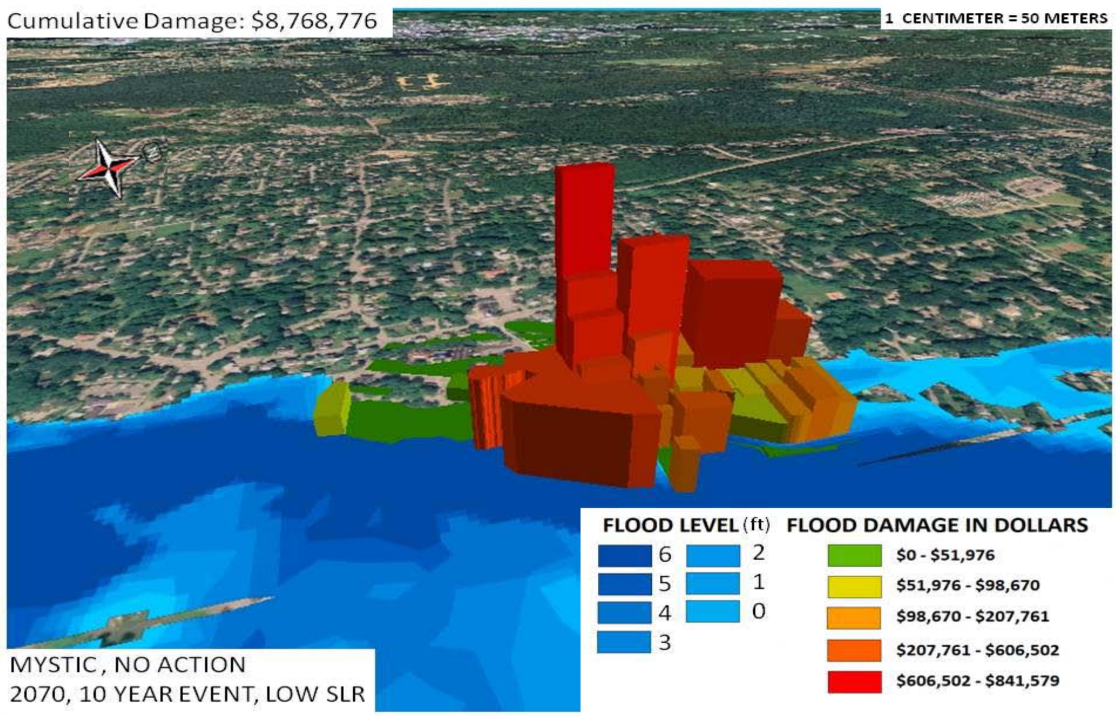
4. We empower stakeholders with a sense of possibility – and then get out of the way. We help citizens put dollar numbers on their choices, and enable to them to identify their comfort with risks implied by different actions to protect assets *they* decide are most important to them.

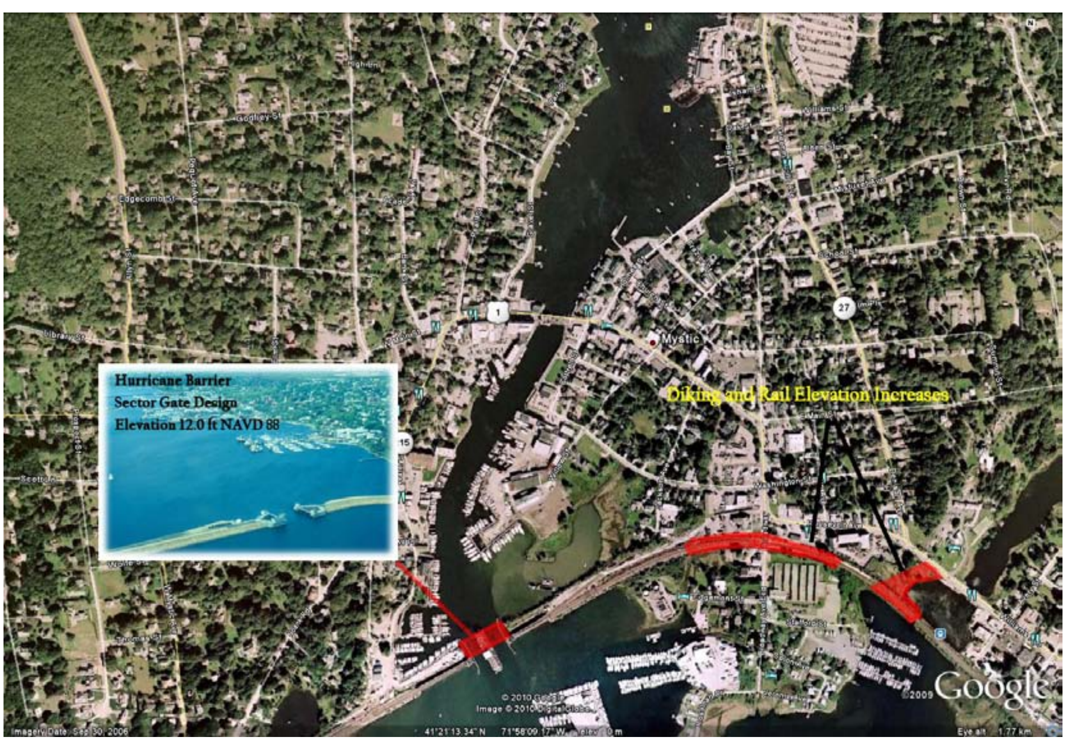
5. We develop consensus to create candidate adaptation strategies tailored to each local setting. There is little sense in spending engineering design dollars for potential projects that may be speedily rejected if buy-in was not established in the first place.

An example of COAST graphic output is below, showing a no-adaptation-action scenario for 1 meter of sea level rise and a 10-year flood event in the year 2070, for a portion of downtown Mystic Seaport in Groton, CT. The z-axis polygons represent cumulative expected lost real estate and building contents value of over $8.7 million (maximum loss per parcel is over $800,000). Adaptation actions subsequently modeled in this location included installing a hurricane barrier, elevating a road, and building dikes, each of which could provide some protection to the vulnerable areas.

Visually, each adaptation action was then represented in maps showing reduced or eliminated polygons extruding out of the landscape. Numerically, this is an effective way of showing up front and maintenance costs of hard-structure approaches versus expected damages from particular inundation events. Soft-structure approaches may also be modeled, such as flood-proofing, rezoning over time, and others. Importantly, the approach allows modeling of ranges of SLR and storm surge frequency and intensity. Combining multiple future scenarios provides stakeholders an opportunity to select their expectation of future conditions and then visualize damages under action versus no-action scenarios.

COAST output is in the form of files compatible with Google Earth, and tables showing cumulative expected damages for the selected vulnerable asset under the adaptation scenarios stakeholders have developed, that allow cost-benefit analysis of candidate adaptation actions.





COAST software was developed at the University of Southern Maine with funds from the US EPA, and in collaboration with partners at the Maine Geologic Survey, the University of New Hampshire, and Blue Marble Geographics.