Case Study 17:
Reducing Vulnerability of Coastal Visitor Facilities, *Cape Cod National Seashore, Massachusetts*

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Goals

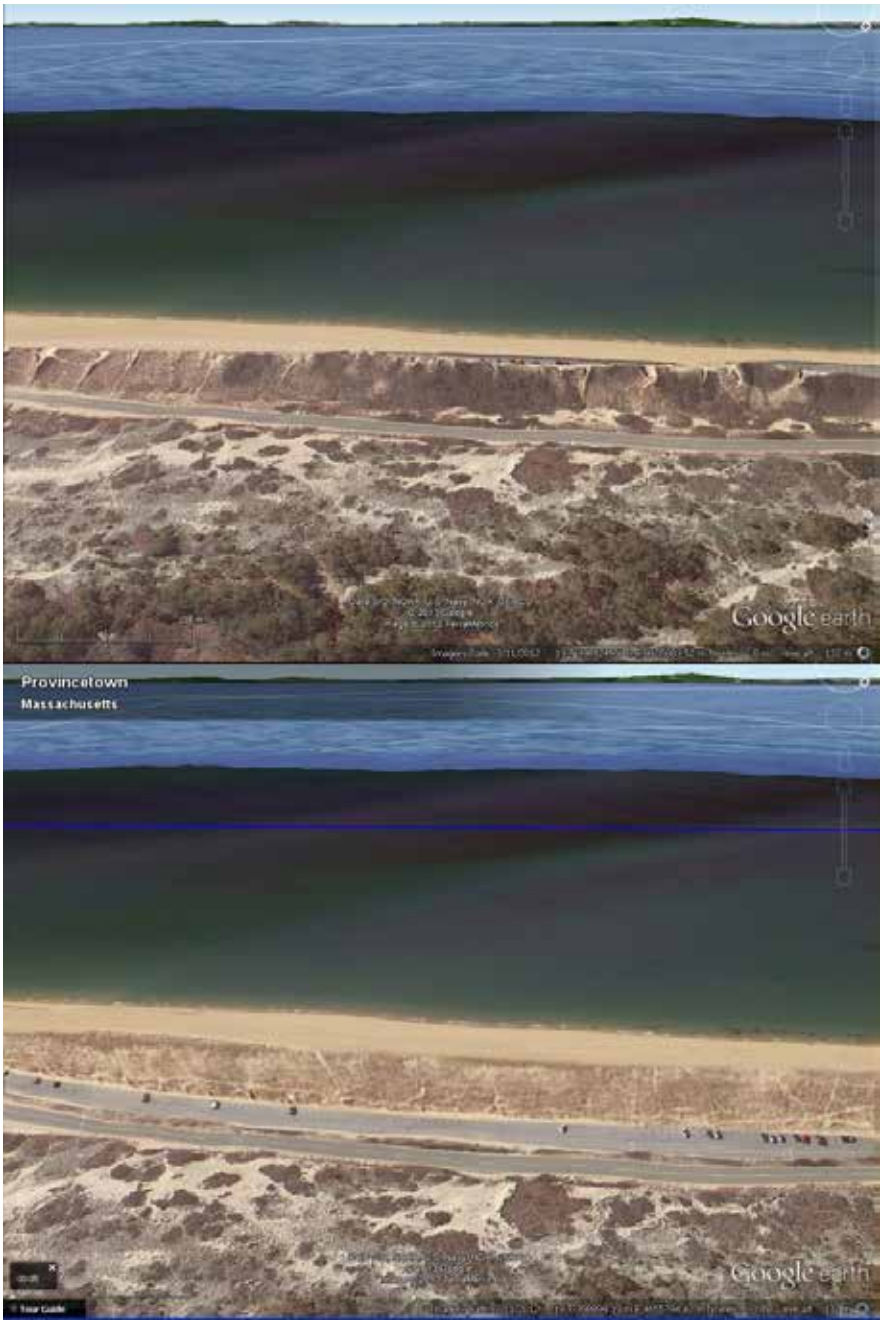
Cape Cod National Seashore, Massachusetts, needs to replace visitor facilities along a popular beach vulnerable to coastal erosion and storm impacts. Redesigning this area required collaboration with visitors, town representatives, coastal engineers, and scientists to incorporate visitor use and needs with the realities of coastal change.

Challenges and Needs

Visitor facilities at the park's most popular life-guarded beach, Herring Cove, were built in the 1950s and included an asphalt parking lot atop the beach and a concrete block bathhouse and concession stand. An artificially high dune was maintained and expanded over several decades through the maintenance practice of pushing windblown sand from the parking lot's surface to its landward edge.

The north parking area at this beach is popular not only for beachgoers in the summer, but also for winter visitors who sit in their parked cars to enjoy the viewshed and the opportunity to see North Atlantic right whales (*Eubalaena glacialis*) in Cape Cod Bay, where 200 of the 450 known individuals in the world have been counted.

In December 2011, the Herring Cove visitor facilities were impacted by a storm that



Top: Before the Herring Cove redesign, visitors parked between the beach and an artificial dune. Image credit: Google Earth. **Bottom:** Following the redesign, the parking lot will be adjacent to the road, and the artificial dune will be reshaped to mimic adjacent natural topography. Image credit: Mark Adams (NPS) conceptual visualization using photographs from Google Earth.

undermined both parking lots and damaged an asphalt revetment protecting the bathhouse and north parking lot. The park needed to design replacement facilities that would continue to serve visitor needs, avoid placement of permanent infrastructure in highly vulnerable areas, and consider shoreline change and coastal policy.

Responsive Actions

To address stakeholder interests and needs, multiple public meetings were held by a park advisory commission subcommittee to discuss various redesign options. The park recognized public interest in continuing the beach's historic use, which included being able to park cars in a location with an ocean view and direct beach access, and the resistance to taking a shuttle bus from a remote parking lot to the beach.

To ensure the engineering and geophysical integrity of the new design, the park enlisted the services of a coastal engineer and of scientists from the Center for Coastal Studies, a Cape Cod-based research and education organization that provided expertise on marine and coastal geology and biology.

The bathhouse was removed in July 2013 and replaced with moveable structures that have a 0.6 m (2 ft) freeboard above base flood elevation and that are placed approximately 30 m (100 ft) landward of the former bathhouse position. The complex incorporates multiple green design techniques, including being built on pilings that reduce its vulnerability to sea level rise and wave impact. It can be moved in the future to a less vulnerable location as necessary to keep pace with erosion and sea level rise. Funding for a move has been incorporated into project requests for future park budgets.

To mitigate impacts of the 1950s construction, the asphalt from the parking lots will also be replaced when Line Item funds become available. In the meantime, as of summer 2015, the park continues to use Massachusetts Wetlands Protection Act and US Army Corps of Engineers notifications to remove asphalt and repair the parking lot. The artificial dune, which prevented natural beach processes from occurring, will be reshaped to replicate the topography of natural adjacent beaches. This will have the added benefit of allowing visitors to view the ocean from the new parking lot location. The north parking lot will be rebuilt on higher-elevation land (0.3–0.6 m [1–2 ft] above the base 100-year floodplain) located 38 m (125 ft) landward of the prior location, a distance that accounts for ongoing and expected shoreline erosion over the next 50 years due to sea level rise, continental subsidence and major coastal flood events. These calculations were possible in part due to the long-term shoreline monitoring datasets and local expertise available for this coastline.

This case study is an example of the following adaptation strategies:

- Incorporating climate change into plans
- Reducing local climate or related change (e.g., incorporating low-energy fixtures, sustainably-harvested wood, and natural ventilation)
- Reducing non-climate stressors (e.g., installing low-flow faucets, eliminating on-site septic waste)
- Increasing/improving public awareness, education, and outreach efforts
- Conducting vulnerability assessments and studies
- Making infrastructure resistant or resilient to climate change
- Developing/implementing an adaptation plan

For more information:

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