Case Study 5:
Strategic Planning and Responsible Investments for Threatened Historic Structures, *Dry Tortugas National Park, Florida*

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Goals

Sea level rise and increased tropical storm intensity pose a serious risk to the long-term sustainability of historic Fort Jefferson at Dry Tortugas National Park, Florida. The park is trying to mitigate these effects over time through strategic planning, informed decision making, and responsible investments that consider historical integrity and long-term sustainability of the fort and island on which it was built.

Historic Fort Jefferson is a six-sided structure built on a landform that is impacted by coastal processes.
Image credit: Marcy Rockman, NPS.

Challenges and Needs

Located 110 km (70 mi) west of Key West, Florida, in the Gulf of Mexico, the seven small islands and historic Fort Jefferson of Dry Tortugas National Park sit on the front lines of the climate change discussion and decision-making process within the National Park Service. The most pressing climate change issues that could directly affect the resources and operations of Dry Tortugas National Park are sea level rise and increased tropical storm intensity. These two factors pose a serious risk to long-term sustainability of Fort Jefferson, the main cultural resource and the base of all park operations, as well as the other islands and accompanying natural resources of the park.

Fort Jefferson needs repairs to its front and moat wall.
Image credit: Kelly Clark, NPS.

For more than 165 years, Fort Jefferson on Garden Key has exhibited incredible resilience to storms and the marine environment of the Dry Tortugas. Still the structure is deteriorating. The fort is a mid-19th century Third System Coastal Defense. It is an unreinforced masonry structure composed of coral concrete faced with

brick, with six sides and three tiers. It is surrounded by a 21 m (70 ft) wide wet moat that is separated from the open waters of the Gulf of Mexico by a masonry wall, formally called the counterscarp. The counterscarp sits approximately 2 m (6 ft) above the low water line and 1 m (3 ft) above high tide. The moat and counterscarp were designed to keep would-be attackers at bay and to provide a structural first line of defense for the fort against the sea.

Throughout the architecture of the fort, there are iron components embedded within the masonry that served various functions, including water collection, supports for catwalks, and, most importantly, protection against enemy fire. In this salt water environment, the wrought-iron has rusted and expanded, pushing the brick apart and causing serious structural damage to Fort Jefferson's exterior scarp walls; large sections of the fort walls have collapsed into the moat.

The moat wall surrounding the fort also needs repairs in many places. Because it is an integral part of the site design and protects the fort from wave forces, it also protects the investment in stabilization of the fronts.

Given projections for sea level rise and increased storm intensity, many questions exist as to the appropriate level and nature of investment in repairs and restoration of Fort Jefferson and other historically significant cultural resources at the park. Such spending decisions will incorporate considerations such as long-term feasibility of park operations within the fortification, sustainability of the fort and moat wall and the island on which it was built, historic preservation goals of the National Park Service in terms of both stewardship and visitor experience, and other repair needs within the National Park Service.

Responsive Actions

Through strategic planning, informed decision making, and responsible investments, the park is trying to mitigate the effects of the environment over time. This approach has resulted in removing the corroded iron shutter assembly components and stabilizing the exterior masonry walls. Preservation and stabilization work on the fort has occurred on an intermittent basis since the 1990s. The moat wall has been worked on intermittently since the 1960s. For both structures, the scope of work has been guided by the amount of available funding. At this point in time, all six sides of Fort Jefferson have received some form of stabilization, but the work is not complete. The main priority for the park is to complete the removal of the remaining iron shutter components embedded in the exterior scarp wall (fronts 3 and 2) and to stabilize as much of the brick work from the top of the parapet to the low water line with selective brick replacement and repointing. The estimated cost to finish these stabilizing measures by 2018 is just under $12 million.

Moving forward with preservation efforts, the park is following the National Park Service Climate Change Response Strategy to address the projected consequences of climate change. The park is also using the National Park Service Climate Change Action Plan as a framework for the development of mitigation and adaptation plans; consideration of alternatives for making decisions based on cost effective actions that deliver results; and development of long-term monitoring and documentation that will contribute valuable data to be considered in the future. This course of action should allow the National Park Service to maintain park operations on-site, comply with the park's enabling legislation by preserving important cultural resources, provide opportunities for visitor enjoyment, and simultaneously make the fort more resilient to the effects of projected climate change while allowing for future adaptation.

To help in prioritizing park needs and strategic investment planning, the park has looked towards scientific data being produced by groups such as the Intergovernmental Panel on Climate Change and the Southeast Atlantic Coastal Ocean Observing System. The US Geological Survey has completed coastal vulnerability studies of the park. The park also installed a sea level monitoring station at Garden Key in fiscal year 2014 using concessions franchise fee funds; this real-time,

on-site sea level data will establish a monitoring baseline and will aid in climate change scenario planning and future decision making.

Preservation decisions must also consider long-term feasibility of park operations within Fort Jefferson and on Garden Key, historic preservation goals and mandates of the National Park Service, visitor experience, and the overall short- and long-term budgets of the National Park Service. Striving for constant improvement and long-term sustainability through the stabilization efforts, the cultural resources staff and stabilization project team have continued to review and improve specifications and contractor performance with increased project oversight and improved documentation of material performance.

Planning for future repairs to the fort and the moat wall require budget foresight, structural vulnerability analysis, careful historic preservation considerations, and continued incorporation of climate change projections, particularly with respect to local sea level rise and storm intensity. Such decisions must include all appropriate compliance and consultation, and participation by policy, preservation, documentation, interpretation, and other programs from across the National Park Service.

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

- Incorporating climate change into policies, plans, and regulations
- Conducting vulnerability assessments and studies
- Making infrastructure resistant or resilient to climate change
- Developing/implementing an adaptation plan
- Creating new or enhancing existing policy

For more information:

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