

Climate change and Martin Van Buren National Historic Site: Building a holistic plan

Megan O'Malley

In a world where the devastating and immediate impacts of climate change threaten fundamental resources and visitor experiences at iconic National Park Service (NPS) sites like Yosemite and Yellowstone, how do NPS units like Martin Van Buren National Historic Site (MAVA) plan for climate change resilience? Recent floods in Yellowstone that forced the temporary closure of the entire park and required the evacuation of 10,000 visitors, and wildfires that threaten 2,000-year-old sequoia trees in Yosemite, very rightly command the attention of NPS and the world as funding and resources are devoted to both the immediate and long-term needs of these sites.

But do we understand the climate change threats to MAVA and similar small NPS sites that were established to manage historic resources? How do we evaluate those threats? And what resources are available to fund evaluations and plans? The Climate Change Response Strategic Plan finalized in 2019 clearly outlines the challenge to the entire NPS.

Our work to understand and manage the effects of a changing climate on natural and cultural resources, infrastructure, and operations is part of the NPS core responsibility to protect parks and support visitor experience and enjoyment for present and future generations.

But it's still largely the role of NPS regions, individual parks, and individual park managers, all of whom are stretched to capacity already, to incorporate climate change into park management. Managers at MAVA cannot claim to have solved the issue of climate change resilience but have made significant progress in assessing climate change by adopting an approach that echoes the core principles of Operational Leadership (OL). More than a decade ago, OL was adopted as an NPS-wide employee-centered safety program. Under OL, all employees are both accountable for safety and, armed with a suite of tools to evaluate risk, are empowered to ensure their workplace is safe. In an agency notorious for rigid adherence to hierarchy and chain of command as well as the siloing of disciplines, the notion that regardless of title, grade, or discipline an employee can speak up about unsafe work conditions is a revelation. OL has become embedded in NPS culture and employees at every level in every discipline use its principles daily. The lesson learned from OL is that when something is integrated across disciplines and operationalized at all levels we can effect change.

The integration of climate change into MAVA's planning and operations began with the Natural Resource Condition Assessment (NRCA) completed in 2021 by Geraldine (Geri) Tierney and James Gibbs of SUNY-ESF (the State University of New York College of Environmental Science and Forestry). Funded by the NPS Natural Resource Stewardship and Science office, the NRCA provided the first comprehensive evaluation of natural

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resources at MAVA. Like many NPS units with a cultural resource focus, MAVA staff had limited understanding of park natural resources. This is despite the fact that the cultural landscape, including an active organic farm managed through a lease, is by definition both a cultural resource and a set of living, natural resources.

Before leaving the presidency in 1841, Martin Van Buren purchased an estate in his hometown, Kinderhook, New York, which he renamed “Lindenwald.” Following the philosophical path of Thomas Jefferson, Van Buren threw himself into “progressive” farming and over the years grew hay, potatoes, and hops as well as a large apple and pear orchard. In the 19th century, as now, farming was political. Access to food, land ownership, and labor are central to the human condition and US politics. While today we debate the minimum wage and the gender wage gap, free labor versus enslaved labor was the core antebellum political issue. For Van Buren, who intended to demonstrate that large-scale agriculture in the Northeast was still viable and possible with free labor, farming was merely another stage of his political career. Although it seems self-evident in hindsight, the NRCA was the spark that inspired a shift in mindset away from a traditional binary cultural/natural resource approach to an integrated, interdisciplinary view.

An additional, significant benefit of the NRCA was the opportunity to act on the robust list of recommendations, including the further study of climate change. Again, through funding from NPS Natural Resource Stewardship and Science, MAVA staff worked with Tierney through a CESU (Cooperative Ecosystem Studies Unit) agreement to write *Climate Change Trends and Impacts: Martin Van Buren NHS, Focused Condition Assessment Report* (hereafter, Climate Change FCA). Typically, historic structures, archaeology, and agriculture are not evaluated as a part of this report but Tierney was willing to expand the scope of the project. Margaret Breuker, project specialist, collections; David Bittermann, chief of design, preservation, and planning with NPS Historic Architecture,

Lindenwald Mansion. NATIONAL PARK SERVICE



Conservation and Engineering (HACE) Center; Nathan Allison, tribal historic preservation officer (THPO) with the Stockbridge-Munsee Band of Mohican Indians; and Jody Bollyut of Roxbury Farm met online with Tierney and the park management team. Although they were in regular communication with park management, filtering the conversations through the lens of climate change brought new perspectives to light.

The MAVA curatorial staff has been collecting environmental data in the Lindenwald mansion for several years. In 2018, during the early planning stages of a project to replace the HVAC (heating, ventilation, and air conditioning) system at Lindenwald, the cache of temperature and relative humidity data informed specifications for the system. Using Psychrometric, Time Series, and Cumulative Relative Frequency (CRF) charts developed with that data, Breuker determined that the environmental fluctuations in the historic mansion fell mostly within an acceptable range given the building type, location, and collections on display. Knowing that the historic fixtures, furniture, and fabric of the mansion were not threatened by long-term indoor environmental conditions, Breuker, Bittermann, and engineers from HACE determined that the new system would not need the addition of air conditioning, much to the chagrin of some MAVA staff, and the project could proceed within budget.

Using this robust monitoring protocol as a starting point, Breuker's inclusion in the Climate Change FCA led to the recommendation of an on-site weather station. The weather station, which will be installed in late summer 2022, will provide data for rainfall, barometric pressure, differential pressure, and wind speed and direction.

Data logger in the basement kitchen of Lindenwald. The park installed wifi hotspots in Lindenwald to accommodate remote access to these loggers. NATIONAL PARK SERVICE





External temperature gauge mounted on maintenance facility immediately behind Lindenwald. NATIONAL PARK SERVICE

As climate change becomes entrenched, weather patterns will become more intense and erratic. The ability to correlate on-site weather data—particularly from powerful, hyperlocal wind- and rainstorms—with interior environmental data will be invaluable. In the future, the curatorial staff may even be able to tap into predictive weather models and anticipate impacts on Lindenwald.

An on-site weather station will also benefit Roxbury Farm, which leases and farms the same agricultural land that Van Buren and several generations before him cultivated. Without question, climate change will have clear and potentially devastating impacts on agriculture. From droughts to floods to the timing of frosts, changing weather patterns driven by climate change could ruin crops. Roxbury Farm already employs a suite of practices to reduce soil erosion, including crop rotation and “driving lanes,” but changing global weather patterns will likely have a difficult-to-predict cascade effect on their operations. The potential loss of pollinator/crop synchronicity, the complete loss of pollinators, and crop loss due to heat or water stress are all possible. While some pest insects will die out because of changing weather patterns, new pests will migrate into the area and compound the effects of other stressors.

These shifting weather patterns will also have devastating impacts on the trees and shrubs on the cultural landscape. According to data compiled by the US Forest Service, roughly one-third of the tree species identified in the 2016 Cultural Landscape Report are “less than capable” of adapting to predicted changes in temperature and rainfall in the coming decades.



Agricultural land leased to Roxbury Farm. Note the grass driving lanes designed to minimize erosion. Crops are rotated throughout the season and from year to year. NATIONAL PARK SERVICE

New apple trees, which will be planted in the spring of 2024 as part of multi-year project to restore the Van Buren-era orchard, are being selected with an eye for resiliency and adaptability. Although heirloom cultivars likely grown by Van Burn are available, they vary widely in their adaptability to predicted changing weather patterns. Decisions about rootstock for the new trees and which variety to select are also being made through the lens of climate change.

Nathan Allison, who at the time of the NRCA was the THPO with the Stockbridge-Munsee Band of Mohican Indians, shared the unique perspective and preservation goals of Tribal partners with the project team. Although the Delaware Nation and Delaware Tribe are also affiliated Tribal partners with MAVA, because the Stockbridge-Munsee have a THPO office on their ancestral homeland not far the park, they often entrust the Stockbridge-Munsee to communicate their shared perspectives with park managers because the latter have a THPO office on their ancestral homeland not far the park.

Going into the conversation with Allison, the research team assumed that Tribal partners would share our concern about the potential loss of archaeological sites and items of cultural significance during floods along the Kinderhook Creek. As is so often the case, our assumption that the Tribes would share our perspective was wrong. Allison explained that our Tribal partners see floods as part of the larger natural cycle of life. Archaeological sites and artifacts washed away or damaged by flooding are not viewed through the lens of loss; rather, they are simply experiencing another phase of natural forces. Through several years of consultation, the Stockbridge-Munsee have expressed their desire that artifacts with Tribal affiliations remain in the ground. They see the excavation and storage of artifacts in perpetuity in a box in climate-controlled facility as a loss.

Given the complex laws and regulations the NPS must adhere to and the fact that allowing natural forces to destroy archaeological sites would likely impact artifacts with non-tribal associations, it's unlikely that NPS could fully honor this perspective. However, by starting the dialogue, building trust and mutual respect, we are creating a framework for collaboration in the future.

Several years before the NRCA project or the Climate Change FCA, park staff began working with the remarkable staff of Farmscape Ecology, a local non-profit dedicated to fostering greater understanding of ecological and cultural resources in Columbia County, New York. Farmscape Ecology is a part of Hawthorn Valley, a dynamic organization that also includes a farm, a farm market, and a school offering a variety of informal learning opportunities. In 2019, Farmscape Ecology and park staff began a collaboration centered around phenology records for Kinderhook from the 19th century. Phenology, the observation and study of the visible phases of plants, was historically used by farmers as a guide for planting crops. Although not as precise as the US Department of Agriculture Plant Hardiness Zone Map used by contemporary farmers and gardeners, by observing the different phases of spring growth farmers could roughly gauge the optimum planting schedule for a variety of crops.

With training and support from Farmscape Ecology staff, MAVA staff members are observing and recording the phenophases of many of the same species monitored in Kinderhook during Van Buren's time at Lindenwald. Although far from the only tool to understand climate change, knowing that in 2021 American elms flowered a full 25 days sooner than in 1851 is compelling evidence for staff and visitors that our environment is changing.

American elm reference images used for phenology monitoring. (clockwise from top left) Leaf buds; flower buds; flowers; fruit. NATURE'S NOTEBOOK



During the summer and fall of 2022 a series of temporary waysides marking the phenology “trail” will encourage visitors to explore the park through the lens of climate change. And in 2023 the park plans to engage a corps of volunteer citizen scientists to expand this project.

Without question, elements of the holistic, interdisciplinary approach to climate change at Martin Van Buren National Historic Site are rooted in the partnerships unique to the site, but dozens of sites around NPS have similar resources, budget, and staffing. All NPS units can apply for funding for Natural Resource Condition Assessments and Focused Condition Assessments and park managers can play a vital role in directing these research projects to meet the needs of their sites.

NPS units *will* be impacted by climate change and it *will* affect our ability to fulfill our mission to protect and preserve resources. Leveraging existing relationships and building new ones with Tribal partners, non-profits, and subject-matter experts within NPS to develop plans now, *will* help parks plan for resiliency in the face of climate change.

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On the cover of this issue

Climate change creates conditions conducive to larger, more frequent fires, particularly in the American West. As a result, historic structures and artifacts are at greater risk of fire damage. The Bent's Fort Fire started on the morning of April 12, 2022. Approximately 85% of the national historic site's 800 acres burned. Thanks to the efforts of fire crews, the reconstructed adobe fort was undamaged. | [NATIONAL PARK SERVICE](#)