Heritage Documentation Using LiDAR Technology

Cooperative Ecosystem Studies Units allow partners with technical expertise and equipment to assist with cultural resource management activities in National Park Service units and other public lands. Professors and students participated in this project, which aimed to document, analyze, and preserve built environments and cultural and natural landscapes.

Great Sand Dunes National Park and Preserve in Colorado is a treasure of visual, geological and biological surprises—a high mountain valley holding the highest dunes in North America and flanked by some of the highest peaks in the Rocky Mountains; unique wind-powered geologic systems; insects physically adapted to life in the sand and found nowhere else; alpine lakes and tundra; disappearing creeks; and inter-dunal wetlands. Park boundaries also include significant historical and cultural resources that contribute to the San Luis Valley settlement story.

In January 2012, the Trujillo Homesteads received National Historic Landmark designation. The sites represent the expansion of Hispanic-American settlement in the part of the American Southwest newly-acquired by the United States in the 1848 Treaty of Guadalupe-Hidalgo. Teofilo and Andrelitta Trujillo and their son, Pedro, were...
among the wealthiest Hispano ranchers in the San Luis Valley. All that remains at Teofiló’s homestead is archeological evidence, but Pedro’s two-story log house and some ranch outbuildings are extant.

The Trujillo Homesteads are located on land owned by The Nature Conservancy and within the boundary of Great Sand Dunes National Park and Preserve. In order to share the stories of the Trujillo Homesteads with visitors, the park wanted to create virtual tours accessible via their website. Having additional documentation of these cultural sites also benefitted resource and facility managers tasked with preserving them for future generations.

The College of Architecture and Planning at the University of Colorado Denver used terrestrial light detection and ranging (LiDAR) scanning equipment to collect data from about a dozen locations at the Teofiló and Pedro Trujillo homestead sites. They also used high dynamic range imaging, which intensifies light and shadows, allowing for a broader range of contrast than traditional digital photography. With this data, the team of students and their advisors developed two virtual tours and several “images” of the sites developed from the LiDAR scans.

**Easy Access to History**

By marrying technology and history, cultural resource managers and university expertise, the Cooperative Ecosystem Studies Units Network allowed for in-person and virtual visitors to experience the Trujillo Homesteads. These types of projects focus on telling a narrative—a story of place—to reveal the traces of the past, to make the place resonate in the present, and to give consideration for the future of cultural landscapes.