NATIONAL GEOGRAPHIC

PROTECTING HUMAN HISTORY IN EGYPT WITH A VIEW FROM ABOVE

From left to right, the photographs above are courtesy of Mark Thiessen/ National Geographic, Robert Clark/ National Geograhic, and Sarah Parcak.

Sarah Parcak was choosing classes one semester in college when she noticed a course about satellite imaging. It may not have been a typical choice for archaeology majors, but Parcak had always been interested in aerial photography. Her grandfather was one of the first to use it in his work in forestry to measure tree height and forest health. Parcak took the course, not realizing at the time how much it would impact her future.

Fast-forward about 15 years, and Parcak is a professor of archaeology at the University of Alabama in Birmingham, Alabama, specializing in the study of Egypt. A pioneer in space archaeology, Parcak uses images taken by low-orbit satellites to help pinpoint the locations of buried archaeological sites. Parcak wrote and published the first textbook on this research method.

Her passion for preserving the past was fueled on her very first dig in Egypt. While excavating in a 4,200-year-old cemetery, she discovered an intact pot. When she turned the artifact over, she noticed it had a thumbprint. Time stood still for her in that moment. She realized when archaeologists dig, they are not digging for objects, they are digging to learn about people from the past and their way of life. The awe of that moment led her on a quest to preserve treasures from the past.

Parcak continues to engage the world with archaeology. She especially wants to shed light on the problem of theft, called looting. When she sees areas that appear to be at risk, she shares her data with government authorities to help them detect patterns of looting, preserve endangered areas, and catch thieves.

Asking Geo-Inquiry Questions

Through her early work, Parcak saw archaeological sites were in danger of being lost forever. Expanding development and the changing natural environment put sites at risk, but looting was a particularly growing concern. She wondered: How could her team preserve and protect these irreplaceable records of human history?

This guiding question led to others: (1) Where are Egypt's archaeological sites, and what is the most efficient way to find them? (2) Which sites are in greatest need of protection? (3) How do we encourage people to recognize the importance of protecting these sites?

Gathering and Analyzing Data

Parcak knew to answer her questions she first would need to gather data to establish where ancient sites were located. She and her team analyzed large geographic areas using state-of-the-art technology to locate sites. That process had multiple steps. First, she conducted extensive background research on an area. She read ancient texts, reviewed maps from the era, and studied any research, excavations, and land surveys already conducted. She compiled all of this information so there was a clear idea of what was already known about the location.

Then she checked satellite imagery databases for the highest resolution images of the area, which would show the most detail. With the help of computer programs, she could find clues in the satellite images about where buried buildings, streets, and walls of ancient cities were located. She scanned the images for differences in the landscape, such as discolored soil or changes in vegetation, that signaled something might be lying underneath. When searching for signs of recent changes, such as looting, she also compared satellite images from different years to analyze how the landscape had changed.

Creating a Geographic Story

Parcak used all of the data collected about an area to create a geographic information system (GIS) database. This made it possible to create map layers for the satellite imagery and existing archaeological information. Then she analyzed the information and created maps and other visuals to convey the data's story.

Sometimes the data's story was not only about the distant past. It could also reveal important information about what is happening to an area in modern times. In 2011, after the political upheaval in Egypt called the Arab Spring, Parcak heard on social media that people were digging illegally at various sites and stealing artifacts. Concerned, she compared satellite images of the region taken in 2010 to images taken after the events of 2011. In satellite images, signs of looting appear as dark rectangles surrounded by a doughnut-shaped ring of dirt. When Parcak compared early images to later ones, she saw that the dark spots spread rapidly, like a rash on the smooth landscape. Clearly, looting was on the rise.

Sharing a Geographic Story for Action Taking Action

Parcak traveled to Egypt and met with the Ministry of Antiquities as well as other government officials to share what she had found. The satellite imagery showed very clearly where looting was occurring and how much was happening in different places. The government used her data to improve protection of the endangered sites and help prevent looting. Impressed by Parcak's process, they also asked Parcak to train Egyptian archaeologists in the techniques she uses so they can monitor the sites themselves.

Parcak strives to inspire others to recognize the value and importance of preserving our human history, and she shares her story in both informal and formal settings. During her fieldwork, she sometimes hires local residents to help with the dig so they learn about the objects that are uncovered and hopefully become inspired to protect them. She brings local children to the sites to inspire interest in their buried history, and she speaks with local leaders about the tourism potential of newly excavated sites so they see economic value in site protection. She studied Arabic so she could speak with Egyptians in their own language during these encounters.

More formally, she takes advantage of every opportunity to talk about her work, in videos, blog posts, radio and television interviews, and newspaper and magazine articles. For Parcak, politics is a crucial part of archaeology. Archaeologists need to partner and collaborate with people and help them feel excited about their heritage. That requires being a diplomat in addition to being a scientist.

Using space archaeology methods, Parcak has discovered 17 potential pyramids, 3,000 ancient settlements, and 1,000 tombs in Egypt. She estimates that there are hundreds if not thousands of archaeological sites left to find in Egypt alone. Her most recent adventure is the launch of GlobalXplorer (www.globalxplorer.org), an online tool that enables citizen scientists to help authorities reduce site looting as well as discover new sites.

Parcak believes what we learn about the past can help us tackle problems in the future: "I hope my work contributes to understanding long-term patterns of human behavior and how we survive, thrive, or fail during times of environmental, social, and economic crisis."

Satellite images of the archaeology site el Hibeh in Egypt comparing two time periods. In the top image, you can see few looting pits (dark rectangles surrounded by donut shaped piles of dirt), but in the bottom picture, the landscape is scarred by them. Photographs courtesy of Sarah Parcak. Source: Satellite image © 2017 Digital Globe.