



Sandbags protect 3rd- to 5th-century C.E. mosaics at the Ma'arra Mosaic Museum in the Syrian city of Maarat al-Numaan.

Scientists work to save antiquities from Islamic State destruction

Western scholars and their Syrian and Iraqi colleagues are using technological tools to document and protect a vanishing cultural heritage

By **Earl Lane**

In the summers of 2009 and 2010, Katharyn Hanson was working in the Syrian city of Raqqa as a University of Chicago doctoral student in archaeology. Just down the street from her lodgings were the revered tombs of three medieval Islamic prophets. Today, those tombs have been obliterated and the ground on which they stood graded to remove all evidence of their existence.

Such targeted destruction by the Islamic State or ISIS, which occupies Raqqa as its headquarters city, is meant to both terrify the local population and rob it of its cultural heritage, said Hanson, a visiting scholar for the AAAS Geospatial Technologies Project and a postdoctoral fellow at the Cultural Heritage Center of the University of Pennsylvania Museum.

While ISIS has drawn worldwide condemnation for blowing up the temple of Baalshamin in the ancient city of Palmyra this summer and for destroying other historical sites in that city and elsewhere, such actions involve more than smashing structures the group deems idolatrous. They strike at the heart of the religious

pluralism that marked Syria and Iraq for centuries, Hanson said, and erase physical manifestations of a people's history. Once lost, that cultural heritage can be irreplaceable, she said.

In a 10 November colloquium at AAAS, Hanson spoke movingly of the need to preserve and protect Syria's antiquities. For Hanson, it is a personal as well as a professional imperative. She has worked closely with Syrian and Iraqi specialists who face tremendous peril in their efforts to protect historic sites not only from the symbolic atrocities of ISIS but also the general chaos that accompanies armed conflict.

Hanson noted that cultural sites in Syria and Iraq had been threatened well before ISIS arrived on the scene. Since the 2011 beginning of the Syrian civil war, she said, troops of the Bashar al-Assad regime routinely have been embedded at cultural sites that often occupy the high ground. Iraqi troops and Shia militias have scribbled graffiti on a historic spiral minaret in Samarra, Iraq, and displaced persons have been living within fragile Byzantine ruins northwest of Aleppo, Syria.

Looting of historic sites also has been rampant, with ISIS selling permits to locals who want to engage in the practice. Iraq's U.N. ambassador has said that ISIS earns up to \$100 million annually from looting and trafficking of antiquities to support its terrorism. Satellite images analyzed by AAAS have shown the extent of such looting, with some sites, such as one in Apamea, Syria, so pockmarked with pits and tunnels dug by looters that they appear as though they have been carpet-bombed.

"To an archaeologist, this is painful to see," Hanson said. The activity "rips up the stratigraphy" of the site, the crucial geological record that specialists used to date materials and provide historical context. Accustomed to working in the region as a field archaeologist, Hanson said it has been frustrating to now view some sites only via satellite photos. In the case of looting, it can

Tools to help save a culture

Satellite and drone imagery—The AAAS Geospatial Technologies Project has produced several lengthy reports documenting damage or destruction at important cultural heritage sites in Syria and Iraq, showing the scope of the problem and confirming reports from sources on the ground. The project is exploring the possibility of using aerial drones to get an even closer look at looting and other threats to critical sites. Drones have been used by other specialists in a “Follow the Pots” project to monitor looting at an Early Bronze Age cemetery in Fifa, Jordan.



A 3D reconstruction of the Iraqi Nirgul Tablet. The original artifact was destroyed by ISIS.

Time-series analyses—By analyzing multiple satellite images over time, researchers can spot physical changes in the historic structures of interest and also detect the arrival of trucks and bulldozers that could be a warning of imminent destruction to come. The method has been used to document the status and subsequent destruction of sites such as the tombs of Uwais al-Qarani, Obay ibn Qays, and Ammar ibn Yasir in the Raqqa neighborhood where Hanson lived. Time-series analysis also has been used to document the destruction of Armenian cultural artifacts in Azerbaijan between 1998 and 2005, Hanson said.

High-resolution scans—Specialists have been creating 3D reproductions of endangered, damaged, or destroyed artifacts. One effort, called Project Mosul, is collecting imagery of materials in the Mosul Museum that were destroyed by ISIS fighters in February. These cyber archaeologists are using file photographs and even videos and pictures taken by tourists to digitally reconstruct lost objects. The Mosul team also has been collecting images of historic buildings destroyed by a devastating earthquake in Nepal in April in hopes of helping to rebuild the Durbar Square area of Kathmandu.

Archival documentation—The German Archaeological Institute and the Museum of Islamic Art in Berlin have undertaken a joint effort to digitize paper records of numerous research projects conducted in Syria over the years under the auspices of the Syrian Directorate-General of Antiquities and Museums. Such documentation is essential to protect important archival data and to help experts better evaluate the current status of Syria’s imperiled cultural heritage.

be nearly impossible, she said, to determine from overhead images just what artifacts have been stolen or damaged.

Still, Hanson and other western specialists have remained very much engaged with the region and their Iraqi and Syrian colleagues. They are using scientific methods and technological tools to document and better understand the ongoing loss of cultural heritage and prevent further destruction if possible. Hanson traveled to Erbil, Iraq, twice this year to conduct training sessions for local antiquities specialists, helping to update them on methods to do site assessment and risk management for artifacts under threat. “There are some incredible conservation efforts being done quietly” in the region, Hanson said.

The Safeguarding the Heritage of Syria and Iraq (SHOSI) Project—a collaborative effort by AAAS, the University of Pennsylvania, the Smithsonian Institution, The Day After Association (a Syrian-led civil society group), and others—stabilized an ancient wall mosaic at the Ma’arra Museum outside Aleppo and placed sandbags in front of it for protection. When the museum was bombed in June, allegedly by the Assad regime, the mosaic survived.

Beyond efforts to document the status of endangered sites, Hanson said, there is a critical need to restrict the illicit trade in antiquities from Syria and Iraq. That was one focus of a 28 October panel discussion on Capitol Hill, organized by the University of Pennsylvania Museum in conjunction with AAAS, the Smithsonian Institution, and the U.S. Committee of the Blue Shield, a nonprofit organization committed to the protection of cultural property worldwide during armed conflict.

Speakers at the event, hosted by Sen. Bob Casey (D-PA), called for the Senate to pass a bill, cosponsored by Casey and already approved in the House, to impose restrictions on the import of illicit Syrian artifacts.

“In Syria, cultural heritage is part of everyday life,” said Salam Al Kuntar, former deputy director of Syria’s Department of Excavation and Archaeological Research. “It’s not something that belongs to the past.” Emphasizing the ongoing importance of sites that have been destroyed or looted by the Islamic State group, she noted that these “living historical landscapes” are “embedded in our identities as Syrians and Iraqis.” ■

(Andrea Korte contributed to this story.)

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