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A METHODOLOGY FOR DOCUMENTING PRESERVATION ISSUES AFFECTING CULTURAL HERITAGE IN SYRIA AND IRAQ

LEEANN BARNES GORDON, BIJAN ROUHANI, SUSAN PENACHO, AND ALLISON CUNEO

Armed conflict in Syria and Iraq has resulted in a humanitarian crisis that includes the destruction of cultural heritage. The Cultural Heritage Initiatives project is a cooperative agreement between the United States Department of State and the American Schools of Oriental Research to implement cultural property protection in the region. This article discusses the development of the project's methodology for documenting preservation issues affecting cultural heritage. The methodology was created to better understand the types and patterns of threats and damage, which in turn inform future safeguarding and post-war conservation efforts. The condition assessment process is closely linked to other activities of the project, including the development of a digital inventory and map of heritage sites and the archiving of information about cultural heritage from major news outlets, online media, satellite imagery, and in-country sources. The methodology was initially designed to record the physical condition of a property as well as threats and/or disturbances. A Condition Issues section was developed in order to track the effects of damage and the components of a property that may be affected. Later additions include a section designed to rate the priority for future on-the-ground assessments. Testing, revision, and improvement of the methodology are discussed, and initial results of assessments of the properties within the United Nations Educational, Scientific and Cultural Organization World Heritage Site of Ancient Aleppo are presented.

KEYWORDS: Condition assessment, Documentation, Emergency response, Cultural heritage, Heritage inventory, Satellite imagery, Remote sensing, Armed conflict, Post-conflict, Cultural property protection, Syria, Iraq, World Heritage, Aleppo

1. INTRODUCTION

The armed conflict in Syria began in 2011 when protests against the Syrian government broke out in various cities, inspired by popular uprisings in the region. Military crackdowns on protesters led to widespread insurgency. By 2013, the Syrian Army was engaged in a full-scale civil war against local rebel militias throughout the country. Meanwhile, the emergence of jihadist groups signaled an increase in foreign, extremist influence among the armed opposition. In the spring of 2014, the situation escalated with the takeover of Mosul, Iraq, by the Salafi-jihadist group ISIL, followed soon by the declaration of Raqqa, Syria, as the capital of its new Islamic caliphate. Despite cease-fire attempts, fighting has continued to the present time with even greater international involvement.¹

These five years of war have caused a humanitarian crisis with hundreds of thousands of casualties and more than 11 million people forced from their homes (United Nations 2015; 3RP: Regional Refugee and Resilience Plan 2016). Additionally, collateral damage to historic monuments and cultural repositories has been extensive: archaeological sites have become militarized for their strategic locations, celebrated landmarks have been demolished in crossfire between groups, and historic neighborhoods have been obliterated by indiscriminate bombing (fig. 1) (American Schools of Oriental Research Cultural Heritage Initiatives 2016). This conflict has also been marked by systematic, deliberate destruction of heritage sites throughout Syria and Iraq, perpetrated largely by militant Salafist groups such as ISIL (Danti 2015; Harmanşah 2015).

By 2013, following the first few years of the war in Syria, UNESCO placed all six of the country's World Heritage Sites on their List of World Heritage in Danger due to severe and sustained damage and threats (United Nations Educational Scientific and Cultural Organization—World Heritage Centre 2016). Soon after, international responses to the cultural heritage crisis increased rapidly, including the formation of the Cultural Heritage Initiatives (CHI) project in August 2014. CHI is a



Fig. 1. Satellite image showing demolished historic structures, rubble, and craters caused by bombings near the Aleppo Citadel, December 15, 2014 (Courtesy of DigitalGlobe)

cooperative agreement between the United States Department of State (DoS) and the American Schools of Oriental Research (ASOR) to monitor and report on the crisis, promote global awareness, and develop preservation projects to implement now and in the post-conflict period. The project includes a multidisciplinary team of specialists in archaeology, remote sensing, conservation, risk preparedness, and cultural heritage management, which works collaboratively with international scholars, cultural agencies, NGOs, and in-country specialists. This article focuses on CHI's methodology for documenting preservation issues affecting cultural heritage in Syria and Iraq.

2. ASOR'S CULTURAL HERITAGE INITIATIVES: OVERVIEW OF ACTIVITIES

The CHI project was initially conceived and primarily funded by the DoS, which designed a highly structured and rigorous reporting program from which CHI's primary activities derive. First, CHI is developing a comprehensive digital map and inventory of archaeological sites, built heritage, museums and collections, and libraries and archives in Syria and ISIL-occupied areas of Iraq. As of May 2016, CHI's inventory contained more than 6,500 cultural properties in Syria and 5,900 in Iraq, and was compiled through collaboration with numerous other groups and institutions (fig. 2). It continues to

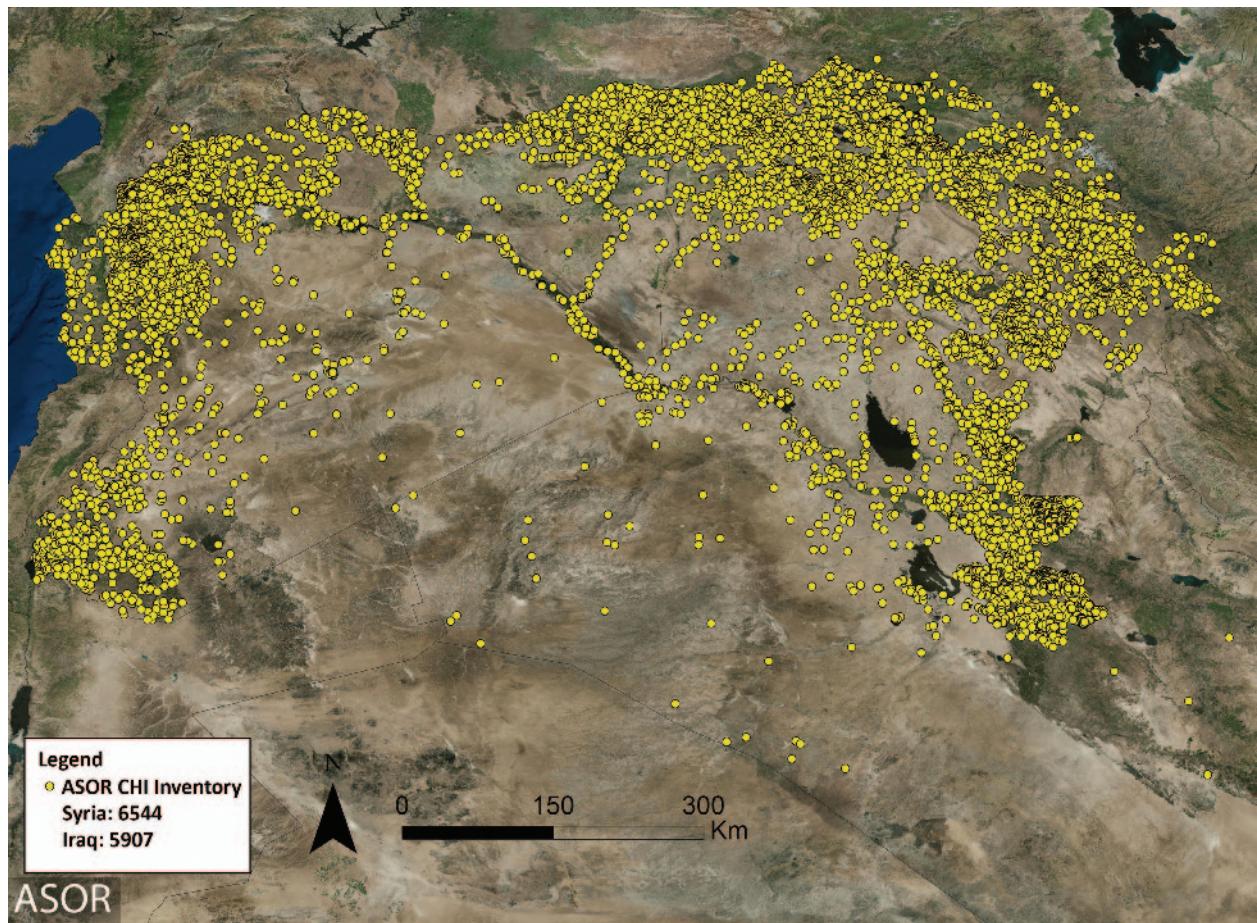


Fig. 2. Distribution of cultural heritage entities in the CHI Inventory, May 2016 (Courtesy of ASOR CHI)

grow as more heritage sites are affected by the conflict. The inventory is stored and analyzed on various platforms including ArcGIS, FileMaker Pro, and Arches (to be discussed in further detail in section 3.1).

Next, CHI assesses and maintains an awareness of the impact of the conflict on cultural heritage. On a daily basis, team members follow online news outlets and social media to gather data about the status of sites and collections in the region. CHI also receives information from in-country sources. The team collects photographs, videos, and written documentation related to damage or condition, as well as information about illegal excavations, theft, trafficking, and sales of antiquities. All of this information is archived in a custom FileMaker Pro database (fig. 3). Each piece of media is tagged with the related site inventory number so that all the media connected with each site in the inventory can be tracked and viewed.

Remote sensing analysis provides another important form of baseline data. CHI's geospatial specialists analyze high-resolution satellite imagery to monitor changes at heritage sites over time, and their analysis is often used to verify open-source and in-country damage reports. Satellite imagery is particularly useful for documenting illegal excavations over time, as illustrated at the site of Dura Europos in figure 4, but also for tracking military-related damage, such as the spring 2016 construction of a Russian military base on the ancient site of Palmyra (fig. 5). As of May 2016, CHI carried out satellite imagery-based assessments for more than 5,700 sites within its inventory. Some sites have been assessed multiple times based on newer satellite imagery, bringing the total number of assessments to over 7,800.

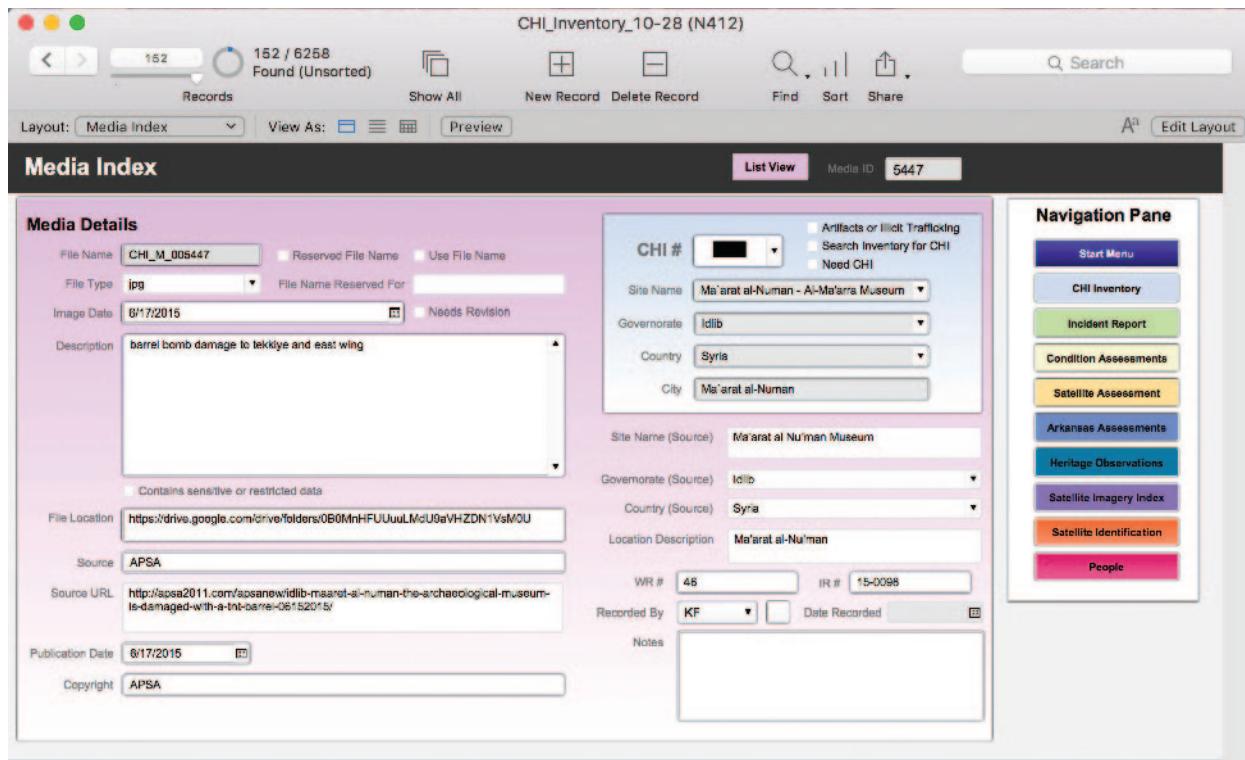


Fig. 3. CHI's Media Index in its FileMaker Pro project database (Courtesy of ASOR CHI)

CHI constantly monitors all newly available satellite images to check for new and additional damage to sites within the inventory.²

All of these observations from news media, local contacts, and satellite imagery are collated into biweekly reports, which are available on the CHI website (<http://www.asor-syrianheritage.org/weekly-reports/>). Approximately 800 incidents have been documented in the project's reporting series since the beginning of the project. CHI also produces additional in-depth Special Reports, including multiple reports on Palmyra and its monuments, which go into greater detail and analysis. CHI's remote condition assessments, the focus of this article, utilize all of the data collected through these monitoring and reporting activities to produce standardized documentation of the major preservation issues facing cultural properties. These data can be analyzed by many factors, such as geographical location, type of heritage, type of threat, or extent of damage, which helps satisfy DoS reporting requirements including planning for safeguarding measures and future documentation on the ground.

In addition to monitoring and documentation, CHI provides support to in-country groups that are working to safeguard heritage during the conflict. This has included the preparation and distribution of basic photo-documentation guides in Arabic for sites and artifacts. Additional support has included technical advice and funding for documentation supplies, emergency responses, and risk preparedness activities. With this assistance, the Bosra Al Sham Antiquities Department in Bosra, Daraa Governorate, Syria, has been able to inventory and re-house collections at the Bosra Museum, as well as to clean and organize storage facilities. The group has documented damage to structures within the World Heritage Site of Bosra, has cleaned and removed debris including unexploded ordnance, and has made temporary repairs to damaged structures. Another example includes the Ma'arra Museum in Maarat al-Numan, Idlib Governorate, a collection of important mosaics housed in a historic 16th-century Khan. Following a barrel bombing of the facility last summer (fig. 2), CHI assisted local groups with emergency response activities such as clearing debris, relocating objects, and carrying out temporary protection measures.

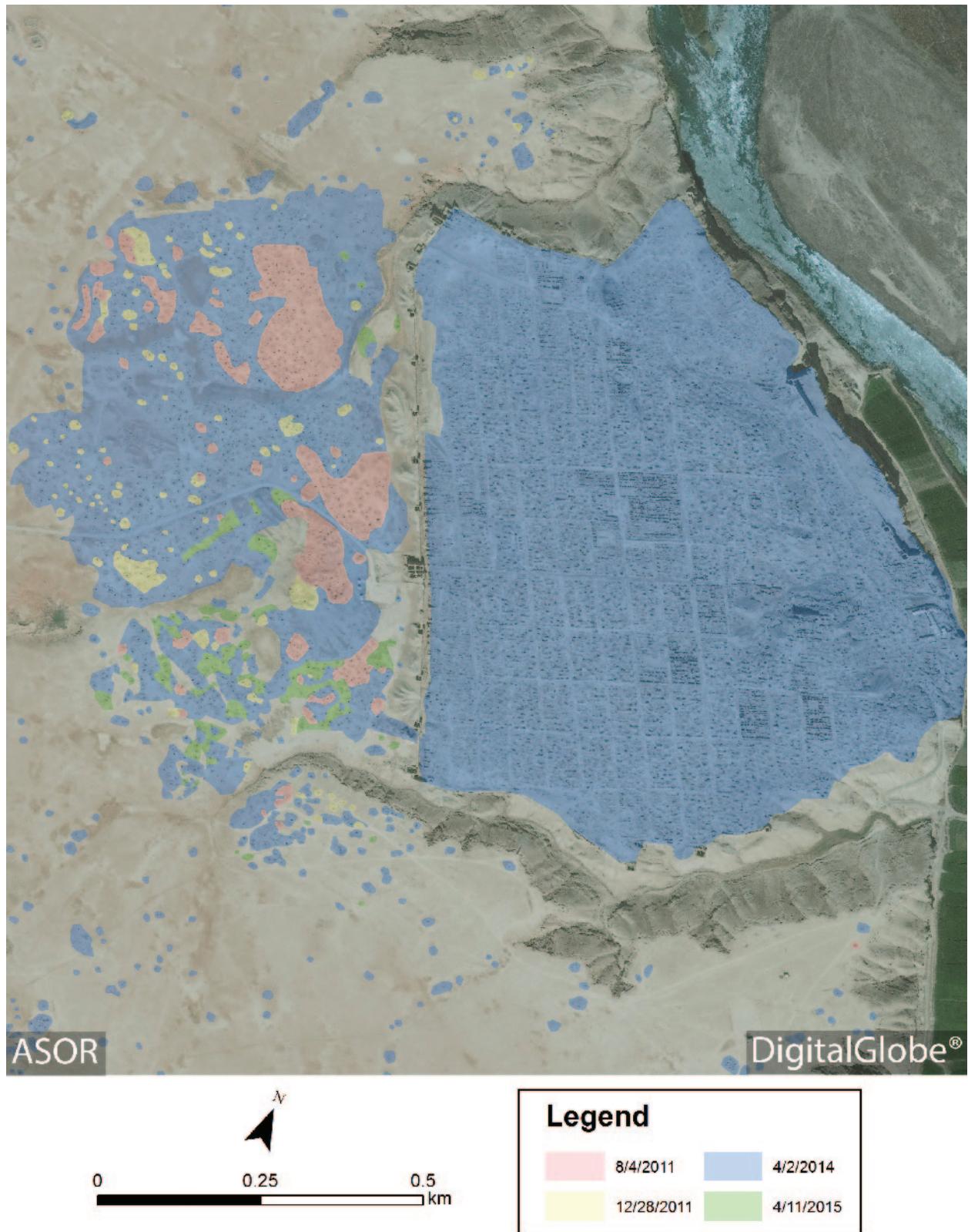


Fig. 4. Expansion of looted areas over time at Dura Europos (Courtesy of DigitalGlobe/ASOR CHI)

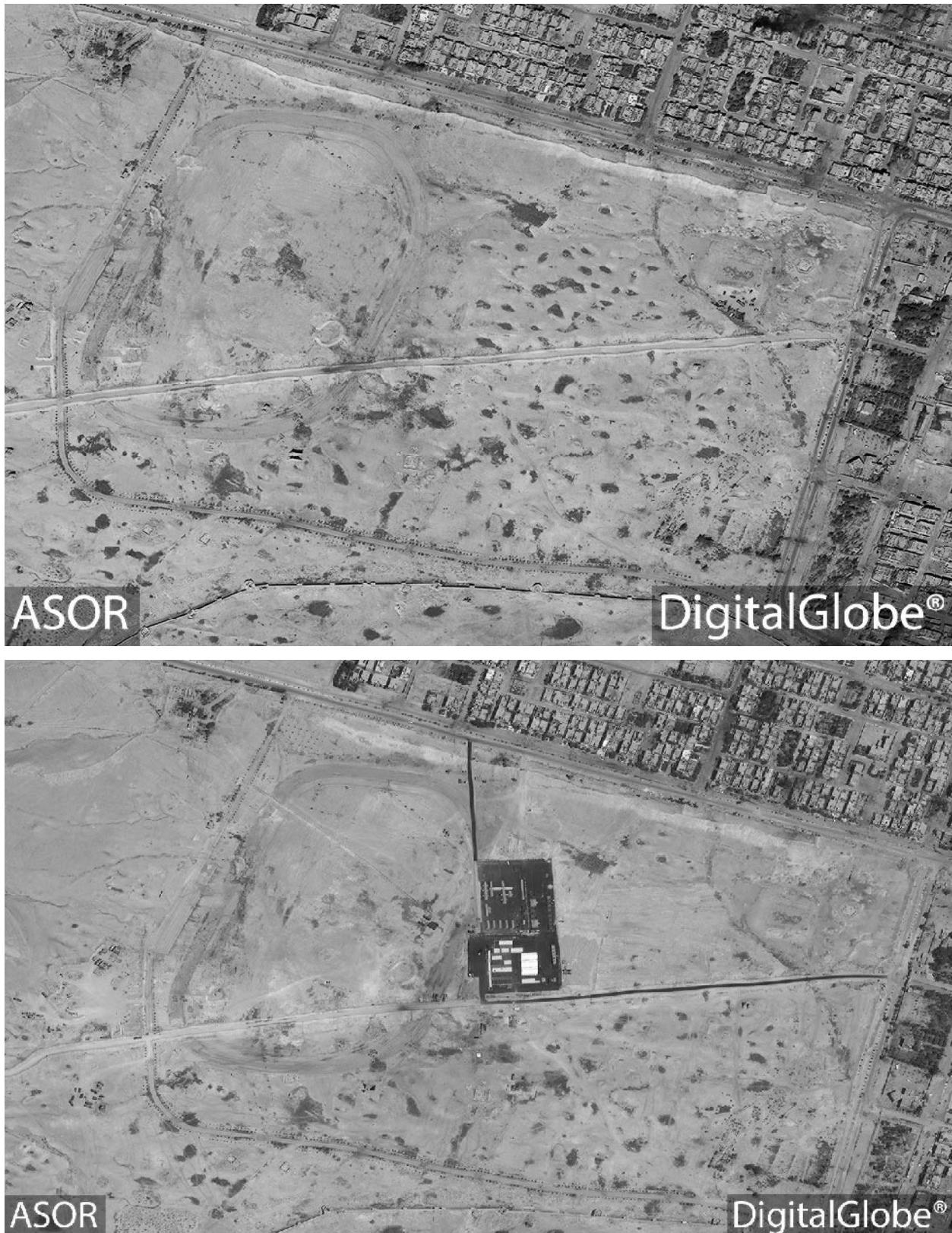


Fig. 5a. Palmyra World Heritage Site, March 30, 2016; 5b. Newly constructed Russian military base at Palmyra, April, 22, 2016 (Courtesy of DigitalGlobe/ASOR CHI)

Finally, CHI produces periodic reports that analyze all of the data collected through these activities to better understand the full impact of the conflict on cultural heritage in the region. Using this information, proposals have been developed for future in-country documentation of damage and assessment of preservation needs. CHI also maintains proposals for large-scale heritage projects that could be undertaken in the post-conflict period, as an important part of recovery and revitalization. The project also monitors the long-term needs for heritage management in Syria and identifies ways to build capacity.

3. DEVELOPING A REMOTE CONDITION ASSESSMENT METHODOLOGY

3.1 EXISTING MODELS, ADAPTATION, AND DESIGN

From the earliest stages of the project, CHI was interested in working with its site inventory in the Arches System developed by the Getty Conservation Institute and the World Monuments Fund (<http://archesproject.org/>). Arches is an open-source, geospatially enabled software platform designed for heritage management. Within Arches, separate modules exist to record threats, disturbances, condition, and management recommendations. In 2014, the Arches condition assessment module consisted of an overall condition rating and a free-text condition description. The CHI team needed something more detailed and also customized to the situation in Syria and Iraq, so other existing models were examined.

While there are now multiple projects that have developed database systems for recording damage to cultural heritage in the region such as the Syrian Directorate-General of Antiquities and Museums, Endangered Archaeology in the Middle East and North Africa, and the Syrian Heritage Archive Project, at the onset of the CHI project there were essentially no guidelines for assessments based on secondary data or that were specific to armed conflicts. During the planning stages, references and international standards on documentation were studied. Also, many generous colleagues contributed examples of condition assessment and survey forms to the project, and consultations were held with numerous heritage experts.

Based on this research, it was agreed that the CHI methodology should adhere to best practices in documentation and should be systematic, able to produce meaningful analysis, and able to be conducted by researchers working remotely without first-hand access to the cultural properties. It was important that the methodology be useful at present during the conflict as well as easily integrated with future emergency response efforts. With these factors in mind, the following three fundamental objectives were emphasized when designing the methodology: 1) to classify the causes of risk or damage, 2) to identify the effects of damage, and 3) to describe the intensity and extent of damage.

Designing the methodology began with creating standardized terminology for the condition assessments. A threat was defined as “an incident that threatens to disturb a cultural property,” and a disturbance was defined as “an incident that has disturbed a cultural property.” The purpose of recording threats and disturbances is to identify the causes of risk or damage. The following six broad categories were selected to classify threats and disturbances: agricultural activities, development activities, human activities, military activities, natural impacts, and site management. Each category contains approximately 10 terms (table 1). These categories, terms, and an Overall Threat Rating scale were based on the MEGA Jordan database, a precursor to the Arches Project, which has a well-developed glossary of terms (Getty Conservation Institute and World Monuments Fund 2011). These terms and definitions were adapted to fit the causes of damage observed in Syria and Iraq. This included adding new terms to existing categories, such as “Refugee Camp” to the Human Activities category, or removing terms that were not currently relevant, such as “Land Reclamation” and “Reforestation.” A new category, “Military Activities,” was created to include a range of damage causes linked directly to military operations.

Table 1. CHI Condition Assessments: Types of Threats and Disturbances

Category	Terms
Agriculture	Agricultural Burning, Grazing, Grove/Orchard, Irrigation, Plowing, Terracing
Development	Bulldozing/Leveling, Construction, Drilling, Inundation by Dam, Mining/Quarrying, Road Work, Trenching, Vibrations, Modern Town
Human Activity	Controlled Fire, Dumping, Illegal Excavation, Modern Burials, Theft, Vandalism, Water Damage, Refugee Camp/Encampment, Reuse of Ancient Building Materials, Reuse of Ancient Structure (Non-combatant)
Military Activity	Airstrike, Chemical Agent, Construction (Military), Earthworks/Roadworks, Explosives, Gunfire/Light Weaponry, Landmine, Occupation/Militarization, Reuse of Ancient/Historic Structure (Combatant), Tunneling, Vandalism/Intentional Destruction (Combatant), Vehicle/Heavy Weaponry
Natural Impacts	Collapse, Earthquake, Erosion, Environmental Conditions (Light/Temperature/Relative Humidity), Fire, Flooding/Rain, Land/Rock Slide, Pest Infestation, Rising Damp, Vegetation (Non-agricultural)
Site Management	Compromised Administrative Access, Maintenance, Inappropriate/Unstable Conservation/Restoration, Tourism/Visitor Activities

The condition of a cultural property was adapted from the MEGA Jordan database and defined as “an indication to what degree an entire site or element is physically stable, and is or is not experiencing active deterioration.” The condition rating scale from MEGA Jordan provided the basis for the CHI overall condition rating scale along with some modifications to the definitions (ratings include Good, Fair, Poor, Very Bad, Destroyed, and Non-extant).

Next, CHI developed a way to record the effects of damage at a more in-depth but systematic level of detail. Inspiration was drawn from the Evaluation section on assessment forms designed by the National Center for Preservation Technology and Training (2011), which approaches the assessment by component parts and ranks the intensity of the damage. Using this model, CHI created terminology and definitions for a broad list of condition issues (table 2). It was particularly challenging to design a list that could be useful for all of the heritage types in the CHI inventory, from cultural sites to movable objects and collections.

CHI also adopted an estimated damage scale to record the percentage of the property that has been damaged (1–10%, 10–30%, 30–60%, 60–90%, 90–100%) and created terminology and definitions for three broad categories of cultural heritage components that may have been adversely affected. These categories of components include immovable cultural heritage and facilities, movable cultural heritage, and administrative infrastructures (table 3). This was inspired by the Material section of the Field Guide Assessment Form created by Heritage Preservation (2006), and it allows for more detailed recording of the extent of the damage.

Due to the remote nature of the assessments (primarily the highly varied quality and availability of data for each particular site or object), it was recognized that it would not always be possible to record the intensity and extent of the damage. However, incorporating such a level of detail in the methodology allows the recording of intensity and extent in the occasional instances when such information is available, and it also allows the system to be more compatible with future on-the-ground assessments.

Table 2. CHI Condition Assessments: Condition Issues

Terms	Definitions
Collapsed/Off Foundation	Buildings or structural elements such as walls or archaeological baulks have collapsed or are no longer on their foundation.
Losses/Destroyed Elements	Areas where original material has been lost or destroyed, such as missing elements and holes; for archaeological strata, this could also include loss of access to the strata due to new construction.
Breaks/Detached Elements	Breaks in, or delamination of, a structure resulting in loose, unsecured parts not firmly held in place; depending on the severity, elements may be partially detached, able to be detached, or completely detached.
Cracks/Tears	Cracks, splits, fissures, or tears in a material without complete separation of the parts.
Leaning/Mechanical Damage	Architectural or structural element is leaning or exhibits mechanical damages including distortion, warps, or dents.
Flaking/Friable Surface	Surface phenomena that include flaking, peeling, tenting, lifting, powdering, or the tendency to crumble easily and that often result in loss; commonly but not exclusively applicable to surface coatings such as paint.
Corrosion	Corrosion is the gradual deterioration of materials, typically metals and metal alloys, by chemical reactions with their environment.
Mold/Mildew	Mold, mildew, or microorganisms are the result of a biological infestation or growth of various types of fungi on the surface of a material.
Soil/Accretions/Discoloration	Layers of dirt, grime, sediment, soil, or other matter that have accumulated on a surface; or a change in the original color of a material due to deterioration or the foreign substances that are embedded in the substrate and cannot easily be removed.
Graffiti	Writing or drawings that have been drawn, scratched, or sprayed on the surface.
Fire Damage	Damage from fire and smoke, including burned materials and soot accumulation.
Water Damage	Damage from water, including waterlogged and wet materials.

Once the initial terminology and assessment procedures were agreed on, a platform was needed to test and revise the methodology, so CHI created a condition assessment database using FileMaker Pro (fig. 6). The condition assessments are digitally stored alongside CHI's site inventory, media index, incident reports, heritage observations, and satellite imagery assessments. All of the terms and definitions are included on the right-hand side of the assessment page for easy reference while working. By scrolling down the assessment page, the following sections can be viewed: Condition Summary, Threats and Disturbances, Condition Issues, and Rapid Assessment Priority.

Table 3. CHI Condition Assessments: Cultural Heritage Components

Categories	Terms
Immovable Cultural Heritage/Facilities	Archaeological Strata/Sub-surface Materials, Foundation/Floor, Walls/Columns (Other Structural Elements), Roof, Windows/Doors, Ceiling, Decorative Architectural Features (Three-Dimensional), Façade/Surface Coverings, Infrastructure
Movable Cultural Heritage	Books, Paper, Photographs/Film, Wood, Textile, Stone, Metal, Ceramic, Glass, Mosaic, Furniture, Painting
Administrative Infrastructure	Housing for Display/Storage, Office/Laboratory Equipment, Office/Laboratory Furnishings, Administrative Files

3.2 TESTING AND REVISION

Once the database was built, testing of the methodology began by CHI team members and with the assistance of outside consultants. Initial testing resulted in numerous adjustments to the terminology and the layout of the assessment form, and the more notable changes are described here. A section for recording the sources of data was added using checkboxes for some of CHI's most common sources as

The screenshot displays the CHI Inventory application interface. At the top, there are standard window controls, a title bar 'CHI_Inventory_10-28 (N412)', and a toolbar with icons for 'New Record', 'Delete Record', 'Duplicates', 'Find', and 'Sort'. Below the toolbar, the main content area is organized into several sections:

- Site Details:** Shows 'CHI #' (redacted), 'Search Inventory List', 'Go to Detailed Inventory', 'Site Name' (Al-Aqsa - Umayyad Mosque (Great Mosque)), 'Country' (Syria), 'Governorate' (Aleppo), 'Alt Names' (Al-Aqsa Mosque), and 'Site Type' (Religious Site or Monument).
- Assessment:** Displays 'Assessment # 3', 'Assessment Date' (2015-04-27), 'Assessor Initials' (SR), 'Additional Assessor' (SFG), and 'Assessor's Assessor' (dropdown). It includes a note about reasons for unable to assess (checkboxes for 'Not Enough Available Information', 'Not Extant', and 'Property Requires a Specialized Assessment Method'). Data sources listed include 'Photograph(s)' (APSA, UNITAR), 'Satellite Image(s)' (DJI), 'CHI Reports' (Burns, News/Social Media, Other), and 'Additional Sources'.
- Condition Summary:** Shows 'Overall Condition Rating' (Very Bad), 'Overall Threat Rating' (Urgent), 'Overall Rapid Assessment Priority' (77.5), and a detailed 'Condition Description' section. This section contains a large block of text describing the destruction of Umayyad Mosque in April 2013 and the subsequent dismantling by the Free Aleppo Council.
- Threats and Disturbances:** Lists 'Threats' (Explosion, Robe of Ancient Building) and 'Disturbances' (Archeological Excavation, Construction, Contamination, Damage, Graffiti/Vandalism, Vandalism, Very Aggressive Commercial/Industrial Access).
- All Assessments for this Site or Collection:** A table showing one assessment entry: 'Assessment # 3' (Date 2015-04-27, Status BK, Condition Very Bad). A note states: 'Following the destruction of Umayyad Mosque in April 2013, the Syrian Association for Preserving Heritage and Ancient Landmarks (with the assistance of the Heritage Office of the Free Aleppo Council) dismantled and removed all remaining structures from the early Islamic period.'
- Definitions:** A section with a dropdown 'Definition Category' set to 'Site Type'. It lists several categories with their definitions:
 - Archaeological Site/Monument:** Located in or unexcavated areas, including historic cultural landscapes, which may contain artifacts, architectural remains, standing ruins and structures including fortifications and other enclosures and examples from the earliest periods up through the early Islamic period.
 - Religious Site/Monument:** Built cultural heritage including structures, landscapes, and architectural elements associated with religion, including shrines of worship, churches, shrines, madrasas and minarets that were or are currently used for religious purposes from the Islamic Period to the present.
 - Secular Site/Monument:** Built cultural heritage including structures, landscapes, and architectural elements other than those explicitly related to religion, such as public buildings, structures, temples, and monuments to the dead, including tombs, funerary structures, monumental structures, civic or performing arts theaters, or madrasas/minarets no longer in use for religious purposes.
 - Museum, Collection, Library, and/or Archive:** Collections of movable cultural heritage including archaeological and historic collections and library collections such as books and paper-based artifacts and archival and library documentary records that are important for their historical, environmental, or administrative interests; collection of records with cultural, historical, or monetary value.
 - Administrative Infrastructure:** Buildings for administration of cultural heritage resources, such as offices of the DIAH, headquarters of archaeological sites or museums.
 - Historic District, Neighborhood, or Cultural Landscape:** A collection of structures, landscapes that consist multiple cultural heritage sites, monuments, or structures within its boundaries, which may be archaeological, religious, and/or secular in nature.
 - Modern Village or City:** An inhabited village or city that likely contains cultural heritage sites, which have not yet been specified in the inventory.
- Navigation Pane:** On the right side, a vertical pane containing links to other parts of the application: Start Menu, CHI Inventory, Incident Report, Condition Assessments, Satellite Assessments, Arkansas Assessments, Heritage Observations, Media Index, Satellite Imagery Index, Satellite Identification, and People.

Fig. 6. CHI's Condition Assessment Form in its FileMaker Pro project database (Courtesy of ASOR CHI)

well as an open text field. Since the assessments are compiled from numerous sources rather than first-hand observations, this complex issue is unique to remote assessments and may still need development. It was also realized that the methodology needed to accommodate potential revisions or updates when new data becomes available. This challenge was met with the development of protocols for revisions or updates and the development within the FileMaker Pro platform of a series of checkboxes, open text fields, and portals to display all assessments in the database for a particular site or collection.

While the aforementioned changes were primarily procedural, some revisions were made to the underlying methodology itself. A section on “significance” that had been previously developed in the draft form was eliminated due to the complexities of evaluating authenticity and integrity. However, a new metric was developed to quantify the priority for first-hand assessments that takes significance into account. The value is based on the following seven weighted factors, which result in a numerical score, out of a total possible of 100 points: condition rating, potential risks, inherent material vulnerability, significance, accessibility, permissions, and occupation. This value will help to prioritize primary field assessments when conditions permit.

4. PRELIMINARY RESULTS: ALEPOO

By the summer of 2016, CHI had assessed more than 600 properties using this methodology. This section will demonstrate how this data can be analyzed, using Aleppo as a case study. The assessments presented here were conducted in the late summer and fall of 2015 and do not reflect damage to sites in Aleppo that may have occurred from December 2015 to the present. In figure 7, the border of the Old City of Aleppo as designated on the World Heritage List is marked in red. Within the CHI inventory, there are approximately 350 cultural properties in Aleppo.

The CHI remote condition assessment methodology was unable to be carried out for 38 of these properties, which are historic neighborhoods that require a more specialized assessment. However, the individual properties within these neighborhoods were assessed. Table 4 shows the distribution of the overall condition ratings for the properties. Fifteen sites received the highest possible condition rating of “Good,” while 11 sites received a rating of “Destroyed.” For 48 properties, there was not enough information to make an assessment. It is possible the unassessed sites are in good or fair condition, since no information has been available about them, but at present their status is uncertain. Figure 8 maps the distribution of the condition ratings for the 264 properties that could be evaluated. Of the assessed sites, 45% were in good to fair condition. Those in the poorest condition are grouped to the southwest of the citadel, where the fighting has been the most intense.

Table 5 shows a breakdown of the overall percentage of a cultural property that is damaged. At approximately half the sites that were assessed, CHI was unable to determine the percentage of the site that was damaged based on available information. These numbers show that while a condition rating could be assigned based on our data, it was far more difficult to discern the extent of the damage. Figure 9 presents the distribution of the percentage damaged, excluding those with the overall percent damaged marked as unknown. Similar to the condition rating, the properties with the greatest extent of damage are found in areas where the fighting has been the most intense.

The threat of damage or continued damage to sites in Aleppo is displayed in Table 6. Perceived threats include all categories listed in Table 1, from the risk of combat-related damage to deterioration caused by underlying condition issues. At 74% of the properties, the risk is considered to be high to urgent, indicating that substantial damage will occur soon or immediately if mitigating actions are not taken. While the properties in the poorest condition with the greatest extent of damage were concentrated near the west of the citadel, the distribution seen in figure 10 shows that the threat of damage remains quite high for properties located throughout the Old City.

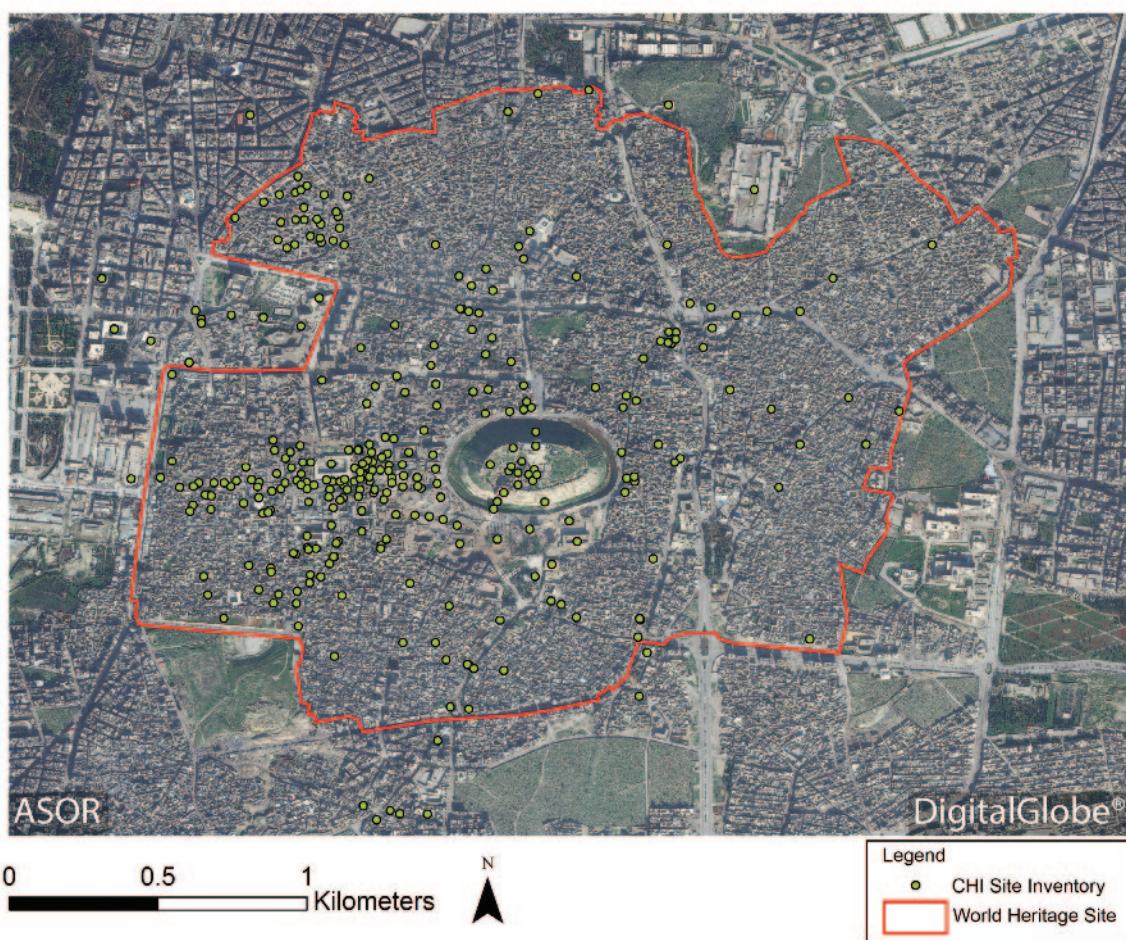


Fig. 7. Distribution of cultural heritage entities in Aleppo from the CHI Inventory (Courtesy of DigitalGlobe/ASOR CHI)

Using the CHI assessment methodology, types of damage or disturbances can be studied by category (Table 1). Figure 11 is a map of sites that have been impacted by either military or human activities. Shown in red, 151 properties have been damaged by military activities, shown in yellow, three properties have been damaged by human activities, and shown in orange, 28 properties have been affected by both categories of disturbances.

Table 4. Aleppo: Overall Condition (of 312 Cultural Properties)

Rating	Number of Properties	Percentage of Assessed Sites
Good	15	5%
Fair	104	33%
Poor	62	20%
Very Bad	72	23%
Destroyed	22	4%
Not Enough Information	48	15%

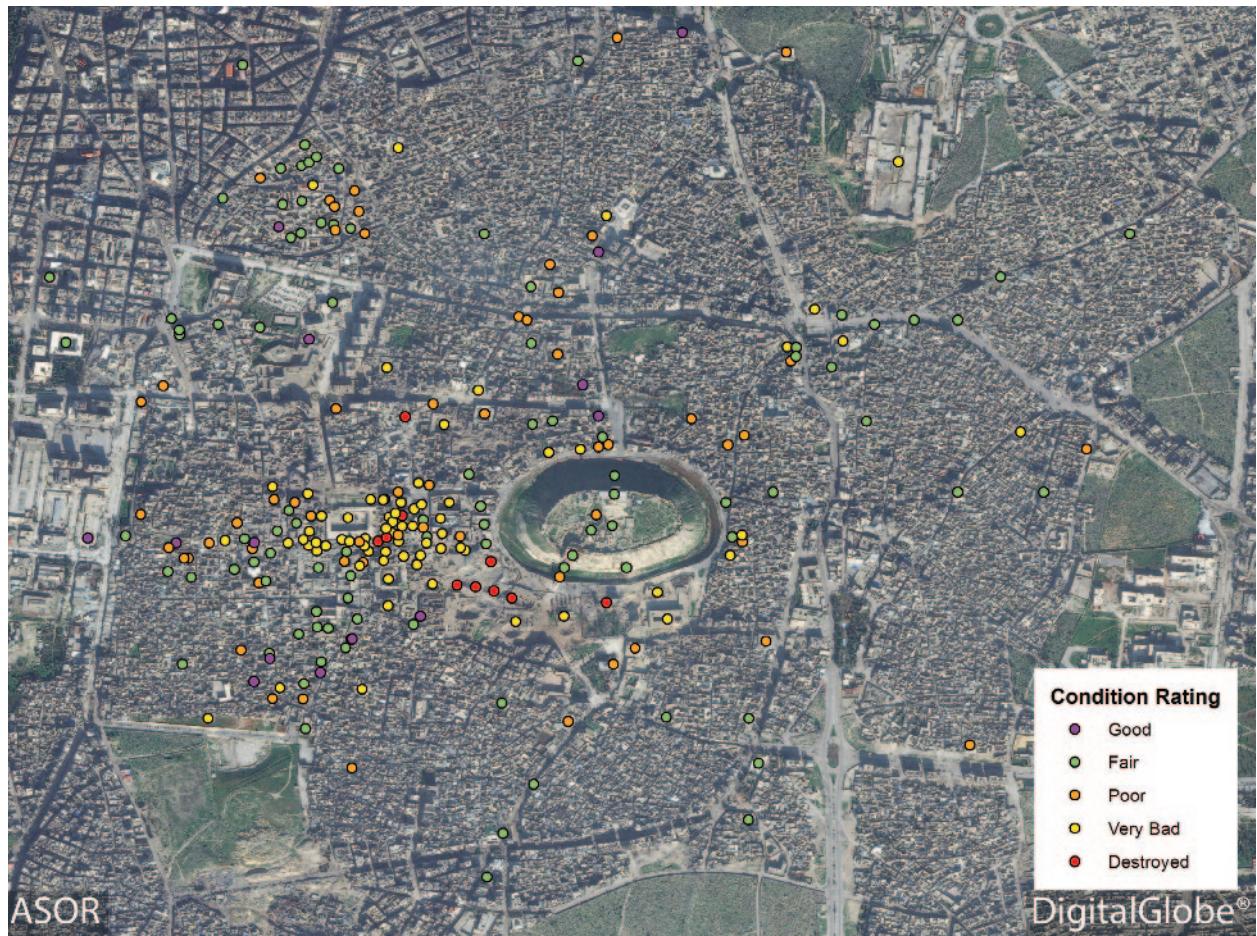


Fig. 8. Distribution of condition ratings for cultural heritage entities in Aleppo (Courtesy of DigitalGlobe/ASOR CHI)

Types of damage can also be examined individually. For example, figure 12 shows the distribution of tunneling (i.e. the excavation of tunnels underground for military purposes such as explosions). Shown in orange, 54 properties in Aleppo have been impacted by tunneling. Alternatively, figure 13 shows the distribution of 13 properties impacted by theft, a factor in the CHI Human Activity category. Furthermore,

Table 5. Aleppo: Percentage of a Site that is Damaged (of 264 Cultural Properties)

Rating	Number of Properties	Percentage of Assessed Sites
None	21	8%
1–10%	22	8%
10–30%	28	11%
30–60%	25	9%
60–90%	21	8%
90–100%	13	5%
Unknown	134	51%

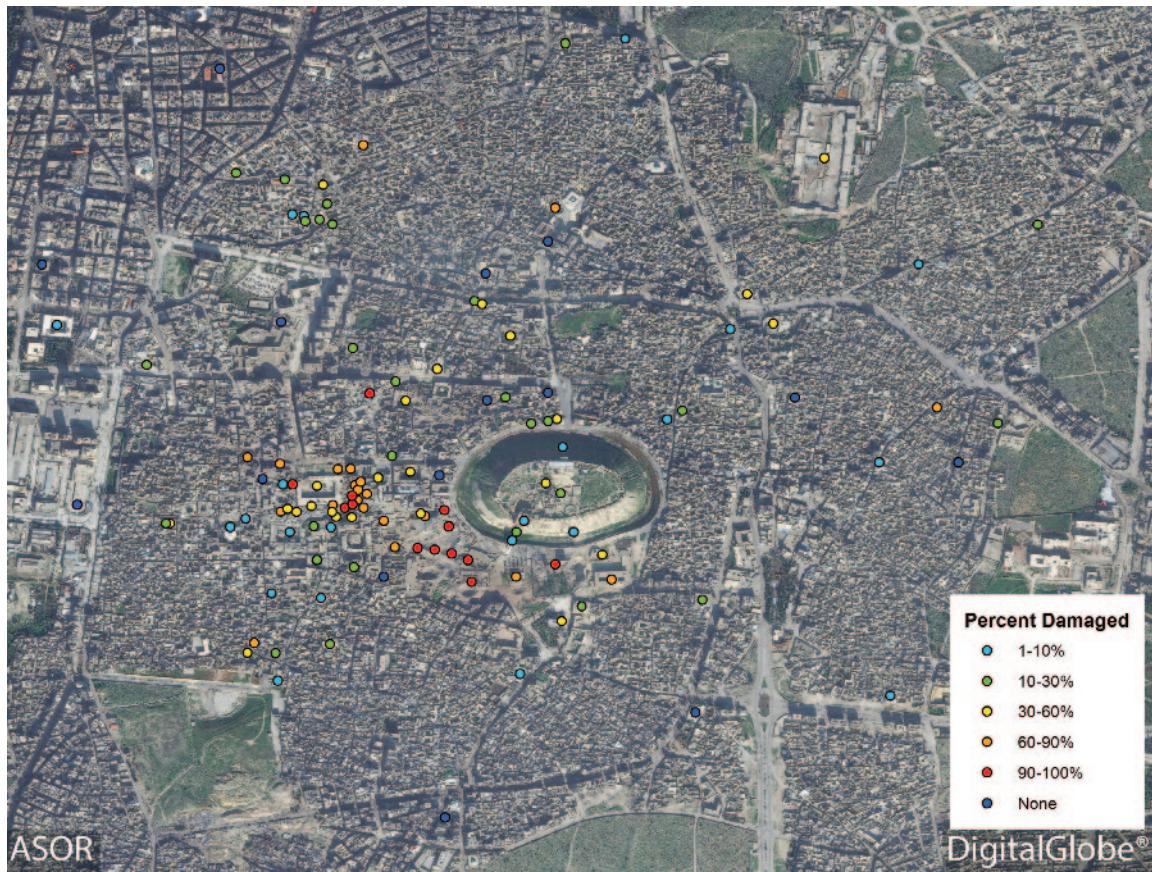


Fig. 9. Distribution of overall percentage damaged for cultural heritage entities in Aleppo (Courtesy of DigitalGlobe/ ASOR CHI)

individual condition issues can also be examined. Seen in figure 14 are cultural properties with documented fire damage or collapsed structural elements, and those affected both by fire damage and structural collapse.

The final assessment parameter to be illustrated is the rapid assessment priority (described previously in section 3.2). Of the 264 properties in Aleppo that were assessed, 44 properties that scored above 75 are presented in figure 15, from blue to red, with the highest-ranked property in red. This ranking could help determine the priority for primary field documentation that could be carried out as soon as conditions permit. For example, if there were time constraints, a route could be mapped to reach the top prioritized sites in the area. This first-hand documentation would allow experts to assess the overall heritage situation and identify emergency protection measures.

Table 6. Aleppo: Overall Threat Rating (Of 264 Cultural Properties)

Rating	Number of Properties	Percentage of Assessed Sites
Low	15	6%
Medium	53	20%
High	114	43%
Urgent	82	31%

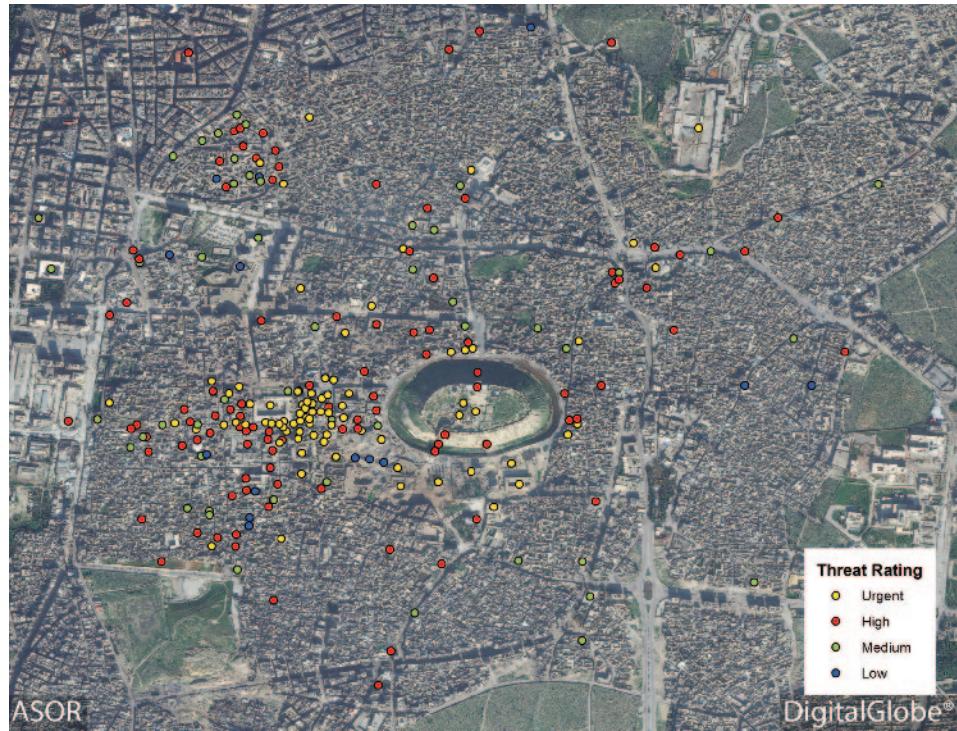


Fig. 10. Distribution of overall threat rating for cultural heritage entities in Aleppo (Courtesy of DigitalGlobe/ASOR CHI)

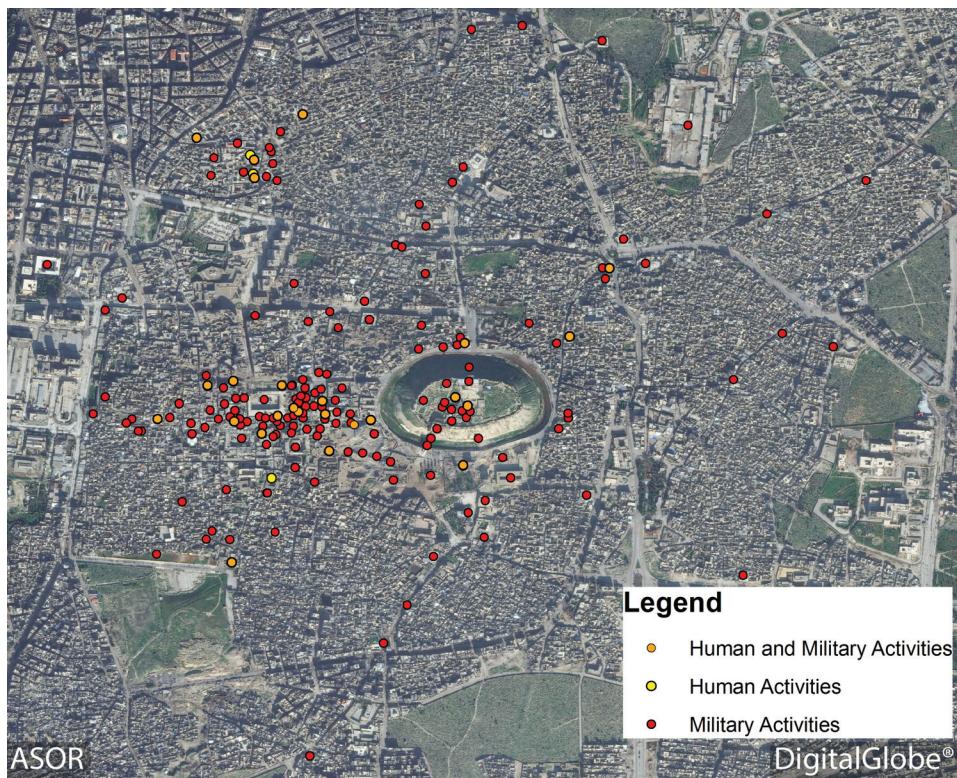


Fig. 11. Distribution of cultural heritage entities in Aleppo damaged by military and human activities (Courtesy of DigitalGlobe/ASOR CHI)

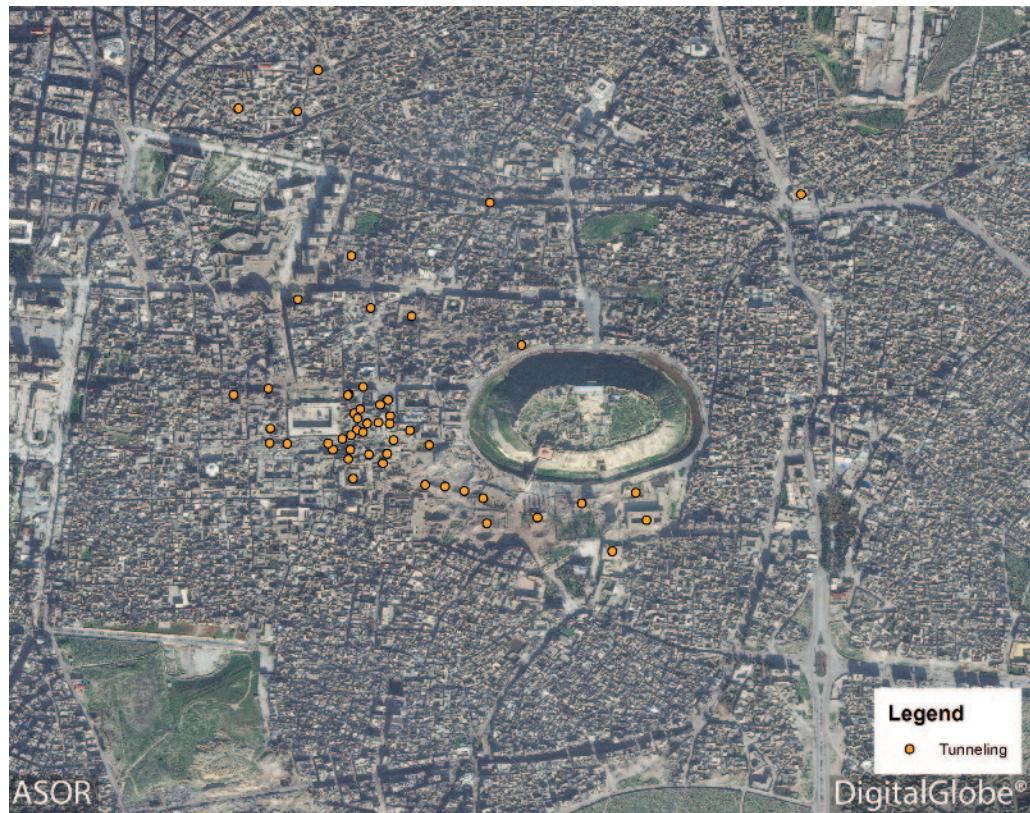


Fig. 12. Distribution of cultural heritage entities in Aleppo damaged tunneling (Courtesy of DigitalGlobe/ASOR CHI)



Fig. 13. Distribution of cultural heritage entities in Aleppo impacted by theft (Courtesy of DigitalGlobe/ASOR CHI)

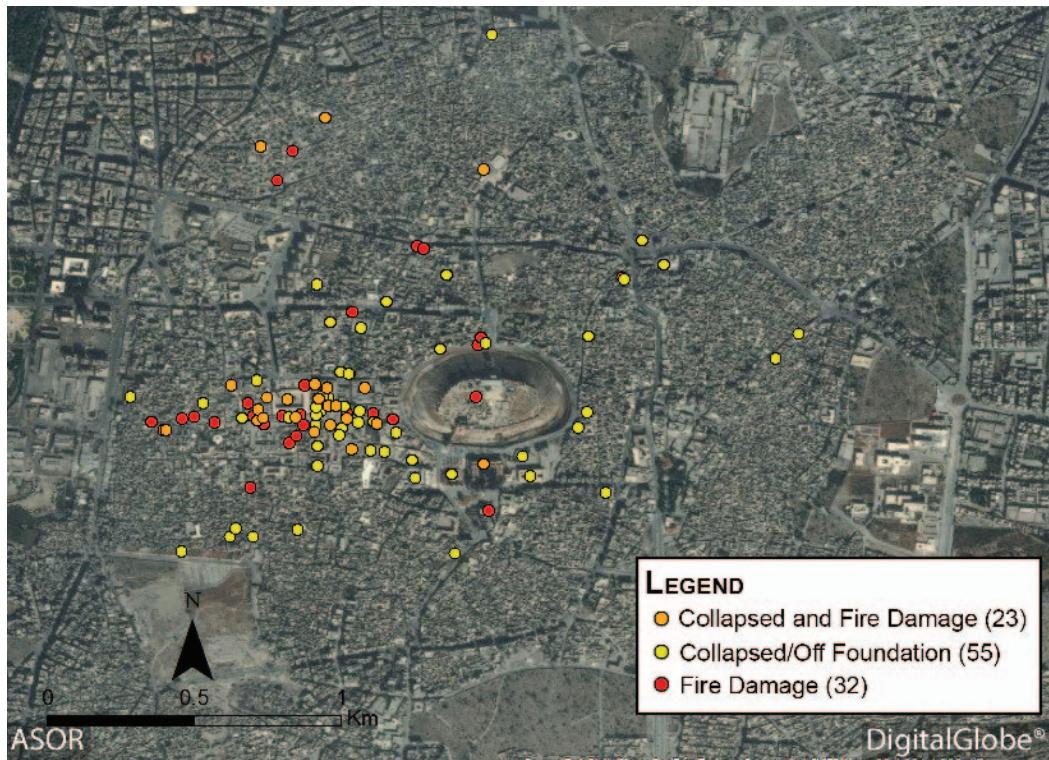


Fig. 14. Distribution of cultural heritage entities in Aleppo with fire damage and collapsed structural elements (Courtesy of DigitalGlobe/ASOR CHI)

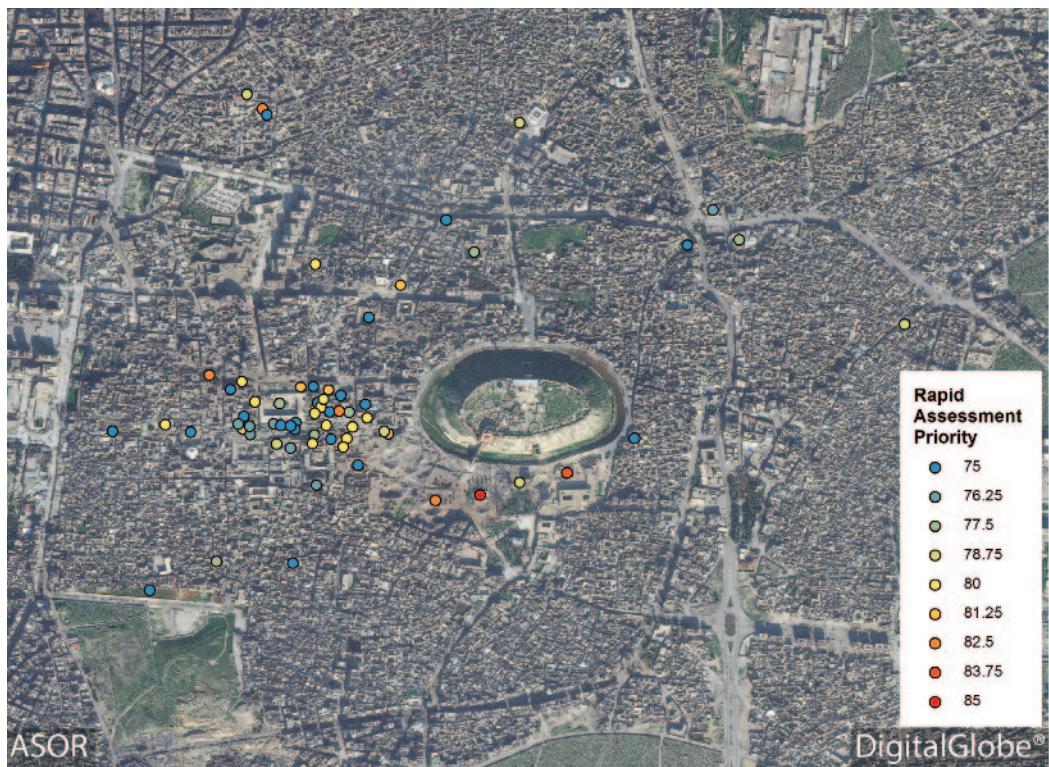


Fig. 15. Distribution of the rapid assessment priority for 44 cultural heritage entities in Aleppo (Courtesy of DigitalGlobe/ASOR CHI)

5. CONCLUSIONS

In developing this methodology, our primary challenge has been to find a way produce condition assessments in a systematic way without first-hand observations. Another challenge is the impossibility for assessors to have an intimate knowledge of each of the more than 12,000 sites in the CHI inventory. In these circumstances, one difficulty can be recognizing the line between observable fact and inference. For example, if a satellite image shows a collapsed roof, can it be presumed that the walls of the structure have been damaged as well? Without good baseline data, how do we know which damage in a photo is recent? It would be useful to somehow incorporate the concept of “confidence level” into the methodology. How confident are we in our various assessments of risk, disturbances, percentage of damage, or condition? Also, how reliable are particular data sources? Additionally, it’s important to recognize that the situation on the ground is not static, so these assessments need constant updates if they are to stay relevant and useful.

Overall, the CHI methodology has tackled difficult questions to create a robust platform for documenting preservation issues during armed conflict. The system appears to be manageable for assessors working with secondary data sources; preliminary analysis has yielded results that are in line with expectations, and CHI has received positive feedback from our international colleagues who are also working on developing best practices for this type of work. Lastly, the methodology remains flexible and open to change and revision.

For the future, CHI is currently working on assessments for all of the properties that have been covered in our weekly reporting series, and plan to move on to other heavily impacted areas after that. The next significant change will be to integrate the condition assessment database with Arches when the new version, Arches 4, is released. Incorporating our assessments into Arches will facilitate working geospatially to view condition information and to further explore patterns and relationships between properties. Some of the anticipated updates to Arches include the ability for increased customization of the condition assessment module and mobile data collection. Hence, CHI is developing rapid assessment forms for on-the-ground documentation that could be used within such a mobile platform.

To conclude, this article has discussed how the CHI project collects, archives, and analyzes information about status of heritage sites and collections in Syria and Iraq during the current crisis. It has also demonstrated how this information can be used to systematically document the causes, effects, and extent of damage to these cultural properties. Ultimately, it is hoped that this work will improve our understanding of the types and patterns of risk and damage to cultural properties, in order to better protect and manage heritage during periods of armed conflict.

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NOTES

1. For more on the development of the regional conflict, see Rodgers, L., D. Gritten, J. Offer, and P. Asare (2016) or Institute for the Study of War (2016).
2. For more on satellite imagery-based analysis of archaeological sites in Syria during the conflict, see Casana (2015).

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