



# SHINING LIGHT ON LOOTING

## USING GOOGLE EARTH TO QUANTIFY DAMAGE AND RAISE PUBLIC AWARENESS

**Daniel A. Contreras and Neil Brodie**

*Daniel Contreras is a postdoctoral teaching fellow in the Introduction to the Humanities program at Stanford University. Neil Brodie is the Director of the Cultural Heritage Resource of the Archaeology Center at Stanford University.*

The market-driven looting of archaeological sites is an internationally recognized problem, but consensual solutions and the political will to implement them remain elusive. A key reason for the failure of the international community to articulate a coherent response is the difficulty of obtaining reliable quantitative information “on-the-ground” about either the extent and intensity of looting or the material damage being caused (see Brodie and Renfrew 2005:345–347 for an overview). Archaeological field surveys tend not to record such information because it is regarded as “non-archaeological,” and aerial photography is poorly suited to the task because of the costs involved in flying non-targeted reconnaissance missions. The scarcity of reliable information about the scale of archaeological site looting facilitates claims that the seriousness of the problem is being exaggerated: that most artifacts reaching the market are either “chance finds” (objects discovered through building or agricultural activities), or are from “old collections.” Therefore, the argument goes, no strong responses are necessary. Compelling horror stories about the damage caused by looting (e.g., Atwood 2007; Politis 1994) are dismissed as anecdotal and unrepresentative cases (see, for instance, comments in Mead 2007). The scarcity of information also makes it difficult to monitor the effectiveness of any ameliorating policies—how are we to know when looting is increasing or decreasing?

In principle, quantitative information can be obtained from high-resolution satellite imagery, which offers a means of identifying and assessing site damage without time-consuming and expensive site visits (see Stone 2008). In practice, however, the cost of obtaining suitable images has until recently been prohibitive for regional-scale projects. The imagery made publicly available on Google Earth now promises to overcome the obstacle of cost, though problems of coverage, appropriate resolution, and surface visibility remain (see Beck 2006; Scollar and Palmer 2008; Ur 2006). We have recently (Contreras and Brodie 2010) explored the use of Google Earth imagery for the investigation of site looting in Jordan, concluding—parallel to suggestions made by Parcak (2009) and Kennedy and Bewley (2009)—that

Google Earth is a tool well-suited to the task. We identified heavily looted areas, searched the published literature for relevant information, and visited the majority of these sites to ground-truth our assessments. The result is a corpus of data that includes estimates of the total area damaged by looting, information (where available in the archaeological literature) about the time period and cultural affiliation of looted sites, and on-the-ground photos detailing some of the looting damage (for examples see Figures 1 and 2). This information is being used for further research into the socio-economic contexts of looting, both locally and internationally.

Demonstrating the utility of the method, however, is only a first step. While most archaeologists might not need convincing that looting does significant damage, and that Google Earth may represent a means of quantifying that damage, there are more appropriate—if more difficult—targets. Looting is a problem that, like the drug trade or traffic in products derived from endangered species, is international in scope, and because of the power of the economic incentives in play, the market forces driving it are often beyond the reach of national authorities to police. Strategies of “social persuasion” can be more productive than legislative countermeasures. In particular, it is important to engage with the collectors who, in buying illicit antiquities, indirectly cause such destruction, and the policymakers charged with site protection and/or the movement, sale, and purchase of antiquities. To this end, we are investigating the use of Google Earth not only as a research tool, but also as a means of compelling, visceral communication.

Google Earth can serve as a tool for public outreach in archaeology by drawing the attention of *non-archaeologists* to the damage inflicted by extensive looting, and inviting them to participate in the research effort. Thus our outreach project has two aims: (1) to make looting damage visible—and visceral, and (2) to provide a means by which colleagues (and the public!) can collaborate, either by contributing documentation (for example photos, maps, etc.) or by identifying new sites that should be included.



Figure 1. Example of looting damage as seen in Google Earth; the pockmarked landscape visible is the result of numerous and densely spaced looter's pits. The site is Bab adh-Dhra, in a Google Earth image from 2007.



Figure 2. Bab adh-Dhra as seen from the ground in June 2009 (photograph by Daniel Contreras). On-the-ground images like this one both serve to ground-truth the identification of looting damage made on the basis of Google Earth images like that seen in Figure 1 and provide a dramatic sense of real effects of looting damage.

## ARTICLE

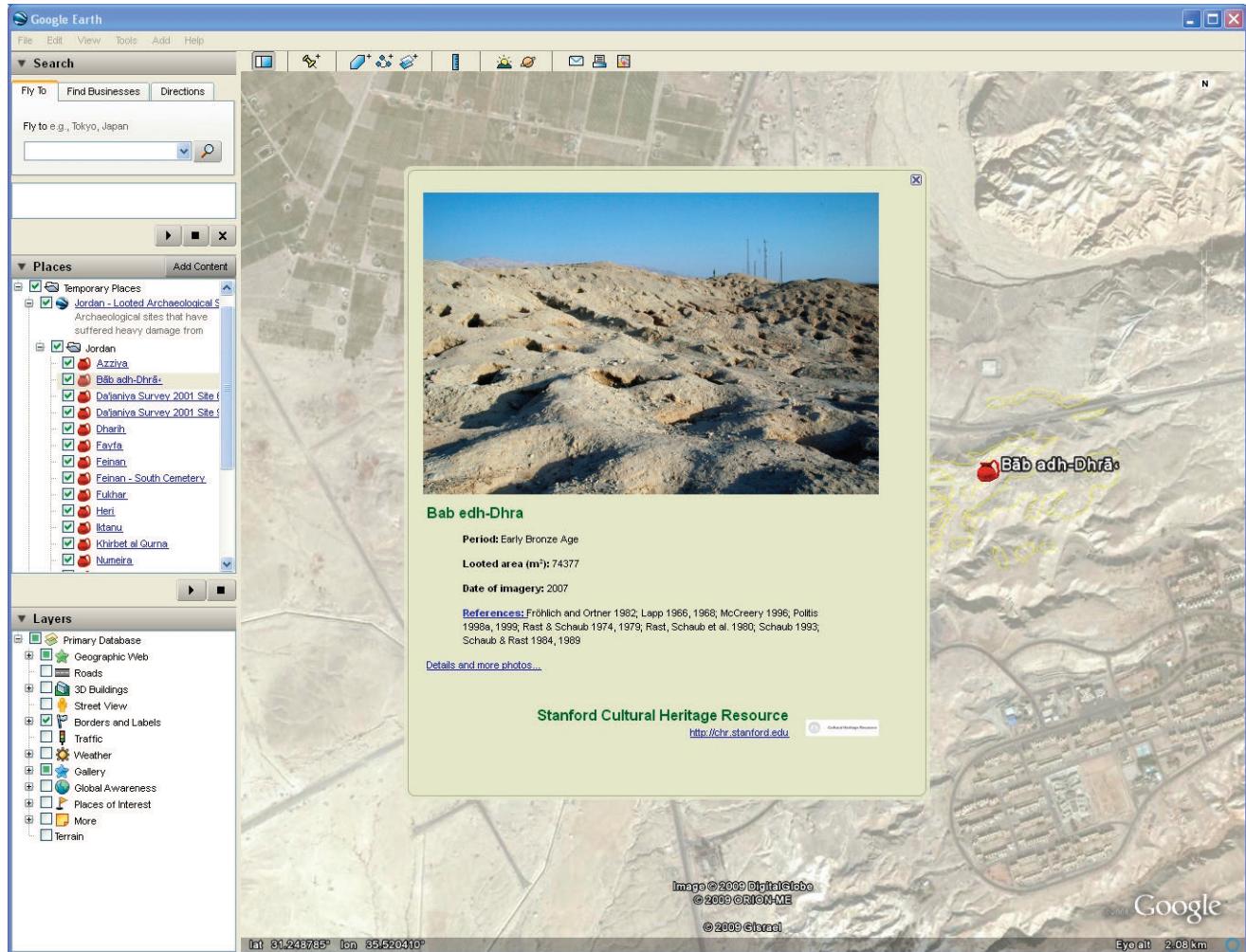


Figure 3. Screen capture of looting data maintained in Spreadsheet Mapper, as seen in Google Earth.

Drawing on the suite of tools that Google has made available through Google Earth Outreach, the arm of Google Earth dedicated to encouraging and enabling non-profit use of Google Earth (<http://earth.google.com/outreach/index.html>), we have published the array of data on looting damage that we have collected on Jordan. Publishing to both the web (see <http://chr.stanford.edu>) and Google Earth (either for internal or public consumption), we argue, is a useful means of raising public awareness, soliciting information and collaboration from colleagues, and advocating the implementation of the research equivalent of “sunshine laws” for looting.<sup>1</sup> In other words, we hope that employing Google Earth in an interactive manner can facilitate publicizing as well as quantifying looting damage, making the consequences for archaeological sites of the inter-

national trade in illicit antiquities more apparent to all.

The Spreadsheet Mapper tool provided by Google Earth Outreach<sup>2</sup> is admirably suited to our purposes. We provide (see <http://www.stanford.edu/group/chr/drupal/content/looting-jordan>) a network link to a spreadsheet that we maintain as a Google Document, which produces a Google Earth layer of site locations, with pop-up balloons providing further information about the sites, a photo of what the damage looks like on-the-ground, and links to further information on the web, which we host at [chr.stanford.edu](http://chr.stanford.edu) (see Figure 3). The layer is dynamically linked to the spreadsheet, meaning that as we update any information hosted there, the Google Earth layer will change appropriately. This allows interested viewers to stay up-to-date with

current research and to see that any contributions that they may make (identifying a looted site which we may then include in the database) are actively incorporated into the research effort.

Two challenges remain. The first, as Ur (2006) and Parcak (2009:224) have pointed out, is that publicizing site locations on Google Earth may invite looting of said sites. In the case of our use of Google Earth, however, the publication of locations of sites that are already heavily looted carries minimal risk, as looters presumably have nothing to learn from publication of their own work; the danger is one more associated with publicizing locations of sites newly located by archaeological survey. The second will require pushing the limits of the methodology itself. Using Google Earth imagery can only give us a snapshot of the extent of looting damage on the date of image acquisition; it cannot tell us anything about patterns of looting over time. Addition of older imagery would be particularly useful; where such imagery has ever been available in Google Earth it is now accessible in version 4.0 of Google Earth. Where previous satellite imagery is unavailable or of resolution too low to be useful, historical aerial photographs have proven useful for calculating the time periods with which extensive looting is associated (Contreras 2010). Even where time series of images are not available, however, establishing a baseline measure of looting damage for a given date provides a means of monitoring the rate of contemporary looting should it continue.

As more researchers tackle the problems of looting and traffic in illicit antiquities (e.g., Bowman 2008; Brodie and Renfrew 2005), it has become increasingly clear that the scale of looting damage is truly alarming. Attention has understandably tended to focus, however, on single exceptional artifacts (e.g., the Euphronios krater) or small assemblages (e.g., the Morgantina silver), which dramatize the appearance of prize materials in private or institutional collections and the associated disappearance of archaeological contexts. Our work complements this focus by emphasizing concern over a scale of looting damage that goes far beyond the loss of individual contexts, and that cuts archaeologists even closer to the bone: the wholesale loss of patterns of material culture that occurs when a cemetery is looted. We hope that Google Earth may serve to help educate the public generally, and policymakers and collectors in particular, about the gravity of this problem.

## References Cited

- Atwood, Roger  
2007 The Rape of Batán Grande. *Archaeology* 60:29–33.
- Beck, Anthony  
2006 Google Earth and World Wind: remote sensing for the masses? *Antiquity* 80(308).

Bowman, Blythe

2008 Transnational Crimes Against Culture: Looting at Archaeological Sites and the “Grey” Market in Antiquities. *Journal of Contemporary Criminal Justice* 24(3):225–242.

Brodie, Neil, and Colin Renfrew

2005 Looting and the World’s Archaeological Heritage: The Inadequate Response. *Annual Review of Anthropology* 34(1):343–361.

Contreras, Daniel A.

2010 Huáqueros and Remote Sensing Imagery: Assessing looting Damage in the Virú Valley, Peru. *Antiquity* 84(324):544–555.

Contreras, Daniel A., and Neil Brodie

2010 Quantifying Destruction: An Evaluation of the Utility of Publicly-Available Satellite Imagery for investigating Looting of Archaeological Sites in Jordan. *Journal of Field Archaeology* 35(1):98–111.

Kennedy, David, and Robert Bewley

2009 Aerial Archaeology in Jordan. *Antiquity* 83:69–81.

Mead, Rebecca

2007 Den of Antiquity: The Met Defends its Treasures. *The New Yorker* April 9.

Parcak, Sarah

2009 *Satellite Remote Sensing for Archaeology*. London: Routledge.

Politis, Konstantinos D.

1994 Biblical Zoar: the looting of an ancient site. *Minerva* 5(6):12–15.

Scollar, Irwin, and Rog Palmer

2008 Using Google Earth Imagery. *AARGnews* 37 (September 2008):15–21.

Stone, Elizabeth C.

2008 Patterns of Looting in Southern Iraq. *Antiquity* 82:125–138.

Ur, Jason

2006 Google Earth and Archaeology. *The SAA Archaeological Record* 6(3):35–38.

## Notes

1. This is currently the province primarily of NGOs like ICOMOS (<http://www.international.icomos.org/home.htm>), Saving Antiquities for Everyone (<http://www.savingantiquities.org/index.php>) and the Global Heritage Fund (<http://www.globalheritagefund.org/home.html>); the latter is preparing to launch the Global Heritage Network ([http://www.globalheritagefund.org/what/ghf\\_network.html](http://www.globalheritagefund.org/what/ghf_network.html)), intended to facilitate such monitoring.

2. For details see [http://earth.google.com/outreach/tutorial\\_spreadsheet.html](http://earth.google.com/outreach/tutorial_spreadsheet.html).