Todd Brenningmeyer et al.
http://dx.doi.org/10.15496/publikation-43156

Unsettled Settlements: Documenting Site Abandonment and Transformation in Modern Greece

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Abstract

The Deserted Villages Project is a multidisciplinary study of 19th- and 20th-century settlements in Greece. The short period of inhabitation in these settlements presents opportunities to document evidence of site formation, decline, and transition using a variety of methodologies. Two case studies will be presented. In the mountains of Phocis, villages founded in the mid-19th century and burned by the Germans during World War II are documented through traditional and GPS survey, UAV based aerial photography, close range photogrammetry, and the collection of oral histories. On the coast of Macedonia, a Cold War settlement for the Voice of America radio station near Kavala is documented through terrestrial photography, GIS, and video. The settlement, occupied from 1972 to 2006, presents a short-lived example of American domestic architecture transplanted into the landscape of rural Greece.

Keywords: GIS, photogrammetry, historical archaeology, architecture

Introduction

The Greek landscape has played a special role in the Western imagination as embodying idyllic ideals unadulterated by modernity. Created by early travelers and archaeologists, this notion is perpetuated by tourism, which promotes aspects of Greek culture as unchanging and rooted in the landscape. The violent history of Modern Greece, however, has disrupted lived continuities between the present and the past. Beginning in the 1970s, archaeological field surveys mapped the nuances of the cultural landscape through the collection of surface pottery and the modeling of temporal and spatial change. Settlement patterns have shifted radically in response to global and local forces. A more dynamic model of the Greek landscape has been corroborated by ethnoarchaeological research carried out along with surface collections (Forbes 2007; Pavlides and Sutton 1995; Sutton 1994). Susan Sutton (1988) traced the fluctuating demographics of rural life from the 16th century to the present, noting that village foundations, demographic decline, and related population movements were frequently associated with changing political realities and villagers' participation in local, regional, and global economies. The modern village of the 16th to the 20th centuries is, therefore, a fragile spatial entity defined by the mobility of populations and capital rather than a static repository of ancient values. Migration and depopulation remain core components of life in the Greek countryside. The settlement pattern of Greece became increasingly ephemeral as a result of economic bankruptcies (1893, 1929, 2009), wars with its neighbours (1897, 1912-13), World Wars (1919-22, 1940-44), civil war (1946-49), and dictatorships (1925-26, 1936-41, 1967-74). Although escalated during the 20th century, migration within and beyond the national borders was a common and

Figure 1. Map showing the location of Aigition, Kavala, and Distomo.

vital part of this process, producing a landscape of perpetual abandonment and resettlement (Kourelis and Caraher 2010).

Although scholarship has increasingly accepted this dynamic model of the Greek landscape, little attention has been placed on how such change has affected the architectural fabric of settlements. Even less attention has been given to the archaeology of Greece's most recent past. The blossoming field of an archaeology of the contemporary world has used the notion of supermodernity to characterize the heightened destruction occurring globally between World War I and the present (González-Ruibal 2008: 247). Two case studies in Central and Northern Greece provide a fertile arena to investigate the effects of supermodernity through the archaeological study of domestic architecture (Figure 1). The village of Aigition, Phocis is a traditional Greek village founded in the mid-19th century and sustained by remittances sent back from the United States in the early 20th century. In 1943, the village was burned by the Axis Powers and its residents were interned in a concentration camp in Athens. At the end of World War II, the population resettled in Aigition's ruins. Thirty years later, the village was abandoned as its residents moved away to Athens or more connected places. The Voice of America (VOA) station in Kavala, Macedonia was an American army base transmitting propaganda to Eastern Europe. Its civilian staff were housed in a settlement built to replicate an American suburb. In 2006, this American settlement was abandoned. Although physically and conceptually unrelated, the two sites were the research subjects of the Deserted Village Project, an undergraduate field school that brought together Greek and American students. Both Phocis and Macedonia are regions that experienced supermodernity's extreme unsettlement. The studies of Aigition and VOA presented instructive challenges on how to map and interpret the materialities of crises in the recent past grafted on the physical remains of rural settlements. The following sections briefly discuss methods used in the study of Aigition and VOA.

Aigition

Since 2010, an international team of scholars has investigated the diverse natural and man-made landscape surrounding the modern village of Lidoriki in the prefecture of Phokis, central Greece (Figure 2) (Brenningmeyer, Kourelis, & Katsaros 2016). At the center of the study area is the artificial Mornos reservoir, which dominates the region's topography. In the early 1970's the Greek Water Supply Company (EEY) created the reservoir to meet the growing water needs of the city of Athens (Ananiadou-Tzimopoulou and Nana 2015: 76; Kaika 2005: 136). Its construction flooded archaeological sites and cut off historic transportation and communication routes that once connected small villages in the surrounding countryside. Ancient Kallion (Kallipolis) was among the most important ancient sites impacted by the flooding; rescue operations were carried out by an international team of archaeologists who recorded the site before its inundation (Herbert and Kase 1977; Laffineur 1977; Laffineur 1978; Laffineur 1979; Laffineur 1980; Themelis 1979). Modern houses and settlements located along the Mornos valley were likewise submerged within the lake. Communities located in the mountains surrounding the lake found themselves isolated by the reservoir's construction. The village of Aigition, located on a mountain ridge

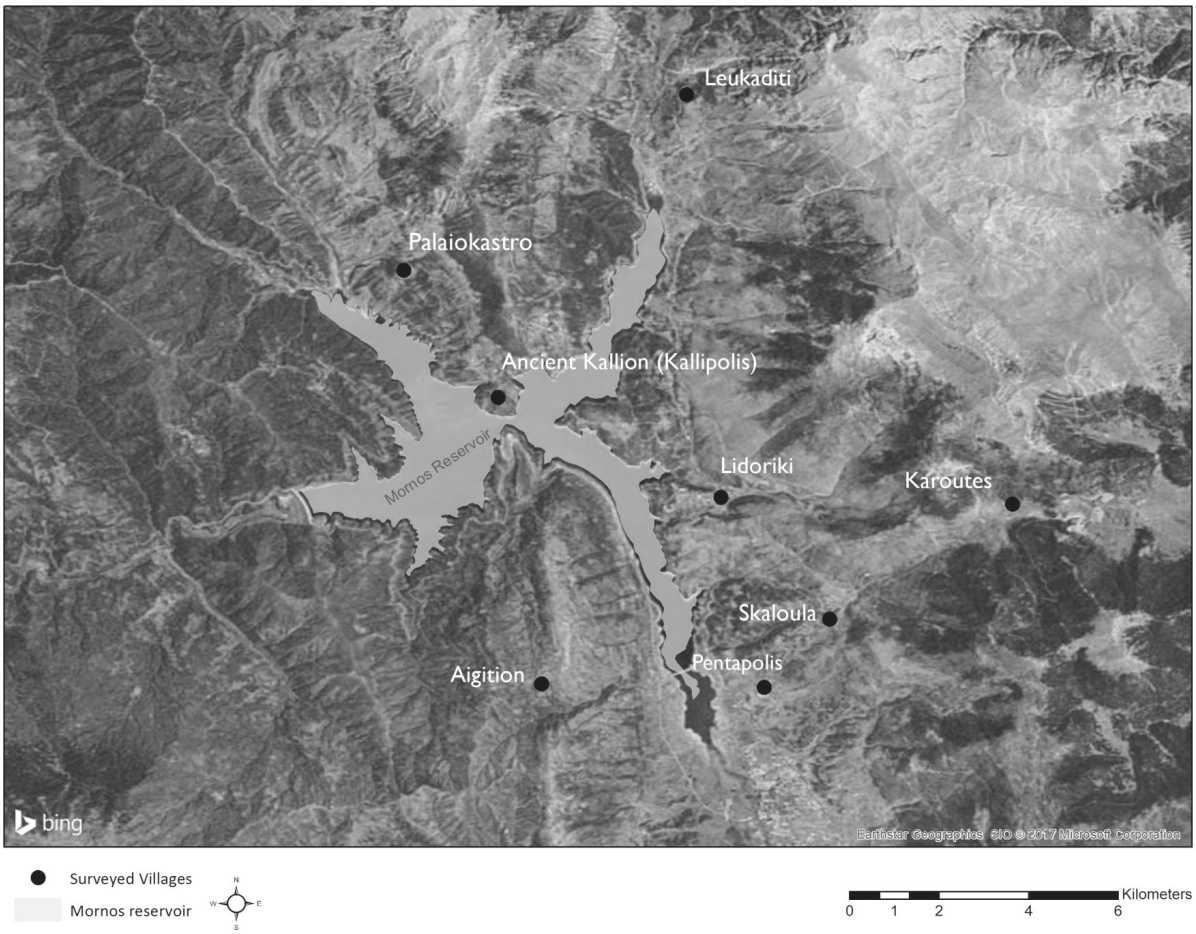

Figure 2. Map of the project area surrounding the Mornos reservoir.

west of Lidoriki, was among the settlements impacted. The process of decline and abandonment that began in the 1940s solidified in the 1960s as residents migrated to villages closer to primary transportation routes. Aigition has been a focus of our investigations from the beginning of the project.

The history of Aigition can be traced to the 19th century when the village was known by the name Strouza. This name has been identified in Ottoman registers from the late 15th and 16th centuries, but there is no evidence of structures built before mid-19th century (Doorn 2009: 200). The notion of an earlier village located at Palaiokastro survives in the oral histories. The physical evidence at Aigition suggests that the foundation of the settlement is contemporary with the dedication of the village church in 1852 (marked by an inscription on the church's east apse). This date corresponds with the period of general agricultural prosperity that followed the establishment of the Modern Greek state in 1832, when fertile lands belonging to Ottoman feudal lords were passed to Greek owners (Frangakis-Syrett and Wagstaff 1992). Aigition likely developed through the gradual nucleation of small pastoral settlements before formally establishing itself as a village through the dedication of the church. Work by the Archaeological Survey School of Holland (1989: 239) underscored the historic importance of pastoral economies in the area surrounding the village, noting that significant environmental changes took place in this area during the 19th century as woodlands were deforested and converted into shrubbed pasture lands.

The history of Aigition after its foundation follows many of the patterns noted elsewhere in Greece. The village, along with the rest of the region, experienced a demographic boom in the 1870s (Asdrachas 1979). By 1893, a phase of slow decline brought on by Greece's financial collapse led to emigration. Members of the village were among the quarter million Greeks that immigrated to the United States. Local informants identified houses in Aigition that were constructed using remittances sent from the United

States. Two donor inscriptions on a house (1915) and the school (1909) mark immigrant donors that can be traced-through the records of Ellis Island-to Madison, Wisconsin. A sizeable diaspora community from Aigition settled in Chicago. The Balkan Wars, World War I, and World War II further transformed the village. The most dramatic episode occurred on July 23, 1943, when the German army burned the village and sent its residents to a concentration camp in Athens. The central village of Lidoriki was also burned on August 29, 1944. Further east, the mass execution and burning of Distomo (Figure 1) received international attention (Life 1944). The residents of Aigition returned after the war and resettled the ruined village. In 1950, some of the residents moved to the new village of Pentapolis located in the plains along modern roads and infrastructure. Census records indicate a significant population decline between 1951 (324 residents) and 1961 (120 residents). By 1971 the census records 0 full time residents remaining (Stamatelatos and Vamva-Stamatelatou 2001: 432). The history of the village from 1971 to the present is one of gradual decline. Some buildings in Aigition have been converted to temporary seasonal residences (kalivia). A small number of buildings has been renovated by past residents or their descendants, while the vast majority are in a state of disrepair and ruin. The documentation of these buildings provides a window into the processes of abandonment and site formation, while providing a historical record of unique regional architectural traditions exemplified in the construction practices of the builders.

Project Data

While the village of Aigition had not been systematically studied prior to our investigations, historic documents and published regional survey reports record regional topographies and lifeways. Early travellers describe the region's late 19th century geography within travellers' accounts and tourist guidebooks (Bazin 1864; Murray 1900: 650; Woodhouse 1897). Historic maps illustrate the principal settlements in the region along with transportation routes. The Dépôt de la Guerre produced the most detailed of these in 1852 at a scale of 1:200,000. It provides a remarkably detailed record of routes and settlements

Figure 3. Project team conducting interviews in Aigition.

and was the earliest to identify Aigition's position on regional transportation networks. More recent studies provide a foundation for interpreting the site within its regional context. During 1980s and 1990s, the Aetolian Studies Project of the Netherlands Institute in Athens surveyed a large area that extended from Mount Giona in the east to the Achelous River in the west (Bommeljé 2009; Bommeljé and Doorn 1996; Bommeljé et al. 1987). While their study did not publish details about Aigition, their research area encompassed the village, and their team used the village as a base during their survey of the surrounding region. Their published survey data and maps of Aetolia were incorporated into our project GIS. Maps at 1:50,000 scale, compiled by the Hellenic Military Geographic Service (HMGS) in 1971, 1975, and 1988, provide more recent details about the topography immediately before and just after the flooding of the valley. Two sets of declassified CORONA KH-4A satellite images acquired July 26, 1965 and February 1, 1968 provide further coverage of the area and illustrate patterns of land use in the valley before the dam's construction. Taken together, the historic datasets informed our understanding of Aigition's place within the regional history.

The investigation of Aigition involved oral interviews, including the last resident of the village Demetrios Kafritsas (1941-2017), who recounted the burning of the village and its reoccupation in the 1940s (Figure 3). Our collaborator Sophia Klossa has been instrumental in collecting oral histories, as well as founding and curating the Lidoriki Folklore Museum, which opened its doors in 2017. The Deserted Village Project created a photographic inventory of the collections and created 3D photogrammetric

models of prominent objects for presentation. Informants from Lidoriki and other nearby villages provided additional accounts of Aigition and the surrounding region. Research on social media has also allowed us to discover and interview émigrés that have settled in America and Europe.

In 2010 initial survey work began at the village. Traditional land survey with a total station and manual architectural survey were coupled with preliminary aerial reconnaissance using balloon aerial photography (BAP), pole aerial photography (PAP), and kite aerial photography (KAP). The aerial reconnaissance relied on techniques applied by team members on the island of Karpathos and in the Peloponnese (Nelson et al. 2015). BAP and KAP photography used small Canon S90 and S110 automatic cameras suspended from a 3.3 m3 helikite or a range of kites tailored to specific wind characteristics. PAP photography used a similar camera elevated on a 9 m carp pole. Scripts written using the Canon Hack Development Kit (CHDK) and Stereo Data Maker (SDM) automated camera capture during flight. A video transmitter attached to the camera allowed the surveyors to track the camera frame remotely. Architects from the National Technical University of Athens developed measured plans of a handful of buildings within the village as well as nearby mills, bridges, and decorative components of notable structures. By 2014, the project added an Unmanned Aerial Vehicle (UAV) to the survey toolkit to more efficiently document the village and its topography. The process and preliminary results of this work were published in Brenningmeyer et al. (2016). The results of this work provided a detailed orthophoto and map of the site and its architecture. This information was further situated within regional data extracted from previous surveys, traveller's accounts, and historic maps and imagery.

Methodology: Photogrammetric Architectural Survey

During the final two field seasons (2015 and 2016), the project focused on developing a complete catalogue of Aigition's architecture. While architects had developed hand drafted plans of notable buildings during previous seasons, greater emphasis was placed on documenting the full range of structures represented at the site in preparation for a study season and publication. Structure from Motion (SfM) and Dense Surface Reconstructions were implemented for the rapid collection and reconstruction of architecture in the village. SfM is an automated method for estimating three-dimensional coordinates from overlapping photographs that developed in the field of computer vision research (for brief overviews of SfM, see Carrivick et al. 2016; James and Robson 2012). Like traditional photogrammetry, it relies on overlapping photographs to generate measured reconstructions. While SfM shares some similarities with traditional photogrammetry, the process and requirements differ. Traditional photogrammetry requires a calibrated camera with a well-defined collection process to ensure at least 60 percent forward overlap and 30 percent side overlap in every image. SfM by contrast is designed to work with unordered photographs taken with cameras that may vary in terms of their lens characteristics (see for example Carravick et al. 2016; Snavely et al. 2006; Snavely et al. 2008). SfM software estimates the interior and exterior orientation of the camera while identifying matching features across processed photographs. While the quality of the lens and camera are still limiting factors in the quality of the final models, SfM offers flexibility that is not typical to traditional photogrammetric projects. The output of SfM processing are a sparse point cloud and reconstructed camera positions. These may be used on their own or (more typically) become inputs for software that applies algorithms to produce a dense surface reconstruction in the form of a dense point cloud and/or mesh (Carrivick et al. 2016: 50). While we experimented with a variety of platforms during the course of the project, we currently use Agisoft PhotoScan Professional for our reconstructions. PhotoScan provides a simple workflow for model construction. The program, however, does not currently publish the algorithms used for their SfM and dense surface reconstructions. Notes on their website suggest that Multi-View Stereo (MVS) and "pair-wise depth map computation" are used for dense surface reconstructions (Semyonov 2011; see also Dall'Asta and Roncella 2014:190).

Photographic and video inputs were used to develop architectural reconstructions. The collection and processing of these inputs present two different approaches for rapid survey of architecture. In 2015, students and researchers collected overlapping pho-

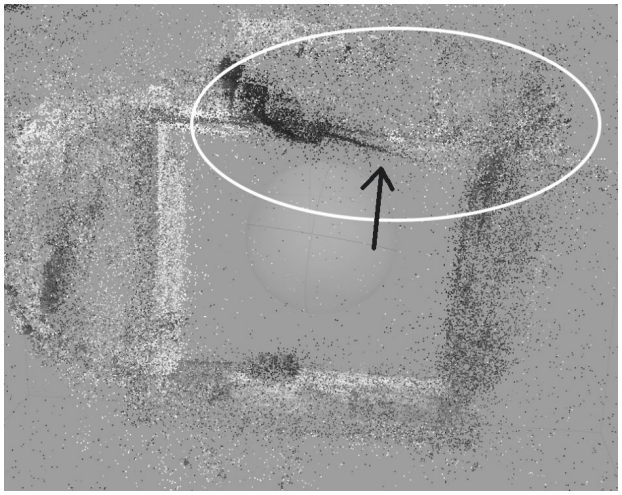

Figure 4a. Sparse point cloud of Building 12 from Aigition showing poor alignment at left caused by small baseline distances.

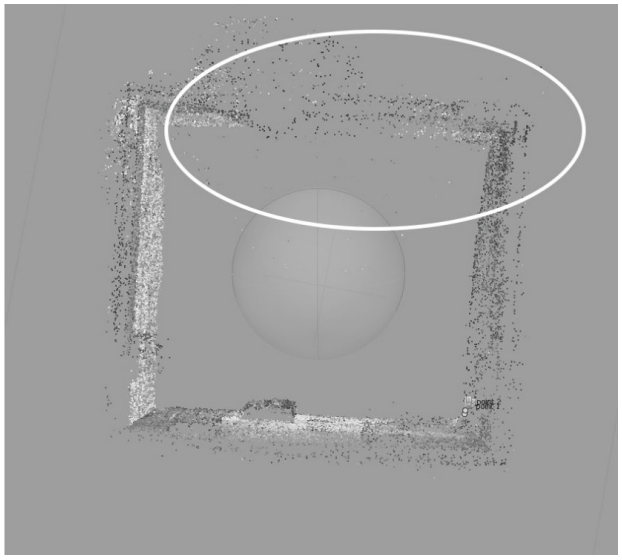

Figure 4b. Building 12 with improved alignment using refined selection of photos with improved baseline distances.

tographs of building exteriors using DSLR cameras as part of the 3D reconstruction effort, often taking 500 or more photographs per house. Surveyors used Nikon D5000 and D750 cameras for much of the collection with a few houses surveyed with compact cameras (Canon Powershot G12, and S110). Frame numbers were associated with building IDs noted on preliminary printed maps of the village. These frame numbers were later associated with corresponding buildings within the developing project GIS. Surveyors carefully positioned cameras to ensure at least 60 percent overlap between frames. Care was taken to capture transitions along corners and between building exteriors and interiors. In many cases, camera set-

Figure 5. Reconstructed model of Building 12 from Aigition, created using iPad videos.

up was time consuming. The village rests on the top and sides of two broad ridges separated by a narrow draw. Buildings lie along the edge and top of slopes with fallen building debris and stones spread across an uneven ground. Scrub vegetation, in the form of Kermes Oak and various xerophile herbs and grasses further obscured many buildings and increased the difficulty of accessing some areas. Using this photographic collection process, our crew members averaged approximately 1-2 buildings per day. The speed of the photographic collection severely limited the number of buildings that we were able to document during the 2015 season. In some instances, surveyors collected enough photographs to reconstruct only one or two sides of a building.

In 2016, we returned to Aigition to begin our final season at the site. A decision was made to forego broad DSLR photographic collection in favour of video, which would provide contextual information for reviewing architectural details during the study season. We also believed that the use of video would speed the collection of image data for our model reconstructions. DSLR cameras were reserved for documenting architectural details and images for publication. 10.5" iPad Pros were used for the video collection. The decision to use the iPad Pro was pragmatic. The iPad is a device provided to all faculty and students from one of the survey's participating institutions. The devices, therefore, were readily available and students involved in the data collection were familiar with their use and could rapidly begin the video survey. The iPads also facilitated GIS data entry and update using a mobile GIS that was installed on each device. iGIS, a mobile GIS app that integrates with Apple devices, was used as our mobile GIS plat-

form. iGIS has options for form creation, which provided opportunities for quality control while entering data in the field. An orthophoto, produced using the UAV data collected during previous seasons, provided a high-resolution backdrop for the mobile GIS and simplified identification of buildings by student surveyors. Students were able to navigate to specific structures, rapidly collect detailed videos of the exteriors and interiors, and enter collection data directly into the mobile GIS, which was later synced with the project GIS maintained within ESRI's ArcMap program. As with the previous DSLR photographic collection, surveyors captured video footage of each building in regular swaths that extended from the bottom to top of house walls. The surveyors ensured that vertical swaths overlapped by at least 30 percent on each side. The number of buildings surveyed in this way increased from 1-2 to 10-11 per day.

The videos collected during the 2016 field season were post processed with FFmpeg, an audio/video encoding and decoding tool, to extract frames for model reconstructions. Similar workflows have been discussed by Teo (2015) and Block-Berlitz et al. (2015). Approximately three frames were exported as .jpg images for each second of recorded video. These images were input into Agisoft PhotoScan with blurry or redundant images removed from the image set. While the videos provided excellent overlap between frames, the exported images sometimes overlapped too much to generate accurate measurements. In SfM applications, as with traditional photogrammetry, measurement uncertainty increases when using photographic pairs with small baseline distances. Models that are derived from images with small baseline distances may have offsets in the resulting point clouds and points that "noticeably deviate from the object surface" (Agisoft 2017: 65).

Figure 4a presents such a situation. The image presents a sparse point cloud of a house from Aigition, shown here in plan view. As can be seen in this image, points located along the front of the building (circled in Figure 4a) are significantly offset from the surface of the structure. A line of points highlighted by an arrow, deviates from the angle of the house facade. The misalignment of these points resulted from a poor alignment of images with small baseline distances. These images were manually selected and removed in Figure 4b. The sparse point cloud was further refined through an iterative process of point selection and deletion. Points falling outside specified tolerances for reprojection error, reconstruction uncertainty, image count, and projection accuracy were selected and removed from the point cloud. After each iteration a camera optimization was run to improve camera alignment. While this process improved the models, the process of manual selection and removal of images was time consuming and future work will explore automated approaches for the identification of images used in reconstructions.

Results

In most cases, the frames extracted from the iPad videos provided excellent overlap and continuity for construction of 3D models and most buildings had sufficient coverage and image overlap to produce high definition point clouds. The reconstructed model shown in Figure 5 presents one example of the output of this video derived model construction. Initial comparisons of the models generated from video frames with those created from the DSLR photographs indicate difference in the detail captured using the two techniques. The resolution of the iPad video is lower than that of the DSLR photographs and the texture maps covering the surface of the models preserve this difference. Figures 6 and 7 present two models of the same wall. The DSLR based model (Figure 6) preserves the tool marks and construction details along the quoins. These features are obscured in the video derived model (Figure 7).

While we did not compare the point clouds, it is possible that differences in the accuracy of the two models are also present. The differences in accuracy, however, are not evident upon visual examination. For our purposes, the ability to rapidly survey and document the site within a short span of time outweighed the reduction in resolution associated with the video capture method described above. The models generated from the survey have been uploaded for display within Sketchfab and the project's web-GIS (Figure 8).

In future work we would like to compare differences between the accuracy and resolution of models produced with iPad video to models produced from video captured using other hardware. The videos taken during the survey were 1080p HD video at 30 frames per second (fps). The iPad is capable of col-

Figure 6. Screenshot showing reconstructed wall of Building 84 generated from DSLR photographs.

Figure 7. Screenshot showing reconstructed wall of Building 84 generated from frames extracted from iPad videos.

Figure 8. Screenshot of Deserted Villages Project's WebGIS.

lecting 1080p at 60 fps and 4k video at 30 fps. These options were not used but would likely have resulted in better quality frames and more accurate reconstructions.

Voice of America, Kavala Station

During the 2016 field season, the project began exploration of a relic of the Cold War, the Voice of America relay station near Kavala, Greece. The Voice of America (VOA) was a shortwave radio station that began to transmit against Nazi propaganda in 1942. During the Cold War, it became a media instrument to combat Soviet propaganda. Greece's proximity to the eastern bloc positioned it as the ideal centre for transmission. In 1952, VOA established a relay station based on a navy ship off the coast of Rhodes. The permanent station at Kavala was built in 1972 as one of the last major capital investments of VOA (Heil 2003: 115). It included extensive technical facilities and antennas that broadcast globally between 1972 and 2006. In order to meet personnel needs of highly qualified civilian broadcasters and technicians, the VOA station required adequate housing for families coming from the United States. Although it operated as a military base, the VOA housing resembles a mid-century modern American suburban subdivision with ranch-style private family dwellings (Figure 9). The houses have dramatic sloping roofs originating in the progressive language of American domestic architecture in the 1960s (Lane 2015). The transplanted VOA American development in Greece raises interesting questions over the transmission of American suburban ideals through architecture. The station was turned over to the Greek government in 2006 and much of the transmission equipment has been dismantled, sold, recycled, or looted. When the VOA closed, the Greek government hoped to reuse the equipment and asked the U.S. Army not to destroy the base, as was protocol. The station was never reused. The houses, like the abandoned villages of the Mornos Reservoir, are slowly becoming ruins.

In the last decade, the new field of Cold War archaeology has steadily grown. Field research typically covers nuclear test sites in the U.S. (Beck 2002; Hanson 2016), radial defence systems (Whorton 2002), missile sites in Cuba (Buström 2009), installations in the Soviet Union (Fowler 2008), frontier zones in

Figure 9. House documented at the VOA Relay Station, Kavala, Greece.

Czechoslovakia (Rak, Funk, and Starková 2016) and Ethiopia (González-Ruibal 2006). The VOA station in Kavala presents an interesting counterpoint to this scholarship in targeting residential rather than defensive material culture. The VOA station was located within NATO's sphere of influence and projected immaterial radio waves to the Soviet bloc. Its residential cul-de-sac is a surreal implantation of an American suburban dream in an otherwise Greek landscape. The houses are strikingly different from contemporary housing in Greece in their central air-conditioning systems, their sprawling horizontality, and their irregular placement around driveways. Interviews with the last Greek foreman of the VOA revealed the name of the firm that designed the enclave, Holmes & Narver, Inc., from Orange, California.

Methodology

The site's typological regularity coupled with the existence of construction blueprints obviated the need for an aerial survey of the site. Documentation, instead, focused on recording each individual house and the grounds that surround it. As in the case of the 2015 Aigition survey, we used video recording to document house interiors and exteriors. iGIS was used as our mobile GIS platform. iPhones were used for much of the GIS update with iGIS using the onboard GPS to geotag photos of houses, pump stations and other structures that document the current condition of the settlement. Each photograph was automatically embedded within the mobile GIS and titled using a naming scheme that concatenated the GIS feature class, house ID, and photo number. While the

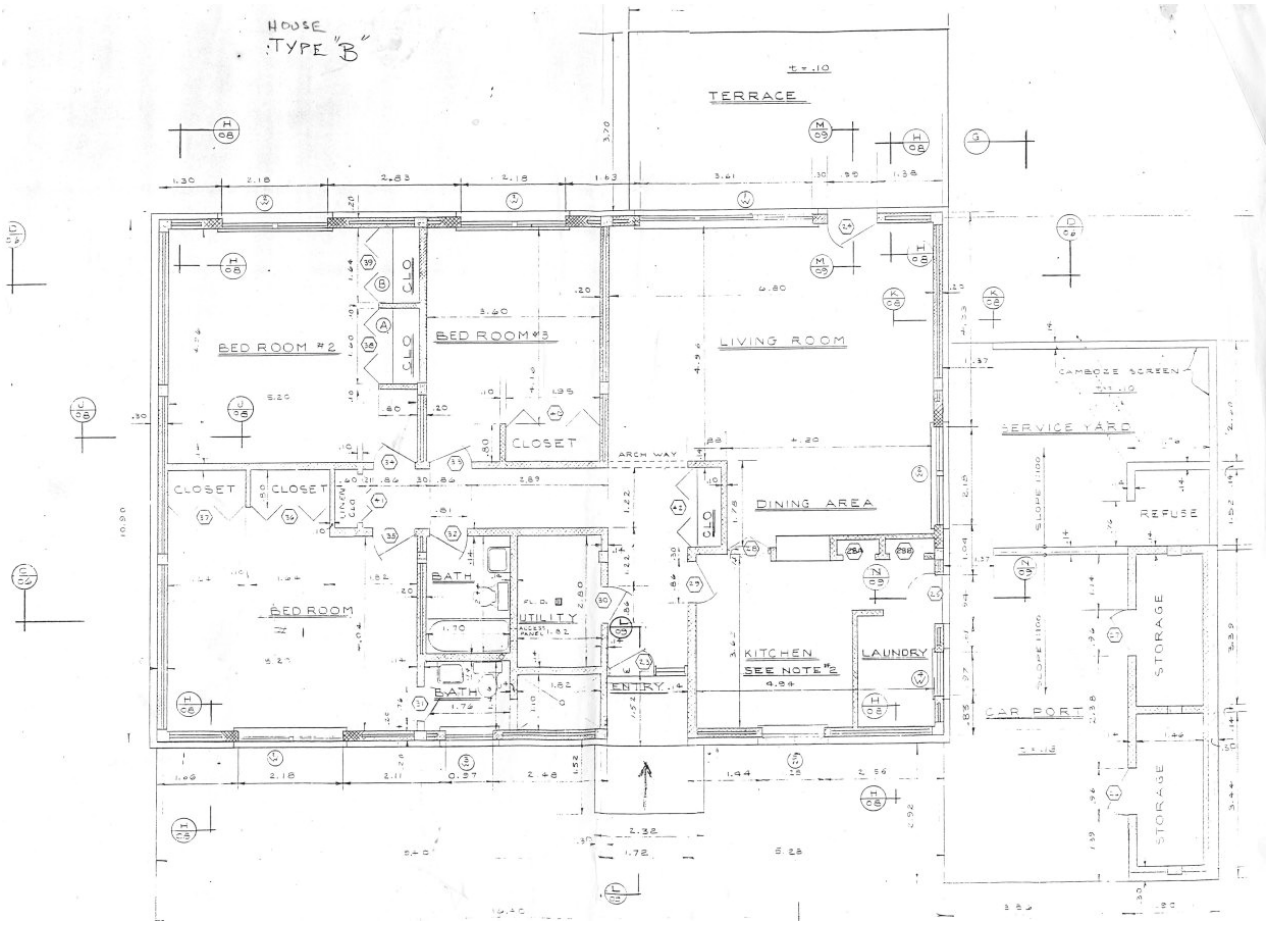

Figure 10. House plan recovered from the VOA Relay Station, Kavala, Greece.

iPhone's GPS had limited accuracy, it was sufficient for basic location of features on facility plans. A satellite image, loaded into the background of the mobile GIS, provided contextual information for students as they navigated the site. Using this system, students were able to quickly and systematically document and photograph features.

Still photographs also were taken of each house, focusing on the relative chronology of building elements. Such internal variations could periodize changes in added fixtures (such as lighting, shutters, window frames) in the 30-year horizon of the site's inhabitation. The frame numbers for these photographs were entered into the mobile GIS and attached to the corresponding house within the GIS. While most houses had been emptied by their American inhabitants, rare elements that were left behind were noted by the surveyors. These included exercise equipment, office furniture, video tapes, mechanical manuals, and correspondence. Finally, a record was made of evidence of post-abandonment inhabitation that illustrates squatting or semi-official residence post-2006.

Results

Our investigations at VOA are in the early stages with work focusing primarily on data collection activities. The remains of the VOA suburb are pristine enough to provide good evidence for typologies of abandonment and post-abandonment processes. Logbooks, elementary school materials, mail, and other materials left behind by the final residents document the final history of the site. Architectural plans, digitized as AutoCAD dwg files by Greek workers in 2003 (Figure 10), complement our site survey and preserve the original house designs and facility plans. This information, together with surveyed data, provides the core of our developing project GIS (maintained in ESRI's ArcMap). Greeks who worked on the station were interviewed during the 2016 field

season, providing a window into life at the site both during and after its American occupation. We hope to interview other individuals (especially the American staff) that lived and worked at the station as the project progresses.

Summary

Ancient monuments and sites dominate archaeological practices in Greece. As a country dominated by national narratives of a glorious classical heritage, the archaeology of the recent past presents unique methodological and interpretive challenges. The progressive above ground ruination of historic buildings necessitates innovative and efficient documentation of three-dimensional structures and spaces. The projects presented in this paper, illustrate examples of two diverging approaches for investigating the recent past. At Aigition, aerial and terrestrial survey documented traditional architecture within a rural landscape. Detailed hand drawn plans provided a direct observation of construction methods and architectural details, but this process was time consuming and significantly limited the number of buildings that could be documented in a field season. A hybrid approach involving hand drafted plans of notable buildings and photogrammetric documentation of all structures allowed the project to rapidly survey the village. Similar approaches have been implemented for building archaeology elsewhere (e.g., De Vos 2017). The use of video as a documentation tool and as a medium for capturing data for architectural model generation significantly increased the speed and thoroughness of our survey process. The use of iPads for data collection was sufficient for model creation but at a diminished quality when compared with DSLR based models. The approach presented worked well within the diverse architecture of the rural location. A slightly different approach was implemented at the VOA site. Unlike the houses at Aigition, the VOA buildings were constructed using standardized architectural plans. The base maintained records of these buildings through 2006 when the site was abandoned. Building plans, converted to AutoCAD dwg files, maintain a record of mechanical and architectural modifications at the site. Within this context, photogrammetric and hand drawn plans were less vital to our documentation process. Videos documented interior and exterior spaces and photographs captured artifacts throughout the built spaces. If needed these could be used to develop photogrammetric models of features or buildings. The existing CAD plans also provide a foundation for model construction. In both projects, a small mobile GIS app (iGIS) allowed students and surveyors to rapidly enter and update data in the field using their iPads or iPhones.

The approaches applied in the two surveys illustrate the use of low-cost tools for rapid survey and data acquisition and update. Our work emphasizes student involvement in the process of research and the projects described provide both an avenue for exploring and documenting the past and a pedagogical environment for involving students in the process of applying technological solutions to the study of historical sites. The study of Aigition is part of a broader and ongoing examination of early modern settlements and the architectural history of the surrounding region. The investigation of the Kavala VOA settlement is in the early stages of study and we anticipate expanding our investigation and student involvement as our research progresses. The examination of settlements bridges the worlds of ethnographic study, historic archaeology, and the archaeology of the contemporary world. We look forward to the process of continuing our investigations of these sites in the coming years.

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