
MANAGING ARCHAEOLOGICAL SITES WITH MOSAICS: FROM REAL PROBLEMS TO PRACTICAL SOLUTIONS

THE 11TH CONFERENCE OF THE INTERNATIONAL COMMITTEE
FOR THE CONSERVATION OF MOSAICS, MEKNES, OCTOBER 24-27 2011

edited by

Demetrios Michaelides and Anne-Marie Guimier-Sorbets



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**The 11th Conference of the International Committee for the Conservation of Mosaics:
“Managing Archaeological Sites with Mosaics: From Real Problems to Practical Solutions”**
Meknes and Volubilis, 24-27 October 2011

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Season, Labours of Hercules mosaic, House of the labours of Hercules, Volubilis, Morocco (photo: D. Michaelides)

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MOSAIC FLOORS IN THE NORTH-WEST CHURCH OF SUSSITA: A CASE-STUDY ON TEN YEARS OF A JOINT CONSERVATION AND ARCHAEOLOGICAL PROJECT

Julia Burdajewicz

ABSTRACT

The case of the North-West Church in Hippos-Sussita, Israel, represents an excellent example of practical and scholarly cooperation of archaeologists and conservators working simultaneously on an archeological site with mosaic floors. The exploration of the church began in 2000 and was completed by 2009. Mosaic floors have been revealed in the nave of the church, the aisles and accompanying rooms of the church complex. The very specific characteristics of the site, the project's and the local conditions entailed and revealed a wide range of conservation issues and problems of logistical and technical nature. Time for conservation interventions was limited to a four week season of archaeological work. Discoveries were immediately followed by conservation treatments. Since the site is not yet open to the public and was being abandoned for eleven months of the year, all discovered mosaics had to be thoroughly protected for this period of time from environmental factors as well as a large number of curious sightseers visiting the area on their own.

A significant contribution to this project was the documentation of the state of preservation of the mosaics, the techniques of execution as well as their iconographical traits. Prepared with the application of advanced digital methods, it turned out to be essential for the understanding of relative chronology of the mosaics and the history of the whole North-West Church complex. Since the exploration has now been completed, the church requires a long-term management plan and the permanent exhibition of the mosaics in their architectural context, which would allow them to speak to the public about the site's history.

Sussita (Hippos of the Decapolis) (Fig. 1) is located on the east shore of the Sea of Galilee. Founded as a Greek settlement in Hellenistic times, it developed as a city in Roman Imperial times. During the Byzantine period, Sussita reached the peak of its growth and served as a seat of a bishop. Its history, over eleven centuries long, suddenly ended in AD 749 due to an earthquake that sealed the city under layers of stone when it was still inhabited. Except for a short rescue excavation conducted by Claire Epstein in the 1950s, and research on the aqueduct by an Israeli-German team in the 1990s, the site remained unexcavated until 2000 when an international project aimed at uncovering the city was initiated. Within the framework of the Hippos Archaeological Project led by the University of Haifa, the North-West Church in Sussita was excavated in the years 2000-2009 by an archaeological team from the Polish Academy of Sciences, the National Museum in Warsaw and the University of Warsaw, under the direction of J. Młynarczyk and M. Burdajewicz. The goal of the archaeological project was to uncover an Early Christian church, analyse its architectural development and interior decoration, characterize specifics of the ceremonial practices, determine the period of use, and investigate its destiny under Umayyad rule (Fig. 2).



Fig. 1. Aerial view of Sussita Mountain. The site was inhabited between the 3rd century BC and AD 749. The North-West Church seems to be the largest of four churches uncovered so far in Sussita (photo: Zinman Institute, Haifa)

The first season of exploration, carried out without a conservator, showed that a conservator would be necessary for the continuation of the project. The following excavation seasons brought to light many finds and prompted the formation of a conservation team. The main tasks of the team were to follow up on newly discovered areas and provide necessary on-site treatments during the course of the excavations. Both the archaeological part of the undertaking as well as the conservation campaigns was carried out simultaneously, and they were to a certain degree a new experience for both the archaeologists and the conservators. Both groups had to learn how to cooperate smoothly and perform their duties while understanding

and respecting each other's goals and priorities. The characteristics of the project often required improvised solutions, specific processes, immediate decisions and actions. All these challenges are presented in this paper as an account of ten years of experience in a joint archaeological and conservation project in the North-West Church in Sussita.

THE MOSAIC PAVEMENTS

Since the church was destroyed during the great earthquake of AD 749, not much of the mosaic floors were expected to have survived under the debris of basalt masonry. The exploration of the western portion



Fig. 2. Aerial view of the North-West Church and adjacent rooms (photo: Zinman Institute, Haifa)

of the nave during the first excavation season did not bring very promising results. Only very scanty remains of mosaic were discovered, preserved along the foot of the walls. Tesserae, crushed into small chips, and crumbled mortar bedding were found when the fallen column drums were lifted. However, the exploration of the aisles brought to light generally well-preserved carpets of floral and geometrical patterns, along with two intact inscriptions commemorating the donors, preserved in a perfect condition in the south aisle (Fig. 3 and 5). Also two of the rooms adjacent to the basilica on the north, as well as the southern portico of the atrium turned out to have been paved with floors with simple mosaic decoration. Moreover, large frag-

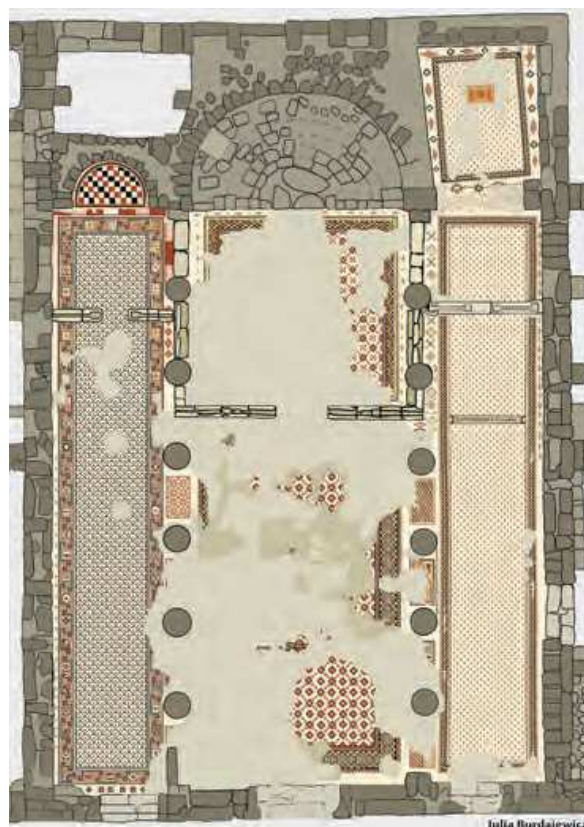


Fig. 3. The surviving mosaic floors in the North-West Church. The graphic documentation was first made as hard-copy drawings and then digitized after the end of a season. Furthermore, a software for the graphic documentation of conservation, metigoMAP, was employed to document the state of preservation and estimate the range of damages (drawing: J. Burdajewicz)

ments of plain white, large-tessera mosaic have been found face down, just above the floor level in the aisles. These were most likely mosaic pavements laid on the floors of the galleries located above the aisles. The analysis of the state of preservation of the mosaics, their decoration, and the architectural modifications of the interior of the church indicate that the carpets were laid between the middle and the end of the 6th century, while a big room in the northern annex appeared to have been paved as late as the Umayyad period (661-750).



Fig. 4. Graduate students from the Faculty of Conservation of the Academy of Fine Arts in Warsaw performing stabilization treatments to the mosaic carpet in the north aisle of the Church (photo: J. Burdajewicz)

Fig. 5. The mosaic floor in the south aisle of the Church during exploration. Stabilization treatments had to be performed immediately after discovery (photo: J. Burdajewicz)



FORMATION OF THE CONSERVATION TEAM

The development of the conservation team over the ten-year period reflected the growing need for professional intervention, proportional to the successive expansion of the exploration areas. New discoveries had to be secured and preserved, previously discovered areas needed to be checked, and if necessary, treated again. After the first season of excavation, a conservation technician was deployed from the Israeli National Parks Authority to conduct basic protection treatments. During the follow-

ing years, the Polish mission established its own conservation team which, during peak years of exploration, consisted of a senior conservator, an assistant to the senior conservator, a group of graduate conservation students and a conservation technician and mosaic maker. Graduate conservation students came from the Faculty of Conservation and Restoration of Works of Art of the Academy of Fine Arts in Warsaw, Poland. In certain cases, the archaeology students and other volunteers were allowed to assist in simple actions such as sweeping the mosaic pavements or collecting and cleaning

loose tesserae that were found scattered all over the site. It should be emphasized that the conservation team was not formed exclusively for the mosaic conservation but had to share its time between the mosaic floors, the wall plasters, remains of wall paintings and excavated small objects (Fig. 4).

LIMITATIONS OF THE PROJECT

All conservation activities were performed in the context of this particular archaeological project. They were bound to the time frame, work hours, schedule and sequence of the exploration. Work was conducted during the four-week excavation seasons that took place every summer in July. Even though the summer is probably the toughest time of the year to perform any archaeological and, particularly, conservation activities, this time was chosen in order not to coincide with the academic year in Israel and the activities of the University of Haifa. As far as the treatment of the mosaic floors was concerned, the main goal was to secure and preserve the pavements and enable further safe exploration. This objective determined the types and range of applied treatments, and limited the time for lower-priority tasks, such as aesthetic restoration for presentation purposes. Also, due to the working conditions and limitations, most of the applied reinforcements were considered to be temporary and most likely will have to be replaced if the site opens to the public.

MAJOR CHALLENGES

Major challenges of this archaeological-conservation project naturally arose

from its characteristics. One of them was time. A four-week season practically meant 20 days of work on the site, but taking into consideration the time for the installation of the team and the tools at the beginning of each season and packing and clean-up activities on the last day, it did not leave more than 17-18 days for actual conservation activities. In order to make the most of the time given, all actions had to be carefully planned. However, the nature of working in situ during the archaeological exploration naturally imposes unexpected and unplanned actions that have to be taken immediately, every time there were new, sudden discoveries (Fig. 5).

Time limitations did not apply only to the length of the season, but also to the working hours. The site is located on the flat top of a mountain rising around 300 m above the level of the Sea of Galilee (100 m above sea level) (see Fig. 1). The team members had to be transported to the site and back with a bus and had to climb a narrow path on the ridge of the mountain. The beginning and ending times of work were strictly bound to very particular, rigid hours and, due to safety reasons and the difficult weather conditions during the day, no person was allowed to stay on the site beyond working hours. This fact imposed a very particular working mode, where all actions had to be completed before the end of the day, all tools and materials stowed and secured until the next day. Moreover, the difficult accessibility to the site often slowed down the delivery of conservation supplies. Another serious challenge were the weather conditions during the work seasons, which always took place in the month of July, except for the campaign of 2004, which was conducted in September. Temperatures in July in the area of the Sea

of Galilee exceed 40° C and the air is generally dry. Such weather is not only hardly bearable for a human involved in any physical activity, but also significantly too high for a proper binding of lime-based mortar, which loses the moisture immediately and tends to crack during drying. Often, newly applied mortar bands and fills had to be covered with moistened cloth and secured under shade in order to maintain acceptable conditions for the initial stages of binding. Gusty winds, which often swept over the top of Sussita Mountain turned the cleaning of the pavements into a truly Sisyphean labour and hindered the photography and graphic documentation processes.

CONDITION OF THE MOSAIC PAVEMENTS — INITIAL CAUSES OF DETERIORATION

The most serious damage to the mosaic pavement occurred when the church collapsed in the earthquake of AD 749. Large blocks of limestone and basalt collapsed on the floors, in many places breaking through them and crushing large numbers of tesserae. This resulted in numerous lacunae in the surface of the mosaics, large indentations and damaged tesserae (Fig. 6). There is almost no mosaic pavement preserved in the nave. Several surviving patches give a total of 22.33 m², which is 22.6% of the entire area of the nave (Table 1). There are two possible explanations for the almost complete lack of the mosaic in the nave. It could have been destroyed in antiquity, perhaps for iconoclastic reasons. However, the discovered remains together with the rest of the surviving mosaic decoration suggest that the decorative motives were purely geometric and floral; hence there was no real reason



Fig. 6. Serious surface deformation and large lacunae appeared throughout the mosaic carpets as a result of the earthquake of AD 749 (photo: J. Burdajewicz)

for iconoclastic intervention. The other explanation is that, during the final decades of the church, the nave was excluded from ceremonial practices and was not taken care of, something that led to the gradual decay of the pavement. This explanation is partially confirmed by the archaeological investigation which shows that particular areas of the church were used during different time periods. The current state of preservation results also from the disintegration of the materials of the substrata, caused by physical, chemical and biological factors. In general, there were no symptoms of a serious detachment or separation of the layers of the mosaics' structures but already existing

	TOTAL AREA	AREA OF REMAINING MOSAIC	PERCENTAGE OF REMAINING MOSAIC
CHANCEL	34.35m ²	8.71 m ²	25.35 %
NAVE	68.60 m ²	13.62 m ²	19.85 %
SOUTH AISLE	66.38 m ²	58.44 m ²	88.03 %
NORTH AISLE	55.82 m ²	49.71 m ²	89.05 %

Table 1. Areas and percentage of remaining mosaics in given sections of the church. The calculations were made with the use of metigoMAP graphic documentation software

lacunae were expanding easily due to the fragility and tendency to crumble of the mortar bedding. The technique and quality of execution of the pavements varies slightly in individual areas and indicates that the deterioration problems are occurring mostly in the lower mortar layers of the mosaic bedding, where a poorer quality mortar seems to have been employed. The physical and chemical erosion affected also the state of preservation of the tesserae; especially the red and yellow ones made of a soft limestone, which were very fragile, powdery, washed out or cracked.

CONSERVATION ACTIVITIES

The surface of the mosaic directly after unearthing was overall moderately grimy; however, some areas were coated with a thick crust of dried hardened dirt. Also, large fragments of plaster that had fallen from the walls adhered in many places to the surface of the mosaic floors. Surface cleaning included sweeping the pavements with brushes and mechanical cleaning of incrustations with small dental tools. In

some cases, low solutions of acetic acid were applied to dissolve the crust of hardened dirt mixed with crumbled fragments of wall plasters that had stuck to the surface.

Stabilization treatments of the mosaics' structure were focused on the reinforcement of edges around lacunae and securing the losses from expanding. This was achieved by the application of lime-based mortar bands and filling the lacunae. In some instances, minor losses were restored with the use of tesserae collected on the site (Fig. 7). Also, badly eroded tesserae were replaced with better preserved ones. These treatments depended on time limitations and could not be carried out in all of the lacunae. In the case of powdery tesserae, consolidation treatment with a solution of a synthetic resin was carried out. A solution of Paraloid B-72 was applied multiple times to the surface of the weakened tesserae until the desired cohesion was achieved (Fig. 8). Large indentations caused by the collapsing masonry of the church, found especially in the mosaic pavement in the southern portico of the atrium, were brought back to level. This required cutting out a certain area of tesserae, filling



Fig. 7. Some minor aesthetic restorations were carried out in small lacunae. However, due to the character of the works, most treatments were focused on immediate stabilization and preservation (photo: J. Burdajewicz)

the gap that appeared in the bedding and then placing the tesserae back with a new lime-based mortar binding. Cracked and smashed tesserae were replaced with loose ones collected on the site (Fig. 9). During the entire course of the conservation campaigns, documentation of the state of preservation and the treatments applied was being made and updated. The main means of documentation were photography and drawings, complemented with notes and reports. Again, due to the short length of the campaign and the difficult working conditions on the site, the drawn and written documentation was made with traditional methods and digitized later, after the end of the season. Also, throughout each season, previously discovered and treated areas were checked and any changes in their condition were recorded. The fact that the site is not properly guarded during eleven months of the year imposed the necessity of a very careful preparation of the mosaic floors for that period. Due to the character of the undertaking, the only available way of securing the mosaics for the rest of the

year was reburial. At least two full days of work at the end of each season had to be planned for the reburial. The method was subject to changes and modification, based on experiences from previous seasons. In the early years of the project, a geotextile material had been recommended to the team and employed as a contact layer under a thick layer of sand and earth. However, heavy rainfall during the winter and spring months was causing accumulation of mud, which was hardening with time, becoming very heavy and hard to remove when dry. Polyethylene foil sheets were also tried out, but even though they kept the mosaic pavements clean, they were slowing down the evaporation of the moisture from the surface of the mosaics. After several seasons with different reburial materials and techniques, an optimal solution for the case of Sussita was devised. A thick layer of clean sand laid directly on the mosaic floor and topped with local soil for camouflage, turned out to be the best available method.

CONTINUING THREATS TO THE MOSAIC PAVEMENTS

Environmental factors are still eliciting the chemical and physical deterioration of the mortar layers and some of the tesserae cut out of soft limestone. Some preventive treatments had been carried out during the years of the archaeological and conservation campaigns, but the pavements will still be exposed to these factors as long as the site is not protected with a proper roof and a rainwater drainage system.

The presence of moisture also causes biological activity, whose peak intensity falls on the rainy months of winter and early spring. Various kinds of weeds and subshrubs sprout throughout the site. Many



Fig. 9. One of the conservators preparing loose tesserae for replacement where the pavement was smashed by falling stones during the earthquake of AD 749 (photo: J. Burdajewicz)

of them have a deep-reaching system of long roots, adapted to a hot, dry climate. They penetrate the substrata of the mosaic floors, undermine their structure and often break through their surface. There were some attempts to spray the site with pesticides, but budget limitations and environmental concerns stopped this practice. Another challenge that the North-West Church complex and the conservation team have to face and prepare for is human interference. Even though the site of Sussita is not officially open to the public, there is an uncontrolled and illicit tourist circulation taking place throughout the year. Sussita has been known for decades



Fig. 8. Many of the colourful tesserae needed immediate consolidation. Particularly those made of soft red and yellow limestone, which were almost completely worn in many areas of the design (photo: J. Burdajewicz)

to the local communities, but the excavations and the spectacular new discoveries attracted masses of people wishing to witness the site being unearthed after 13 centuries. The mountain is also a popular destination among local hikers and cyclists who seek a little work-out; and among adventure-loving campers and romantics coming to simply admire beautiful views of the Sea of Galilee. Some of these visitors tend to be proactive when it comes to archaeological exploration. Often the mosaic floors reburied at the end of the season were found partially uncovered eleven months later. The problem of tourist circulation affects also the scanty remains of the wall plasters and walls of the church, many of which are made of fragile limestone or unhewn basalt stones. One more risk connected to human presence is that of theft or vandalism. Fortunately, so far none of the mosaic floors was a target of such actions. However, acts of vandalism were already noted in Sussita, the most serious of which was the smashing to pieces of a marble chancel screen with a representation of a cross, which had survived the earthquake in situ in the south aisle of the North-West Church, but could not defend itself from contemporary vandals.

THE FUTURE

At the end of the final season of archaeological work in the North-West Church in 2009, all mosaic floors were reburied under layers of clean sand topped with local soil. Seasonal checks revealed that due to uncontrolled tourist presence on the site, the reburial should be revised regularly in order to maintain a proper protection. Proper sheltering should be designed for



Fig. 10. The North-West Church needs a project for a proper exhibition of the mosaics in their architectural context. An overall plan of opening the site to the public should include a long-term conservation plan and the upgrading of some of the solutions applied during exploration. This will allow the mosaics to speak the site's history (photo: J. Burdajewicz)

fulltime or seasonal exposure of the mosaics. An overall plan for opening the site to the public should include a long-term conservation project and an upgrade of some of the temporary reinforcements applied during exploration. This future project requires also a significant financial input, which could not be provided by the archaeological-conservation team and remains in the hands of the National Parks and Israel Antiquities Authority. However, the goal of the North-West Church archaeological project was achieved with the committed support and assistance of the conservation team (Fig. 10).

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