

NEW VERSION OF THE JADIS DATABASE FOR THE DEPARTMENT OF ANTIQUITIES OF JORDAN

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Introduction

Under the auspices of a Senior Fellowship from the National Endowment for the Humanities and the American Center for Oriental Research (ACOR) I have had the opportunity to develop and install a revised and expanded version of the Jordan Archaeological Data Information System (JADIS) at the Department of Antiquities of Jordan (DOA) and ACOR. The new version supports many additional functions, including archaeological projects, information on permits, loans, condition reports and digital photographs. An embedded GIS map control makes it easy to see the distribution of sites and projects against a background of satellite images or 1:50,000 scale topographic maps. After reviewing the current JADIS database, this article will describe the new system briefly.

The original JADIS database was compiled and edited by Dr. Gaetano Palumbo (1994) under the auspices of ACOR's Cultural Resource Management Program, sponsored by USAID. Palumbo's original effort resulted in the encoding of over 8,600 archaeological sites in a FoxPro relational database implemented by CDG Management and Associates, of 'Amman. At the time the program was developed, GIS technology was relatively new, prohibitively expensive, and difficult to implement or manipulate. As a result, the original JADIS database did not offer map or GIS support, though the 1994 JADIS volume included a series of site distribution maps drawn by InfoGraph, Inc. of 'Amman from an ArcInfo database, and GIS support was always envisioned (Fakhoury and Azar n.d.). Though the original program did not include true map support, a limited spatial query capability was included, based on the scheme developed to create site numbers in the system. Using the site's location in the Palestine Grid projection, a site number was created by appending a sequential number to values that identified the 10 by 10km² in which the site is located. This results in a seven-digit site number in the format 9999.001 that could be spatially searched in a

limited way by typing in the coordinates of a search box in the query section of the current program. The search retrieves all the sites in the rectangular area — there is no way to request an irregular region.

Recent improvements to the old JADIS database were made, but they were done outside the actual JADIS program. For example, the basic text entries from Palumbo's 1994 volume have been placed in a web-based search engine at <http://www.nis.gov.jo/anti/owa/sitetype>. If one knows the name of a site, its JADIS information can be retrieved from this web page. And I have produced a series of interactive GIS-based maps of Jordan, divided by time period, and placed them on my web page at <http://archaeology.asu.edu/Jordan/jordmaps.html>. Users can select a time period, and then pan and zoom around the map. Clicking on a site opens a small table or window with the JADIS site data. While both of these web pages provide greater access to the JADIS data, neither is a fully integrated database and map system, allowing for additions, editing and full-fledged map or attribute based queries of the data.

Now that GIS software, such as ESRI's ArcView and MapObjects (which allows GIS functions to be customized and built in to standard database packages like MS Access) has become fairly inexpensive and readily available, it is time to update the current system to provide greater flexibility. This need is fully recognized by the JDOA (Fakhoury and Azar n.d.). The addition of map-based support to the system makes it much easier to use, both as a research tool and as a planning tool for cultural resource management purposes. Development projects can be planned in order to limit their potential impacts on known archaeological sites, because the actual "footprint" of a planned development can be searched; the area of potential effect can be adjusted if significant archaeological sites will be impacted by the project. And researchers will be able to query the attribute tables and create distribution maps based on com-

binations of site attributes. For example, it would be easy to create a distribution map of all the EB III settlements in the country, and print a formatted map, ready for inclusion in an article or report.

The New JADIS Database

A significantly enhanced version of the JADIS system has been deployed at the DOA and ACOR. The new program has an MS Access front end, which employs a MapObjects control by ESRI and about 200 pages of VBA code to provide an interactive Access/GIS user interface. The new program supports Digital Chart of the World layers, satellite images at 28m and 10m resolution, and the new series of 1:50,000 scale topographic maps of Jordan. These are delivered as background images, and automatically load and unload as needed; the effect is a seamless quad sheet or satellite image coverage of the entire country. Users can query the Access table, or the map. Irregular polygons can be drawn on the map and buffered to a user-specified distance, and all the sites that fall within that region can be retrieved instantly, and sent to printed reports. Elaborate queries of the tables can be made, and the results can be displayed on the map.

Figure 1 shows the Sites and Projects form, and illustrates several of the enhancements to the system. All information related to the Site is organized on a series of tab controls on the left side of the screen. Pressing the Projects button closes the site information, and opens project information on the same form. On the right side of the screen you can see the map controls. The map has been zoomed in to the region where the site shown on the left is located. Sites are shown on the map as points; projects are shaded regions. The current site record, Qarn al-Kabish, is shown on the map as a larger dot near the center of the map. The map also shows the use of the 28m resolution Landsat images. When the Pan button is pressed, the user can grab the map and drag it through the map window. The needed satellite images will be automatically retrieved from the hard drive and displayed, and unneeded ones will be dropped off the map. This, in effect, provides seamless coverage for all of the southern Levant. The user can zoom in and switch from 28m Landsat images to 10m SPOT images, and then to the 1:50,000 scale topographic maps of Jordan.

The program allows photographs and documents to be attached to sites, site visits, and it allows reports to be attached to projects, permits, and loans. **Figure 2** illustrates a visit photograph attached to the site of al-Murayghāt. Visit and site conditions have been removed from the Site table and placed in their own table, which means that

many visit records can be attached to a single site. This lets the system be used to monitor changing conditions at any site, and document them with photographs and detailed reports.

The new program also has an Export/Import function, and it now supports projects as well as sites. After having registered the project area on the system at the DOA, a PI can use the Export function to automatically retrieve all the known sites and other projects that intersect their project area, and export them to a new Access database. A stand-alone data entry program is included in the new system (discussed below), which can either link to an exported JADIS database, or create an empty database in the JADIS format. Sites and projects can be added or modified in the stand-alone program; then the modified database can be imported back into the main JADIS database via the Import function. The stand-alone program automatically includes all the codes that are used to define time periods, site types, etc. So you can create databases in the JADIS format that are completely compatible with the JADIS system at the DOA, and then import your data to the DOA database. You will no longer have to get printed reports of the sites in your area, and you would not have to mess with site cards.

Figure 3 is from the Export routine. It illustrates what happens when the user clicks on an existing project area on the map. All the sites and projects shown in cyan are located within 1000 meters of the project area. The buffered area is shown in hatched magenta. The user simply has to supply a valid MS Access file name, and the records related to these sites and projects will be exported to the new database.

The version of the program that has been set up at ACOR is read-only; it will support the Export function but not the Import function. This is necessary in order to maintain consistency in the assignment of JADIS site numbers. Only the DOA version of the JADIS program will be able to assign real JADIS site numbers, because they are assigned sequentially within 10km blocks, based on the Palestine Grid coordinate system (this method was established by the original JADIS program, and I have chosen to keep it for the sake of consistency). Two different users could very easily end up with different sites with the same JADIS site number, so the stand-alone program substitutes a randomly assigned large number for the JADIS site number. It is used throughout the standalone to link related records. When the records are imported into the main JADIS database, a real JADIS site number is assigned.

JADIS Sites and Projects

Site Number:

Site Name:

Arabic Name:

Map Mode

North: 31.75832 East: 35.68

T: 373.310

Search Buffer:

Visits | Location | Features | Names | Citations | Reports | Photos | Projects

Site Visits and Conditions

Site Rating	Excavation Recommended: Medium priority
Site Condition	Project Number
Disturbance	Agricultural Use
Disturbance	Flowing
Disturbance	Erosion
Construction Threat	No Risk
Roadwork Threat	No Risk
Development Threat	No Risk
Dam Threat	No Risk
	Cultivation Threat
	Erosion Threat
	Quarry Threat
	Other Threat
	High Risk
	Medium Risk
	No Risk
	No Risk

Notes:

Visited By:

Document:

Open It!:

Date Visited:

Entered By:

Date Entered:

Delete current record.

Record: of 3

Map Functions

Use the navigation buttons at the bottom left of the form to move through the records. Table Functions operate on the table shown to the left. Switch from sites to projects by pressing the "Sites" or "Projects" Button. Use the buttons shown above to operate the map.

Table Functions

Record 4711 of 10405

Projects Composite? Features? Edit Record

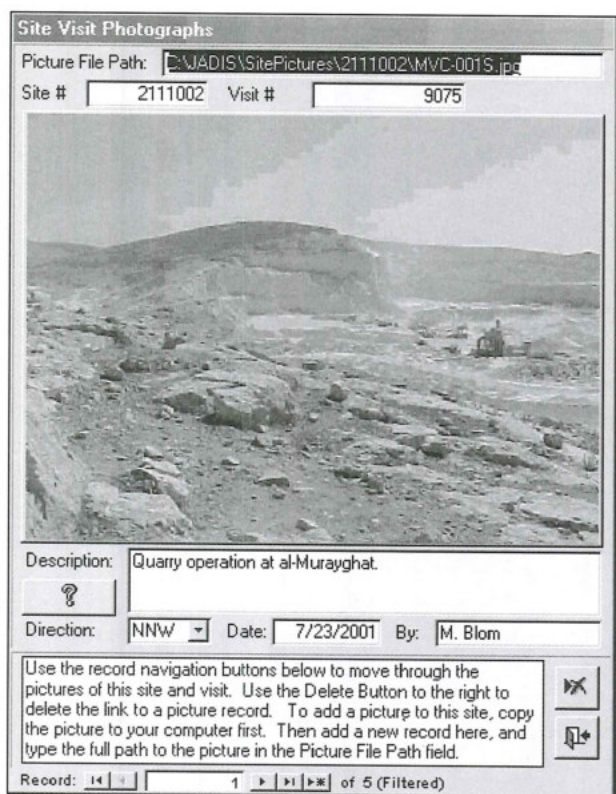
Map Mode

North: 31.75832 East: 35.68

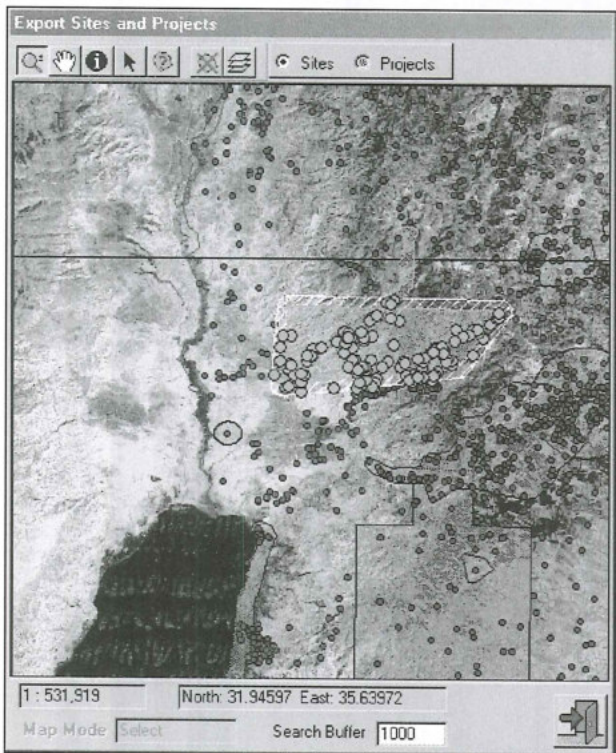
T: 373.310

Search Buffer:

1. The Sites and Projects form.



2. A visit photograph attached to the site of al-Murayghat.



3. The Export screen. The highlighted sites and projects will be exported.

The JADIS Standalone Data Entry Program

The JADIS Data Entry Program is a stand-alone MS Access program that is designed to create or

link to JADIS formatted .mdb (MS Access database) files. All codes and references in the JADIS system are included, so that records that are created or modified with this program conform to the JADIS format established by the Department of Antiquities of Jordan (DOA). Since the JADIS Data Entry Program does not contain data beyond the codes needed to operate drop down lists, the program is compact. The Standalone program can be downloaded free from <http://archaeology.asu.edu/Jordan> by pressing the JADIS button and following the links to the standalone download page.

The new JADIS database system that has been installed at the DOA provides many features that the older, FoxPro system did not. These new features include support for archaeological survey, testing, and data recovery projects, and built-in GIS features. In the new system, an Export/Import function lets the DOA staff export a subset of the main JADIS database to an external file in .mdb format. This will make archaeological survey work and reporting to the DOA a lot easier, because all the records currently in the main JADIS database from an area of interest can be exported in the JADIS format, and can be read by Access.

The Standalone program is designed to work with the exported subsets. Researchers can use the Standalone to add or modify JADIS Site and Project records in a project area. Sites are entered on the form shown in Figure 4, all the information related to a site can be accessed from one of the buttons on the right side of the form. The form accepts site coordinates in decimal degrees of Latitude and Longitude, so field workers do not have to worry about converting them to the Palestine Belt, or programming a GPS unit to do so. The Import function in the main JADIS system handles it automatically by projecting the site coordinates into both the Palestine Belt and the UTM projections and adding these coordinates to the JADIS site record. When a field survey is finished, the subset of the JADIS database that was modified with the Standalone (or a newly-created database in JADIS format) can be taken back to the DOA, where the JADIS staff can run the Import program on it. The data will be reintegrated with the main JADIS database. New sites will be added, existing sites will be modified, or additional data will be related to them.

The Standalone, like the Main JADIS Program, supports full table query capability. You can use the simple, Control-F find method (which works in all Microsoft Office programs), create simple queries that address one table in the system, or build composite queries. Composite queries search for Sites that have the information you want is stored

JADIS Sites Data Entry

JADIS # Inst. Site #

Site Name

Arabic Name

Note: Site coordinates in decimal degrees of Latitude (Y) and Longitude (X) are REQUIRED! The coordinates should be complete to at least five decimal places. These values are best obtained directly from a GPS unit. The Import program in the main JADIS system will automatically calculate the proper UTM and Palestine Belt coordinates, store them in the site record, and create a site point.

Latitude (Y)

Longitude (X)

Lat/LonSource
 Calculated Cited GPS

K737 Map Number

Other Map Number

Air Photo Series

Air Photo Number

Satellite Image

Size:

Elevation:

Topo Zone:

Close Form, Reports, Edit, Delete, Find, Find All, Print Record, Help, Projects functions with these buttons.

Site Notes

Use the navigation buttons below to move between sites or add new sites.

Record: of 88

To add information to a record related to this site, press one of the buttons below.

Conditions

Features

Site Names

Citations

Site Reports

Projects on Site

Site Photos

4. The Site Form in the Standalone Data Entry Program.

in more than one table. Composite queries are built on a special form, shown below, where you tell the program what information to look for, and which tables to use. The Composite Query Form is accessed either from the Main Menu. Once you have defined a query, you can save it and reuse it.

In the JADIS database, the Site table stores the main information about sites. However, other tables in the database also contain information about sites. For example, the Citations table links information about sites to published references. Similarly, the Features table links sites to time periods and site (feature) types, and information about site conditions is stored in the Visits table, and linked to Sites through the JADIS Site Number. On the Composite Query Form you put a check mark beside the fields you want to include in the query, and then type in the information you are looking for (or choose it from a drop down list). The form lets you open queries in related tables and automatically link specifications from those tables into the Site table. So you could, for example, look for all the sites in Sector 4 (sectors refer to the sections of the map published in the 1994 JADIS book) that have remains from the Byzantine period. **Figure 5** shows the results; there are 315 sites that satisfy the query.

Summary

The importance of the updated JADIS database system cannot be underestimated. Its ease of use, both in terms of data entry and data retrieval, en-

ures that the DOA and archaeologists conducting research in Jordan will use it extensively. As a planning tool, the new JADIS database will allow much more detailed archaeological searches, especially when combined with topographic map support. Searches based on topographic maps can easily outline the impact area of a proposed new highway, for example, and quickly identify any known sites that will be impacted by the construction. The identification of impacted sites is only the first step in a process that can include the preservation and development of important archaeological resources for touristic purposes. The system's capability to conduct attribute queries and produce distribution maps will greatly enhance the ability of researchers to address any number of questions related to settlement patterns, human impact on ancient and modern environments and so on. I believe that the new JADIS database will form the backbone of future archaeological preservation and research efforts in Jordan.

Acknowledgments

The new JADIS database is a fusion of MS Access, SQL Server, and GIS capability, implemented through ESRI's MapObjects software in Visual Basic for Applications. The project represents a substantial effort at re-working the existing JADIS database, and could not have been accomplished without the generous support of many individuals and institutions in Jordan and the United States.

First, I would like to thank Dr. Gaetano Pa-

Site Number	Site Name	Mnemonic	Article
2012003	NN/EDSAS: SUWAYMA 3		
Sector Number	UTM Zone	Arabic Name	
4	36		
Pal Grid East	UTMEast	Latitude	K737 Map Number
207387	746800	31.74323	3153.3
Pal Grid North	UTM North	Longitude	Air Photo Series
1127914	3515000	35.60468	
Pal Grid Source	UTM Source	Lat/Lon Source	Air Photo Number
Cited	Calculated	Calculated	
Site Size	Topo Zone	Flint	Pottery
2193	Unknown	<input type="checkbox"/>	<input type="checkbox"/>
Elevation	Structure		
-279	<input checked="" type="checkbox"/>		
Inscription			
<input type="checkbox"/>			
Features			
18) EB			
02) Sherd / Flint Scatter (Uncertain Presence)			
43) Roman			
02) Sherd / Flint Scatter (Uncertain Presence)			
46) Byzantine			
02) Sherd / Flint Scatter (Uncertain Presence)			

Record: 1 of 5

5. Results of a Composite Query — All Byzantine Sites in Sector 4.

lumbo for his efforts in developing and populating the original JADIS system, and for his continued enthusiastic support for the development of the new system. Although some changes were made in the database format, by and large the original system admirably suited the functions it was designed to perform, and it became the foundation upon which the current project was built.

The final programming, documentation, and training of people at the Department of Antiquities of Jordan (DOA) and the American Center for Oriental Research (ACOR) in Amman was financed through an NEH/ACOR Senior Fellowship, between September and December 2003. Without the generous support of the NEH and ACOR, and especially Drs. Pierre and Patricia Bikai, and Mr. Kurt Zamora, the final push toward implementing the new system would not have been possible. ACOR has proven to be an excellent base from which to do the work.

The topographic maps that underlie site and project data on the map form were derived from the 1:50,000 scale Arabic series for Jordan, 171 sheets in all. Mrs. Maha Tawrawneh and her staff at the Natural Resources Authority of Jordan pa-

tiently scanned these maps, clipped the borders off, georeferenced them, and edge-matched them, so that they could be incorporated in the program as a seamless topographic coverage. I am especially grateful for their efforts.

Finally, I would like to thank Dr. Fawwaz al-Khraysheh, the Director-General of the DOA, his staff, and the people of the Hashemite Kingdom of Jordan for their support of these efforts.

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