Geoarchaeological Investigations in Hiw, Egypt

Hiw is a village in Upper Egypt, about 8 km southeast of Nag Hammadi. Located at the bend where the Nile shifts its course to east-west, Hiw was known as Diospolis Parva in Greco-Roman times.

From the data of Sir Flinders Petrie, who excavated in a 16 km stretch of low desert between Hiw and Semaineh in 1898–1899, it has been estimated that the Hiw region was one of the largest centers of population in Predynastic Egypt, ca. 4000–3000 B.C. A recently obtained Landsat Thematic Mapper image suggests that areas where Petrie located Predynastic villages may still be undisturbed by cultivation. However, roads and irrigation canals are being extended into the area for a new land reclamation project.

Compared to the large body of mortuary data, there is very little evidence of Predynastic settlements, from which we can extract information about subsistence and the economy, and changes in these through time. Hiw may have some of the few remaining settlement sites from Predynastic Egypt.

Major field work and studies of the Predynastic period have been undertaken in the regions of Nagada and Hierakonpolis, as well as surveys for Predynastic and Early Dynastic sites in the Abydos region. It is important to tie these regional studies into a larger configuration and/or network with Hiw providing key data. Hiw may have been a node in the shortest (overland) route between the major centers at Thebes and Nagada and Abydos and the oases of the Western Desert. Thus, it may have been an important center for trade and exchange. Evidence for regional connections and centers of craft production are investigated.

Geoarchaeological investigations at Predynastic sites in the Hiw region include the mapping of major geomorphologic units (pediments and Nile terraces) and the determination of the Pleistocene and Holocene lithostratigraphic units and correlation with those identified elsewhere in the Nile Valley. Postoccupation changes of sites, particularly by wadi erosion and destruction of Nile floods, are examined.

Working with the known pottery typologies, surface samples of sherds may determine period(s) of occupation and extent of sites. In addition, any evidence of stratified occupational sites, which are rare for the Predynastic, are recorded.

Field investigations to be conducted in May 1989 include the selection of sites to be mapped in detail using remote sensing instruments, including a conductivity meter and a magnetometer. These instruments are expected to reveal buried extensions of the exposed sites, so that any future excavations would be done on the basis of a more complete understanding of the sites.
Hydrologic Modeling of Tomb of Nefertari, Luxor, Egypt

A study was initiated in 1986 of the wall paintings of the tomb of Nefertari in the Valley of the Queens, west of Luxor, Egypt (El-Baz, 1986). The study was jointly sponsored by the Egyptian Antiquities Organization (EAO) and the Getty Conservation Institute (GCI). Its main objectives were to determine the need for emergency treatment of deteriorated paintings and recommend a course for final conservation of the tomb walls (EAO, 1987).

The tomb belongs to the favorite wife of Pharaoh Ramesses II, who ruled Egypt for 67 years (1292-1225 B.C.). When it was unearthed in 1904 by an Italian expedition headed by E. Schiaparelli, it had been robbed of all contents. More importantly, it was robbed of some of its magnificent wall paintings by salt crystallization behind the plaster layer on which the ancient Egyptian artisans had applied their paint. Fear of further damage resulted in closing the tomb to visitors during the past 50 years.

The objective of the study was to establish the origin of the water that caused the mobilization of salt from the surrounding limestone host rock and its recrystallization. Remote sensing methods and techniques were applied to: (1) map the region in the immediate vicinity of the tomb for the establishment of a hydrologic model of the area; (2) establish whether the deterioration was a single-time event or a continuous process; and (3) study the state of various segments of the tomb's walls to locate areas needing emergency treatment.

To establish the drainage pattern in the Valley of the Queens, a Thematic Mapper image was obtained and computer-enhanced for detailed study at 1:100,000 scale. The image showed the fracture pattern in three directions (east-west, northwest-southeast, and northeast-southwest) and emphasized that a 3 km long escarpment separated the Valley from the main plateau to the west. This setting allowed the study of the hydrology of the Valley of the Queens as a separate unit.

The basic topographic features of the area were shown in a map made by the French in 1926. Additional detailed were mapped by Swiss Air Photo from aerial photographs. The maps and photographs allowed delineating the drainage of the area (Figure 1). Furthermore, profiles of dry valleys and hillside contours were obtained through the help of Earthwatch volunteers under the direction of surveyors from Cameron and Associates.

All available data were integrated in the computer-generated hydrologic model of the area. This was aided by utilization of the Geographic Resources Analysis Support System (GRASS), which was developed by the U.S. Army Corps of Engineers (Mojzesi et al., 1988). The model supports the theory that the deterioration resulted from a one-time event.

To establish the relationship of the deterioration of the wall paintings over time, we used software that was designed to study Landsat images. Photographs of the same wall taken at different times were compared by C. Woodcock and S. Ryherd of Boston University. This indicated that the recent deterioration is mostly physical rather than chemical; at least some parts have remained from the advanced age. Based on this information, it is unlikely that the chemical deterioration continues to this day.

The study of the state of various parts of the wall was done with multispectral photography. Instruments were used to obtain photographs in visible, near-infrared, and ultraviolet light by F. Hemans of Boston University and P. von Thana of Arthur D. Little. This was to establish if parts of the wall have deteriorated leaving no visible signs on the outside walls. UV images were particularly useful in delineating generations of paintings from the time of the first application of paint to the plaster layer.

The result of this project established without a doubt the applicability of advanced remote sensing technology to the study of the cultural heritage of one of the most ancient civilizations. The methods and techniques used will have applications worldwide.

REFERENCES


Abstracts
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GEOARCHAEOLOGICAL INVESTIGATIONS IN HIW, EGYPT

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