

***An Assessment on the Spatial-Temporal Patterns of Songhor's  
Archaeological Sites in GIS***

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**Extended Abstract**

**Introduction**

Despite academic advances in spatial analysis within archaeology, primary uses of computer based GIS in archaeology were initiated by Cultural Resource Management (CRM) needs in the world. In conjunction with the development of environmental GIS data within several organizations, other federal agencies saw its potential for the management and spatial representation of archaeological data. Therefore, in other ways, developing methods of analysis and visual representation of data, previously impossible, were started. New methods of exploratory data analysis became possible and the efficiency within GIS environments for manipulation and analysis of spatial data contributed to exploratory and experimental use of data.

Developed in catchment analysis of the 1970 in archaeology was a byproduct of settlement pattern and cultural ecological studies in which archaeologists became interested in the types and spatial distribution of resources exploited by a given settlement. The concept is based on the assumption that resource use around a settlement is distance dependant and that sites will be located so that to maximize exploitation of resource. Typically, the area associated with the settlement was calculated through Euclidian boundary techniques. Yet Euclidian distance measures do not take into account aspects of the topography in consideration of distance. Today,

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more sophisticated models utilize cost distance to establish distance in the development of catchment areas.

Other improvements in spatial analysis can also be seen in settlement pattern analysis. With GIS, archaeologists are now able to explore and analyze multiple variables across a given landscape such as distance between archaeological site locations and particular types of architecture and/or artifacts. These variables can be used to discuss issues related to, for instance, mobility and socio-political development through time. At more micro-scales, GIS has been used to manage and analyze the distribution of artifact types at a given site. This type of analysis is useful for understanding the behavioral patterns at a given site and identifying specific activity areas within a site through time.

### **Methodology**

This study has tried to analyze the spatial-temporal patterns of Songhor's archaeological sites in GIS. To conduct the research, the techniques applied for gathering data will be pervasive surface survey. Accordingly, all archaeological and historical evidence will be identified and then recorded, in details. The collected data, including 286 sites and monuments from Neolithic to late Islamic period, was reported in 2 volumes. Dating of the sites has been carried out based on sample recognition and comparing the studies of collected surface data. The material gathered were divided into six general groups, which are Neolithic, Chalcolithic, Bronze, Iron, Historic and late Islamic period. According to current research, from the total 286 sites, two of them belong to Neolithic periods, 32 of them belong to Chalcolithic period, 25 of them belong to Bronze period, 46 of them belong to Iron Age and 147 of sites present the culture of the Achaemenid, Parthian and Sassanian era. Finally, 214 sites and monuments have shown the traces of the Islamic period which some of them show only a particular time of Islamic era and mostly present the monuments and architecture of this period. Then these archeological sites are chosen as our materials and statistical population.

For achieving the research goals, we have used and analyzed geographical information, using Arc GIS 10 Software. By establishing a data bank, as Geodatabase, for the study we carried out an analysis on spatial distribution of the sites. Thus, we focused on natural factors like height, slope, Landform, climate, flowing waters, rivers, flora (pasture), and rainfall to understand the role and efficacy of each factor in appearance of the sites. Our study made it clear that the ancient settlement patterns of Songhor was highly affected by natural factors such as flora, water sources, rainfall, and height.

### **Results and Discussion**

In addition, according to this research it has been specified that each of the natural factors have played different roles in the distribution of the ancient sites and there is no same precept for all. Thus, it is necessary that the role of each natural factor to be studied separately. The analysis shows that the area under study is affected by Zagros mountain ranges, height, distance to the river and dense pasture cover.

### **Conclusion**

This area has a cool climate and height and these factors have created special and different conditions in forming human settlements relative to other areas in central Zagros. Our study made it clear that the ancient settlement patterns of Songhor were highly affected by natural factors such as height and distance to the river.

**Keywords:** *Ancient Sites, GIS, Songhor, Spatial-temporal Patterns.*

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