

■ NIGERIA

Geographical Information System (GIS) and Tourism: The Prediction of archaeological sites in Ijaiye-Orile, Southwestern Nigeria

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Abstract

This paper integrates GIS into the study of the archaeological site of Ijaiye-Orile, Southwestern Nigeria. It relates the relevance of GIS to archaeological studies as well as tourism development. Data for the study were obtained from both reconnaissance surveys and oral interviews. They were analyzed in a stepwise regression model which gave a correlation coefficient of 0.958, significant at 95% confidence level. ArcView GIS software was used to identify the most suitable area for archaeological excavations and hence the prediction of the Old Egba Camp Site, South of Ijaiye-Orile as the archaeological site of the study area.

Introduction

Tourism is the act of travel for the purpose of recreation, and the provision of services for this act (Encyclopedia of Tourism 2005). Another definition by International Association of Scientific Experts on Tourism (IASSET) sees tourism as the totality of phenomenon arising from the travel and stay of strangers, provided that the stay does not imply the establishment of a permanent residence and is not connected with remunerative activity (Marguba 2001). Tourists are people who are traveling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes not related to the exercise of an activity remunerated form within the place visited (Encyclopedia of Tourism 2005). The distance between

these two places is of no significance. The GIS with integrated multimedia tools could provide tourism information in an integrated fashion that would be of a tremendous global benefit (Longmatey et. al. 2005). More than before, nations of the world have become increasingly more aware of the immense benefits derivable from tourism and are vigorously developing their tourism industry this is not without the help of archaeological discoveries. (Alabi 2001; Olonade 2005).

GIS is both a database system with specific capabilities for spatially referenced data as well as a set of operations for working (analysis) with the data. (Wheatley et al. 2002). It is also a set of computerized tools used to collect, archive, manage, retrieve, analyze and output geographic and other related kinds of attribute data (Chiwanda 2004). The use of the GIS in archaeology began in the early 1980's, first in the United States and then later in the United Kingdom (Wheatley and Gillings 2002). In North America and Canada, GIS has been used for predictive modeling as a result of a need for cultural resource management. GIS has also been used in the documentation of dry stone for the purpose of conservation and management in Zimbabwe (Chikwanda 2004).

Until recently, the use of GIS in Nigeria has been limited to oil fields, hydroelectric power, national forest and agriculture among others at the expense of other projects like tourism and archaeological projects (Olonade 2005). However, a GIS database would give intending tourist enlightenment and enriched information of the area as well as the various cultural and natural resources of attraction. To researchers and managers, the GIS would help create a chain of information in a systematic way for easy management and data improvement. This paper uses the GIS to predict the archaeological site of Ijaiye-Orile, Southwestern Nigeria and therefore relates it to the tourism potential of the area.

The study area

The study area is located within the Akinyele Local Government Area of Oyo State, Southwestern Nigeria and lies on geographical coordinates of 30°45'N and 70°50'E. It is about 20 km northwest of Ibadan with an elevation of about 120 m above sea level. An archaeological map of the area depicts a decrease in land use through time. The area experi-

ences seasonal variation characterized by the West African monsoon Climate, marked by distinct seasonal shift in the wind pattern. The seasons are rainy and dry seasons. The former is experienced between March and October, while the latter comes between November and February. The mean annual temperature at Ijaiye-Orile (Ibadan) for the period of 1953 to 1988 was 26.6°C. However, seasonal variations occur in consonance with the seasonal variation in radians, sunshine and cloud cover.

Applications of the GIS in Archaeology and Tourism

Archaeology is the scientific search and study of evidence of past activities of human populations that have long disappeared. It is aimed at understanding the cultural behaviour of populations within their environment (Folorunso 2001). Archaeological sites form a major subdivision of tourist attraction centers in Nigeria. GIS therefore, would help among other areas of application to (1) Develop maps for present and future development and planning alternatives; (2) Predict and discover more archaeological sites with the minutest speculation using remote sensor or radar geographical prospecting methods; (3) Model archaeological materials for presentation and reconstruction of the same without any further damage to fragile artifacts like pottery that may get broken by several handling and transportation; (4) Develop a database for easy access and proper (systematic) documentation, and (5) Project and process more information about an archaeological site without the loss of the existing ones (Olonade 2005).

Methodology

In order to develop a model for predicting the location of archaeological site of Ijaiye-Orile, all known variables that can affect the location of an archaeological site in an area were used in a stepwise regression model. The variables used were the presence of anthills, presence of pits/hollows, presence of trees, potsherds, presence of rivers and presence of metallurgical elements that are all either relics of human activities or factors that sustain human habitation and life. This was done in order to obtain data of the study area. A topographical map of the study area was gridded into 500 m² cells. The centre of each of the squares was then treated as point elements

within the GIS. A reconnaissance survey was carried out using a recording sheet for the documentation of the variables present in each square cell.

Data Analysis

The data obtained was regressed against the dependent variable, the number of metallurgical elements. Using a stepwise regression model, only three variables, the presence of pit/hollows, presence of anthills and metallurgical elements, were correlated. The observed correlation coefficient was 0.958, which is significant at 95% confidence level. In order to identify the most suitable area for archaeological excavations, ArcView was used because of its ability to handle vector based analysis and complex spatial analysis required for the study. Using the interpolation menu within the ArcView environment generated the spatial spread of pits/hollows, anthills and metallurgical elements within the study area (Figures 1-3). Using the Geoprocessing wizard, an overlay technique of the ArcView GIS, a point of intersection of all the three variables was established. The point of intersection represents the most suitable archaeological site in Ijaiye-Orile using the overlaying method of the GIS which simply places a map for each variable one on the other to find a common area to them all (Figure 4).

Results and Discussion

This study established a point of intersection of anthills, pits/hollows and metallurgical elements found at Ijaiye-Oril, and predicted the suitable archaeological site for the study area. The predicted site is centralized around the Old Egba Camp site, South of Ijaiye-Orile (Fig. 4). The three variables used in predicting this site being highly significant at 95% confidence level means that they were most important variables that contributed meaningfully to the explanations of the number of metallurgical elements found in Ijaiye-Orile. Previous work on the predicted area showed that it was the original site of Ijaiye-Orile's iron working site (Olonade 1998). This was in accordance with the findings of Inawole (1999). Oral tradition on the predicted site indicated that it is an abandoned settlement, hence the presence of anthills, pit/hollows and metallurgical elements which are indicative of an archaeological site (Ogundele 2000, personal communication). This agrees with the

Figure 1: Map of Ijaiye-Orile showing the interpolated value for pit / hollows.

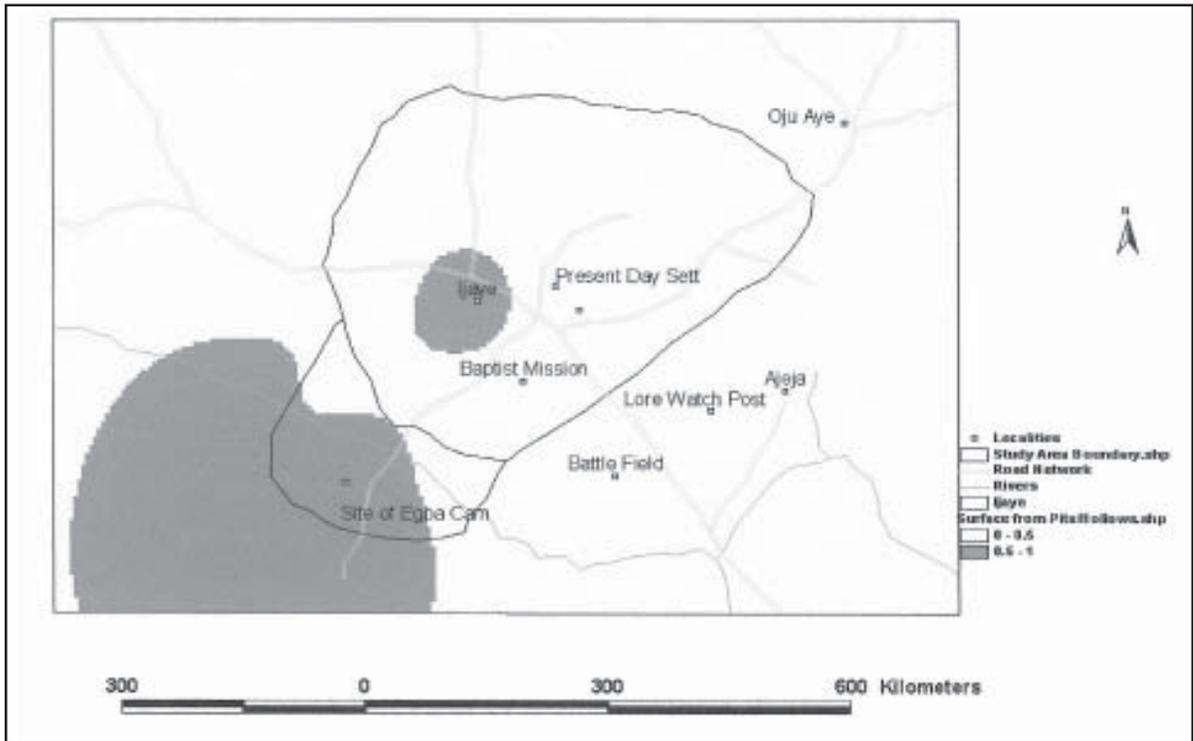


Figure 2: Map of Ijaiye-Orile showing interpolated value for anthills.

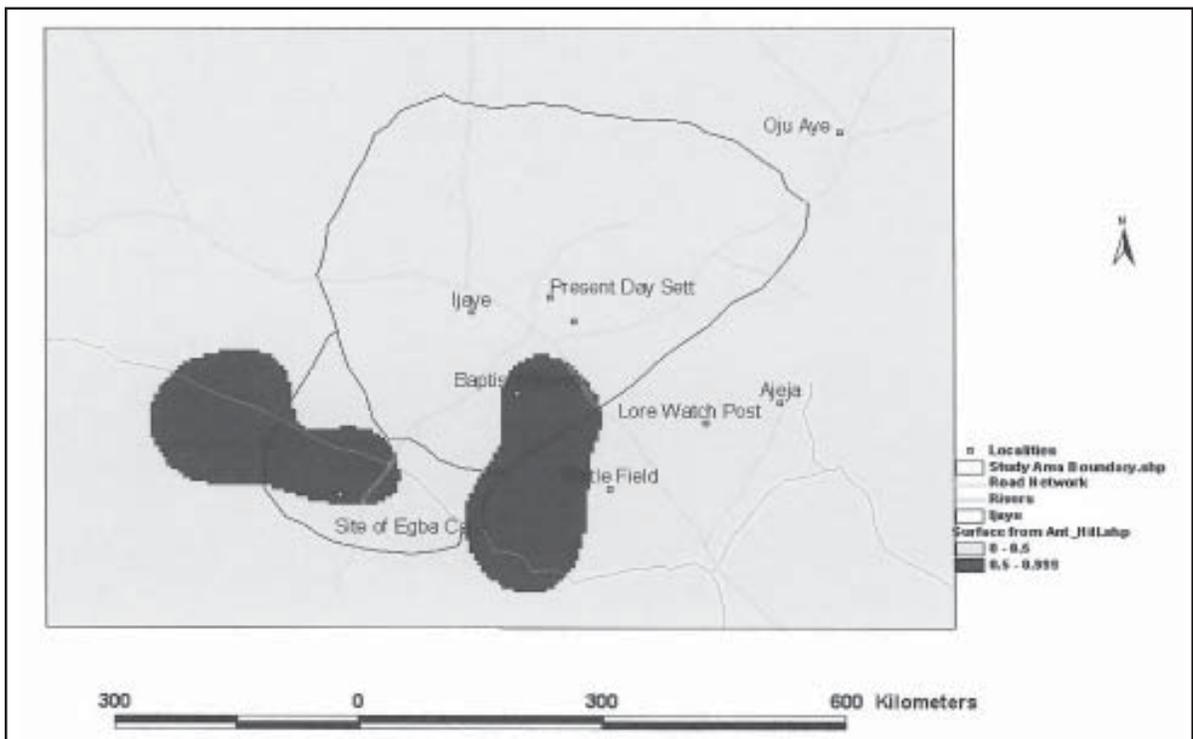


Figure 3: Map of Ijaiye-Orile showing the concentration of metallurgy.

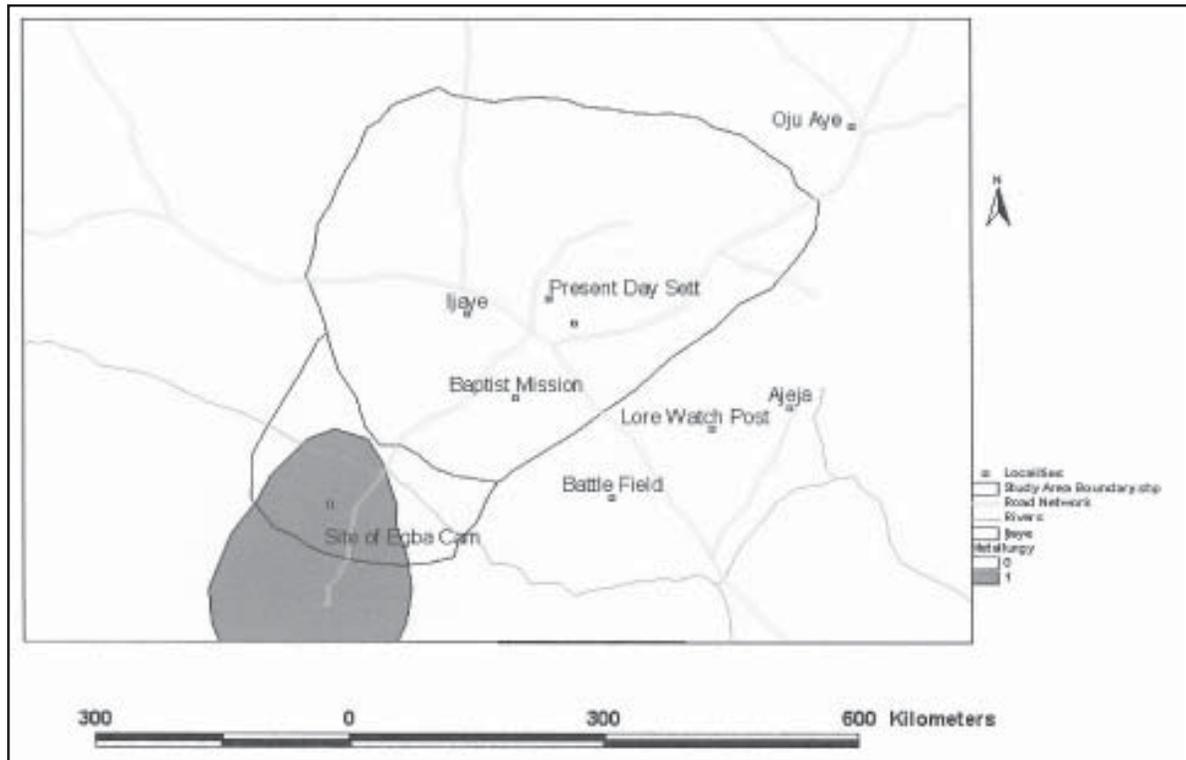
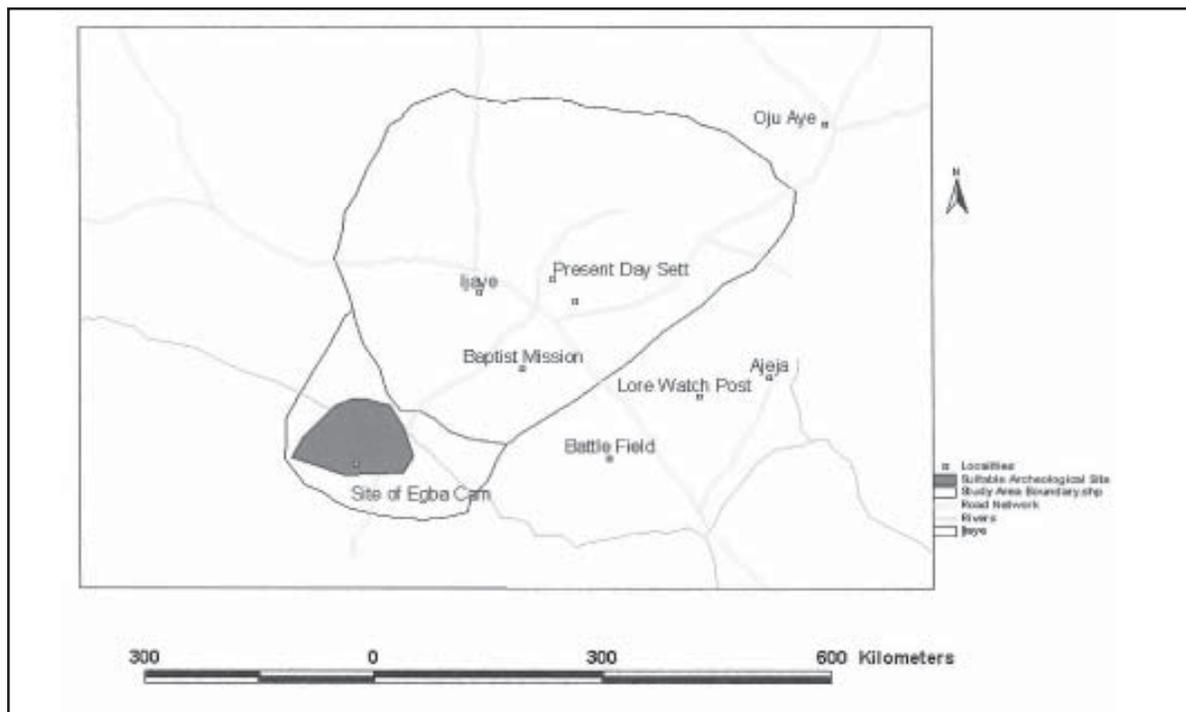


Figure 4: Map of Ijaiye-Orile showing the most suitable location for archaeological excavation.



findings of Samuel (1921) that the early settlers of Ijaiye-Orile, now the Ijaiye Egbas of Abeokuta migrated to the southern part of Ijaiye-Orile. Available oral tradition on Ijaiye-Orile confirmed that the predicted site was once the habitation of the Egbas whose major occupations were farming, metallurgy and pottery (Majiyagbe 2000, personal communication; Ayodele 2000, personal communication). The prediction of the Old Egba Camp site agrees with the findings of Ijor (1998) that iron slag was concentrated in heaps about 50 m away from the Ijaiye-Orile iron-working site.

The finds at Ijaiye-Orile revealed the potential of cultural tourism. Observations revealed the past land use of the area and agree with the presented history of the development of the area. For tourism to thrive in any nation, an understanding must be gained of those objects and places that make for tourism attraction (Olonade 2005). The location, conservation and preservation of cultural and natural resources of archaeological sites are paramount to the level of tourist attraction to the area. Hence, there is the need for more laboratory work on the finds obtained from fieldwork. GIS should be integrated in archaeological survey in the promotion of tourism.

For effective management of tourism resources (tourist attractions such as resort, mountain, river, valley, etc), in the process of planning, execution and evaluation, the right information reflecting characteristics and status about tourism resources is very important for policy makers, local administrators, specialists and the interested parties (Kim et al., 2005). Government at all levels would find GIS very resourceful in planning especially in organizing the vast cultural resources of Nigeria. With the integration of GIS into tourism, searching, editing and analysis of data would become very efficient. The GIS's topology in spatial features that allow for feature overlay as used in the study makes it a tool of decision support such as location analysis, land use plan and tourism development.

The use of the GIS in predicting archaeological sites reveals it as an integrated computerized information systems such as the tourism GIS for future plans, projections and expectations that can be modeled and their overall outcomes on the entire tourism industry thoroughly assessed before they are implemented (Longmatey et al. 2005). As such, the provision of tourism information for the Ijaiye-

Orile's archaeological site would first be a national platform for marketing the site's resource and secondly expose the investment potentials of opportunities of Ijaiye-Orile internationally. The information of the archaeological site made available by this work will no doubt help the development of tourism in the area. Hence all the feasibility studies including accessibility, projected revenues and overall viability could be assessed from the desktop before implementation. The integration of GIS allows quick, convenient and easy updates. With GIS, the archaeological materials of the study area can be updated once the system had been set up without necessarily disposing the original database established, thus making considerable savings in terms of time, manpower and money.

Conclusion

The use of GIS to predict archaeological site of Ijaiye-Orile, Southwestern Nigeria, brings to limelight the exact location of the natural resources that could be harnessed in the development of the tourism potentials of the area. The findings of this work have shown that presenting tourism information in GIS in a multimedia environment would offer an unparalleled platform for the management and promotion of the tourism industry in Nigeria.

There is the urgent necessity to critically look into the performance potential of the GIS in the tourism industry of Nigeria thereby making it internationally marketable. The three tiers of government in Nigeria would do well in integrating the GIS into the nation's tourism thereby increasing the socio-economic importance of the industry. Institutions of higher learning are to take the lead in the integration of GIS into archaeological and tourism studies with the aim of making tourism in Nigeria meet up with international standards.

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