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ПРИМЕНЕНИЕ ГЕОГРАФИЧЕСКИХ ИНФОРМАЦИОННЫХ СИСТЕМ ДЛЯ УСТОЙЧИВОГО РАЗВИТИЯ ТУРИЗМА

GEOGRAPHICAL INFORMATION SYSTEMS APPLICATION FOR TOURISM SUSTAINABLE DEVELOPMENT

Nowdays tourism is one of the highest generating income industries in the twenty-first century. The number of international tourist arrivals has increased tremendously. According to the World Tourism Organization, international tourism

continues to sustain a sharp increase.

However, tourism is a highly complex activity and thus requires tools that aid in effective decision making to come to terms with the competing economic, social and environmental demands of sustainable development.

One of the most remarkable technologic innovations in tourism planning and decision making is Geographic Information Systems (GIS). GIS is a computer based powerful set of tools for collecting, storing, retrieving, mapping, analyzing, transforming and displaying spatial and non spatial data from geographic world for a particular set of purposes that varies for each discipline. The potential for GIS applications in tourism is significant. GIS is now recognized widely as a valuable tool for managing, analyzing, and displaying a large data pertinent to many **local** and **regional** planning activities (Avdimiotis 2004).

Geographic Information Systems applications in the field of tourism first appeared in the early 90s. However, the number of GIS applications for tourism has not developed as in other fields. This is also reflected in the field of sustainable tourism, where the adoption of new technologies has been rather slow. Nonetheless, sustainable tourism decision-making has a lot to benefit from using such technologies.

Taking into account that Geographic Information Systems are important tools for tourism sustainable development we can consider now such countries as Nigeria, Malaysia and Russia as vivid examples of GIS application in the industry of tourism.

Nigeria, Ile-Ife

The Tourist Centers GIS database of town Ile-Ife of Osun State of South-Western part of Nigeria was structured to follow a relational database model format. The core of the database, the spatial component, was developed using ILWIS software while ArcView GIS software was used as a front-end development platform for enhance cartographic presentation and visualization. The summary of the

procedure followed in the development of the spatial database included the following:

a. Acquisition of the map of Ile-Ife.

b. Field checking to determine the reliability of the map.

c. Converting of the analogue map into digital format by scanning, georeferencing and digitizing.

d. Editing to remove errors.

e. Cartographic presentation (Fadahunsi 2011).

In order to provide enhanced cartographic representation, the digital map was further developed using ArcView GIS software. Labels and suitable graphic symbols were assigned to the various features for easy categorization, identification and visualization. Finally, composite digital maps were produced (Fadahunsi 2011).

The databases created were subjected to a number of spatial queries and analysis to assess the effectiveness of the GIS technology as a tool for managing tourism industry. These queries and analysis would be useful for decision makers in performing their day-to-day management of tourism industry in the study area. Five examples of information that can be derived from spatial database created for these tourist centers are discussed in maps 1, 2, 3, and 4:

a) Map 1: At glance the prospective visitors would be able to know the number of hotels with more than 25 rooms and cost per room not more 3000 Naira/night (see fig 1).

b) Map 2: This map shows buffer zone around Igbo Olokun. The map is a summary of analysis of area of influence of the forest in relation to other topographical features like settlements. As a decision support measure in addressing the problem of encroaching Olokun forest, as well as the problem of settlement expansion towards the Forest, a 100m buffer zone was created round the forest to

assess the proximity of the settlements to the forest (see fig 1).

c) Map 3: Buffering around Ile Ife Museum: Security is very important in tourism industry. No tourist would like to visit any Tourist attraction where security is not guaranteed. In order to demonstrate this, buffer zone is drawn around Ife Museum to show the Police stations that are within 1.5km radius. The result of buffering is shown as map 3. From the map two Police stations are within 1.5km radius (see fig 1).

d) Map 4 shows the Tourist Map of Ile Ife. The map is very good for the prospective tourists to have first hand overview into all existing tourists' centers in Ile-Ife (see fig 1).

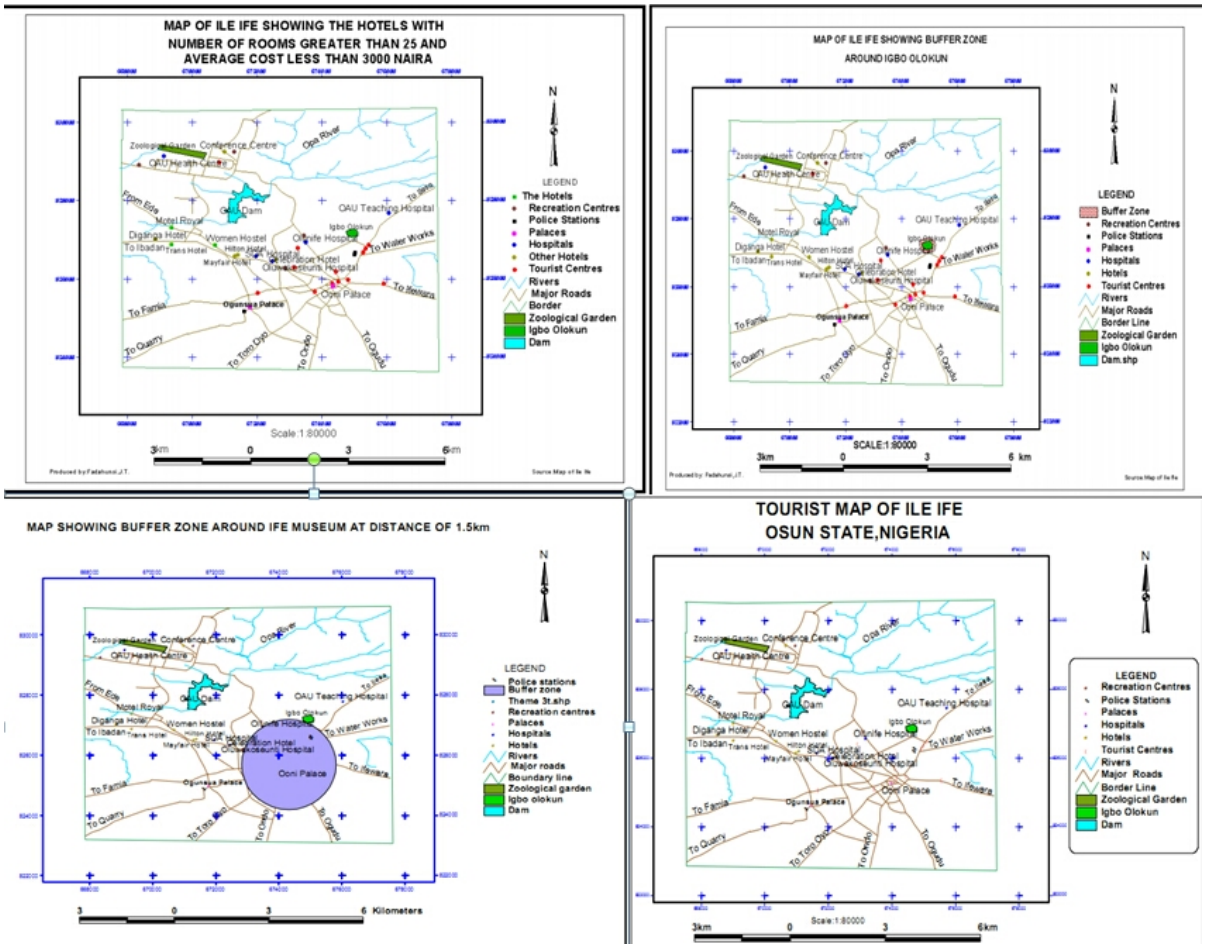

Fig 1: Maps of the databases Ile-Ife, Nigeria (taken from "Application of Geographical Information System (GIS) Technology to Tourism Management in Ile-Ife, Osun State, Nigeria")

We can conclude that the Tourist Centers GIS database of town Ile-Ife provided the means to draw together diverse data sets, analyze and present the results to the user in a manner which could be rapidly assimilated for decision making.

Malaysia, Pulau Pangkor

Before building up GIS application for tourism planning in Pangkor, the first step to be carried out was to conduct a survey among tourists and local communitieson the satisfaction of four main aspects which include physical element, infrastructure available, accessibility and community supports. GIS relies on secondary data for spatial analysis.

Steps involved include data collection, data installation, and data analysis. Figure 2 shows the steps to be taken. The types of data required include attribute and spatial. The attribute data is gathered through two sources. One is from the survey conducted earlier and the other literature review of the tourism products available. The collected data are plotted in GIS system using ArcGIS software. Layers created include tourism products, infrastructures available, land use zones, analysis and new development area. Once data are available in the system, GIS analysis is conducted. Every analysis layer that is conducted using different criteria will be saved as layer for its specific usage. The layers are then used to create new development areas. GIS model is able to suggest and answer questions of business- style site feasibility analysis on tourism products capabilities without disregarding local communities (Rosilawati 2006).

Generally speaking GIS offers a powerful tool in providing information to

support decision making. It has been used in resource inventory, data integration and land use planning. In tourism development, GIS would be a great aid in planning for sustainable development. Developing tourism products with minimal negative impacts on the environment and the local communities is the main objective in driving for sustainable development.

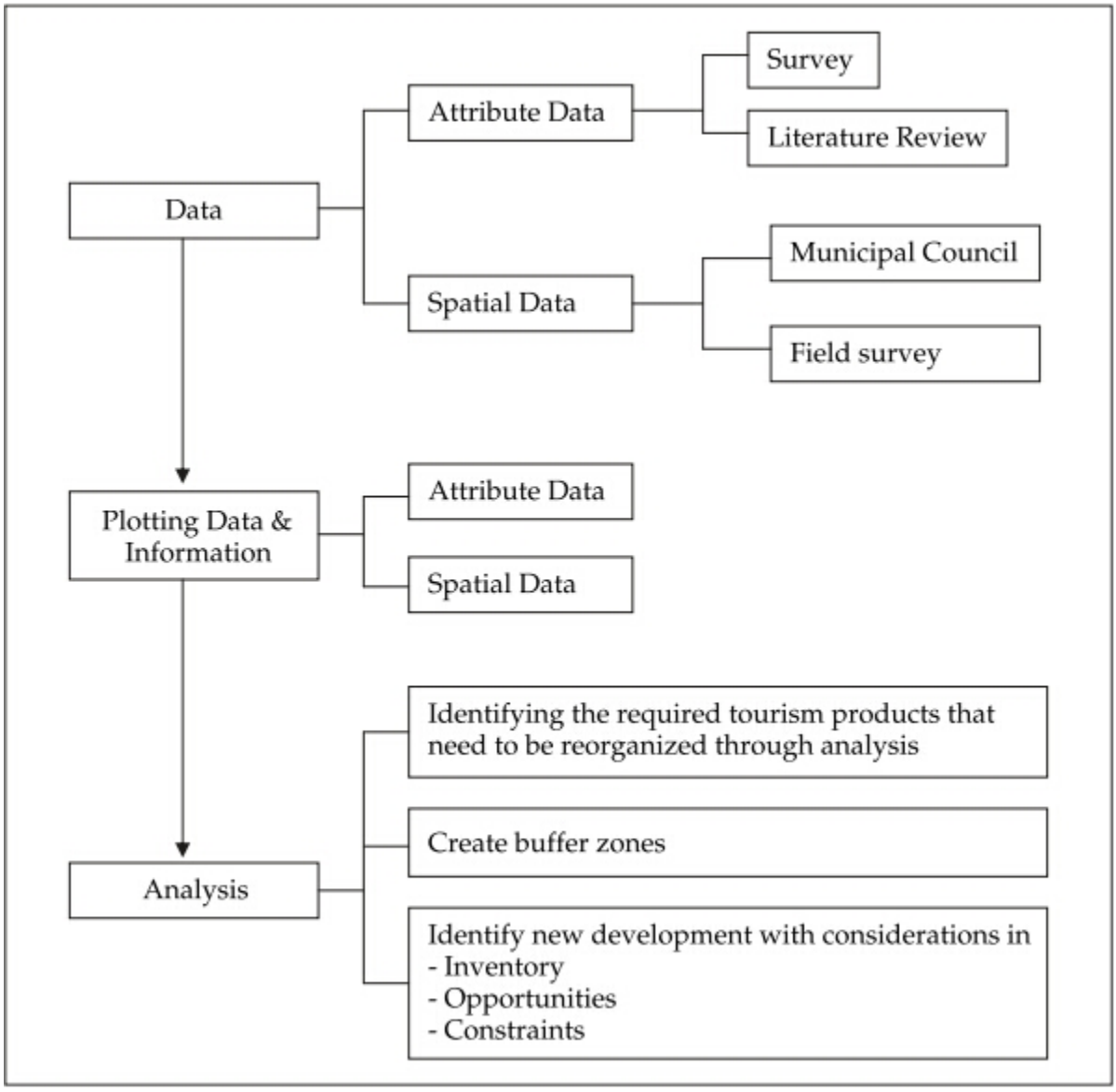

Fig 2: Steps in GIS application in Pangkor tourism planning

Russia, Tyumen

One of the main aims of this article is to show the results of the

investigation of GIS application in the sustainable development of tourism in Tyumen. This research has been carrying out for 4 years and tourist GIS database of Tyumen has already been developed.

The tourist GIS database of Tyumen is an electronic map with all tourist resources of town and the database. This map is plotted in GIS system using ArcGIS 9.3 software and consists of different layers (general layers and layers of tourist resources).

The development of the tourist GIS database has 4 steps:

1) the investigation of tourist potential of Tyumen and collecting information about tourist resources for the database;
2) drawing the general layers (hydrography, landscape, buildings, quarters, roads, etc);
3) making the electronic map of tourist layers (monuments, architecture monuments, museums, hotels, religeous architectural monuments, nature monuments);
4) collecting the tourist layers information database (name, address, historical and cultural category, photo, website etc.).

As a result the electronic map of Tyumen has 95 architecture monuments, 8 museums, 7 monuments, 16 hotels, 12 religeous architectural monuments and 6 nature monuments (see fig 3 and 4).

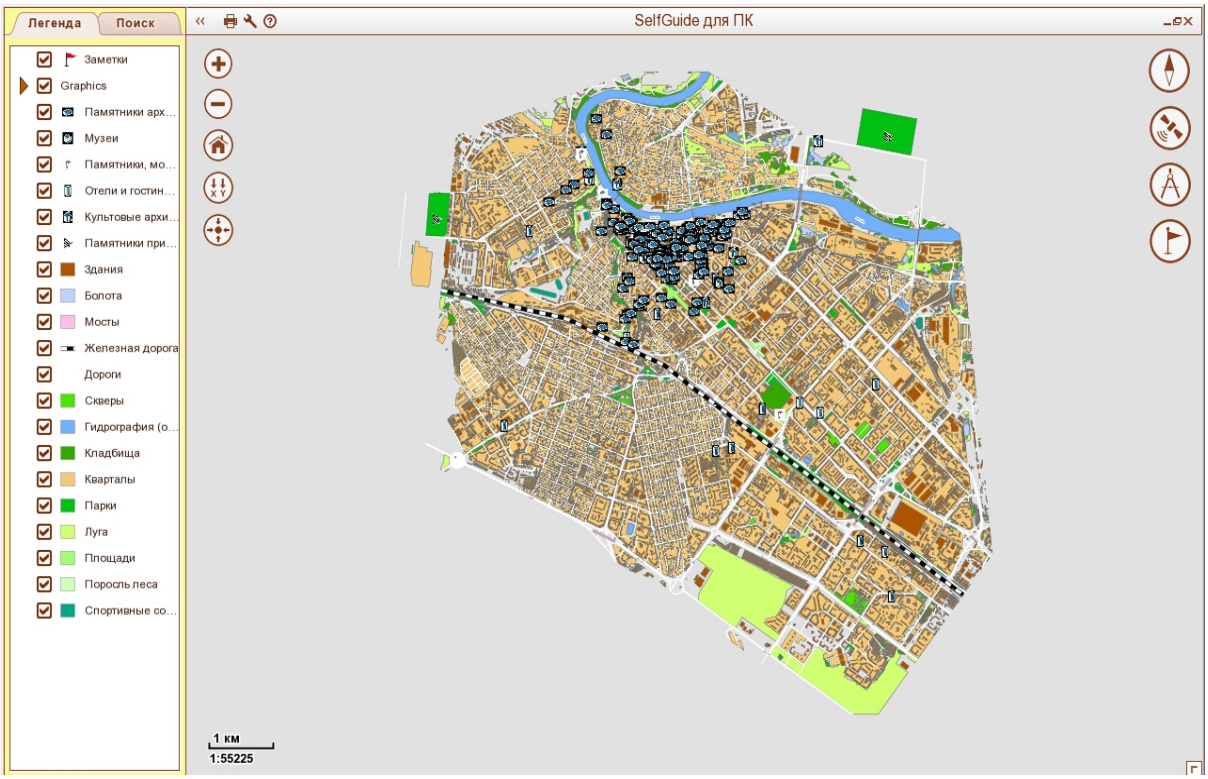

Fig 3: Tourist GIS database of Tyumen

Fig 4: **Database of information for tourist sights**

On the whole the tourist GIS database of Tyumen is one of the most important

tools for sustainable development of tourism in Tyumen region. It can be used for organization of tourist activity and for planning and management of tourism industry.

In conclusion it can be said that tourism is a highly complex activity, and thus requires methods for social and environmental demands of sustainable development. The power of GIS lies not only in the ability to visualize spatial relationships, but also beyond the space to the holistic view of the world with its many interconnected components and complex relationships. Moreover impact assessment and simulation are increasingly important in tourism development and GIS can play a role in auditing environmental conditions.

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