JOURNAL OF RESEARCH IN TOURISM

NIHOTOUR

NATIONAL INSTITUTE FOR HOSPITALITY AND TOURISM ABUJA

Volume 1, 2007

VISUALIZATION OF ECOTOURISM POTENTIALS OF BORGU SECTOR OF THE KAINJI LAKE NATIONAL PARK

Musa Haruna D.
Department of Urban and Regional Planning,
Federal University of Technology, Minna, Niger State.
musharry@yahoo.com

ABSTRACT

Decision-making in tourism development and planning is becoming increasingly complex as organisations and communities have to come to terms with the competing economic, social and environmental demands of sustainable development. Geographic Information Systems (GIS) and Visualization is a computer-base, tool for gathering, storing, manipulating, analyzing, and displaying spatial data. GIS therefore, can be regarded as providing a toolbox of techniques and technologies of wide applicability to the achievement of sustainable tourism development. Spatial (environmental) data can be used to explore conflicts, examine impacts and assist decision-making. The study was carried out using ancillary data such as Maps (Topographic and Planimetric maps), as well as attribute data (such as species of fauna and flora existing, their distribution, tourist traffic, facilities available, and scenic inventories) of the park. The study revealed the importance of space information and technology in ecotourism planning and development. The main goal was to develop a simple Geographic Information System (GIS) that would serve as a Decision Support tool for ecotourism planning and development of Kainji Lake National Park (KLNP).

Key Words: *Ecotourism, Visualization, Computer-based, Data.*

INTRODUCTION

Many developing countries depend mainly on tourism for economic growth and diversity. However, achieving both depends on the ability of a country to sufficiently develop, manage and market the tourism facilities and activities in that country.

In recent years, attention has been drawn to examine how local population can develop tourism activities and benefit from it. In the 1980s, alternative form of tourism began attracting the interest of governments, communities and scholars alike. These were given

various names – "nature tourism", 'soft tourism", "responsible tourism", "green tourism", "ecotourism" (Schaller, 1999), but all were seen as alternatives to mass tourism. Among these labels, the term "ecotourism" has become prominent, although a consistent definition is by no means found, even among scholars (Schaller, 1999).

Ecotourism is the fastest growing tourism sub-market in the world. The number of eco-destinations expands with the increases in park numbers. Today, there is a worldwide nature travel market, with tourists from many countries traveling to destinations in many other countries (Zurick, 1992). Ecotourism has an idealistic agenda, defined by Drumm (1991:54) as "progressive, educational travel, which conserves the environment and benefits local communities". Because it is both succinct and sufficiently ambitious, this definition will be used here.

Tourism activity is a complex of relations that happen in space. As a regional planning activity, ordering the tourism system implies the management of a lot of information related to the cultural, social and economic context of each reality, and potential relations due to proximity or other location factors. Organizing and automating this amount of spatial data through GIS technology enhances the ability of planners, and general public to use it in order to plan the development and marketing of tourism-activity. Three different landscape features characterize tourism destinations: points, lines, and polygons. Point features are individual tourist attractions, for example, a campground in a park, or a historic site along the highway. Coastal beaches and resort often follow a linear pattern, while big theme parks or natural parks are characteristics of a polygon feature. These location attributes enhance the ability to visualize the resource potential of the parks.

It is apparent that GIS has tremendous potential application in ecotourism planning. However, due to the general lack of tourism databases and inconsistencies in data, their applications are limited. For example, there is very little site-specific information about visitor's origin and destination, travel motivation, spatial patterns of recreation and tourism use, visitor expenditure patterns, level of use and impacts, and suitability of site for recreation/tourism development - all this are suitable application areas of GIS.

So far, applications of GIS in tourism have been limited to recreational facility inventory (Nedvic and Budic 2003), tourism - based land management (Feick and Hall, 2000) visitor impact assessment (Nepal, 2003), recreation— wildlife conflicts, mapping wildness perceptions (Carver, 1995), tourism information management system (Kilical,and Kilical 2003) and decision support systems. The range of issues and potential applications of GIS are illustrated in Table 1 and the functional capabilities of GIS and relevant application to ecotourism in Table 2.

Table 1: Common tourism – related issues and GIS application

Problem	GIS Application
Benchmark/ database	Systematic inventory of tourism resources.
Environment management	Facilitating monitoring of specific indicators.
Tourism behaviour	Wildness perceptions
Carrying capacity	Identify suitable locations for tourism or recreation development
Prediction	Simulating and modeling spatial outcomes of proposed tourism development

Source: Adapted from Butler 1993, p.33 (cited in Bahaire and Elliot -White (1999), p.162).

Table 2: Capabilities of a GIS

Functional Capabilities	GIS Basic Question		Ecotourims Application
Data entry, storage and manipulation	Location	What is at?	Tourism resources inventories
Map production	Condition	Where i it?	Identify most suitable location for development
Databased integration and management	Trend	What has changed?	Measure tourism impact
Data queries and serches	Routing	What is the best route?	Visitors management/flows
Spatial analysis	Pattern	What is the pattern?	Analysis relationships associated with resource use.
Spatial modeling	Modeling	What if?	Assessing of potential impacts of tourism development

Source: Adapted from Bahaire Elliott – White (1999, p.159)

Geographic Information Systems (GIS) and Visualization is a computer-based, tool for gathering, storing, manipulating, analyzing, and displaying spatial data . GIS systems have powerful visual display capabilities that present the results of analysis on maps on a wide variety of scales. GIS is an excellent technology to understand and solve problems associated with data whose common attributes are related to place and geography. In its simplest form, GIS can be used to create a map for the user on demand; in its more complex form, it becomes a database with millions of pieces of data that are related geographically and can be displayed in a user-friendly format to make multifaceted interrelationships visually understandable.

National parks are endowed with rich ecological features that are physically unique, biologically diverse, and experimentally breathtaking. In order to make informed decision with information base so voluminous and detailed like we have in our parks, managers must have a system that organized and presents data in a comprehensible manner.

Planning is the key to the mission of the National Park Service to protect National parklands for recreation, inspiration and education. One of the main principles of this mission is making wise decisions based on scientific knowledge. By law, each national reserve needs a general management plan. Each plan maps out a clear vision and framework to guide a national park for certain period of time (15 to 20years). The plan serves as a road map to guarantee the survival of the park and its cultural heritage. It outlines how the National Park service will reach this goal. GIS has become indispensable to these plans, as a tool of choice to create and analyze layers of mapped data. This includes natural and cultural resources, scenic resources, visitor opportunities, and regional land use. GIS technology produces colourful, expressive maps that persuasively illustrate planning ideas to the public and park service managers. It eliminated the old and cumbersome manual "overlay" technique. GIS saves time and money with its easy manipulation and display of data. The digital data also provides accurate information to measure and evaluate how various plans would affect the park and surrounding area as required in an environmental study. The evolution of GIS technology offers exciting possibilities as National park Service planners strive to understand nation's dynamic ecosystems and protect them for generations to come. This paper therefore, demonstrated the importance of space information and technology in visualizing ecotourism potential in Borgu sector of Kainji Lake National Park.

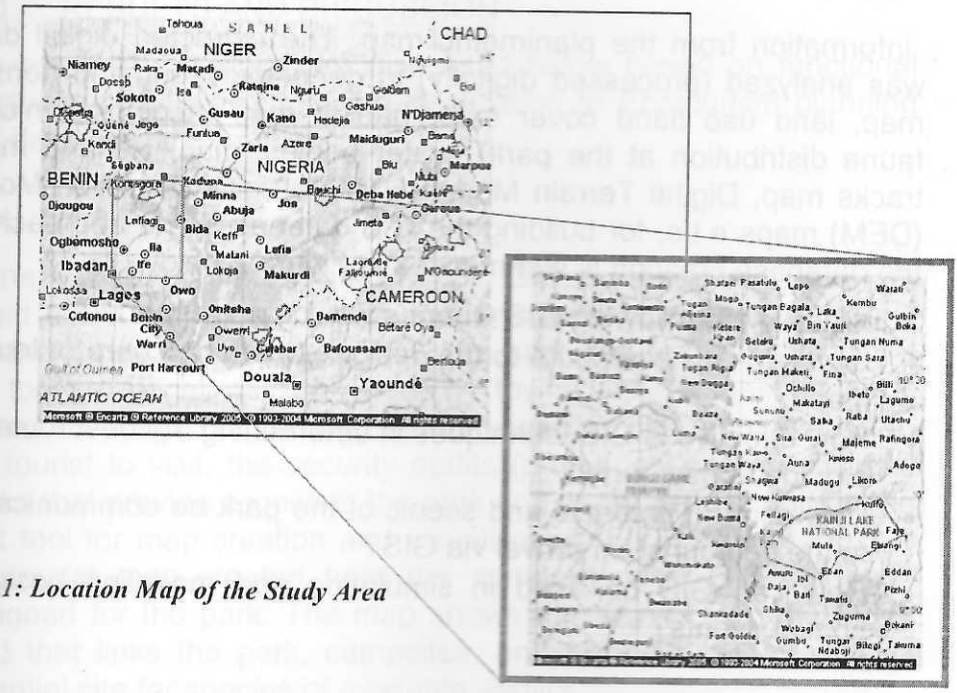

Fig.1: Location Map of the Study Area

2.0 DESCRIPTION OF STUDY AREA

The study area selected (Borgu Sector of the park) for analysis is located within latitude 9^0 54'N, 10^0 02' and longitudes 3^0 46'E and 3^0 59'E in the Lower River Basin. Kainji Lake national Park (KLNP) was established in 1st April 1976.It is made up of two non-contiguous sectors: Borgu sector and Zugurma sector. Covering an area of 5,341 square kilometers, the park enjoys the special privilege and honour of being the first National Park in the country today. The park is endowed with a rich and diverse population of wildlife, and a variety of ethno-historical and cultural sites, which resources are being managed among other purposes for recreation and ecotourism.

3.0 DATA DESCRIPTION AND METHODS

The study was carried out using maps (Topographic and Planimetric maps), as well as attribute data, such as species of fauna and flora existing, their distribution, tourist traffic, facilities available, and scenic inventories. The map was scanned in an acceptable format and imported into ArcView GIS 3.2a Software; study area was then extracted by on-screen digitizing using

information from the planimetric map. The extracted digital data was analyzed (processed digitally) to generate vegetation density map, land use /land cover map, habitat map (ecological niche: fauna distribution at the park), water bodies' map, wetland map, tracks map, Digital Terrain Model (DTM) / Digital Elevation Model (DEM) maps e.t.c, for building the GIS database. The approach to the database creation is summarized in Figure 2 below.

Specifically the following GIS Queries would be responded to:

- How can GIS contribute to the design of park brochure or tourist map?
- How effective is GIS techniques in determining the best route as a guide to ecotourist?
- How can the potential and scenic of the park be communicated to the ecotourist on arrival via GIS?
- How can GIS be used in simulating and modeling possible spatial events?

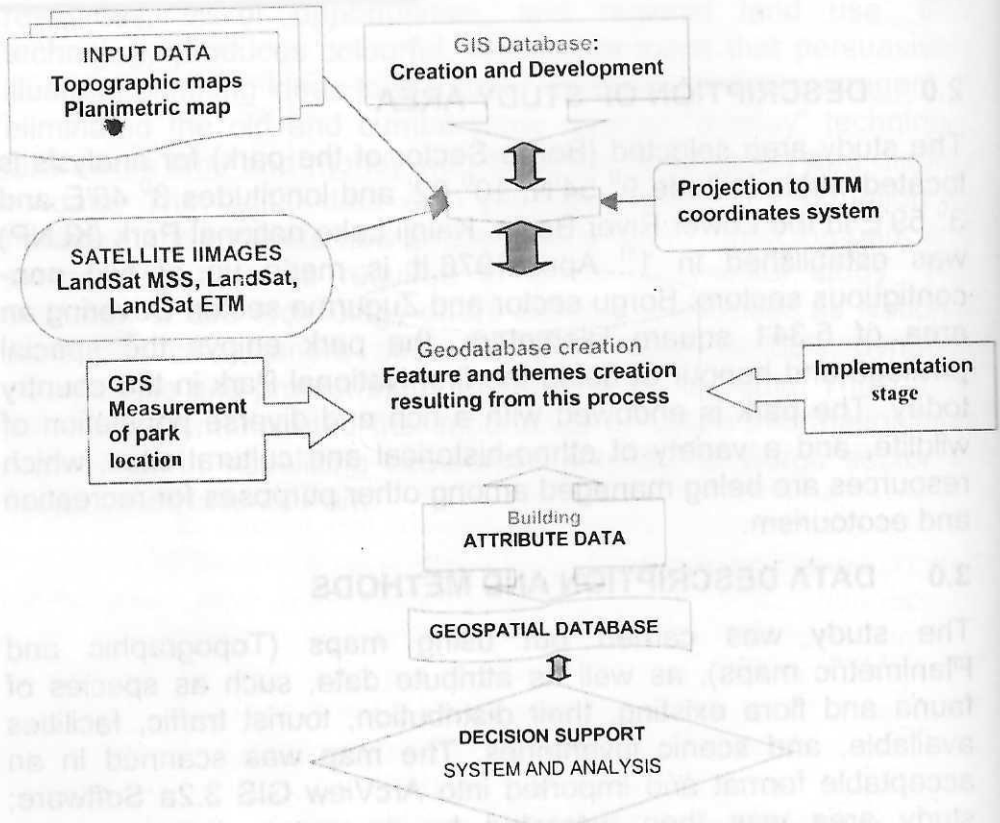

Fig.2: GIS Approach to Database Modeling

4.0 RESULTS AND DISCUSSION

The result of the study are discussed below based on functional capability of GIS and relevant application to Ecotourism planning and development.

4.1 Map Creation

In line with question 1 in section 3.0, GIS is an essential tool that would aid in the design of a tourist brochure for a park. A map is needed for the brochure to show the park and reserve areas that the tourists might visit, the near by towns and villages (of great historical background) around the park which might be of interest to the tourist to visit, the security outfits (patrol-post), the roads and tracks that provide access to the park and game viewing. GIS is the best tool for map creation and visualisation. For instance, Fig.3 is the tourist map created from the comprehensive GIS database designed for the park. The map shows the Kainji Lake, the major road that links the park, campsites, and Lake Cruise as well as potential site for species of available wildlife.

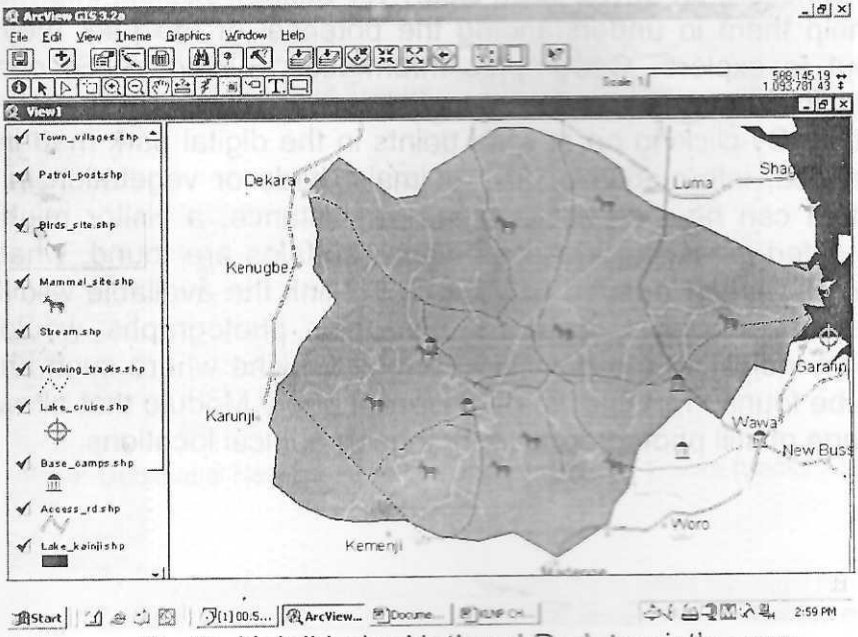

Fig.3: Kainji Lake National Park tourist's map developed from the GIS database

4.2 Identify Suitable Locations for Ecotourism or Recreation Activities

A GIS technique is most effective in identifying most suitable geographic locations, especially locations for Ecotourism or recreation development for instance. Shortest route between two places as well as the best routes and directions to possible tourist site can be calculated and spatially represented by map. In the map Fig.4, from point 'A', other parts of the park can best be accessed via the viewing tracks highlighted within shortest distances (<19Km) than other tracks. The attribute tables provide detail information on the tracks, the width, and the conditions. This spatially represented information can be printed out for a tourist as a guide before the exploration of park. This would also guide the tourists who will be interested in driving around the park for the choice of transport mode to use.

4.3 Wilderness Perception

In our National Parks, the park rangers are always looking for ways to inspire visitors. These are challenges faced by the park rangers. Many visitors on arrival want clear, yet visually exciting information to help them in understanding the potential of the park they are about to explore. Geographic Information System (GIS) can be used to communicate the potential resources of the park to the visitors. By clicking on several points in the digital park map in the database, information on the animals, birds or vegetation in that section can be obtained (Fig.5). For instance, a visitor might be interested in visiting locations where buffalos are found, what the **spatial analyst** needed to do is to hot-link the available wildlife in different ecological locations and their photographs would be shown indicating the possible ecological niche where such animal can be found. 'Hot-link' is a Geospatial query Module that allow the linkage of still photographs to their geographical locations.

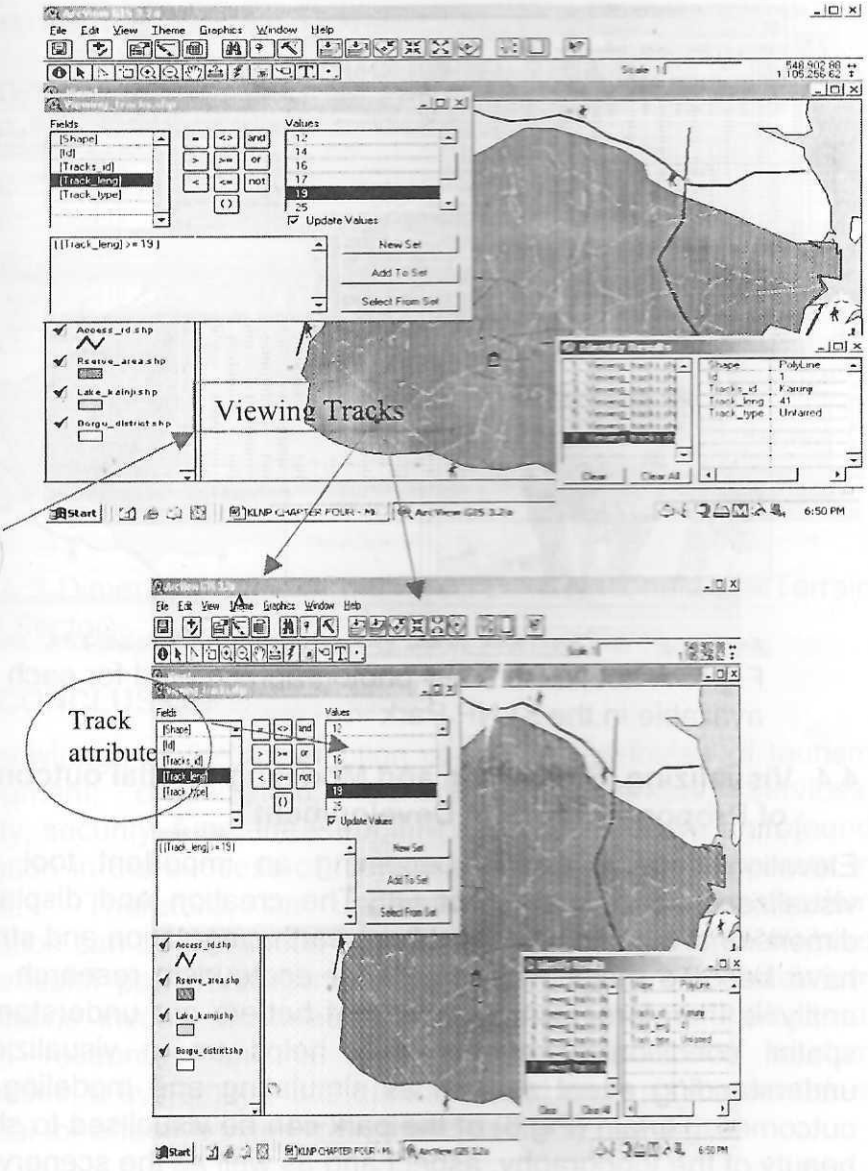

Fig.4: Geospatial Network Analyses of park Viewing Tracks (tracks >19Km)

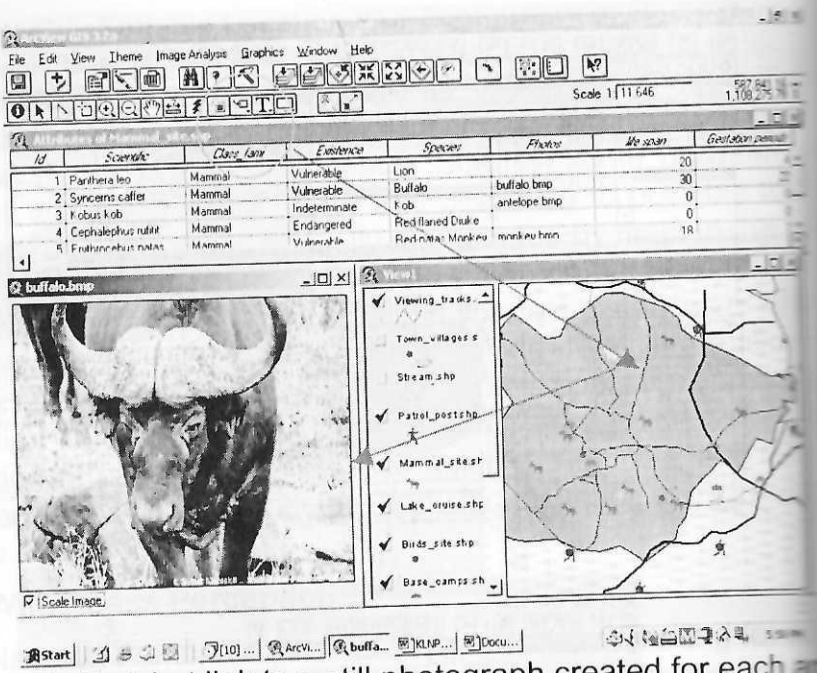

Fig.5: A hot link to a still photograph created for each animal available in the KLNP Park

4.4 Visualizing, Simulating and Modeling Spatial outcomes of Proposed Tourism Development

Elevation data is rapidly becoming an important tool for the visualization and analysis of GIS.The creation and display of dimensional models represent bare earth, vegetation and structures have become major requirement for ecotourism research. Spatial analysis therefore, is a process that betters our understanding of spatial condition or events. GIS helps us in visualizing and understanding event as well as simulating and modeling spatial outcomes. Terrain (Fig.6) of the park can be visualised to show the beauty of the topography, aspect and as well as the scenery.

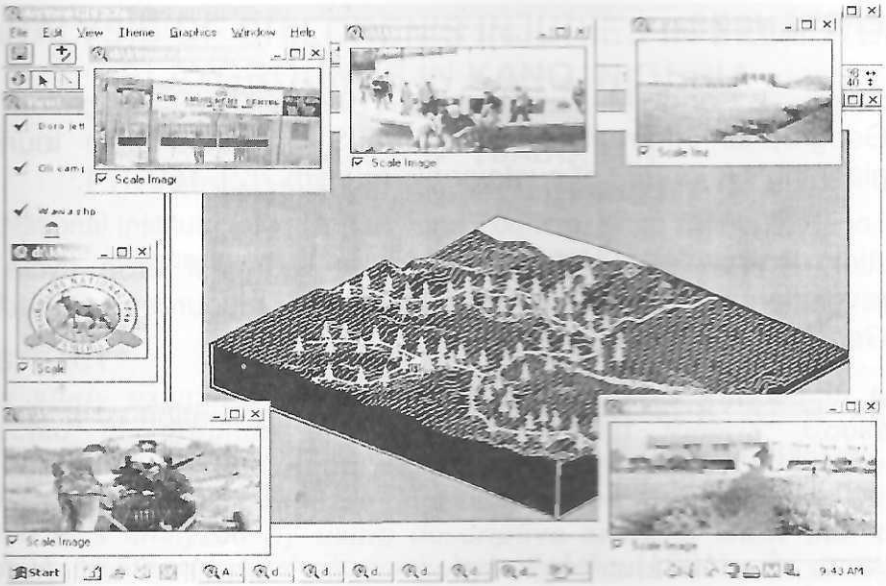

Fig.6: A 3-Dimension View of the Kainji Lake National Park Terrain (Borgu Sector)

5.0 CONCLUSION

The knowledge of the dysfunction of various attributes of tourism development: organization, management, markets, services, publicity, security, fund, infrastructure and utilities- have a profound implication in the success of tourism planning and development in general. Therefore, an understanding of how ecotourism destination can be enhanced and sustained is a fundamental issue in successful park management and planning. Since ecotourism destinations involve multi-faceted components of natural/cultural tourism resources and a multiplicity of man-made tourism businesses, a systematic GIS database and analysis framework is essential for effective visualization and decision making.

REFERENCES

Bahaire, T. and M. Elliot-white (1999). "The applcation of Geographic information system (GIS) in sustainable tourism planning". A *journal of sustainable tourism* 7(2): 159-174.

Buttler, R.W. (1993). "The concept of a tourist area cycle of revolution: implications for management of resources". *Canadian Geograper* 2(9):5-12

Feick, R. D. & G. B. Hall, (2000). " The application of a spatial decision support system to tourism based land management in small Island States", *Journal of Travel Research*, 39 (2) 163-171

Drumm, A. (1991). *Integrated Impact Assessment of Nature Tourism in Ecuador's Amazon Region*. Quito: Feprotur.

Kilical & Kilical (2003). In Wyne, G. (2003), GIS Application in Tourism planning. GIS 340-GIS seminar, November 2003.

Nedvic and Budic (2003). Recreational facility inventory. In Wayne, G (eds) *GIS Application in Tourism*.GIS340-GIS Seminar.

Nepal (2003). *Visitors impact assessment*. In Wayne, G (eds). GIS Application in Tourism. GIS340-GIS Seminar.

Schaller, T.D. (1999), Indigenous Ecotourism and Sustainable Development: The Case of RioBlanco,Ecuador, http://www.eduweb.com/Schaller/section2RioBlanco.htm. Date accessed, 23th March,2004.

Zurick, D.N. (1992). "Adventure travel and sustainable tourism in the peripheral economy of Nepal". *Annals of the Association of American Geographers* 84 (4) 608-628.