

A MULTIMEDIA GIS DATABASE FOR PLANNING MANAGEMENT AND PROMOTION OF SUSTAINABLE TOURISM INDUSTRY IN NIGERIA

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1. INTRODUCTION

MEASURES TAKEN TO ADVANCE TOURISM

- (1) The adoption of the National Tourism Policy (NTP) in 1990.
- (2) The birth of the Nigerian Tourism Development Corporation (NTDC) in 1992.
- (3) The founding of the National Institute for Hospitality and Tourism (NIHOTOUR), in Bagauda, Kano.
- (4) And the National travel Bureau (NTB), a tour operating company of NTDC, (NTDC (2001)).
- (5) The adoption of a Tourism Master Plan and the inauguration of the National Tourism Council with the President as chairman.

The aims of these measures can be summarized as follows:

- To make Nigeria the ultimate Tourism destination in Africa and
- To make Tourism one of the greatest foreign exchange earners in an oil dependent economy.

DEFINITIONS

- GIS: Geographical Information Systems is a computerised system for acquisition, storage, retrieval, analysis and display of spatial data
- MULTIMEDIA GIS: A Specialised GIS which integrates different types of data such as text data, graphical data (maps, graphs), pictures data (still and moving Pictures) and sound data (voice and music), thus creating in some cases, a multiple representation for the same data.
- The combination of the Multimedia and GIS technologies will certainly build a powerful distributed tourism information system which is bound to improve the services offered in the tourism industry in Nigeria.

2. OBJECTIVES OF THE RESEARCH

- With a population of about 120million people, about 300 ethnic groups, a vast land of approximately 1million sq km, a beautiful coastland of about 835km, and a rich diversity of cultural and ecological tourism resources, Nigeria appears destined to be indeed the “Giant” of Africa as far as tourism is concerned.
- The big question is why is it that Nigeria like some other African countries is yet to develop her full potential in the tourism industry?

The objective of this research is

- (1) to develop a multimedia GIS database for Tourism industry as a perceived technical solution to the problem of planning, management and promotion of both domestic and international tourism in Nigeria.
- (2) to bring tourism information to the door step of actual and potential tourists and tourism agents through the power of Digital Technology.

Why Multimedia GIS?

Tourism sites and tourism activities ARE BEST RECORDED BY WAY OF STILL/MOVING PICTURES, VOICE/MUSIC, MAPS/GRAPH AND TEXT/TABLES

Such a database constitutes the basis for promoting efficient and productive multimedia spatial information services by private and government tourism agents all over the country.

3. METHODOLOGY

3.1 Data Acquisition.

Tourism data in form of text and maps about the 36 states of Nigeria and the Federal Capital Territory (FCT), Abuja were collected from a variety of sources including existing Maps Plans Charts, Newspapers, Magazines, Brochures, Travel Guides, Textbooks, and Websites of the states and Federal governments, Ministries and Agencies and by ground survey.

3.1.1 Hardware

The following hardware were used in acquiring and processing tourism data.

Handheld Global Positioning System (GPS) was used for establishing the planimetric coordinates of Tourism sites and features and also for georeferencing and updating existing maps.

Pentium PC, IV, 2.4GHz, 120G, HD, 1G RAM with full multimedia capability for storing and processing text, graphical, sound and image data.

A0 digitizer for digitizing some existing maps in preparation for their conversion into digital format as alternative to on-screen digitisation.

A0 and A3 Scanners for scanning other available maps in preparation for on-screen digitisation.

Digital Camera (Sony) for capturing digital still pictures of tourist sites

Digital Video Camera (Sony Digitals) for recording video clips of tourist sites and features and tourism activities

A0 and A3 Printers/Plotters online with Pentium IV for printing tourism maps of the states, FCT and some state capitals

Microphone for recording sound into the computers to describe images, maps, tourism activities and also as a narration for tourism documentary.

All the listed hardware except the scanners and A0 digitizers were acquired through the University of Lagos Central Research Fund provided by the Nigerian University Commission.

3.1.2 Software (All software acquired thru' CRC/NUC)

The research project required a number of software because of the Multimedia nature of the data requirement.

- **Microsoft Word** served as medium for processing, editing and display of textual information/attribute data about tourism
- **Microsoft Excel** was used to key in relational tabular data and were saved in Dbase IV format
- **AutoCAD Release 14** was employed for on-screen digitizing of all scanned maps
- **Ulead Video DV 5.0 with a Fire wire 1394 adapter** was used in downloading video clips recorded by the Digital Video Camera into Pentium PC IV.
- **Ulead Video Studio Pro 5** which has the capability of converting recorded sound to wave files which are later converted into AVI files and also of converting scanned images and photographs into Video Clips , was also used.
- **Microsoft Window Media Player** played the Video Clips
- **User designed script in Java format** was written to hotlink wave files and video clips to Arc View environment
- **ArcView 3.1 and ArcGIS 8.1** were the only GIS processing software. All text, tabular, map and image data were exported into the ArcView environment.
- **Arc View 3.2a and Microsoft Windows TM explorer** were used to facilitate a seamless integration and manipulation of all the multimedia GIS data types into a Multimedia Database for Tourism. ArcGIS 8.1 was used instead of ArcView 3.1 for the purpose of comparison only.

3.2 Classification of Tourism Data

- In this research, tourism data were acquired under the following three categories, which constitute the major layers in the designed GIS database:
 - **Traditional Cultural Tourism:** Museum, art galleries, cultural, religious and national festivals, historical monuments, and features such as sites and buildings, arts and crafts.
 - **Ecological Tourism:** Geological / geophysical /geomorphologic features, (mountains, waters, falls and springs) beaches, national parks, games/forest reserves, botanical / zoological gardens etc.
 - **Modern TOURISM Features and Facilities:** Hydroelectric power dams, oil rigs, sporting and health facilities and other notable engineering structures travel and accommodation Facilities, Tourism Centres and agents, and other related data to tourism (see fig 1).
- As shown in Tables 1a, 1b and 1c

TABLE 1a: EXTRACT FROM RELATIONAL DATABASE FOR ECOLOGICAL TOURISM IN ABUJA, NIGERIA

STATE_ID	STATE NAME	DESCRIPTION OF TOURIST ATTRACTION	L.G.A	TYPE	CLASS
37	FCT	Aso Rock	Asokoro	Ecological	Hill/Rock/Valley
37	FCT	Abuja Garden Central Area	Central Business District	Ecological	Gardens
37	FCT	Abuja Zoological Garden	Garki District	Ecological	Gardens
37	FCT	Zuma Rock	Garki District	Ecological	Hill/Rock/Valley
37	FCT	Strabag Hills	Central Business District	Ecological	Hill/Rock/Valley
37	FCT	Jabi River	Central Business District	Ecological	River/Creek/Lake
37	FCT	Guzara River	Suleja/Minna	Ecological	River/Creek/Lake
37	FCT	Guzara Falls	Suleja/Minna	Ecological	Hill/Rock/Valley
37	FCT	Julie Useni Park	Garki District	Ecological	Reserve

TABLE 1b: EXTRACT FROM RELATIONAL DATABASE FOR ECOLOGICAL TOURISM IN IMO STATE, NIGERIA

STATE_ID	STATE NAME	DESCRIPTION OF TOURIST ATTRACTION	L.G.A	TYPE	CLASS
16	Imo	Model fish pond	Oigwe	Ecological	Reserve
16	Imo	Oigwe Rolling hills	Oigwe	Ecological	Hill/Rock/Valley
16	Imo	Uboma Fish ponds	Uboma	Ecological	River/Creek/Lake
16	Imo	Imo River	Okiwue/Awka	Ecological	River/Creek/Lake
16	Imo	Adaba lake	Okowo	Ecological	River/Creek/Lake
16	Imo	Zoological Garden at Nkeke	Owerri	Ecological	Gardens
16	Imo	Oguta Lake	Oguta	Ecological	River/Creek/Lake

TABLE 1c: EXTRACT FROM RELATIONAL DATABASE FOR ECOLOGICAL TOURISM IN OGUN STATE, NIGERIA

STATE_ID	STATE NAME	DESCRIPTION OF TOURIST ATTRACTION	L.G.A	TYPE	CLASS
27	Ogun	Ebute-Ori Tourist Beach	Ogun Water	Ecological	Beach/Port
27	Ogun	Yemooj Ecological Swimming pool	Ijebu/Ode	Ecological	River/Creek/Lake
27	Ogun	Tongge Island	Yewa North	Ecological	River/Creek/Lake
27	Ogun	Mauri Boomu	Imeko Afon	Ecological	Hill/Rock
27	Ogun	Jabata Forest Reserve	Imeko Afon	Ecological	Vegetation
27	Ogun	Okunjo Rock	Abeokuta South	Ecological	Hill/Rock
27	Ogun	Isabi Forest	Abeokuta South	Ecological	Vegetation
27	Ogun	Luboye beach	Ijebu East	Ecological	River/Creek
27	Ogun	Yemooj Tourist Center	Ijebu Ode	Ecological	River/Creek
27	Ogun	Okunjo falls	Imeko Afon	Ecological	River/Creek
27	Ogun	Koto Ajala	Ipoika	Ecological	Hill/Rock
27	Ogun	Tongge Island	Ipoika	Ecological	Hill/Rock
27	Ogun	Ogun-ogbo Forest	Odessa	Ecological	Vegetation
27	Ogun	Onu Mysterious Rock	Odogbolu	Ecological	Hill/Rock
27	Ogun	Awodora Okun Beach	Ogun Waterside	Ecological	River/Creek
27	Ogun	Ahoro Ite Spring	Sagamu	Ecological	River/Creek

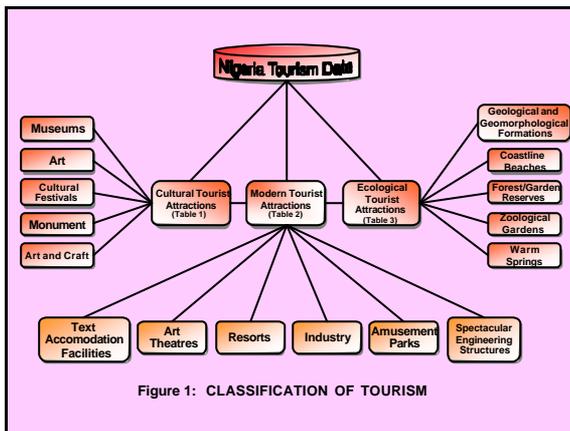


Figure 1: CLASSIFICATION OF TOURISM

3.3 Multimedia GIS Database

- There are two basic approaches to creating a Multimedia GIS Database viz “Multimedia in GIS” approach in contrast to “GIS in Multimedia”
 - Conversion of Analogue map to Digital format using the methods described in section 3.1
 - Creation of Relational tabular database with their attributes and of the topology from the vector data
 - Creation of GIS database for Tourism with capabilities for queries in the ArcView GIS environment.
 - Conversion of recorded digital photographs to video clips and sound to wave files and to AVI formats as described in section 3.12.
 - Hot-linking Multimedia files created above to corresponding files in the GIS database.
- All the constituents of the multimedia GIS database are depicted in fig. 2. It is obvious that the presence of still and moving pictures and sound data are the major elements that distinguish generic GIS from Multimedia GIS.

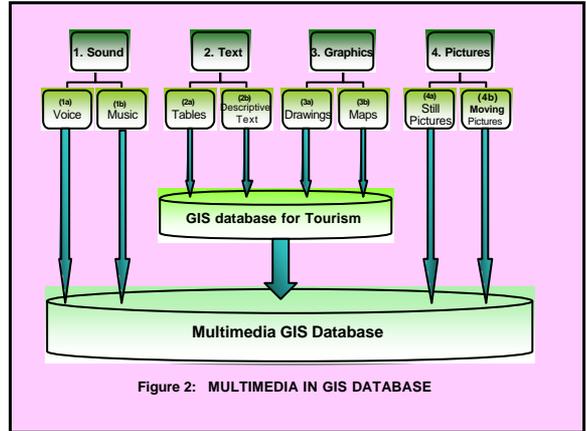


Figure 2: MULTIMEDIA IN GIS DATABASE

4.0 RESULTS AND DISCUSSION

4.1 RESULTS

The main result of the research project is the development of a Multimedia GIS database for Tourism Industry which contains a record of Ecological, Cultural and Modern Tourist Features and activities, and their geographical locations in Nigeria (Fig3)

Fig.3 illustrates the various outputs,

Tourist maps, graphics, pictures and video clips about tourism interests, which were printed on an online A3 Cannon Printer or A0 HP 800 Design Jet printer.

Multimedia Tourism Atlas of Nigeria in analogue and digital format.

Directory of Tourism in Nigeria showing titles and the sources of major tourist information and publications on tourism in Nigeria.

Catalogue of Tourism for Nigeria in Digital and Analogue format, which is a systematic arrangement of tourist interests in Nigeria with detailed description of these interests.

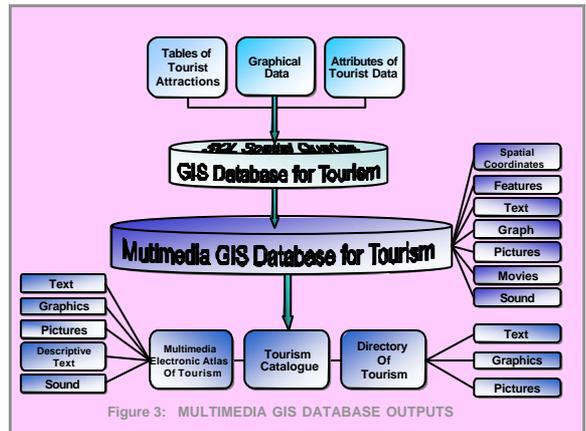


Figure 3: MULTIMEDIA GIS DATABASE OUTPUTS

4.1.1 Comparison of two GIS Software for Multimedia GIS Capability

Considerable effort was made in this research to compare the functional capabilities between Arc View 3.1 and ArcGIS 8.1, two popular software produced by ESRI with substantial price differential, for the development of a Multimedia GIS database for Tourism. The following are the findings:

- The two software are good for building a Multimedia GIS database,
- ArcGIS 8.1 is faster and more versatile and more flexible particularly in hot linking of text, sound, and image data with a digital map in a Multimedia GIS database.
- For handling video data hot linking in Arc View 3.1, it is necessary to write a script specifying the location of the software to be used to play the video file, while in ArcGIS 8.1, only the name of the file needs to be specified with the file extension (.avi, .mpg, etc)
- ArcGIS 8.1 has a greater scope on the SQL Query Builder Dialog box than Arc View 3.1, the corresponding scope of result is also greater in ArcGIS 8.1 than in Arc View 3.1.

The output in terms of maps produced are the same
 However, the extra cost for ArcGIS 8.1 can be said to be justified, in terms of flexibility, versatility and speed.

4.2 DISCUSSION

- A user-friendly Multimedia GIS database, developed in this research constitutes a great resource for producing various tourist maps of Nigeria for commercial and educational institutions involve in tourism in Nigeria.

4.2.1 GIS and Hot-linking/Hyperlink

- Information about the location and types of tourist features and activities is very important to a tourist. Figs 4a, 4b, 4c show three maps of Nigeria, depicting the location of some ecological, cultural and modern tourist attractions.

Fig 4a: Map of Nigeria Showing Ecological Tourist Attractions

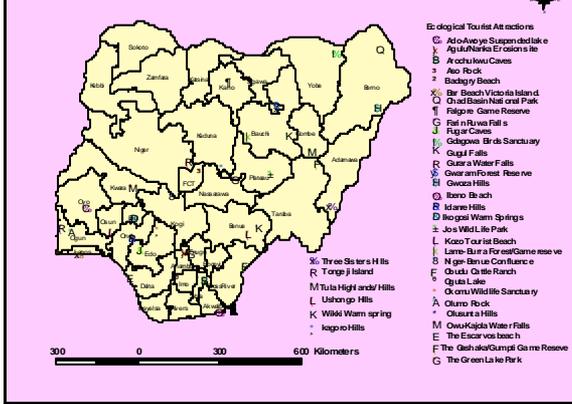


Fig 4b: Map of Nigeria Showing Cultural Tourist Attractions

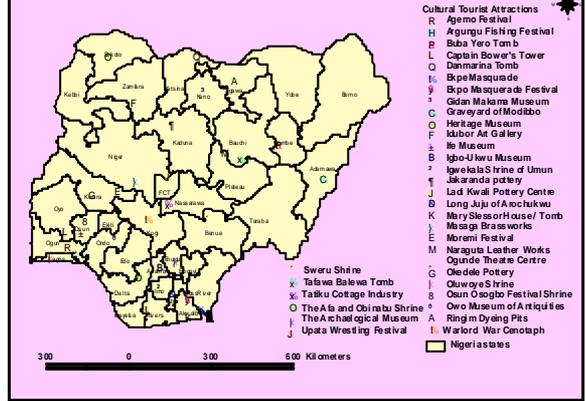
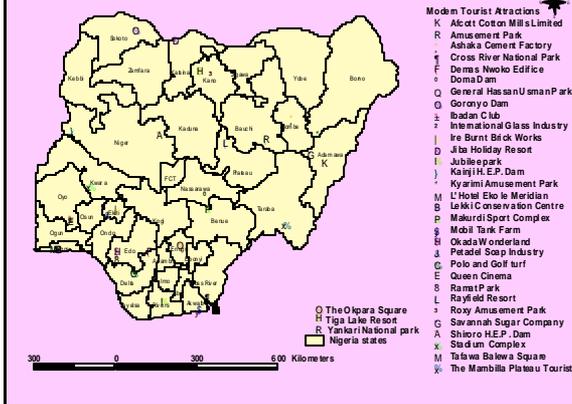


Fig 4c: Map of Nigeria Showing Modern Tourist Attractions



• Fig 4d a Composite Tourism Map of Nigeria was also generated by automation integrating figs 4a, 4b and 4c with a command within the limitations of scale. Also included are Fig 5, Fig 5B

Fig 4d: Map of Nigeria Showing Some Tourist Attractions in States of Nigeria and the Federal Capital Territory

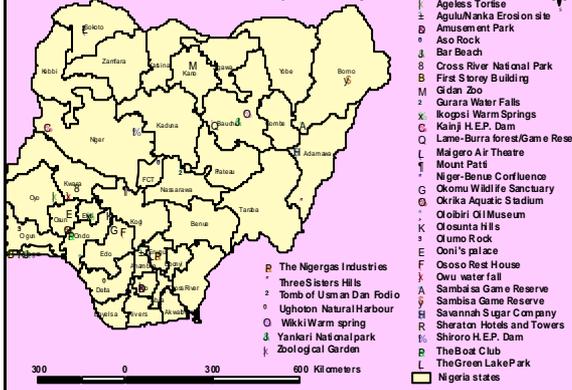


Fig 5: Map Showing Tourist Attraction of Interest in the Federal Capital Territory (FCT)

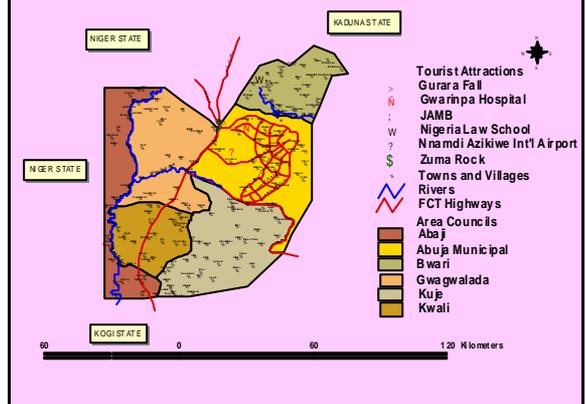
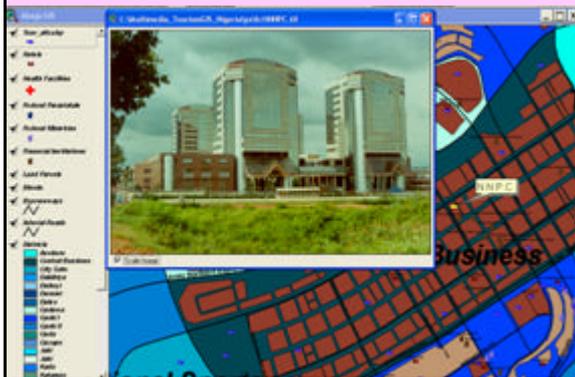


Fig 6c: Multimedia Query on Abuja showing NNPC Headquarters



- Fig 6d displays the result as the road in redline with a description of the direction and a total distance of 17518.86meters.
- Network Analysis was incorporated into the Multimedia GIS database for other towns and cities of Nigeria such as Lagos (Lagos state), Owerri (Imo state), Ibadan (Oyo state), Abeokuta (Ogun state) and Port Harcourt (Rivers state).

Fig 6d: Spatial Network Analysis Query showing the Best route and Shortest distance from Arterial Roads to Existing Hotels within the Abuja Metropolis



5.1 Multimedia GIS and Sustainable Tourism Planning Development and Marketing

Dondo et.al. (2004) referred to Fridgen's(1991) American model for the success of any tourism business as dependent on three factors-

- Tourism planning
- Tourism development and
- Tourism marketing (promotion).

Tourism Planning and Development

- According to Bahaire and Elliott-White (1999) GIS "can be regarded as providing a tool box of techniques and technologies of wide applicability to the achievement of sustainable tourism development" A multimedia GIS provides a bigger "tool box" with the addition and integration of pictures, sound, map and text data into a conventional GIS database. Such a database constitutes the basis for providing efficient and productive multimedia spatial information service by both private and government tourism agents all over Nigeria.
- Identification of the most suitable locations for ecotourism tourism development
- Measurement of tourism impacts.
- Analysis of relationships associated with tourism resources. Bahaire et.al. (1999) have produced a table linking functional capabilities of GIS with tourism planning applications.

Tourism Promotion

- The first step towards effective promotion and market strategies is to computerize the tourism industry in Nigeria.
- The second step towards promotion and marketing strategy for tourism is to make the user-friendly Multimedia GIS Tourism Database and it's by products- the Digital Tourism Atlas, and the Digital Tourism Catalogue, Tourism Directory, and their analogue versions developed in this research, available to all stakeholders and players in the Tourism Industry in Nigeria.
- The third Step is that the Multimedia GIS database for tourism should be posted on the websites of all Stakeholders for a world wide outreach

6. CONCLUSIONS

The following conclusions are made as a result of this research:

- (1) A multimedia GIS database contains unparallel reservoir of multi-dimensional inventory of tourism data which can easily and quickly be updated.
- (2) Multimedia GIS Tourism database and its by-products such as Tourists Maps, Tourism Directory, Tourism Atlas, and Tourism Catalogue, can be used to create awareness of the rich cultural and ecological tourism potentials of Nigeria.

- (3) The Multimedia GIS Database can be used by a tourist or tourist agents for optimum planning of tours by the use of queries and network analysis.
- (4) The multimedia spatial database is indeed a veritable and powerful tool for planning, management and promotion of sustainable tourism industry in Nigeria.
- (5) A world-wide internet access to the multimedia spatial database and its by-products and Multimedia GIS database for tourism is also a veritable tool for attracting indigenous and foreign investors to contribute to the economical development of Nigeria, apart from making access to tourism information and destination easy.

8. RECOMMENDATIONS

- (1) Government agencies, ministries, parastatals and private commissions and all other stakeholders in the Tourism Industry should as a matter of urgency, computerise tourism operations.
- (2) The Multimedia Spatial Tourism Database, Tourism Atlas, Tourism Catalogue and Tourism Directory developed in this research should be posted on the websites, and also installed in the computers of both Government and private agencies dealing directly or indirectly with tourism for a world-wide outreach to domestic and foreign tourists who may wish to have information about tourist interests in the country.
- (3) A National Workshop on how to operate, apply and update the multimedia GIS Database for tourism industry should be organised for all tourism stakeholders operating in the country. In return trained stakeholders are expected to update the aspects of the tourism database in their state, or locality and make the information available to the public via the internet.

- (4) University Degree and Post Graduate courses should be established in the country so as to promote tourism education and research. The Multimedia GIS Database and its by products –Multimedia Tourism Atlas, Tourism Catalogue and the Digital Tourism Directory provide a good Educational Resource Base for University degree programmes and research in tourism.
- (5) There are specialised aspects of modern tourism which are so metimes neglected in Nigeria and in other developing countries such as Sport Tourism, Health Tourism, Education and Technological Tourism (out sourcing). These modern tourism features have greater potential as foreign exchange earners than some classical tourism attractions.
- (6) The problem of security must be fully addressed in developing countries so as to assure tourists of safety of life and property. A good transport system by air, rail, road and water is also vital in promoting tourism.
- (7) Nigeria has 36 states plus Abuja FCT and 572 local government councils which are rich in tourism potentials; it is not possible to get enough funding to cover the whole of Nigeria in details during this research. There is therefore a need for more funding to complete in details the tourism survey of some states of Nigeria.

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