

# • THE GEOGRAPHIC INFORMATION SYSTEM (GIS)



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INTEGRATING GIS WITH THE  
TOURISM BUSINESS AND  
TOURIST GUIDE  
REGISTRATION SYSTEM.



**edtea**

Department :

Economic Development, Tourism and  
Environmental Affairs

**PROVINCE OF KWAZULU-NATAL**

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## 1. INTRODUCTION

A **Geographic Information System (GIS)** is an analytical tool, originated from Computer Aided design (CAD) helps to create maps at different scales in different projections with a database to generate new information and present it in different formats (other than maps). It also creates links between spatial and tabular data and find out spatial relationships between the features of maps. It helps to collect, store and integrate spatial data to analyse and present them as new information. It is considered as a powerful tool to perform these works.

GIS can refer to a number of different technologies, processes, techniques and methods. It is attached to many operations and has many applications related to engineering, planning, management, transport/logistics, insurance, telecommunications, and business. For that reason, GIS and location intelligence applications can be the foundation for many location-enabled services that rely on analysis and visualization.

GIS can relate unrelated information by using location as the key index variable. Locations or extents in the Earth space—like maps—may be recorded as dates/times of occurrence, coordinates representing longitude, latitude, and elevation, respectively. All Earth-based spatial-temporal location and extent references should be relatable to one another and ultimately to a real physical location or extent. This key characteristic of GIS has begun to open new avenues of scientific inquiry.

## 1.1. BACKGROUND

The Department registers tourism businesses and tourist guides in the province with the aim of regulating and professionalising the tourism industry through ensuring compliance and enforcement in the province as well as being the custodian of tourism products, assets and facilities in KZN. This registration of Tourism Businesses and Tourists Guides in the province is conducted using a registration system that seeks to ensure that the province obtains detailed, up-to-date, accurate and comprehensive information which is stored in the provincial database.

This database is regarded as the most comprehensive of its kind in the province since it forms the backbone of tourism research, communication, marketing; and information dissemination in the tourism industry, this is an essentially inventory of all tourism-related services and is composed of 17 categories, which range from accommodation establishments and conference venues to organisers of recreation and entertainment activities. Restaurants, sporting facilities, historic and cultural assets are also included.

The regulation of tourism businesses is According to regulations that were promulgated under the MTA under section 32(f) and (i) of the KwaZulu-Natal Tourism Amendment Act, 2014 which stipulates that it is mandatory for businesses whose primary objective is to provide services and facilities to tourists in the province of KwaZulu-Natal to register with the Department of Economic Development Tourism and Environmental Affairs, tourism, while the Tourism Act, 2014 of 2014 defines the scope of tourist guiding and provides a framework for the conduct and performance of the tourist guiding profession in the country, the Act further makes provision for the establishment of the office of the



National and Provincial Registrars of Tourist Guides with clearly defined roles and responsibilities: the development of a Code of Conduct and Ethics for tourist guides; and a framework and procedures for complaints, disciplines, appeals, reviews, prohibitions and disputes, therefore the Department of Economic Development Tourism and Environmental Affairs tourism businesses and tourist guides in the province in implementing the above mentioned legislations.

## 1.2. PURPOSE AND OBJECTIVES

### 1.2.1. PURPOSE

The Department is mandated to develop, regulate and transform the tourism sector and package the province as the choice of destination, by creating a conducive condition for sustainable growth and development as well as bridging the gap between the first and second economies within the tourism industry.

This is done by among other things registering tourism businesses and tourist guides in the province to ensure that tourist's accurate information is up to date and that all tourist operations in the province are regulated accordingly.

### 1.2.2. OBJECTIVES

The overall objective of the proposed project is to have effective tourism businesses and tourist guides registration system with the online platform where it will be hosted, and maintained and updated.

The project objectives are also:

- To have a detailed updated database of registered tourism businesses and tourist guides in the province

- To have records of all registered tourism business and tourist guides in the province
- To be able to produce monthly financial statement for registration fees
- To be able to print invoices for expiring businesses and tourist guides
- To be able to generate certificate numbers for tourism businesses
- To be able generate monthly report on the registration function

## 2. LEGISLATIVE MANDATE

The province derives its tourism mandate from the Constitution of the Republic of South Africa, Act no. 108 of 1996, which stipulates that the tourism function is a concurrent function between the national and the province.

The Sub-Programme derives its mandate from the following direct and indirect legislations and policies:

- Constitution of the Republic of South Africa (Act no. 108 of 1996)
- Tourism Act no 03 of 2014
- KwaZulu-Natal Tourism Act No. 11 of 1996 as amended in 2002
- Broad Based Black Empowerment Act (Act no. 53 of 2003)
- The White Paper on the Development and Promotion of Tourism in South Africa (1996)
- Tourism Paper on the Development and Promotion of Tourism in KwaZulu-Natal (2008)



## 2.1. POLICIES, PRIORITIES AND STRATEGIC OBJECTIVES

The priorities of the Unit are informed by various pieces of legislation, policies, strategies, national and provincial cabinet directives aimed at ensuring economic growth and job creation within the industry which include but not limited to:-

- Provincial Spatial Economic Development Strategy (PSEDS)
- National Tourism Sector Strategy
- KZN Tourism Master Plan
- Strategy on the Professionalization of Tourist Guides;
- Destination Competitiveness Global Final Report;
- Industrial Policy Action Plan (IPAP)
- Service Excellence Strategy
- Human Resource Development Strategy
- KwaZulu-Natal Archives and Records Service Act, No. 8 of 2011

## 3. THE ROLES OF GIS IN TOURISM MANAGEMENT

Tourism has a strong geographical aspect. And GIS itself is information systems offering services to geographic research and decision-making, which can play roles in tourism management. In particular, possessing the functions such as data collection, storage, processing, spatial analysis and so on GIS directly provides services for tourism management. The roles of GIS in tourism management are mainly in the following areas:

### 3.1. CONDUCTING TOURISM INFORMATION MANAGEMENT

Under the situation of the continuous development of computer science and information technology, the information means time, efficiency and money. And accurate travel information can save the cost of travellers and improve the services and management level of tourism management sector. Currently, the applications of Internet and TV in tourism management have been very popular, but in terms of the depth of information technology application, the development of information technology in tourism management lags behind the overall level of tourism development. Tourism information resources are scattered and cannot be shared by all the tourists, and lack analysis of space multimedia technology during its exploring process, so tourists are not satisfied with its products. The GIS has both the information gathering and storage capabilities and the information analysis and processing functions, so that it can provide services to tourism management from two fields. Firstly, from the tourist point of view, GIS has powerful information storage features and can provide travel information inquiry service for tourists. Secondly, from the travel management service sector point of view, it can help tourism management more easily.

#### 3.1.2. BEING ABLE TO PROVIDE A MORE COMPREHENSIVE THEMATIC MAP

When tourists if tourists have a computer level tourist map, they will be able to click on the map to get better travel services. The traditional tourist maps are paper-based, because of space limitations, it is difficult to provide data in scenic status. A very important advantage of GIS is that it has very powerful



text and image editing functions and data maintenance is also very convenient. It can greatly reduce the cost of the plans and avoid the cumbersome process of traditional mapping. Compared to traditional paper tourist map, the advantages of GIS drawing tourism plans are obvious. Meanwhile, because of its tiered storage capabilities, tourists can not only output a map including all tourism elements, such as terrain, road transport, services, facilities, tourist attractions and so on, but also superpose one or a few elements and then output the map in the use of GIS. This brings the convenience to tourists.

### 3.1.3. PROVIDING REFERENCE FOR THE TOURISM DEVELOPMENT

GIS has powerful spatial analysis function, which has been commonly used in urban planning. Similarly, GIS can also be applied to the tourism development. Using GIS spatial analysis capabilities, may do space analysis of the human and natural landscape, transportation, climate, topography, soil, vegetation, animals and plants in a particular region, which can help relevant departments draw the priority development areas, appropriately arrange the layout of the tourist routes, clearly define scenic protection zones and development potential, determine the extent of tourist attractions, and provide references for tourism planning and decision-making. At the same time, GIS is also conducive to data mining, potentially serves travel management. From a large number of GIS stored data, tourism management department can get the information that is good for business operations and improving competitiveness by the use of data mining technology. Tourism planning departments can make further development and expansion

planning and forecasting to tourist attractions based on the information.

## 4. THE SIGNIFICANCE OF LINKING GIS WITH TOURISM

To maintain all aspects of tourism in a planned, sustained and economically sound way, computing and IT technologies facilities are necessary in this modern world. GIS- the special analytical tool can be helpful in tourism sector at different ways. GIS is now recognized widely as a valuable tool for managing, analysing, and displaying large volumes of diverse data to many different levels of planning activities.

GIS is used in tourism sector in different ways. In general the most common use of GIS in tourism is location analysis and related to transport and accommodation. In general the following results can be achieved by queries in GIS: Design and Application for Tourism:

- Determination of important and necessary places for tourism;
- Determination of historical and tourist places;
- Determination of the best suitable hotel;
- Determination of the optimum plan for scenic spots/pieces;
- Determination of the shortest distance between the selected places;

Analysis and Application of GIS in the tourism sector can be divided into the following three categories:





Website with interactive mapping GIS technology offers great opportunities for the development of modern tourism applications using maps. This technology integrates common database operations such as query with the unique visualization and geographic analysis benefits offered by maps. The integration of tourism data and GIS data is a big challenge for the tourism industry, today.

## 5. THE INTEGRATION OF TOURISM DATA AND GIS DATA

For tourism, one of the most important things is the local map of the tourist site. Map and GIS is closely related to each other. Maps with relevant spatial data can be produced with GIS. It can show the important features, attractive sites, possible routes of travel, location of hotels, restaurants, bars, shopping facilities with details. General information from this map and routes for travel can be used by tourists in selecting their destinations and further planning for travel and stay.

GIS is used to provide:

A digital map base for printed maps

Digital files for Internet mapping

Digital files for mobile mapping

Attractions map

GIS operates on two data elements: spatial and attribute data. Spatial or geographical data refers to a known location on the Earth's surface. Usually this is expressed as a grid coordinate or in degrees of latitude and longitude. Technological advance, particularly in software and hardware, has resulted in the development of systems which provide a range of searching, querying, presentation and analytical functions in a more user-friendly manner. Tourism planning requires more spatial data collecting and processing, as all locations and their interrelations should be defined and analysed within a spatial context. For this purpose, GIS can describe and identify tourism infrastructure elements geometrically, topologically and biologically. Moreover, GIS can deal with both object data (e.g., visitor centre, hotels) as well as field data (e.g., road network) of which both types can be processed in either grid or vector data format.

### 5.1. THE CREATION OF A SPATIAL DATABASE

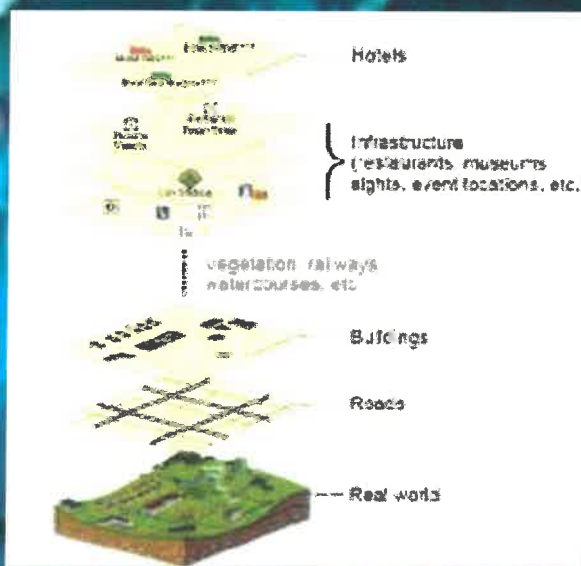
The procedures to be followed in the development of the spatial database include but not limited to the following:



- Acquisition of graphical maps covering the Region;
- Converting the paper maps into digital maps by digitizing;
- Creation of topology to establish relationships between the map features;
- Transformation into real world coordinates.

To build tourist maps, vector graphic shapes (e.g., paths consisting of straight lines and curves), textual information, and images must be integrated. Each object is assigned to a thematic layer. Each layer combines related objects like roads, building, or watercourses. To integrate tourism data the traditional layer model with layers like roads, buildings, vegetation, watercourses, etc. must be widened with additional tourism layers like hotels, restaurants, sights and further infrastructure layers (this is illustrated in the figure below)

**Figure 5.1 The Application of GIS in Tourism and Its Components**



## 5.2. ATTRIBUTE DATA CREATION AND MULTIMEDIA DEVELOPMENT

Attribute information on the various tourism facilities collected from different sources can be linked to their respective spatial features. This involves the following steps:

- Compilation and addition of text information to feature locations in tables
- Development and editing of pictures and images to text labels
- Hot linking of images to their respective feature locations
- Audio narrations on some selected features recorded digitally were also linked to their respective feature locations

A link to a feature on the map would display an image combined with text in addition to audio description of that particular feature. The audio narrations would generally include a brief history of the feature, available facilities and what a potential visitor could expect to experience from a visit.

## 5.3. APPLICATION SCENARIOS

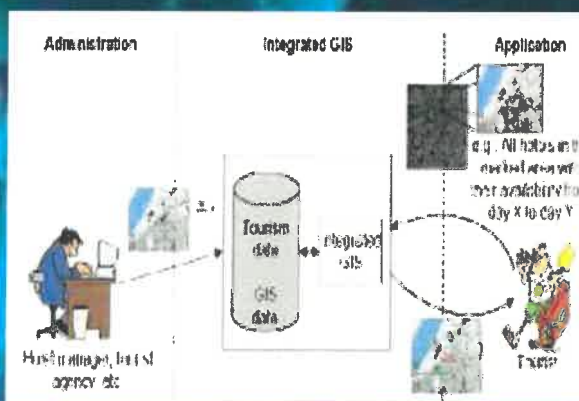
In regard to this section, the application uses a geographic search to perform complex geographic queries in geographic context. It allows the combination of touristic attributes, like hotels, e.g., hotel, restaurant, event location, etc. and criteria like name, category of hotels, etc. and geographic criterions like nearness, distance, location (city or province) or objects located inside a selected rectangular map region. The user defines a query by selecting



tourist criteria and choosing a geographic area (e.g., map area).

A thematic mapper is used to integrate tourism information (e.g., object symbol to identify the object type, object name, category (stars) of hotels, a link to the object homepage for further navigation, etc.) and GIS data to build tourist maps. A hotel search can be a time-based search which extends the map with available information of rooms (e.g., the color of the hotel symbol emphasizes the availability). To guarantee a sensible use, the user will have the possibility to zoom in/out to change the scale of the map, scroll on the map and print as well. When returning the map to the Web-client, only queried layers are set to be visible (Fig.2) to give the user a more detailed impression of where things are, how they can be reached, and which things are located nearby. SVG offers the possibility to turn layers on or off to create the representation which fits to the requirements of the user. All layers can be combined without restrictions to achieve the goal of the user.

Figure 2: Integrated GIS system



## 6. KEY FUNCTIONS OF THE GIS LINKED REGISTRATION SYSTEM

The specific functions of the GIS linked Tourism Businesses and Tourist Guides registration system development are to;

- Capture information of tourism businesses and tourist guides registered with the department
- Record and archive all payments made during registration
- Print tourism businesses certificates and tourist guides ID cards
- Send reminders to registered expiring tourism businesses and tourist guides
- Distribute invoices to expiring tourism businesses and tourist guides
- Generate monthly statistical report on new, renewing, expiring, and registered tourism businesses and tourist guides.
- Allow tourism products owners and tourist guides access to view their profiles after their registrations have been finalised
- Enable communications between tourism product owners and the system administrators.
- Allow system administrators to create and manage accounts for the tourism product owners through the accounts of the registration system.
- Allow tourism products inspectors with the inspectors registration system to have the ability for addition of new tourism products in the registration system.



## 7. PROSPECTS OF GIS APPLIED TO TOURISM

GIS applied in Tourism has played a significant role. At the same time, it should be noted that information technology changes continuously, GIS applied in tourism also need to improve according to the development of information technology to adapt to the information technology development. Looking the prospects of GIS applied in tourism management, the following areas need to be improved:

- **RS, GPS as Supplementary Means Applied to GIS Data Collection and Update to Enhance Information Collection Ability of the System.** RS has stronger functions in the fields of destination space information collection and image processing of tourist attractions. GPS plays the larger roles in orientation in space and data collection of natural tourism resources. It can be used to quickly obtain the parameters of ground control points and it can also be used for measurement to obtain spatial information data. The RS, GPS and GIS applied to tourism management simultaneously enable the system to automatically acquire, process and update tourist information data, dynamically update information in the database at any time so that tourists will be able to more timely and accurately get tourism information. This is convenient for tourists, and further improves the level of tourism management.
- **Combining the Multimedia and Virtual Technology with GIS to Enhance the Attractiveness of the System for Tourists:** Multimedia combining audio, video, image and text into together enriches the function of the system and enhances the visibility of the system. While a variety of showing forms is very beneficial to tourists to get all the required tourist information. On the other hand, by using virtual reality technology, imitating the scene area and displaying the area by three-dimensional forms make travellers more intuitively understand tourism information and enhance the interest of tourists, then better play the GIS's roles in tourism management.
- **Combining the Expert System Technology with GIS to Enhance the Capacity of the System to Solve Travel Problems.** Expert system is a computer system that is set up on knowledge-based programming method. It comprehensively integrates the "experts' knowledge and experience in a particular field and can use the knowledge like an expert to solve complex problems that only the experts can solve by the process of thinking, imitating experts to make decisions. In the process of GIS applied to the tourism management, the use of expert system evaluation system to establish tourism resources evaluation system, landscape assessment and recovery system and ecological environmental protection and protection system so that



rationally develop and utilize tourism resources and scenic resources.

## 8. CONCLUSION

GIS has been applied in many disciplines including geography, forestry, urban planning, and environmental studies. Similarly, tourism is a subject related to geographers, economists, business, environmentalists, planners, anthropologists, and archaeologists. For that the potential for GIS applications in tourism is significant. Its use in environmental planning is rapidly increasing. Tourism is an activity highly dependent on environmental resources. Now eco-tourism is becoming more popular rather than traditional tourism. On the other hand, the strength of tourism planning can be enhanced by GIS applications. So as whole it can be said that GIS is a useful and efficient tool for sustainable tourism development and for tourism research as well.