

## Application of GIS in the Management and Promotion of Tourism in Eritrea (Africa)

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### Abstract

Eritrea is a recently formed country located in the Horn of Africa. It is bordering by coastline of Red sea in the entire eastern side. This country is very rich in cultural and natural heritages. There are nine ethnic groups having diverse cultural features are residing in this country. Besides, numbers of archaeological sites of different time periods are locate in different parts of the country. Despite the charming scenery of natural landscapes, attractive coastal zones and welcoming climatic conditions of Eritrea. Although, this country is rich in tourism but because of lack of proper communication and accommodation facilities, awareness of tourist sites, difficult to locate the exact location etc it is difficult for tourists to reach their destinations. Geographic Information Systems (GIS) - is a scientific method of locating a particular place or sites with proper orientation, altitude, distance and directions etc. This GIS facilitates different kinds of geographic information to tourists to accesses the tourist sites. Though tourism industry is currently rated as one of the lowest foreign exchange earners in the country, the potential of the tourism industry to become a leading source of foreign exchange earnings in Eritrea has not been far realized. It is evident that the country's tourism potential has not been fully explored and marketed. In this present paper an emphasis has been given to discuss about the potentialities of Eritrean tourism and the possibilities of use of modern and scientific techniques, like GIS would help tourists to reach their destinations smoothly. Because of this smooth and obstacle free traveling how it would fascinated and promotes tourists to visit the unique tourist centers of this country more and more and to increase the revenue of the nation.

**Key Words:** GIS, Tourism, Eritrea, Massawa, Quahito

### Introduction

Eritrea is a young country with complex series of landscapes and climatic features. It is located in the horn of Africa (Fig. 1). It sprawls between 12° to 18° north and 36° to 44° east, is bounded by Red Sea in the northeast and east, by Djibouti in the southeast, by Sudan in the north and northwest and Ethiopia in the south (Houdek *et.al.* 995). No doubt, Eritrea's tourism industry is a new sector but the Government is working on plan to develop it. Eritrea is a land of startling contrast from sweltering heat of the Denakil Depression to the cool but stark mountains of the highlands (Charles 1990). Although Eritrea possesses tourist attractive natural landscapes, archaeological and historical sites, it gets little benefits from the tourism sector. This country offers most distinctive destination for the discerning tourists. The Government efforts are underway to support effective management and promotion of the industry and several attempts have been made to enhance its rapid development and promotion, but these efforts have suffered some major drawbacks due to lack of various facilities and destinations (Agbodza *et.al.*).

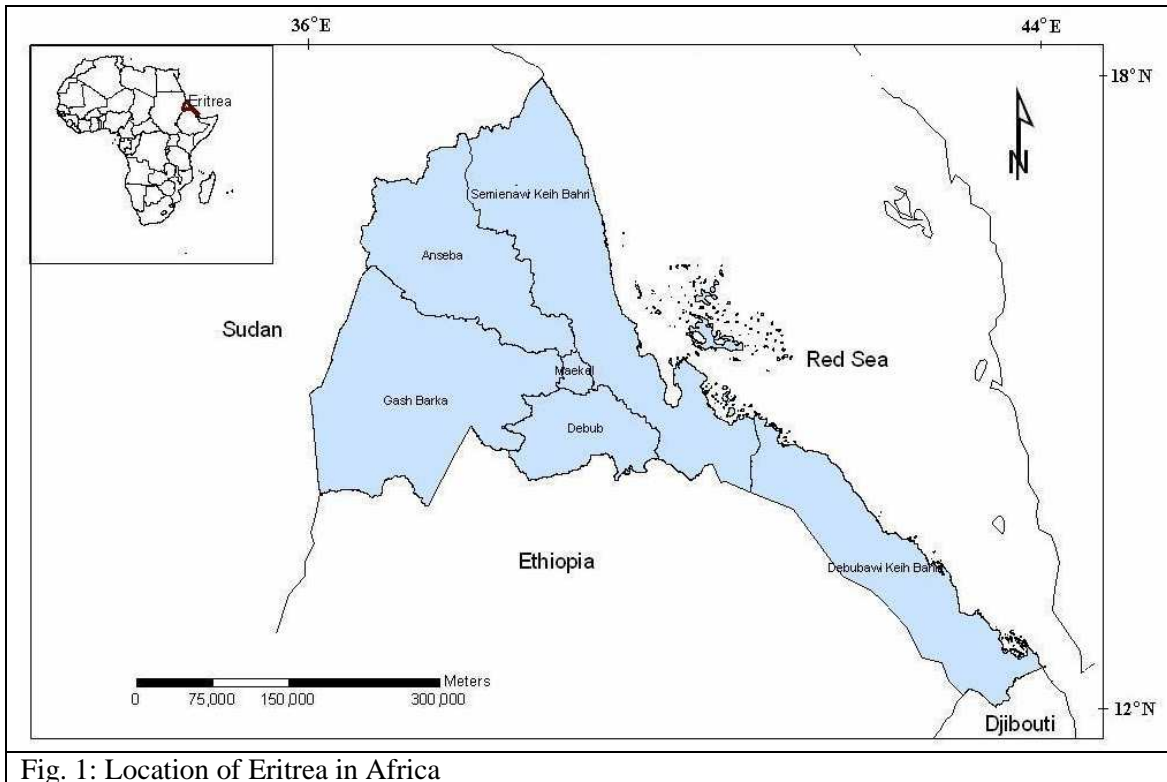
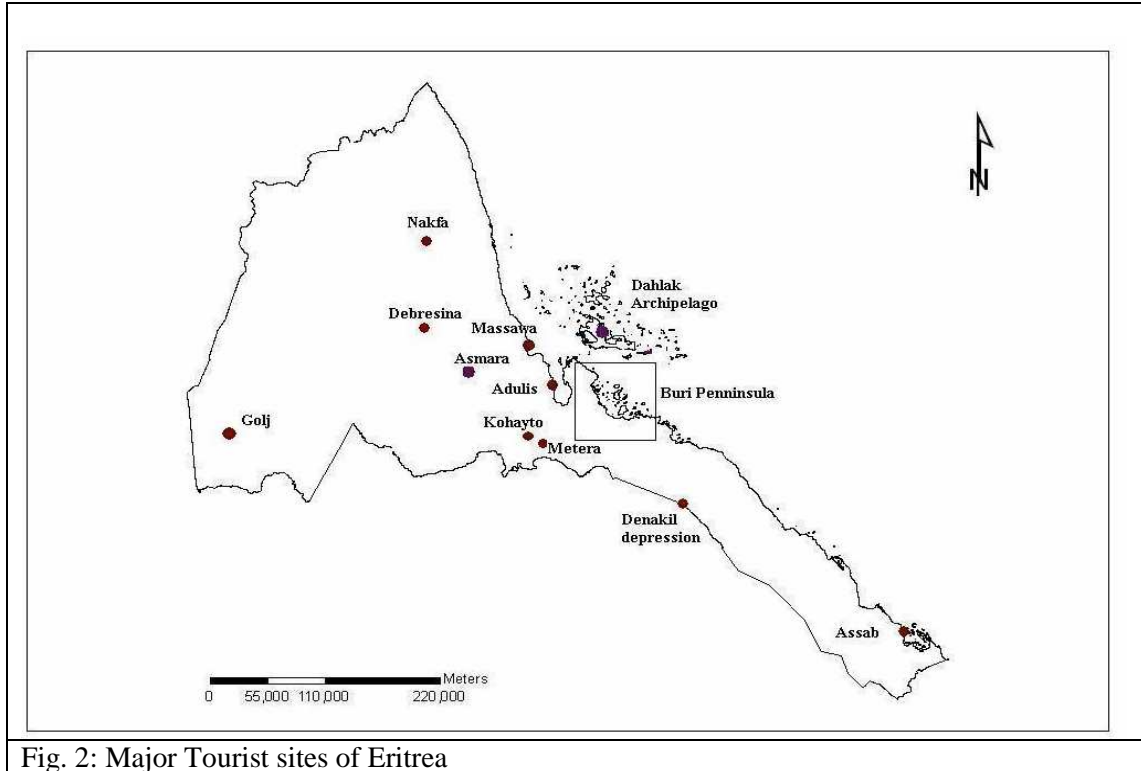


Fig. 1: Location of Eritrea in Africa

In Eritrea, there are many tourism sites in different parts of the country and it is also considered as income generator to the GNP. The tourism sites in Eritrea have great ability to attract tourists. However, they are not as they should be. That is why tourists do not visit all the tourism sites because of some unavoidable circumstances; they visit to only some specific areas – mostly Asmara and Massawa. Tourism sites in Eritrea have a long list that includes Nakfa, Debresina, Dahlak Archipelago, Golj, Adulis, Kohayto, Metera, Denakil Depression, Assab, the viewpoint on the Massawa road, Asmara city Museum, Railway Museum, Archaeological sites at Orotta, Fort park, Italian and British Cemeteries, the National zoo, Botanic Garden, Ethnographic Museum, Coastal Beach Resort at Gurgusum in Massawa and other resorts at Ras Artau on Buri peninsula, Semenawi National park which offers some spectacular scenery, Hiking lodge, Industrial Museum, Agro-tourism resort of Elabered farm, Halhal Plateau National park, Hot Springs Spa resort at Akwar and Maiwui white water boating on the Setit river, Halhal Akordat hiking trails and Mount Elit-Kunama cultural centre (Fig. 2). For the above mentioned tourism sites the tourism facilities are not yet fulfilled (Ministry of Tourism, 1998).

Basically, in Eritrea almost there was no tourism industry in the last hundred years. Officially, the first tourism branch office was opened in 1966. Between 1966 and 1973 arrivals of international visitors were more or less consistent. However, the arrivals decreased during 1973 to 1991 period. In the early sixties Eritrea had flourishing tourist industry by the standards of that time (Department of Tourism, 1993: 129). Since 1991, there was a considerable increase in tourist arrivals with 12, 576 in 1991 increasing to 416, 596 in 1996. But starting from 1998 visitor arrivals has dropped due to border conflict with Ethiopia.



### Major Drawbacks

Several attempts have been made and are still being made to explore the tourism potential of Eritrea in order to enhance its rapid development and promotion. But all these efforts have suffered some major drawbacks due to:

- Inadequacy of transportation and access routes to the tourist sites.
- Most of the hotels and restaurants are found in the big towns and such facilities are almost non-existent in remote tourist centres.
- Most of the attractive destinations have lack of power (electrical) installations, water supply systems and other similar service facilities.
- The tourism sector is also suffering from lack of skilled man power.
- Inadequate motivation for effective marketing.
- Lack of comprehensive information base on the Internet

Due to the above mentioned drawbacks GIS has been chosen as the suitable platform because the location of tourism destination provided a common denominator to link all information related to the tourism industry.

### Objectives of the Study

The main objective of the present research is

- To identify the entire tourist attractive natural landscapes in Eritrea and their capacity of potentials to attract tourists.
- To analyze their importance to the nation.
- To identify and analyze the constraints and obstacles that influence tourism development.
- To assess the professional qualification of workers in tourism sector.

- To inform the public about the social and economic importance of tourism.
- Encourage scholars, Eco-tourists and wildlife specialists by providing enough facilities to make a further investigation of the tourism sites and
- Finally to come up with possible recommendations.

## **Methodology**

To follow a relational database model format the tourism GIS database has been structured. The spatial components have been developed by using ESRI Arc Info software while Arc View software has been used as a front-end development platform for enhanced cartographic presentation and visualization. Multimedia capability was included by utilizing Avenue programming.

## **Creation of Spatial Database**

For the development of spatial database the following procedures have been included:

- Acquisition of graphical maps covering Asmara with the coastal beach resort at Gurgusum in Massawa and Semenawi National Park have been taken in great detail than any other parts of the region.
- Determining the reliability of the source maps through the field checking to verify the existence of features and also their relative positions to each other.
- Converting the simple maps into digital maps by digitizing.
- Editing to remove errors.
- In order to establish relationships between different map features topology is created and
- Lastly, they have been transformed into real world coordinates (Projections)
- For making map Arc View software has taken ESRI.

## **Promotion and Development of Tourism**

The government of Eritrea has a plan for these tourism sites to upgrade and to fulfill the necessary facilities up to 2020 A.D. The above mentioned tourism sites are among the interesting features that make it a unique destination for the international tourists desiring an eventful trip to Eritrea. Undoubtedly, one of the most attractive aspects of Eritrea's ethno- tourism is the colorful and vibrant cultural events and traditional festivities. It is believed that the full tourism potential of this multicultural and hospitable nation is yet to be fully tapped.

So far as the management and promotion of tourism in Eritrea is concerned, there is large number of factors, like trained and skilled man power, promotion and advertisement, safety and security, communication and accommodations, medical facilities etc which influences the tourism development in the country. A brief discussion on these aspects of promotion and development of Eritrean tourism has been made below.

### **(a) Lack of Skilled and Trained Man Power**

Some of the important factors include the lack of skilled manpower, insufficient tourism promotion and marketing activities and border conflict between Eritrea and Ethiopia. In Eritrea, the Ministry of tourism had suffered from shortage of skilled manpower. The Ministry had taken some measures to solve this problem. It brought foreign expert from India and Sri Lanka. Moreover, almost all the workers of Ministry were given different informal job training. Because of the lack of proper and adequate number of trained officers, guides they are unable to make proper plan for the development of tourism as well as to attract both the domestic and international tourist. In table-1 a statistical data about the educational status

of employees of the ministry of tourism has been given which indicates about their skill and knowledge about the tourism.

Table -1: Educational Qualification of Employees of the Ministry of Tourism.

Level of Education	Number of Employees	Percentage of the Total
M.A.	01	1.923 %
B.A.	12	23.076 %
Diploma	10	19.231 %
12+2	06	11.538 %
12+1	07	13.461 %
9 <sup>th</sup> – 12 <sup>th</sup> grade	15	28.84 %
4 <sup>th</sup> grade	01	1.923 %
Total	51	100.000 %

Source: Ministry of Tourism Personnel Information, 2005

The table-1 shows that there are only 51 employees working in the ministry of Tourism out of which almost one-third of the employees have completed only high school. The number of workers having higher qualifications is relatively few. Most of them have specialization in area (disciplines) other than tourism. However, they took variety of tourism related informal training. Among the informal training courses, which the workers took, includes tourism development, tourism planning, finance management, travel agency management, human resource management, marketing to tourism, tour planning and management, labour market analysis and public relations etc. Although majority of workers had taken such training, it usually lasted for a short period of time.

#### **(b) Lack of Proper Promotion and Advertisement**

Tourism promotion is one of the most important tools for tourism development. The basic function of all tourist promotion is to have an effective communication with the tourists. One of the most important tasks of any national tourist office is the promotion of the country as a destination for the tourists. Since the starting of the Eritrean tourism sector, Ministry of tourism had employed a variety of promotion techniques. Advertising, sales support and public relations are among the promotion techniques, which were being used by the Ministry. Advertisement of the destinations and tourist products had been carried out by the news papers, magazines, T.V. programmes and Videos. Although these kinds of advertisements are stopped at this time, since 1996, Eritrea Horizons, a yearly magazine of the Eritrea tourism industry had consecutively published for three years. This magazine was distributed through the travel agencies, local government offices, Eritrea's Embassies and Councils abroad and by the main office of the ministry. Videos aimed at portraying the Eritrean shipwrecks and other destinations were being displayed on the ERI – TV. In addition to this ministry had also produced three Video films namely *Peace at last*, *The Luul of the Red sea* and *Journey through Eritrea*. These Videos are still kept in Eritrea's Embassies abroad as a means of promotion.

Sales support materials were used as a potential promotional media. The Ministry of Tourism had published around 5,000 brochures. The brochures were mainly aimed at giving general information about Eritrea and particularly Massawa and Asmara. These brochures were distributed through travel agencies, Embassies and Ministry itself. Although the Ministry had employed different promotional activities, they are yet inadequate for efficient growth of tourism. For instance, the magazines and brochures were distributed through some selected institutions. As a result only few people have access to them. In addition to this only local people watched the Video displayed on ERI-TV. These Videos could have been as potential advertising media on popular TV broadcasts such as Aljazeera, CNN and BBC to facilitate the international tourists. However, such an attempt has not yet been taken place. Most of the promotional methods were made to convey only mere description of the destinations. Thus, they failed to include detailed information on accommodations

prices, communication, transport, health services and other facilities. Since the border conflict with Ethiopia, almost all the promotional activities have been ceased. Moreover, there was no campaign aimed at making the public aware about the importance of tourism welcoming a tourist.

### (c) Safety and Security

As tourism can prosper only in a peaceful environment, it is highly dependent on peace. Fear is a powerful deterrent to travel. War, unrest and terrorism in the host area (country) create doubt and fear in the mind of the traveller. On the other hand, a peaceful situation of a destination is more conducive for large tourist arrivals. The border conflict between Eritrea and Ethiopia had negatively influenced the trend of tourist arrivals. Although the wars and security problems were confined to the territories between the two countries, the international tourist arrival had decreased dramatically.

Table-2: Trend of International Visitor Arrivals (1996–2005)

Year	No. of Visitors	Percentage change over the previous years
1996	416596	
1997	409544	-1.69
1998	187647	-54.18
1999	56699	-69.78
2000	70354	24.08
2001	113024	60.65
2002	100828	-10.79
2003	80029	-20.62
2004	87401	9.21
2005	83307	-4.68

Source: Ministry of Tourism statistical data.

The table-2 shows the trend of international visitor arrivals from 1996 to 2005. According to the data given in the table, there is great fluctuation in the number of tourists who visited Eritrea in the decade (1996 – 2005). In 1996, the total number of tourist arrivals was 416596 while in 1997 it decreased to 409544. But in 1998, the number of tourist arrivals drastically decreased to 187647, which was almost less than half of the previous year. Again in 1999, the number of tourist arrivals dramatically decreased to 56699 which was almost three times less than the previous year. In the year 2000, there was slight increase in the number of tourist arrivals which was 70354. In 2001, the overall condition in the tourist arrivals improved and the number jumped to 113024. But again in 2002, the number of tourist arrivals slightly decreased. In 2003, it further decreased. In 2004, it slightly increased and finally in 2005, it further decreased slightly.



#### (d) Communication and Accommodations

In the field of communication and transportation this nation is lagging behind. Road network- the only means of communication, is poor due to unfavorable topographic situation and undeveloped economic development. Inadequacy of transportation and access routes to most of the tourist sites because of lacuna in government.

In the present decade with the help of Cines development programme few roads have been constructed to connect the major cities. Other infrastructural developments have also been contributed to this nation. A way to Massawa via Filfil from Asmara has been constructed recently.

#### (e) Medical and Other Facilities

Generally tourist places have not developed properly except few like Massawa and Asmara. Most of the tourist places surviving without facilities of medical, hotel, restaurant, bar, internet café, market and proper water facilities.

#### (f) Problem in Accessing the Exact Location of Tourist Spots and other Geographical Information

Due to the above mentioned drawbacks GIS has been chosen as the suitable platform because the location of tourism destination provided a common denominator to link all information related to the tourism industry. In a multiuser GIS, people in an organization—from a few in a single office to hundreds in different branches—use GIS in different ways to support their daily tasks. Departmental GIS refers to systems developed within a single department to support a key function of the department.

### Why GIS is Needed in Eritrean Tourism?

While planning, decision making, and analyzing the effect of changes, looking for patterns etc., we may have a glance on maps, charts, tables, lists, graphs and reports. Sometimes, it becomes difficult to collect all these sources of information together to extract important information from them. Since, the GIS have the capability of handling different kinds of information at a time that can be related to a location or area. It helps a lot to planners, geographers, scientists, tourists etc (L Daniel *at. al*). For instance, hotels and tourist destinations all have one thing in common – location. As the geographic position of any map feature is unique, it provides a complex link between different data sets. The result is no longer a simple map but a complex multi-dimensional model of information. Therefore, the use of GIS makes it possible to integrate tourism information, visualize complex sceneries, present powerful ideas and derive effective solutions otherwise not possible. Apart from this, Geographic Information Systems are dynamic, allowing the user to ‘enter’ the map to explore, enquire and analyze geographic locations and the information linked to these locations.

As discussed earlier, Eritrea is a country having different relief features. Some of the tourist sites are either located in remote locations and are not connected by road or are connected by temporary/seasonal road where no regular public conveyances are available for tourists. For example, Qohaito an important archaeological site of Eritrea but because of the lack of proper road and public transportation facilities very few tourists are getting chance to visit this site. Besides, there are number of reported and unreported tourist sites having cultural and natural heritages are located in the valleys, hills and other locations. For examples, some of the prehistoric rock painting sites are located on the cliff and are not connected with any type of roads (Ministry of Land, Water and Environment, 1999). Because of this tourists are unable to visit these kind sites during their short period of time. Sometime, because of the lack of time to visit tourism office or due to the unavailability of sufficient reading materials, tourists are unable to know the details, like location, topography, road and communication of the site before their visit. In such cases, this GIS would help them to know the details about the site which may help them to plan their tour or visit to the specific site smoothly.

Geographic information system is capable of answering variety of questions such as where facilities and resources are located represents enormous benefits. It is also capable of providing tourism information in an integrated fashion and will be of immense benefit not only to the Asmara but Eritrea as a whole. Many benefits can be realized through the tourism GIS, such as intelligent and flexible mapping capabilities, analytical capabilities, modelling and prediction and revenue generation (Demers, M.L., 1997). With the help of GIS the following facilities can be provided to both domestic and international tourists.

#### (a) Cartographic Advancement

For producing advanced cartographic representation, with the help of Arc View GIS Software, digital maps of some of the Eritrean tourist sites are developed. With the help of GIS, visualization labels and suitable graphic symbols are assigned to the various features for easy categorization and identification of several tourist landmarks. Besides, different type of facilities, like roads, tourist spots etc have also been shown for the production of a composite digital tourist map. By using GIS the detail features of unexposed tourist destinations can be added in the Eritrean tourist map.

#### (b) Multimedia Development and Creation of Attribute Data

Various tourism information on Eritrean tourism have been collected from different sources, was linked to their respective spatial features. For example, the Cathedral Catholic Church of Asmara (Fig. 4), the Coastal Beach Resort at Gurgusum (Massawa) (Fig. 5) as well as the Semenawi National Park (Fig. 6) was hot linked to their respective locations on the small scaled map. In addition to this, there are various tourist destinations are need to hot linked to their spatial and attribute data. This will give the exact



locational and attributional information. Tourists could be highly facilitated and fascinated to their destinations.

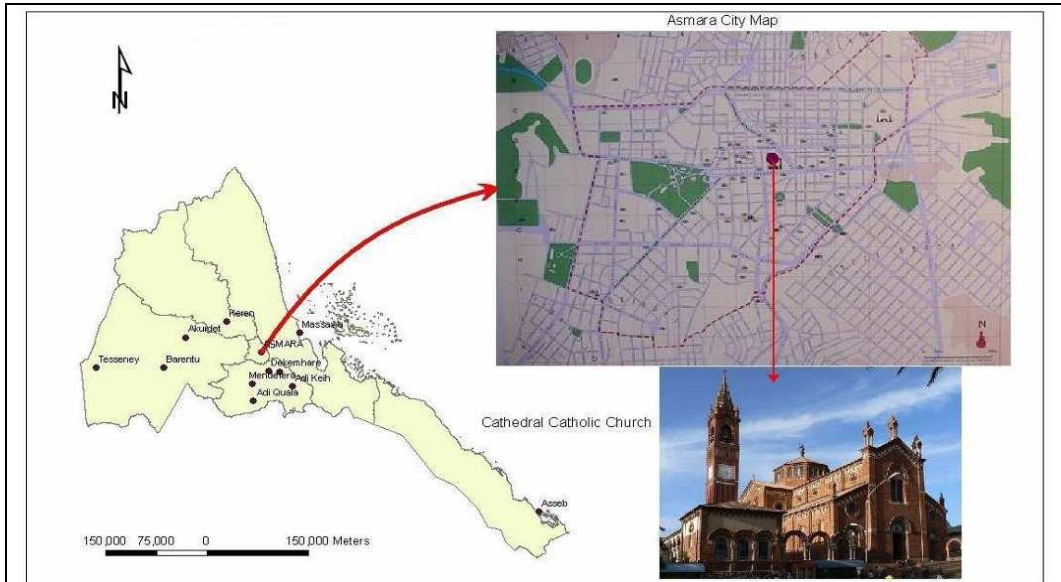


Fig. 4: A Hyperlink showing a concurrent display of graphics and a description of Cathedral Catholic Church, Asmara.

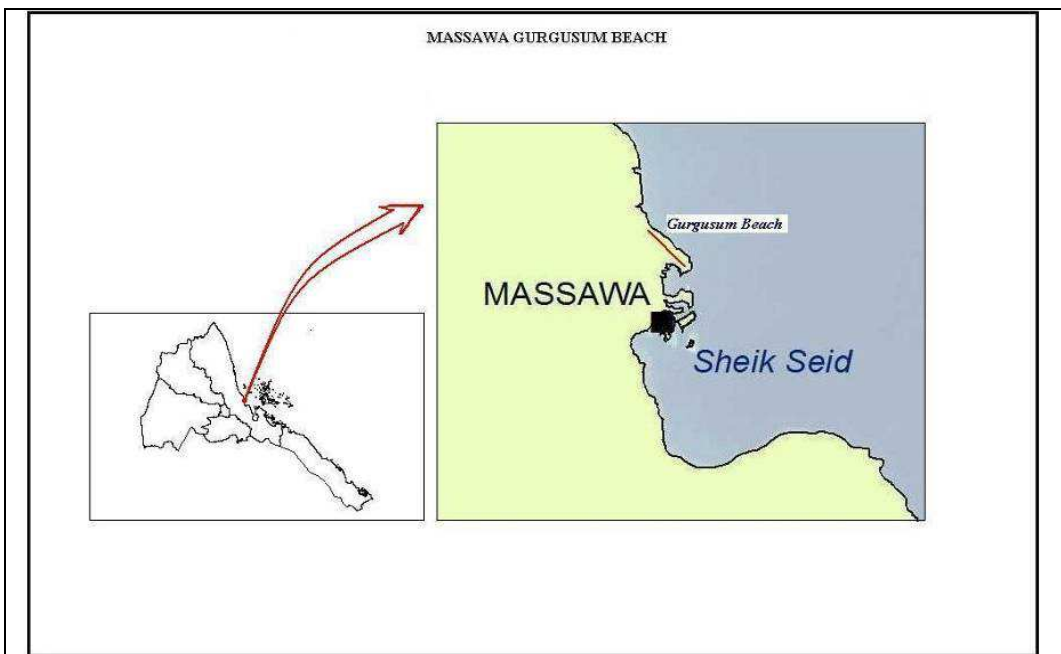


Fig. 5: A Hyperlink showing a concurrent display of graphics and a description of Gurgusum Beach Resort, Massawa.

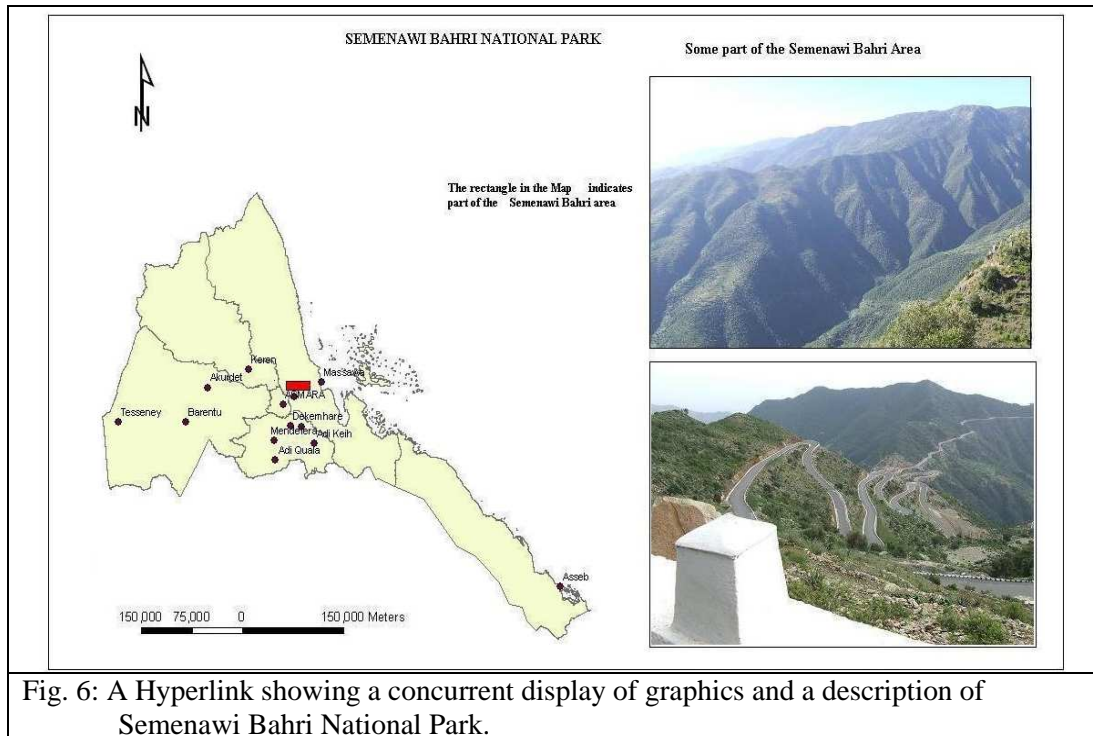


Fig. 6: A Hyperlink showing a concurrent display of graphics and a description of Semenawi Bahri National Park.

### (c) Intelligent and Flexible Mapping

Unlike other geographic information systems, there are multiple functions of the tourism GIS. From a planning perspective point of view, intelligent and flexible mapping capabilities are the most attractive. It would be convenient for the user of the system to create maps of their own chosen themes, map features are edited to suit particular requirement and purpose and the available information are updated for tourism features. Thus, the tourism GIS have the capability to keep the maps always up to date on the one hand and to create the historic maps on the other hand that may show the situation at some points in history. Apart from this, new sets of data can be created and the digital data from other sources may be intelligently joined with the existing geographic data. Decision makers would be able to obtain comprehensive information to provide realistic assessment of current situations.

### (d) Analytical Capabilities

Geographic Information System is quite distinct from any other system only because of its special ability to perform analytical operations. GIS connects all the analytical capabilities of standard database systems with powerful geo-information processing tools. It helps to carried out simple analysis such as statistical summaries (minimums, maximums, means and sums) and analysis of inter-relationships between various tourism related variables in a GIS environment. For example, the data sets of historic monuments and roads could help to solve the problem of finding all historic monuments along a primary road.

The other significant advantage of this analytical operation is in derivative mapping. Thus, it is envisaged that these powerful analytical capabilities would constitute the most important use of the tourism GIS for effective planning, marketing and monitoring of tourism facilities.

### **(e) Modelling and Prediction**

The aesthetic aspects of a tourism GIS is that future plans, projections and expectations which can be modelled and their overall outcomes on the entire tourism industry thoroughly assessed (in time and space), before they are implemented. It has great capabilities for modelling the tourism sites in the form of database and map queries. A place where either a new facility is to be located or a new tourism plan is to be developed; everything could be assessed from the computer screen before its implementation.

### **(f) Revenue Generation**

No doubt, the tourism GIS is a great asset for the tourism industry because it would provide an advanced platform for marketing Eritrea's tourism destinations and facilities while exposing investment potentials and opportunities. Eritrea's tourism industry could be promoted through the effective marketing as most of the tourists come from the foreign countries and would lead to more revenue generation in the form of foreign exchange earnings. Apart from this, there would be other sources such as revenue derived through advertising and publicity offered for hoteliers and other tourism service providers through the distribution of the system.

### **Conclusion**

Despite the charming scenery of natural landscapes, attractive coastal zones and welcoming climatic conditions of Eritrea, the tourism sector has not grown yet as much as it should. This is because of number of obstacles and constraints. Lack of skilled manpower is one of the obstacles which have resulted to insufficient market research activities. The insufficient tourism promotion and marketing activities together with the lower roles of travel agencies are contributing to the low growth of the sector. The inadequacy of transportation and access routes also creates inaccessibility problems. Moreover, deficiency of infrastructure has aggravated the lack of necessary tourist products. Thus, absence of water supply system in some attractive sites made them less important. The poor development of other constructed facilities such as highways, airports, roads, railways, parks, resorts, hotels, motels and places of entertainment has influenced the sector negatively.

So far as the application of GIS in the management and promotion of tourism in Eritrea is concerned, no doubt it has put the required information and critical data of Eritrea's tourism on the desk top to serve the tourism market. It has also revealed that this sort of presentation of tourism information in GIS multimedia environment would offer an unparalleled platform for the management and promotion of the tourism industry in Eritrea. Tourism GIS has made easy access for the tourism agencies, policy makers and stakeholders to get detailed information and thus serve as an important source of motivation to encourage the performance of the sector. Thus, for efficient marketing and promotion adequate incentive could be assured. However, the problems of updating graphical tourist guides and maps now become quite easier. This process is cheap, easier and less time consuming. A comprehensive information base for tourism in Eritrea on the Internet could be seen as an outcome of this research paper. Until the performance potential of GIS in the tourism industry of Eritrea is critically observed, Eritrea could not stand in the international competitive tourism marketing. If it is so with the help of GIS we can answer so many fundamental questions related to locations, communication or transportation etc. Application of GIS in the tourism industry of Eritrea will strengthen the zobawise (province wise) plan for managing and promoting the tourism industry in the country. No doubt, in the beginning the investment is high, but it is sure that the importance of GIS will increase in the tourism industry at global level. In this context it seems to be very much suitable to say 'first come first serve', because earlier the tourism industry of Eritrea will adopt this technique the better it would be for its future development.

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