A GIS Model for Tourism Administration in Kerala – A Study based on Google Maps

Dr. K.S. Anil kumar
Principal
Ayyappa College, Eramallikkara
Venugopal C.K.
Assistant Professor
KITTS
Email: ckvenu@gmail.com

Abstract
This paper aims at developing an online Geographical Information System (GIS) that use Google maps to administer the tourism resources in the state of Kerala. Using the inherent capabilities of Google maps the tool developed will provide information to travelers and administrators. Since this tool has been developed on a zero budget basis, this is an ideal platform for researchers and students to explore the immense possibilities of Google maps further. Stand alone GIS applications using proprietary or free software requires a large amount of money and time. The features in this application can be incorporated into other applications by providing links to the maps developed in this application. Since Google maps are already in digitized format and are accurate, additional data can be added without compromising on quality and accuracy. Different layers provide access to information based on categories such as elephant corridors, tourist attractions, hotels and other information related to tourism.

Keywords: GIS, Tourism, Google maps, Kerala, Layers

Introduction
Geographical Information systems (GIS) are used worldwide in route mapping, location based searching and as a travel aid. In addition to the above, GIS can be used an administrative tool in
Tourism. This study aims at developing a GIS using Google maps for managing the tourism resources of Kerala. Tourism being the leading job provider is an integral part of the socio-economic fabric of Kerala. Administration of tourism efficiently using state of the art technological tools will hold the key to sustainable development in the state. Since Tourism is ideally suited to the Kerala model of development use of Information technology as an aid to the tourism sector has to be encouraged. Use of GIS in Tourism as a management tool which will aid administration is yet to be fully exploited. This paper provides an insight into how a tourism GIS can be used to aid administration all the levels of management.

Objectives of the study

1. To develop a GIS model for tourism administration in Kerala using google maps
2. To suggest ways in which this model can be used to improve tourism administration in the state of Kerala

Limitations of the Study

This project was implemented using google maps. Hence this will work only if internet connection is available. The maps displayed in the application can be modified only in the following ways.

a. Adding non spatial data to existing maps
b. Plotting lines, polygons and point using tools available in Google maps

Literature Review

Maps are a natural means of indexing and presenting tourism related information. Today due to advances in modern telecommunication and information technologies, there is an increasing effort in the development of Geographic Information Systems. This paper explains the creation
of an easily adaptable Integrated Environment for the development of efficient applications which require Geographic functionality. (Christodoulakis et al). When making decisions, planning, analyzing the effect of changes, looking for patterns etc, maps, charts, lists, graphs and reports are used. Often it is very difficult to get use information out of these sources. Geographic Information Systems have the capability to handle several kinds of information that can be related to a location or area. This paper focuses on GIS in Tourism management and promotion in Ghana. Presenting tourism information in GIS in a multimedia environment will help tourism agencies, stake holders and policy makers in information gathering and taking decisions. This project will help in creating a comprehensive information base for tourism in Ghana on the Internet. (Longmatey et al, ). This study developed a tourism potential model and detected spatial disparity in the distribution of recreational resources. It has also demonstrated the applications of the model’s outputs for recreational planning. The tourism potential model can be applied to identify areas with potential for successful future tourism development, particularly in the design of new walking tracks. A need for an integrated and collaborative approach is articulated in the research, rather than a confrontational approach to disperse the growth generated by tourism over the years. (Chhetri, et al).

A Tourism Planning model was developed for the state of South Carolina in USA using natural and cultural resources. (Gunn, 1990). A simulation model was used to estimate a numerical value for social carrying capacity (for hiking and vehicles) for Delicate Arch and Arches National park, Utah, USA. (Lawson et al, 2002). An approach of sustainability was used for modeling tourism potential for the Grampians National Park by combining environmental resiliency and tourist attractiveness. (Arrowsmith and Inbakaran, 2001). Ecotourism sites were identified within Northern Ontario, Canada using GIS techniques. This was used for mapping inventory of
recreational resources. (Boyd and Butler, 1996). A tourism resource inventory developed for British Columbia integrates both biophysical and human parameters. (Williams et al, 1996).

Mysore Urban Development Authority (Muda) is going hi-tech by adopting 3D Geographical Information System (GIS) technology, a first by any Indian city. Muda is establishing GIS using high-resolution-satellite images (of 0.6m resolution) and ground surveys with the incorporation of Muda data by geo-tagging. The remote-sensing centre of the IT department (Karnataka) will help the urban body in the project. The last two decades have witnessed high population growth in India’s urban areas. Urban centres are the hub of the manufacturing, services and trade. As a result, more people are migrating from rural areas to urban centres, making municipal governance a very complex issue. The complexity is more pronounced in states like West Bengal which has on of the highest population densities. One of its towns, Kalyani is a planned industrial town but with large unplanned settlements in form of slums. It has a university and number of colleges. It is part of the Kolkata Metropolitan Development Authority and is surrounded by villages. It is situated on the bank of river Ganges on its natural levee.

GIS database provides invaluable inputs not only for planning of infrastructure like road, sewerage and drinking water, but also helps manage important services to various stakeholders. All the above planning components are interlinked with each other. Moreover, the whole municipal planning is related with the regional planning and the planning of neighboring municipalities. It is possible to integrate slum development plan with infrastructure development as well as the local economic development plan. In a democratic setup, this GIS framework simultaneously provides transparency to the elected representatives who run the municipalities and to the stakeholders.
The purpose of this paper is to investigate STIP’s potential—as a tourism planning approach—to incorporate ‘sustainability criteria’: realize development objectives; enable desired and expected visitor experiences; do not exceed carrying capacity standards; and minimize overall resource impacts. The overall goal was to map sustainable trail development locations by integrating (i.e., using a GIS) social (visitor preferences and managerial objectives) with biological (natural resource) data. When the three-phase GIS-supported methodology set forward here allows realizing these goals, STIP can be considered a comprehensive and operational sustainable tourism planning tool.

This paper presents a conceptual GIS-supported sustainable tourism infrastructure planning approach (STIP). This approach aims at integrating a comprehensive set of sustainability criteria (i.e., dealing with development objectives, preferred visitor experiences, and carrying capacity standards) in tourism planning, using GIS. STIP involves three phases: a visitor segmentation phase, a zoning phase, and a transportation network planning phase.

STIP integrates the 1) visitor segmentation; 2) zoning; and 3) visitor transportation network planning phases (see Figure 1). The integration of these phases allows for directing visitors through preferred zones, to undertake preferred activities at preferred facility locations, while accounting for development objectives and resource constraints. Experiences have shown that it is important to plan judiciously so that funds invested for ecotourism projects are maximized. This article emphasizes the use of modern techniques such as GIS for Multiple Criteria Decision Making (MCDM). Framework for prioritization of important ecotourism projects for funding opportunities so as to reach the optimal level of eco-tourism development.
Study

Even though various GIS based packages are available that can be used to develop a fully fledged GIS, in this study Google maps are used to develop a GIS model for tourism administration due to the following reasons. This being a individual research paper, purchasing and developing a GIS tool like ArcGIS is expensive. Since the focus of the study will shift to developmental intricacies associated with a software tools and will become time consuming, free software such as QGIS is also not used. Google maps have been used in this study due to following advantages. a) The maps are readily available and accurate b) The response time related to the click event of the mouse and responses obtained are fast enough in a standard internet connection c) Since the spatial data is accurate only non spatial data needs to be added. d) Non spatial data can be used extract information using queries e) This will help in decision making.

The tool developed during this study can function in the following ways

1. The administrator can develop an application or presentation to access the maps and layers.
2. The maps with built in layers can be accessed in different ways and is available online
3. Therefore when the user clicks the link from any application which he uses (provided he has corresponding link) can access the map and the associated resources and data

Google maps can be used effectively to provide a cheap alternative for travel solutions. Since the latitude and longitude are already plotted with pin point accuracy in Google maps, they can be customized to suit our needs. The concept of layers which is an intrinsic component of GIS can be created from the Google maps. In this study all districts of Kerala were mapped. Each
district was outlined and given a different shade. Since the Google map already contains the important locations of all the districts, these can be added to the layer which was created under the layer Thiruvananthapuram. The different layers thus mapped are

a. Tourist places
b. Information Centres
c. DTPCs
d. Forest areas
e. Trekking routes
f. Elephant corridors
g. Restaurants
h. Resorts

Other features

1.0 Conventional features
   1.1 Shortest Distance finder
   1.2 Distance finder
   1.3 Shortest route
   1.4 Layers
      1.4.1 Tourist Places
      1.4.2 Trekking paths
      1.4.3 Walking tours
      1.4.4 Elephant corridors
      1.4.5 Water holes

2.0 Tabular data (Non Spatial)
   2.1 Details of Hotels
      2.1.1 Type of room
      2.1.2 Room rent
      2.1.3 Pictures
      2.1.4 Facilities
      2.1.5 Address
      2.1.6 Location map
   2.2 Details of destination
      2.2.1 Type of destination
      2.2.2 Facilities
      2.2.3 Pictures
      2.2.4 Location map
   2.3 Trekking packages
      2.3.1 Rate, Route, Duration of trek, Trek path (map)
   2.4 Elephant corridors
2.4.1 Route, Distance, map

2.5 Walking tours
   2.5.1 Rate, Route, Duration, Tour map

2.6 Cycling tours
   2.6.1 Rate, Route, Duration, Tour map

3.0 Analysing Changes
   3.1 Calculation of change in forest cover
   3.2 Calculation of change in coastal area

4.0 Tourist related
   4.1 International
      4.1.1 Year, Number, Country, Type of Tourist
   4.2 Domestic
      4.2.1 Year, Number, Country, Type of Tourist
   4.3 Calculation of change in percentage of tourists year wise based on
      4.3.1 Country
      4.3.2 State
   4.4 Change in revenue earned year wise based on
      4.4.1 Country
      4.4.2 State

Even though the important tourist places are already mapped in the google map only additional information such as description of the destination, type of destination etc are to be added. Since this layer gives only description of the tourist places, additional information related to Tourist Information Centres, DTPCs and other layers as mentioned above have to be added. Information centres like those in Thampanoor are located in the railway station and bus station and are not marked in the google map. These have been incorporated into the layers which have been created during the study. The DTPC layer is also added in similar fashion. Forest areas consist of Eco Tourism destination like Neyyar, Peppara, Arippa, Kallar, Wayand, Peechi – Vazhani, Athirapalli, Thekkady etc. There is Eco Development Committees (EDC), Vana Samrakshana Samithis (VSS) located in these destinations. There function as livelihood providers to local communities in the fringe areas. These eco tourism destinations can be mapped as a separate layer incorporating the description of the destination and the activities that can be done here. Other layers than can be added are trekking paths are elephant corridors. These can be marked as
routes into the maps using the line tool. Restaurants and Hotels can be added as a separate layer at each destination. For example a destination such as Kovalam has a number of restaurants and resorts which can be incorporated into the map. The advantage of this approach is that new features and information can be added to the existing ones without compromising on accuracy.

The intrinsic features of GIS such as finding the shortest distance, measuring the distance between two points etc are also incorporated. In Google maps sometimes a route may be missing such an inner road. This is also as part of this study.

The application which was developed as part of the study has the following broad capabilities.

1. Displaying tourism related information for each district layer wise
2. Calculation of distance between routes
3. Finding shortest path
4. Displaying the area falling under each district separately using different shades.

Advantages of using the web based GIS developed

1. This provides accurate location based data
2. Additional information can be incorporated or new data can be added
3. New layers can be created.
4. The maps are real time and accurate
5. Additional information and tables can be added
6. Existing data can be modified
7. The links to the respective maps (layers) can be incorporated into a document or presentation and can also be accessed from another application.
Analysis specific to Kerala in addition to regular analysis

- Changes specific to eco tourism destinations
- Change in forest cover
- Change in Tourism receipts associated with Kerala model of Tourism development in area such as
  a. Responsible tourism
  b. Eco tourism
  c. Other practices that are associated with tourism and livelihood

System Diagram

The components of the system (Figure 1) are as follows:

1. **Customised Layers** which consists of Tourist Places, Hotels and resorts, wildlife sanctuaries, trekking paths, Walking tours, Cycling tours, Elephant corridors, ATMs, Hospitals etc.
2. Customized Google maps that are created from existing Google maps and customized to suit the requirements

3. The Application interfaces can be any one the following: An interface or link from a PowerPoint presentation, A link from an external application or any other application that can access internet. These interfaces can prove very useful since the application developed as part of this study can be accessed according to the requirements of the user.

4. The outputs can be reports, graphical images in the form of maps or tabular data

Some screen shots from the system

Figure 2: Thiruvananthapuram

Figure 3: Kottayam

Figure 4: Ernakulam

Figure 5: Idduki
Findings

1. In addition to the existing features of a GIS such as shortest distance finding, distance calculation, location finding and route mapping the following features will help Tourism

   a. Displaying non spatial data in tabular format related to a location such as

      i. Details of rooms in a hotel or resort
      ii. Facilities available in a Tourist location
      iii. Total number of tourists
      iv. Classification of tourists based on country, state, spending, stay, type etc

   b. Location specific information based on destination types (eg. Sea side, Lakes, Hill stations, Eco-destinations etc)

      i. ATMS
      ii. Hospitals
      iii. Information centres etc

2. Top, middle and bottom level managers can used both spatial and non spatial data based on their needs for the following

   a. Top level

      i. For taking long strategic decisions which will have long time implications such as

         1. Deciding on choosing and developing a destination
         2. Planning tourism development in an existing destination in a sustainable and scientific manner
3. To analyze tourism receipts and arrivals over a period of time and arrive at factors that affect these parameters. This will help maximize revenue without compromising carrying capacity.

b. Middle level

   i. Arriving at tactical decisions such as solving a bottle neck problem at a destination. This may involve analyzing and finding reasons why
      1. The destination is becoming unpopular among tourists
      2. Environmental damage happens (using EIA tools)
      3. Local participation is less etc

   ii. Bottom level
      1. Taking day to day decisions like scheduling, assignments, overall monitoring etc

3. Analyzing land use pattern due to tourism over a period of time (Number of buildings, other structures, landmarks etc)

4. Analyzing changes in coastal areas associated with tourism over a period of time (Such as analyzing areas encroached or reclaimed over a period of time)

**Suggestions**

Developing a fully fledged GIS using a free software or proprietary software in lines of the above tool, can be done if time permits. This involves the following steps.

- Procuring maps from agencies (This may require payment)
- Digitizing the maps and adding layers (This requires the service of GIS expert and each point, line or polygon has to mapped manually) – May require over a year to complete
• Designing a query engine to cater to decision making
• Developing a report generation module
• Finally these may be integrated into a single package for full deployment

The whole project once implemented can be made a web based app, standalone package or Web GIS depending on the need

Scope for further study

A fully fledged GIS can be developed using proprietary software such as ArcGIS or by using free software such as QGIS. Even though such an approach allows the user to make tailor made GIS, this has the following disadvantages.

1. Maps have to be procured and digitized which requires expertise and involves a substantial cost factor
2. Only an expert in GIS will be able to digitally map the various elements accurately into the base map. This is time consuming and requires assistance from a team

However the present study can act a stepping stone for developing a standalone application in GIS. All the components developed during this study can be used for this.

Conclusion

There is no doubt a GIS based tool will useful for Tourism administration in Kerala. This study aims at developing a GIS tool using Google maps for management of tourism resources of Kerala. Since Google maps are accurate and reliable, a GIS based on this will also provide accurate results. The development of this tool is mainly intended to provide a guideline for future research in this area. This model will act not only a tool for tourism administration but also provided a broad frame work on which future development in this area can be made.
References


Bas Boers B A Gis Based Approach M.S. Wageningen University; Stuart Cottrell, Ph.D. Colorado State University

Gunn C.A (1990). Upcountry South Carolina Guidelines for Tourism Development. College Station TX.


P.K. Ryngnga; Ecotourism Prioritisation: A geographic information system approach South Asian Journal of Tourism and Heritage (2008), Vol 1 No. 1