

# New Technologies and Heritage Tourism: Making Cultural Itineraries with GIS at São Cristóvão/SE - Brazil

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## Abstract:

During the last decades, tourism became a strategy to socioeconomic development in many countries. In this period, some changes also affected tourists' preferences and reasons, which generated a larger segmentation between touristic offer and demand. Thereby, the tourist practice becomes more complex in the use of space in relation to offer and demand components. This way, our aim is to highlight the relevance of using new technologies in tourism as tools that can aggregate information and subsidize the planning and management processes of the territory where the tourist activity will be deployed, in addition to provide the tourist with the possibility to have specific information about auto-guided itineraries in the city of São Cristóvão, where the São Francisco Square (World Heritage - UNESCO) is located. To accomplish this, we used bibliography research, collection of information, touristic inventory and the creation of cultural itineraries through Quantum GIS (QGIS) as methodological procedures to create alternatives to diversify the local touristic offering. Thus, we try to make a contribution to the territorial development of the destination, being studied by adopting spatial concepts in the decision-making process by the Public Administration and the private sector, and also for the new touristic products design. Furthermore, creating new cultural itineraries can raise awareness about the Cultural Heritage of São Cristóvão.

**Keywords:** New technologies; Tourism; GIS; Itineraries; Diversifying Offers

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**Resumo:**

Durante as últimas décadas, a atividade turística se converteu em uma estratégia de desenvolvimento socioeconômico para muitos países. Neste período também foram produzidas algumas transformações no que diz respeito às preferências e as motivações dos consumidores turísticos, o que gerou uma maior segmentação da oferta e da demanda turística. Assim, a prática turística passa a apresentar uma complexidade no momento de espacialização dos componentes desta oferta e da demanda. Desta forma, objetivamos destacar a importância do uso das novas tecnologias no turismo enquanto ferramenta capaz de articular as informações e subsidiar o processo de planejamento e gestão do território onde será implantada a atividade turística, ademais de proporcionar ao turista a possibilidade de obter informações específicas de roteiros autoguiados da cidade de São Cristóvão, onde encontramos a Praça São Francisco (Patrimônio Mundial - UNESCO). Para atingir esse objetivo foram utilizados como procedimentos metodológicos o levantamento bibliográfico, a coleta de informações, inventariação turística e a elaboração de roteiros culturais através do Quantum GIS (QGIS), a fim de criar alternativas para a diversificação da oferta turística local. Assim, vislumbramos contribuir para o desenvolvimento territorial do destino estudado, a partir da adoção de noções espaciais no processo de tomada de decisão por parte dos gestores públicos e dos empreendedores da iniciativa privada e também para a formatação de novos produtos turísticos. Ademais, a elaboração de roteiros culturais poderá se converter em uma alternativa de conscientização acerca dos bens patrimoniais culturais da cidade de São Cristóvão.

**Palavras-chave:** Novas Tecnologias; Turismo; GIS; Roteiros; Diversificação da Oferta

**Resumen:**

La actividad turística se ha convertido en una estrategia de desarrollo socioeconómico para muchos países en las últimas décadas. A lo largo de este período se han producido algunos cambios sobre las preferencias y motivaciones de los consumidores turísticos, lo que ha generado una mayor segmentación de la oferta y de la demanda turística. Sabemos que, la práctica turística presenta una complejidad en el momento de gestionar los componentes de la oferta y de la demanda. Por este motivo, deseamos destacar en este estudio, la importancia del uso de las nuevas tecnologías en el turismo como herramienta capaz de articular las informaciones y subsidiar el proceso de planificación y gestión del territorio donde será implantada la actividad turística. Consideramos la importancia fundamental de proporcionar al

turista la posibilidad de obtener informaciones específicas de itinerarios auto guiados de la ciudad de *São Cristóvão*, donde encontramos la Plaza São Francisco (Patrimonio Mundial – UNESCO). Para cumplir este objetivo han sido utilizados como procedimientos metodológicos: la revisión de la literatura, colecta de informaciones e inventario turístico y la elaboración de itinerarios culturales a través del Quantum Gis (QGIS). Todo ello con la intención de crear alternativas para la diversificación de la oferta turística local y poder contribuir hacia el desarrollo territorial del destino estudiado. Por tanto, a partir de la admisión del conocimiento espacial en el proceso de toma de decisión -por parte de los gestores públicos y de los emprendedores privados- llegaremos a la formulación de nuevos productos turísticos. Sin olvidar que, la elaboración de itinerarios culturales podrá convertirse en una alternativa de concientización de los bienes patrimoniales de la ciudad de *São Cristóvão*.

**Palabras Clave:** São Cristóvão; Desarrollo Socioeconómico; Quantum; GIS (QGIS); Itinerarios Culturales

## 1. Introduction

For many years, touristic activity has been considered an important development factor to areas of destination, specially in countries where it is difficult or impossible to develop other economic activities, such as industrialization.

However, it is required that the State, the private sector and the individual work together to develop tourism, in order to conceive strategies and guidelines that reach positive economic, cultural and, specially, social goals.

The touristic activity has become a critical strategy to local, regional or national economy as the flow of tourists and visitors generates new methods of touristic spatial production and consumption. Cooper *et al.*, 2011: 3 say that "the extension of touristic activities in global terms and the absolute number of people travelling explain why tourism is described as one of the major drivers of global economy." Such flows are produced from some changes occurring in society, specially about preferences, motivations and access to information, which leads to an increase in offer segmentation and the raise of touristic demand in many countries. According to Debbage and Loannides (1998: 287), "although the changes to consumer demand and the emergence of increasingly sophisticated preferences are the key to position a touristic product, it is the 'information production mechanism' that helps to manipulate and facilitate the origin-destination flow of tourists across the world."

Based on this assumption, we understand that tourism studies should focus on these transformations, new production and consumption process. The touristic activity planning must consider new communication media when spatialize the offer components in order to comply with the new demands of a society more and more connected to internet.

Thus, our aim is to analyse the importance of the use of geo-technologies in tourism as a tool capable of articulate information and subsidize the planning and management processes of the touristic territory. Starting here, we try to aggregate new values to tourism planning and management, as well as to present to city planners the possibility of expanding their administrative perspectives by entering a globalized world driven by information. In this case study, we focused our analysis perspective in the city of São Cristóvão/SE, one of the most important destinations of the Sergipe state, located at the Northwest region of Brazil, where the São Francisco Square, UNESCO World Heritage, is located and that we will examine afterwards.

In order to accomplish this, we used as methodological proceedings: bibliography - we consulted authors that focused on planning and the use of new technologies in tourism, as well as analyses of the city as a destination, namely their historic centre (World Heritage) that needs to be identified, mapped and published in a correct way in several Internet's search engines. In this step, we have used Free Software - Quantum GIS (QGIS) and Google Earth (by disclosure of Kml/kmz files) to extend the applicability to more users and to elaborate touristic itineraries to the city of São Cristóvão in a more flexible and accessible way in different kinds of mobile devices, like smartphones.

Therefore, the article aims to indicate alternatives to the diversification of local touristic offer. Initially, we will approach the use of geographic information systems at the planning and management of tourism, considering the importance of GIS as a planning and management tool. The discussion will become deeper in the following item, with the approach to the use of these systems in tourism and, later, its use in tourism in the Sergipe state (Brazil). Eventually, we will highlight the use of a specific GIS – QGIS (Quantum GIS) and its applicability in the elaboration process of auto-guided touristic itineraries at São Cristóvão/SE.

## **2. Using the Geographical Information System for Tourism Planning and Management**

Geographical Information Systems (GIS) are increasingly being considered as part of solutions and innovative projects capable of building a database and qualitative attributes that can associate mobile applications, internet and geo-codification of historical bases. In Brazil, GISs are more and more important in several areas, including tourism, as they can be used in the

majority of the activities having a spatial component, because the raw material is always spatial information resulting from historical and geographical data inserted in a system that associate them to territorial bases.

Duque and Mendes (2006) say it is possible to formulate a methodology that allows the development of tourism of a place by using cartography and GIS, as both tools can be understood as very important for planning, and are also powerful to promote touristic competitiveness by the formulation of new touristic products.

In fact, as Santos *et al.* (2006) say, GIS is a tool that supports fast decision-making and marketing applications, among other resources. Thus, in tourism, the Public Administration can use GIS to connect related activities, such as the design of a new touristic product, city space analysis, inventory and others.

According to Silva and Souza (1987: 236), the Geographical Information System:

*is the more important kind of structure to make geoprocessing feasible. The last one, being a set of computing procedures operating in geocoded databases, or more developmentally, in geographical databases, executes the analysis, reformulations and synthesis on the available environmental data.*

Rodrigues and Quintanilha (1991: 513-9) say that the Geographical Information Systems can be understood as:

*real world models, useful to a certain purpose; they subsidize the observation process (definition, measurement and sorting activities), acting (operation, maintenance, management, building, etc) and the real world analysis.*

To Câmara (1993: 19),

*GIS's main characteristics as a system are: integrate, in a single database, spatial information from cartographical data, census data and urban and rural register, satellite images, networks and land numerical models; to combine the information through manipulation algorithms to generate derived mapping; to consult, retrieve, visualize and plot the content of geocoded database.*

From these concepts, one can realize that geographical information systems can be converted into a tool that generates information to support tourism planning and management,

as it can be used as a mechanism to integrate, visualize and summarize complex, diverse information.

According to Duque and Mendes (2006), the use of these new technologies to touristic planning can be thought from two angles: the planner angle and the tourist angle. So, its use can help Public Administration by opening the possibility of compiling data, organizing old information and generating new information, in addition to leading data into touristic information to the benefit of administrative efficacy, specially in the decision-making process. The organization and manipulation of this information are vital to the touristic planning, whether at a local or regional level, because GIS allows space analysis and recognition in digital media. If, in one hand, consumers/tourists need information to make decisions about the touristic practice, in other hand the information has to be available by the suppliers (public or private sector) to present the products/destinations in an attractive way. For the tourist, this will be an excellent communication tool, capable of guiding the rational use of the touristic space, "giving to the tourist a geographical space overview with touristic appeal, with important information to plan activities and coordinate the available time" (Aranha and Guerra, 2014: 43).

According to the ideas of Câmara et. al. (2004: 323), "the use of Geographical Information Systems in the last years have evolved more and more consciously, raising its significance as a solid knowledge and information base". However, despite the growing speed of GIS adoption by tourism, one can see that there is still need for disseminating the tool, specially its insertion in Public Administration and in the effective use of touristic information by the users.

### **3. The Importance of the Use of Geographical Information System in Tourism**

The touristic activity can be understood as an economic system that offers services and products addressed to leisure and as a social and cultural practice, in which State - Private Sector - Civil Society shall be connected. Given its complexity, it uses the knowledge and know-how of different areas to better understand the multiple angles of the touristic practice to illustrate its multidisciplinary character. Related areas, such as Psychology, Anthropology, Sociology and Geography help tourism with analyses on landscapes; construction, use and space appropriation using GISs.

According to their characteristics, GISs have too much importance to several areas and tourism "lacks the development and use of new instruments and tools that can make viable a more refined planning, in other words, with more information" (Ladwig, 2012: 20). It also requires quick and easy accessed solutions, suggesting an "Internet of Things" in the managers,

tourists and even the community's routine that will use the systems to better manage activities related to tourism.

According to Aranha and Guerra (2014: 31),

*However, the technology development produced a dramatic change in its presentation way. Nowadays, there are maps in very different media, each one with its peculiarities. It is possible to mention maps in computers, touristic terminals, internet, palmtops, tablets, smartphones, and others, which many times allow interaction between the user and other technologies, as GPS.*

When planning, the manager can project new products and touristic services from the awareness and visibility that the system provides with territorial and spatial information based on geographical data to assist in the decision making, as well as increasing competitiveness among destinations.

GIS is important to the tourism planning as it allows the possibility of managing information based on geographical data, organized in layers and connected to attribute tables capable of spatial interrelation to produce new information (Ladwig, 2012). Besides, GIS provides access to historical information, as a base to compile new ideas and to the production of destinations and touristic products with diagnostic and spatial information analyses - in other words, these systems quickly provide a significant and diverse amount of data and rich spatial/territorial information that can be accessed remotely by communication networks. This is highly important to plan and manage tourism, as managers/planners can use this information to support policies, projects and efforts and by end touristic activity users, as well, aiming to know better the destination and enjoy their visit at a maximum.

Some functions that can be performed by these systems in tourism management are presented by Ramon Morte (1997). Some of them are: preparation, disclosure and use of self-guided or guided itineraries; touristic expansion and landscape analyses; risk prevention; analyses of the environmental impact caused by touristic activity deployment; land use capacity; inventory; infrastructure and services quality management; destination products and services visibility. Besides management, GISs can provide bases to Virtual Tourism<sup>114</sup>, a touristic segment

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<sup>114</sup> Tourism without physical displacement via Web, in which the visitor can explore the destination(s) by photos, videos and others multimedia resources.

that is being discussed by industry experts, since the appearance and considering the possibilities generated by *Cyberspace*<sup>115</sup>.

However, web-based GIS is essential for a destination's marketing, as it allows for promotion of new touristic products, which is a competitive advantage. The potential tourist can choose the destination through internet according to his needs. Finally, using GISs is important to design and consolidate tourist products.

Managers should expand their horizons by assembling as many information as possible, considering the increasing consumer's requirement at the moment of choosing and purchasing touristic destination and services. To this, Geographical Information Systems function as a foundation and, when associated to internet, they become a new publicity and commercialization method that is available to the whole online community, allowing the creation of new, differentiated services and products, aiming at new market segments and leveraging the competitive edge.

Destinations using GISs and applications connected to Internet's main search engines to promote their touristic products and services have not only more chances to attract potential tourists, but also to increase time spent in the destination. This happens because GIS can present itineraries with different attractions, often poorly promoted and unknown by the visitor, expanding the offer and the profitability with tourist spending at the destination. According to Aranha and Guerra (2014), with GIS, the information can be transmitted clearly and objectively to facilitate tourist's understanding about the visited touristic place. One also highlights that, besides the visitor, GIS can benefit the receiving community, because it will access information more quickly and will have more knowledge of the local, valuing it and becoming aware of the importance of preservation. Also, it will reduce management costs with promotion, considering the traditional advertising methods, such as folders, magazines, etc.

In short, the main (and several) applications of GIS in tourism are the analyses of environmental impact; spatial information supply; touristic services and products promotion; tourists, managers, private sector and receiving community's awareness; internet visibility.

Thus, it is possible to realize that the use of Geographical Information Systems in tourism has countless benefits to the activity that will be developed based on precise information and space analyses, aiming to minimize social, environmental, cultural and economic impacts. Besides, in a consolidated product management, GIS can make analyses to enhance the present activity; the proper web promotion and commercialization to support decision making process, increasing

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<sup>115</sup> Virtual communication space enabled by the Internet and computers.



competitiveness and solving problems of space use. It also has potential to be, in the future, an indispensable tool to the development of the touristic activity anywhere, considering that tourism is an exploring activity and cannot be developed without space.

#### 4. The Use of Geographical Information Systems in Sergipe State Tourism.

There are real applications of Geographical Information System in Brazilian tourism. One can mention the use, in the Minas Gerais state, of the ECOGUIA application (Figure 1), that allows the user to explore and localize Ecotourism points in the Northwest of Minas Gerais (Silva and Dias, 2002).

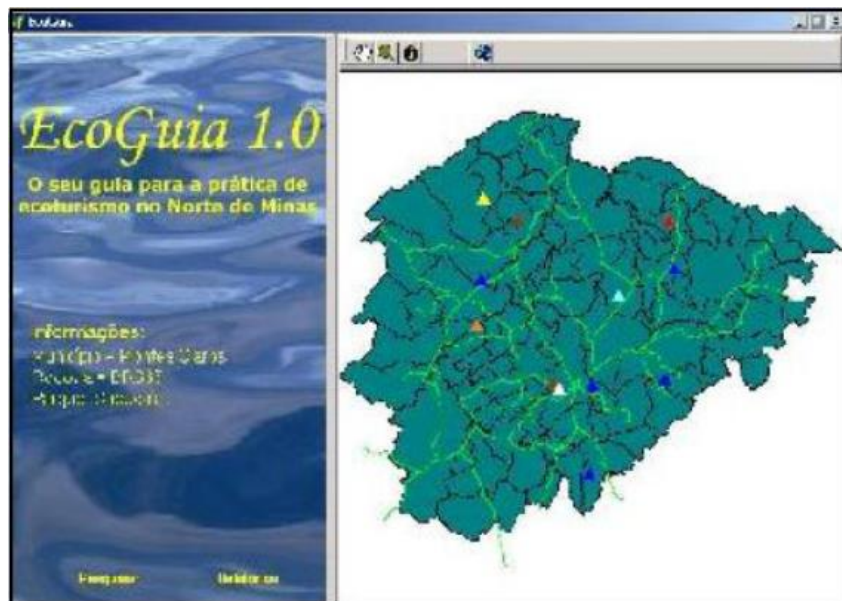


Figure 1. EcoGuia 1.0 Main Screen

Source: Silva and Dias, 2002

Santana and Moura (2005) have developed a GIS, in which the visitors could walk through the Belo Horizonte/MG Central Market in a self-guided way. Schmidt *et al.* (2007) developed a GIS to make information available to tourists about tourist equipment and services in downtown Pelotas/RS, but not using the WebGIS technology applied to the proposal to use GIS in the city of Aracaju/SE, that will be discussed ahead.

In the case of the state of Sergipe, we highlight the importance of GIS to effectively deploy the touristic practice, once the State has not elaborated the inventory of touristic offering, which is the main barrier to create effective tourist routes and itineraries (Santos, 2014). Having an

inventory allows obtaining a previous knowledge about the infrastructure that supports tourism, as well as touristic amenities, products, equipment and services the places have, in order to create products that show the actual site's potential.

Based on the State's needs for an inventory and on precise information about the touristic activity, Dias Junior *et al.* (2006) started to develop a web-based GIS (WebGis) to integrate information related to the touristic activity in the city of Aracaju, Sergipe's capital city, aiming to extend the communication channel between managers and tourists, as well as to make the data available to the population. Named "GEOTUR WEBGIS – Atlas Turístico de Aracaju" (GEOTUR WEBGIS – Aracaju's Touristic Atlas), the city was chosen primarily for having the largest amount of equipment and support infrastructure concentration to this activity, requiring work in the field from authors, in order to make an inventory of the city's touristic products. According to Dias Junior *et al.* (2005)<sup>116</sup>:

*The collected data are the base for an analysis (quantitative and qualitative) of the tourism's spatial distribution, to support a better understanding and management of touristic attractions that characterize the activity in the city of Aracaju. For the application's operation, this Atlas in beta version shows navigability satisfactory levels (speed and theme presentation) as well as the function of cartographic data navigation basic tools.*

However, the link or the internet page made available by the authors, <http://mapaturistico.com.br/cidades/default.asp?idcidade=145>, does not work, which may show that the project was discontinued.

In Sergipe, an academic research project as also developed in 2014 and 2015 by the Sergipe Federal University, Tourism and Geography disciplines, to apply Open GIS and QGIS to create self-guided touristic itineraries in the city of São Cristóvão.

São Cristóvão is a city 25 km far from the capital, Aracaju. It was founded in 1590 and is considered the fourth oldest city in Brazil. There, one can find the São Francisco Square, that received the World Heritage of UNESCO title, at August 03, 2010 during the 34<sup>th</sup> UNESCO World Heritage Committee Session. The basic document for the proposition of São Francisco Square

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<sup>116</sup> For more information, please refer to: Gestão da Geoinformação: Sistema de Gerenciamento de Banco de Dados e aplicações WebGis para o turismo em Aracaju-SE (2006) (in Portuguese), available at: [http://www.cpatc.embrapa.br/labgeo/srgsr3/artigos\\_pdf/o64\\_t.pdf](http://www.cpatc.embrapa.br/labgeo/srgsr3/artigos_pdf/o64_t.pdf). (consulted on: 02.06.2015).

application in the World Heritage list (2007: 19) showed four items that assure its cultural significance:

- São Francisco Square's exclusive characteristics and its environment point to a unique and exceptional testimonial of a colonial city conformation in Brazil. It evidences the influence of Spanish urban legislation and practices in Brazilian urban centres conformation;
- The square and its surroundings constitute an urban centre with potential architectonic unity and aesthetic-visual integrity, configuring a harmonic and authentic set that reassert its exceptional universal value;
- As for the place significance, the Square reassert Brazilian colonial period's cultural values of memory and history, adding a wide and variable multiplicity of past values remaining not only in memory, but also in the daily life, present in the importance of the city life;
- São Francisco Square's authenticity is evident, due to its design, surroundings, techniques, use, function, historical and cultural context, which highlight not only shape and structure, but also its modifications over time.

The extract of the decisions adopted by the 34th session of the World Heritage Committee determines that São Francisco Square is a World Heritage because:

- The São Francisco Square is the only outcome of the merging of the modes territorial occupation and settlement of Portugal and Spain according to which urban settlements were established in their respective colonial empires. This property reflects an exceptional interchange of visions and urban and architectural models, which occurred due to the extraordinary historic circumstances of having the two rival Empires under one crown;
- The São Francisco Square constitutes an exceptional example of a unique model of urban and architectural typology that has been preserved as a space that seats religious and civil powers. It shows a paradigm of integrated rational town planning and adaptation to the specificities of the local topography. It is a landmark used as a place for social and cultural manifestations<sup>117</sup>.

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<sup>117</sup> For more information, see Dossiê da Candidatura (in Portuguese) available at: <http://portal.iphan.gov.br/pagina/detalhes/43>.

Furthermore, the following items were recognised: integrity, authenticity, protection and management requirements.

Thus, São Cristóvão has one of the biggest and more important material and immaterial property assets of the state. According to Santos and Campos (2012: 279),

*the promotion of São Francisco Square, in the city of São Cristóvão, to World Heritage, redesigns a new panorama in Sergipe's historical and architectonic recognition. For this reason, the city of São Cristóvão will have a fundamental role in (re) arranging touristic flows, which even without a suitable policy for planning touristic activities, opens possibilities for the inclusion of other historical cities in the cultural tourism map and promotes economic and social development of their inhabitants.*

However, despite the state and local administrators' acknowledgement of the importance, there are no tangible proposals or well-defined strategies that allow the conversion of São Cristóvão into a consolidated touristic destination, and consequently a competitive destination in the long run (Santos, 2014).

Even being critical to Sergipe's tourism, São Cristóvão lacks the actual conditions of basic and touristic infrastructure maintaining and services, restraining tourism development. Previous research done in the city showed by field work that some São Cristóvão heritage assets are unknown by tourism guides and travel agencies that send tourists in daily visits. Such research also found that the local population does not know much of the local heritage. For this reason, to idealize development strategies for the practice of tourism using GIS to overcome the aforementioned barriers in the city is the most important factor in the extension project, whose focus is the preparation of self-guided cultural itineraries.

Starting from resources recognition and applicability of GISs, it is possible to use geo-technology in tourism to prepare self-guided cultural touristic itineraries, as tourists and the population will get to know better the several elements comprising the city's touristic offering, including its heritage assets, which can lead to an increasing awareness and an educational process about the heritage that will empower a new preservation conscience, so required by the touristic activity survival.

According to Bahl (2006: 298),

*Among the diversity of activities inherent to touristic planning, the one most evident is the preparation of configured itineraries as products, because they*

*summarize an ordination process of intertwined elements in a trip execution. The preparation can establish guidelines and generate a posterior tourist circulation, according to certain paths, creating flows and making possible a reasonable using of the region and attractions that will be visited.*

Therefore, the visitor will have the freedom to choose between following the standardized available itinerary or to create his/her his own, considering that touristic itineraries are flexible as they do not require an initial and final itineraries points. In other words, they don't require a visitation sequence and allow the tourist to start the visit in any of their points. Self-guided touristic itineraries have the main function is to facilitate tourist displacements and allow for the contact with attractions without the presence of a professional tourism guide (Santos, 2014) as the creation of an itinerary allows the emergence of supplemental products, rendering the segment not an exclusive one. For this study, we prioritize the cultural tourism segment, but we highlight the need of offering diversification.

#### **5. QGIS to Elaborate Self-Guided Touristic Itineraries in São Cristóvão/SE**

As mentioned before, Geographical Information Systems are a functional tool that makes possible several applications and possibilities for tourism. Among these, we will emphasize management, availability of fast and precise information to communities and related organizations, and the elaboration of self-guided cultural touristic itineraries, because they are the actual need of São Cristóvão city. For that, we used the QGIS software, a free Geographical Information System to prepare some itineraries that can be accessed in the Internet. QGIS Online module allows to perform some basic tasks, such as creation of dots, lines, polygons, tags, captions, among others; to create new layers or edit the existing ones through data acquired from the city touristic inventory, comparing the City's Planning Secretariat Map Planning Government Office (Banco de Imagens da Secretaria de Planejamento) and the Sergipe State Government Water Resources Superintendence's database (Banco de dados da Superintendência de Recursos Hídricos do Governo do Estado de Sergipe) (Figure 2).

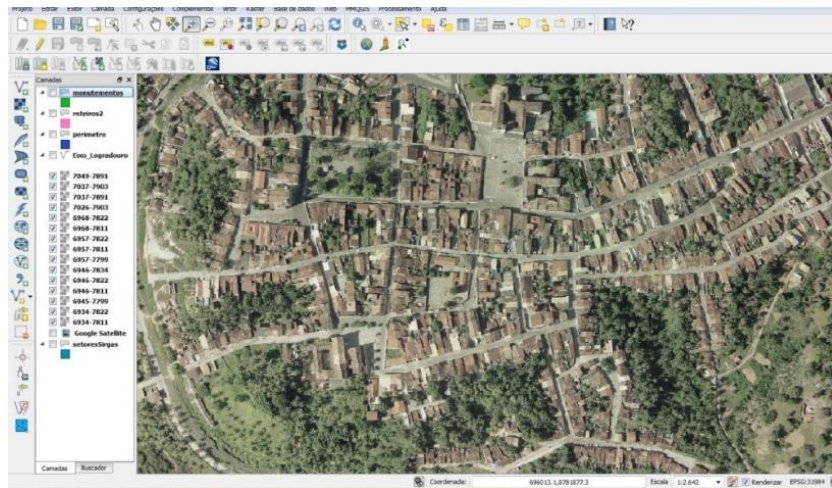


Figure 2. QGIS 2.2.0 Main Screen

Source: Santos, Campos and Rodrigues, 2015

We used this tool to input data collected in the touristic inventory process to prepare mappings proposals that feature cultural touristic itineraries for the city of São Cristóvão (Figure 3). This action made possible two new vital components in the Public Administration modernization: The development of an analytical - spatial awareness from local tourism spatial distribution; digital inclusion, using new technologies.

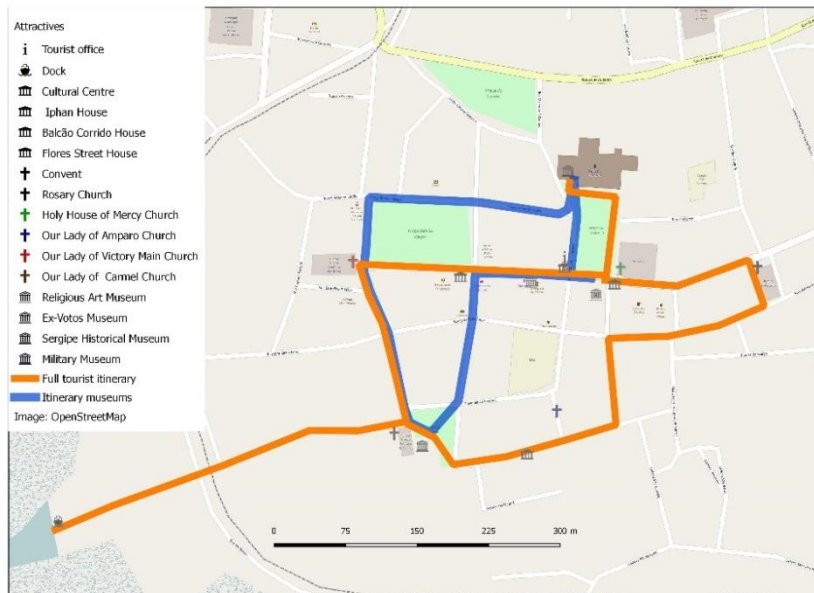


Figure 3. QGIS Screen with Touristic Itineraries

Source: Santos, Campos and Rodrigues, 2015

As we can see in the figure above, two cultural touristic itineraries were prepared. The first one includes the city museums: Religious Art Museum (Museu de Arte Sacra), Sergipe Historical Museum (Museu Histórico de Sergipe), Ex-Votos Museum (Museu dos Ex-Votos), and Military Museum (Museu Militar); the second itinerary covers the main city cultural amenities: São Francisco Square (World Heritage) (Praça São Francisco (Patrimônio Mundial)), São Francisco/Santa Cruz Church and Convent (Igreja e Convento de São Francisco/Santa Cruz), Holy House of Mercy Church (Igreja Santa Casa de Misericórdia), IPHAN House (Casa do IPHAN), Cultural Centre (Casa da Cultura), *Balcão Corrido* House (Sobrado do Balcão Corrido), Our Lady of Victory Main Church (Igreja Matriz de Nossa Senhora da Virótia), Our Lady of Mount Carmel Convent and Church (Carmo Maior and Menor) (Convento e Igreja de Nossa Senhora do Carmo (Carmo Maior e Menor)), Flores Street House (Sobrado à Rua das Flores), Our Lady of Amparo Church (Igreja de Nossa Senhora do Amparo), Our Lady of the Rosary of Black Men (Slaves) (Igreja de Nossa Senhora dos Homens Pretos (Escravos)) and Paramopama River Berth, with the previously mentioned museums. To prepare these itineraries, we initially defined the inherent elements for the touristic itineraries, in other words, the touristic attractions that are part of the itineraries from the touristic inventory process, followed by a hierarchical list of attractions. Next, we proceed to the the following steps: a) definition and suitability to target audience (visitants/tourists going to São Cristóvão independently); b) planning and preparation of itinerary; c) testing itineraries with some community members to verify and fix possible fails, to ensure that those following these itineraries can enjoy the city at a maximum and to allow the city's inhabitants to explore their heritage; d) mapping.

This way, we hope that São Cristóvão's touristic offering is extended, bringing more tourists to less-explored places, but that have a large touristic potential, as well as they can follow the proposed itineraries or make their own itineraries based on information from attractions supplied by the public Open GISs. Furthermore, São Cristóvão administrators will be able to better manage and plan tourism from the data supplied by GIS. In fact, it is believed that the city will benefit from a larger exposure created by the wealth of information on cultural itineraries that is available in WebGis format, possibly attracting potential tourists that use internet to choose and buy touristic destinations - in other words, touristic marketing, as mentioned before. The idea is supported by (Ramos et. al, 2009: 22) by stating that "Internet was one of the ICT that emerged from the 90's, and it came to revolutionize the way of travel. Due to its interaction characteristics, it allows the clients to find touristic information in several places in the world, as well as making reservations and buy touristic products, which allows the traveller to save time and money".

Thus, we propose that building a database for the destination and geo-referencing the main attractions listed, as well as publishing itinerary proposals in a single website for the city, could reduce direct searches to the destination, once it would require extensive marketing efforts. Considering the lack of budget, it would hardly generate an increment in the number of visitors. On the other hand, activities developed for generating itineraries open several and innovative perspectives based on the Web characteristics. We could distribute these itineraries for free in search engine maps, such as Google Maps or Bing Maps, posting the files in Kml or .Kmz formats<sup>118</sup> that are generated by the Software QGIS<sup>119</sup> online, along with internal Google Earth<sup>120</sup> plug-ins (Figure 4).

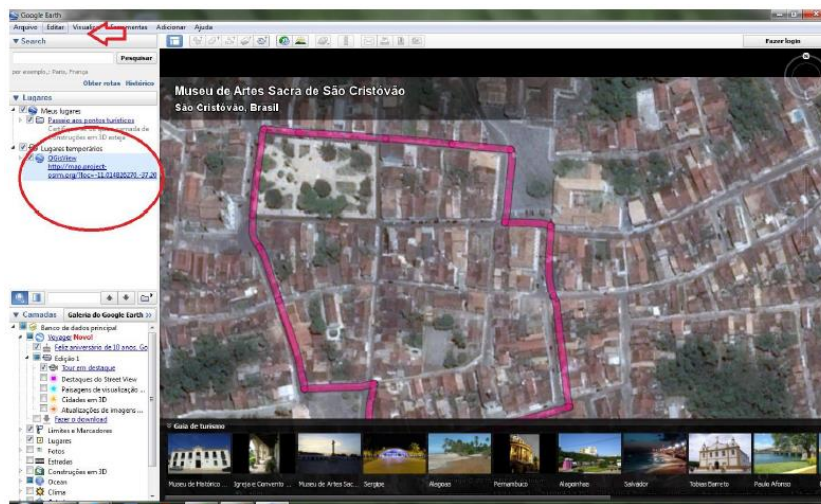


Figure 4. Proposal to promote São Cristóvão as a destination

Source: Santos, Campos and Rodrigues, 2015

Equally, the distribution of data inventoried from the city can generate multiple uses and categorizations, according to users. They can add specificities, such as places of interest, photographs, descriptions and even new itineraries after enrolling and posting in information propagation WebGis communities as, for example, Open Street Map

<sup>118</sup> Keyhole Markup Language (KML) is the format used by Google Earth in the geo-referenced addresses marking and three-dimensional geospatial data. It is based on XML (Extensible Markup Language) language that is heavily used on advanced application development to internet, because it does not require HTML (Hiper Text Markup Language), offering a really efficient way to transmit, in text format, all kind of data through the computers global network. Each KML file has data for title, latitude and longitude, and additional information like descriptions, links and models in 3D. For more information, refer to <http://earth.google.com/kml>.

<sup>119</sup> The most updated software version can be found in: <https://www.qgis.org/en/site/forusers/download.html>

<sup>120</sup> GOOGLE EARTH can be downloaded for free in: <http://earth.google.com>.



(<https://www.openstreetmap.org/>), which is a collaborative mapping project to create a free and editable world map, inspired by websites like Wikipedia.

Therefore, one can realize the importance of the GIS platform to Sergipe tourism, which still has problems in its development, but that progresses towards solutions based on technologic tools, as it is the case for Aracaju and São Cristóvão. This shows the Geographical Information Systems are “an excellent tool to systematize an array of information that is available in several sources and that is able to aggregate data in a single data base highly useful to tourists and to the organization responsible for the planning and management of the activity” (Polidoro, 2010:1).

## **6. Final Considerations**

Geo-processing technology can support planning and possibly increase exposure and, consequently, demand and profitability, promoting the development necessary to the touristic potential of Sergipe state.

In this study, we discussed the development of the touristic activity in the city of São Cristóvão from the preparation of touristic itineraries by QGIS. However, we highlighted that there are possibilities to expand this applicability to other Sergipe cities that present touristic vocation. One of them is Laranjeiras/SE, that, just like São Cristóvão, has a rich material and immaterial historical heritage, but faces barriers to develop tourism, due to the lack of publicity and few itineraries including attractions that are not so close, but that are recognised as relevant to the city.

Thus, GIS could support the assortment of attractions and, after that, the creation of itineraries, as these actions are necessary to consolidate the destination. Also, several attractions are often closed due to the lack of visitors, which is caused by low exposure and crime rates in the area, a problem often mentioned by tourist guides working there. This is confirmed by previous research, making impossible the visitation and consequently the touristic activity, exposing the administrative paralysis.

The Geographical Information System used to support the development of São Cristóvão’s tourism sector is critical, because it is a cornerstone for the future application in the state’s tourism and in other places in Brazil. Also, it is an important tool for the city management and planning that lacks solutions regarding the touristic activity. For this reason, with the use of new technologies, we hope that: a) touristic offering be expanded to consolidate “new products”; b)

the community gets closer to its heritage and know, recognise and preserve it; c) that information be generated in a practical and fast way to the community and to organizations in charge of management and planning; and, finally, d) that the city becomes more visible. In short, cultural attractions in WebGis format will be available to attract tourists that use virtual media to choose touristic destinations and products, as well as to enable tourists to walk through the city as they see fit or still, to create new itineraries from information provided according to the visitor's interest.

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