Ecotourism Planning Model Study by GIS Spatial Analysis

Ya’ou Zhang

College of Tourism, Sichuan Agricultural University, Dujiangyan 611800, China

Abstract

The core development route of current tourism industry is to use Geographic Information System (GIS) to effectively analyze spatial features of tourism resources and provide data support for the rational planning of natural scenic spots. This paper analyzes the GIS application in tourism development projects, and designs the GIS application model on the basis of optimizing ecotourism resources allocation. This paper aims to optimize ecotourism resources allocation through the application of this model and provide references for relevant researches.

Keywords: GIS Spatial Analysis, Natural Scenic Spots, Ecotourism, Space Model.

1. RESEARCH BACKGROUND

1.1 Literature review

The concept of ecotourism was proposed by Hetor Ceballos Lasclmain as early as 1983. Its research direction was mainly to form natural advantages of natural scenic spots though designing scenery tourism projects to improve the quality of tourism, driving by the main advantages of ecological environment, and integrating optimal allocations of various local cultural and morphological systems (Guo et al., 2015). In recent years, the ecotourism development and planning receive a rapid growth, so as to make the traditional tourism resources under certain constraints in the investigation and analysis phase, and seriously affect the overall design effects based on multidimensional users’ requirements (Zong et al., 2016). Therefore, it is necessary to adopt a more comprehensive spatial distribution feature to support the development of eco-resource tourism projects, and achieve the best effect of the rational planning of natural scenic spots. On this basis, Geographic Information System (GIS) is also the most effective technological approach.

1.2 Research purposes

The development of tourism resources inevitably involves the rational planning of natural scenic spots to achieve the best effect of utilizing space resources (Han et al., 2016). However, it is necessary to have high reliability data to effectively analyze the connection between the current ecological resource environment and exploitable spaces in gathering space resources (Yuan et al., 2015). Therefore, this paper analyzes the GIS technology and its application directions in the ecotourism resources development, in order to put forward an effective decision-making model for the reasonable planning of natural scenic spots, support the reasonable development and utilization of ecological resources. Thus, the geographical advantages of natural scenic areas support the comprehensive building of the tourism planning.

2. GIS APPLICATION IN TOURISM DEVELOPMENT PROJECTS

2.1 GIS overview

Geographic Information System (GIS) is a specific spatial information system. The computer software or hardware support geographic information collections about the space of the earth's surface and atmosphere, as well as the geographic information environment descriptions based on relevant data (Yao et al., 2015). The overall usage of data can complete the full dimension observation and arrangement of geographic information in the collection, storage, management, operation, analysis, display, description, and other multiple links, providing data support for the regional geographical spatial planning. In 1998, the National Center for Geographic Information and Analysis defined GIS as a computer database management system based on geographic data. The application
of this technology extends to a wide range of fields with high efficiency, such as the urban and rural planning, environmental management, resource evaluation, disaster forecast, macroscopic decision-making, operation command, decision and research of global environmental problems, and etc.

2.2 GIS Software functions

The ecotourism planning of natural scenic spots is the optimal allocation of ecotourism resources established on the basis of geographic information, so the spatial distribution of geographic information also needs to reach a certain technical indicator and precision of feasibility analysis (Yang et al., 2015). The GIS technology can effectively reduce the adverse factors in the process of using spatial information, and comprehensively analyze the current geographical characteristics, in order to provide objective evaluation indexes for ecotourism project development of natural scenic spots. Currently, there are many GIS software used widely at home and abroad, such as ArcInfo, GeoStar, Arc View, ViewGIS, GDBS, ARISTOWN, MapInfo, CityS - tar, Map GIS, Map CAD, etc. Most of GIS are space geographic information acquisition software systems developed based on processing and function-attribute models of spatial data. The introduction of individual keyword effectively connects the data information, so that the data can be fully gathered and their contents can be retrieved and analyzed.

2.3 GIS spatial planning advantages

With the development of GIS, the development and application of image processing technology increasingly become mature, which not only further expand objects but also provide the technical basis for the reasonable application of tourism resources. At present, most GIS can be used to encapsulate spatial attribute data and demand information data in a unified database to process (Zhang et al., 2015). Therefore, GIS also has the design advantages that other databases cannot complete. On the one hand, GIS can select database model parameters of differential document formats which are more conducive to the spatial information display, statistics, analysis, management, and visualizing outputs, achieving comprehensive assessments of a variety of data resources. For instances, ArcView GIS can complete to collect graphics, texts, images, table layouts, and other key technologies with the help of the views, layouts, chinas, tables, scripts, and other document functions, as well as implement the transformation from a management mode to a data extended application through the establishment of a program model (Luo et al., 2011). On the other hand, GIS possesses strong spatial geographic data analysis and processing functions. The Buffer can finish the analysis with higher precision and select indicator parameters based on the slopes of spatial distribution, and then simulate the real spatial distribution characteristics in the spatial overlay model which is more conducive to analyze the space utilization of tourism resources, reach geography spatial data integrated application effects, and understand the mutual relations of objects in the study of spatial distribution.

2.4 GIS application flow

The application of GIS in tourism projects first needs to collect the local geographical spatial distribution characteristics, and then analyzes the investigation and evaluation, development planning, environmental protection and other issues in the user interface of tourism resources. Files are provided for the computer system through the user interface, and visualizing outputs are achieved according to the effective analysis of GIS databases, so as to provide technical support for the analysis and management of the data space, make an information data summary of related collecting samples within the attribute and spatial databases, and finally return to the design goal to achieve the desired effects which support the overall planning (Zhou et al, 2010). The application flow of GIS is shown in Figure 1.

![Figure 1. GIS Application Flow](image-url)
3. GIS Application Model Design on the Basis of Optimizing Ecotourism Resources Allocation

3.1 Data modeling

The relevant data information of ecotourism resources in natural scenic spots is the basis of GIS application model providing main data. GIS technology is used to describe the 2D and 3D models’ characteristics of the atmosphere, the earth’s surface and underground. GIS can provide visualizing outputs of reference variables for the actual ecological resources in this survey area, objectively reflecting the actual demands of ecological resources and rapidly mapping (Li et al., 2010). The data model can describe the distribution rule of ecological resources, so that the characteristics of the whole earth’s surface can be estimated through the quantitative measurement of finite points. The scalar data of ecological resources in the first 2D drawing describe the region ecological resources distribution in collecting the information data and the second 3D data drawing shows the region ecological resources distribution rule. Overlaying related data of these two drawings can achieve reasonable planning paths of resource information from the ecological resources distribution rule as well as the point and quadrant collections visualization, in order to further analyze reference directions of the planning.

3.2 Topology modeling

The previous application of GIS pays more attention to the selection of known parameters, which mainly depicts the landscape characteristics of this region objectively, so as to find out the conditions and planning of visualizing parameters from the distribution rule. But in the new ecotourism project, the reasonable planning of natural scenic areas needs to be established beyond the overall layout. The application of this new project also needs to be extended to adapt the GIS optimal description in the multidimensional spatial distribution. GIS describes the entity spatial distribution rule of this natural scenic area in the form of topology modeling, and select resource development items with more flexible from the mutual influence mechanism of relative parameters, so as to achieve the best effect of the optimal allocation of natural scenic spots’ building indexes (Zhang et al., 2010). The topological relations among its geographical entities contain connectivity, inclusion, proximity, and other important spatial attributes. The connectivity refers to the internal and environmental connections between adjacent scenic areas, optimizing and adjusting the space efficiency. The inclusion is the subordination relationship that restricts the function of natural scenic spots, achieving the development dimensions of the definite building index. The proximity is related to the development sequence, which can be ignored when the designed space is small.

4. MODEL DESIGN DIRECTION ANALYSIS OF ECOTOURISM PLANNING IN NATURAL SCENIC AREAS BASED ON GIS SPATIAL EFFECTS

4.1 Unified industry standards of tourism and GIS development

Unified industry standards are the bases of applying GIS spatial effects. With the development of computer technology, systems that are beneficial to realize data sharing in the industry are becoming more and more popular for the tourism industry. Unified technology development standards are designed on the basis of the actual situation of natural resources to increase the use efficiency of all kinds of data and improve the randomness of information connections, planning out the objective distribution rule of natural scenic spots and reaching the reasonable application of GIS technology (Li et al., 2010). In addition, relevant departments macro-control the GIS technology resource sharing mechanism to support GIS multi-level development and application, form the network distribution in overall tourism development, avoid iterative development of GIS technology and repeated selection in the space development of tourism resources, as well as reduce the waste of financial and human resources, so as to support the reasonable planning and improvement of natural scenic spots.

4.2 GIS application model developing the professional application and the tourism industry improves integration effects

It is necessary to organize experts to develop an ecotourism professional application model with the help of GIS on the basis of a large number of physical and mathematical models from the investigation and evaluation, development and planning, as well as environmental protection, realizing the seamless integration between the GIS and disciplines as well as prompting the GIS application in ecotourism to the decision-making level by driving GIS in a professional manner (He et al., 2015). This optimal mode is the prerequisite for forming integrated technology advantages of “3S”. GIS information technology must use more integrated system models to support
the information acquisition and spatial planning, while the usage of “3S” in the development of ecotourism projects reflects the credibility of ecotourism resources in the investigation and evaluation, supporting the scientific development and planning of ecotourism as well as the automation and intelligence of environmental protection in tourism areas (Feng et al., 2016). Finally, the introduction of new technology enriches the system functions to support the 3D drawings of tourism resources and perfect the maximum efficiency and optimal allocation of natural resources.

5. CONCLUSIONS

In conclusion, GIS can provide data support for the optimal allocation of tourism resources, as well as the data sharing and the remote query are the best results that can be achieved at present. The application of this technology also can promote tourist consumers to understand the characteristics of ecotourism resources and the distribution, which have higher application values in enlarging the influence of ecotourism areas and increasing potential visitors (Zheng et al, 2016). The analysis of model design directions for planning ecotourism in natural scenic spots based on GIS spatial effects, as the best way to improve the GIS integrated effects, can clarify unified standards of the tourism industry and the GIS development as well as key planning routes of GIS application model developing the professional application and the tourism industry.

REFERENCES