

# **GIS for a Policy Decision Support in National Tourism Portal**

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## **Abstract**

So many tourist information systems serve information for tourists. However, policy decision systems in the tourism field are a few. Therefore, Korean Ministry of culture and tourism established the national tourism information strategy plan for building GIS based national tourism portal. The system includes four major databases such as tourism resources, statistics, law, and investment. In addition, GIS makes linkage among these four databases. Therefore, people who access this tourism portal can get overall information through GIS. This system will be developed as a .NET based Web service model for helping local government's tourism information system.

## **I. Introduction**

Simply put, GIS is an information system that makes us use spatial information effectively for human life. The system in this context means a set of activities that are consists of interoperability between real world elements for common objective of using.

After all, with a wide definition, GIS is an information system for a chain of operation from a survey, collection to storage, analysis and output of spatial information for supporting decision-making. GIS have been recognized as an efficient tool of using spatial data last two decades. Therefore, it has been diffused throughout our society.

With an advance of information technology (IT), analysis functions have been strengthened for investigating various spatial states in GIS field, so decision makers can extract information that needed for complicated spatially referenced decision-making.

GIS can be used for decision support tool not only in a public sector but also in a private sector, because it has an ability of querying spatial relationship and analyzing attributes and spatial data.

## **II. The Characteristics of Decision Making in Tourism**

### **1. Demands for Various Information**

A lot of information in various fields is necessary for decision making in tourism field. As our society advances, many parties concerned occur. In addition, in order to meet their desire, generally complicated decision-making using much information is accomplished.

The related fields with a tourism decision-making are tourist statistics, tourism industry statistics, tourism law, tourism administration, tourism policy, tourism research materials, national land use plan, environment, transportation, investment and so on. Considering an aspect of supplying them with that information, we need to build a database of those and make a plan for connecting system with related database.

### **2. The Difficulties of Acquiring and Using Data**

The core policy of information-oriented society is to furnishing information seeker with not just a single field information but total information of concerned field including sharing information between related organizations.

In the same concept, tourism database should be designed to serve comprehensive information through linkage or sharing between related databases.

For example, usually local government's tourist information system serves only about inside their administrative district. Therefore, if a trip route spread over more than two districts, information seeker has to search all homepages separately.

For the officers in charge of tourism business at the local government, even if they try to design travel products or set up tourism policies, they have a difficulty to get information, because of a diverse type of data format and a different kinds of systems.

### **3. The Matter of Linkage and Sharing Tourism Information**

With positive drive of information-oriented project, they built so many databases and information service using these all over our society. However, because each project is conducted only with their own objectives by different organizations, there are so many troubles of linkage or sharing even in the related fields. It is the same problem in the tourism field in Korea. Therefore, the information about a certain tourist attractions can be different according to

managers of the database.

These problems are caused by lack of information standardization method and organizations in charge of supporting information interchange between interested bodies.

### **III. Using GIS for Supporting Decision-Making in Tourism**

For the effective management of tourism resources (tourist attractions such as resort, mountain, river, valley etc.), in the process of planning, execution and evaluation the right information reflecting characteristics and status about tourism resources is very important for policy makers, local administrators, specialists and the interested parties. However, surveying, monitoring, information management are conducted by each organization or project, so it is not easy to use survey result systematically. In addition, rational decision based on scientific data such as terrain, land use and attributes is hard to make.

GIS has a spatial and attribute data. There is a linkage between spatial and attribute in a database of GIS. It means that searching, editing, analyzing the data is very efficiency. In addition, GIS data has a topology in spatial features, so feature layer overlay, analyze, search, select by theme are possible. These kinds of characteristics make us use GIS as a tool of decision support such as location analysis, land use plan, tourism development plan.

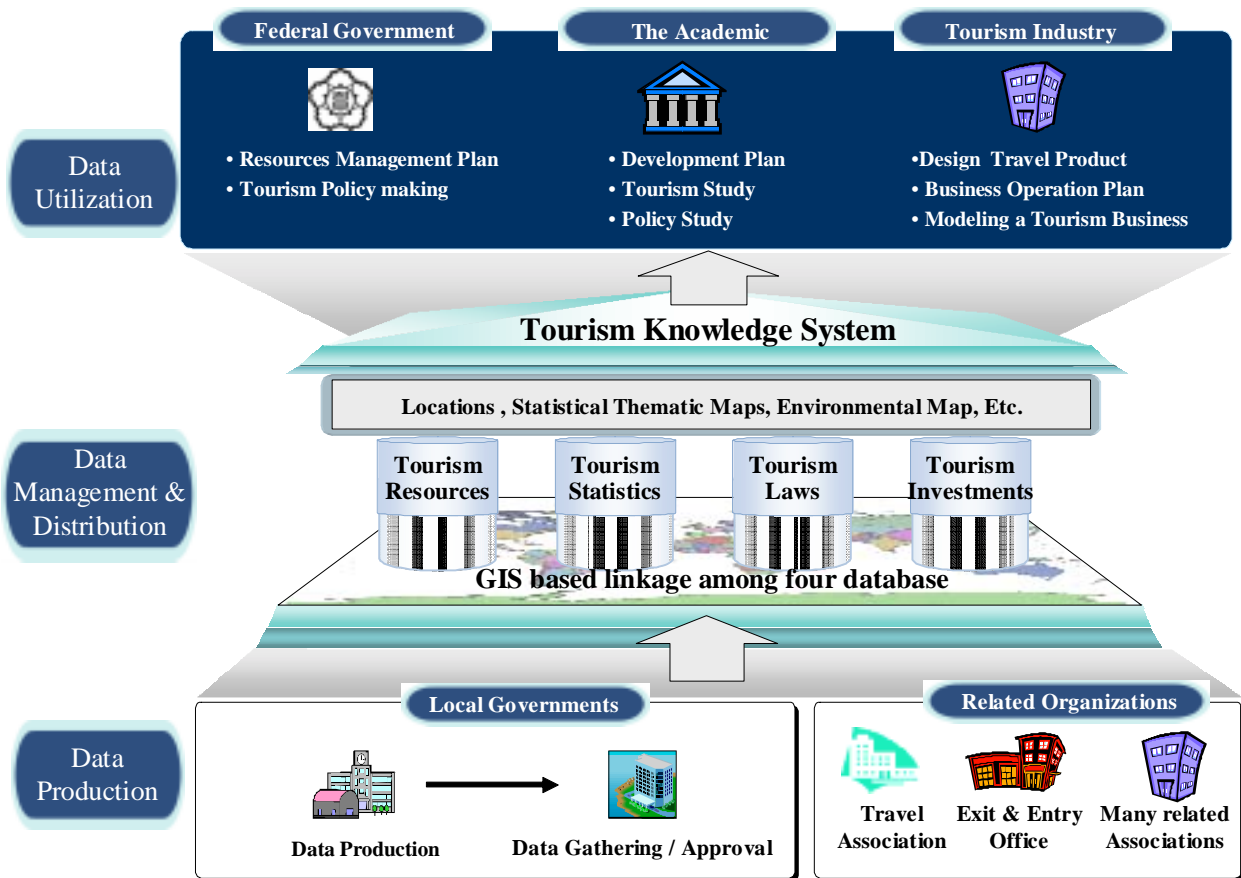
This article illustrates “Korea Tourism Knowledge System” as the example of supporting decision making with GIS.

#### **1. Tourism Knowledge System (TKS; [www.tour.go.kr](http://www.tour.go.kr)) in Korea**

Many tourist information systems serve information for tourists. However, policy decision support systems in tourism field are a few. Therefore, the Korea ministry of culture and tourism (MCT) established the national tourism Information Strategy Plan (ISP) for building Tourism Knowledge systems (TKS) in which GIS has significant role.

The system includes four major databases such as tourism resources (tourist attractions), statistics, laws, and investments. In addition to these four major databases, GIS layers in this system have topographical map, transportation map, land use map and natural environment map. Tourism resources database has about 46,000 points (spatial data) scattered all over the country and its attributes that are based on the nationwide investigation in 1999 and supplemented yearly. The tourism resources are divided into 3 highest classifications such as “culture”, “nature”, “place & facilities“, second highest 19 classifications and the lowest 248 classifications.

**Figure 1. Conceptual Role of Tourism Knowledge System**



In addition, tourism statistics database contains almost of all statistics concerned tourism that are very useful and meaningful for tourism research. Major classifications are “exit & entry statistics”, “attraction visitor statistics” and “tourism industry statistics.”

Tourism laws database gives “current laws”, “historical record of laws,” “local government’s regulations,” “precedent,” “explanatory note of current laws,” “FAQ to MCT.” All laws were reclassified from the tourism point of view after gathering data.

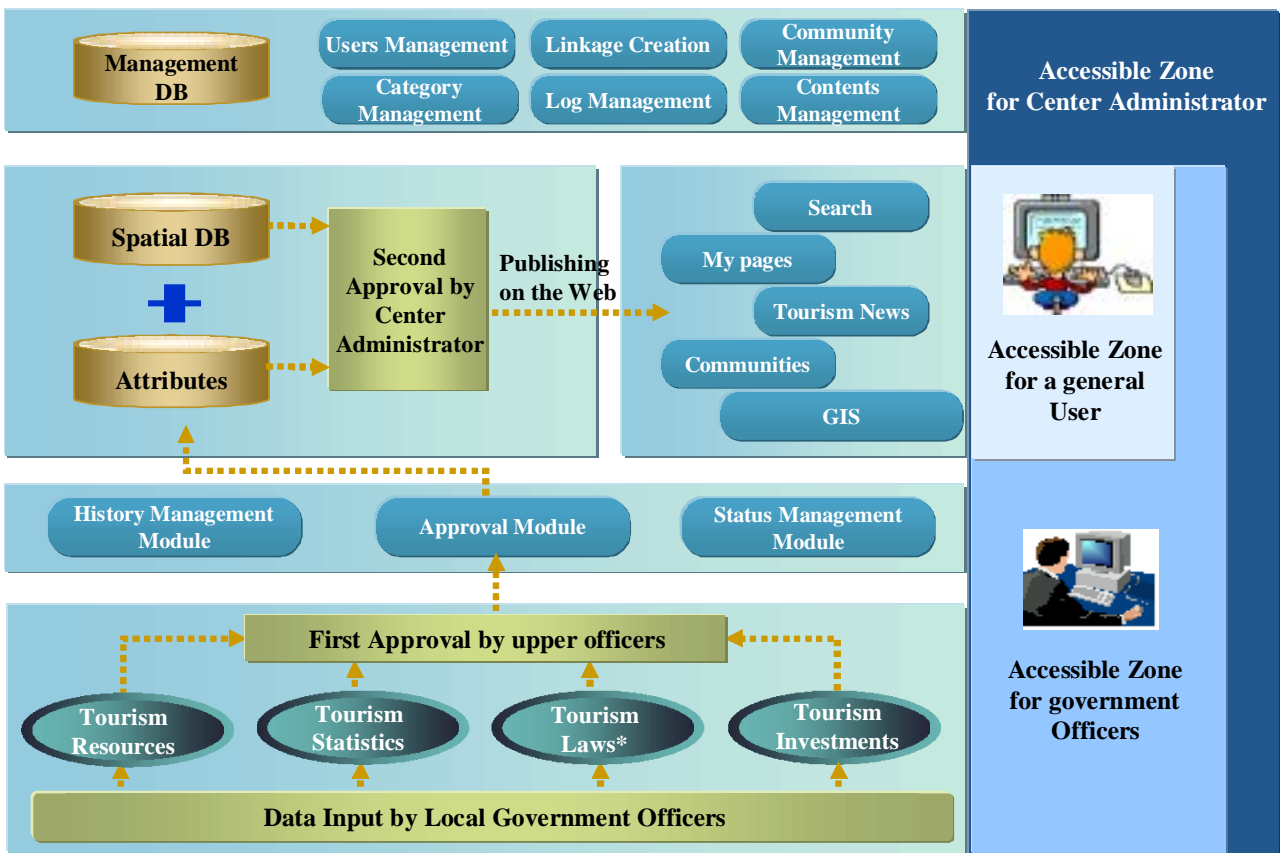
Tourism investment databases are mainly for the investors, researchers, or local-government officials who want to know what sort of tourism developments are going on or will be going on in the future. This database is consists of 3 major part such as 1)“investment guidance” that has information for attracting investment, reports on development plan, development condition and 2)“investment support” that has the present status of tourist resort, investment example, administrative support, financial support, 3)“investment trend” that has development information, product information, trend information.

Figure 2. Korea Tourism Knowledge System (www.tour.go.kr)



The conceptual role of GIS in this system is supporting decision making for government officials by serving various real time statistical thematic maps. For example, it serves tourism resources (attractions) distribution thematic map by user defined classification for establishing resources management plan conducted by government officials and developing travel products sold by travel agencies. In addition, it serves GIS based tourism statistics databases that can be spatially reference such as exit & entry statistics based on world map, attraction visitor statistics based on Korean map. For tourism laws, there is no spatially referenced information except for local-government regulations and it was considered that it is easier to search by text based. For now, the tourism laws have no connection with GIS, but we have a plan for the laws to be linked as secondary information that can be viewed as one of the items related tourism resources and investments database. Lastly, tourism investment databases have been built polygon as a spatial database and texts and images as an attribute database.

**Figure 3. Service Framework of Korea Tourism Knowledge System**



\* ) The data that are inputted by local government officer in tourism laws are only local government's regulations. Not all data of four database are supposed to input by local government officers.

## 2. Building a GIS Based Decision Support System (DSS) in Tourism

### 1) Conceptual Framework

GIS plays an important role of linking four major databases (tourism resources, statistics, laws and investments database) in the TKS. Therefore, the TKS lets visitors browse comprehensive information combined four databases based on GIS.

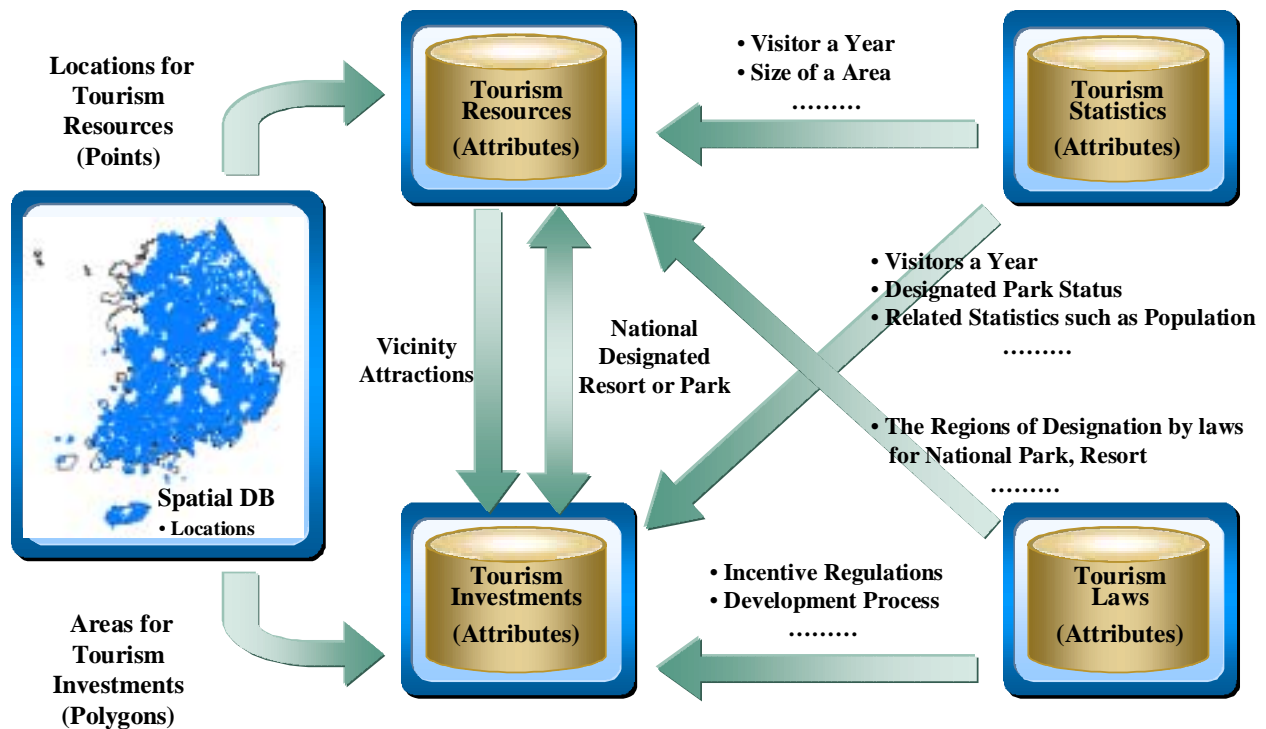
The ultimate objective of the role for GIS is to make four databases be linked. The concept of "being linked" is for example while users watching tourism resources database, if they want to search another database such as statistics or investment databases they can access through "map" (GIS) Therefore, visitors who access the system can get overall information through GIS. The ability to develop higher lever thinking and problem solving using GIS definitely gives a better understanding for decision support systems, especially tourism field that has a multi discipline characteristics.

Figure 4. GIS in Tourism Knowledge System



Section Number	Contents or Functions
①	Map display
②	Selecting a reasons
③	Selecting a category
④	Search result
⑤	Map handling function icons
⑥	Index Map
⑦	Setting up Layer on/off, legend, Scale, Coordinate system

Figure 5. Linkage Diagram Between GIS and Four Databases



## 2) Major Support Tool for Decision-Making

### (1) Layers Overlay Analysis

Mapping where things are lets us find places that have the features you are looking for and to see where to take action. GIS can have various layers such as topographical layer, geological layer, soil layer, environmental layer, land registration layer etc. Based on these thematic maps (or layers), GIS lets us be able to overlay layers and figure out hidden meaning that we can not recognize before overlaying layers.

### (2) The Tourism Resources and GIS

Tourism resources databases is mainly for managing tourism resources by federal government and serving the source to local governments in order to building tourist information system. The detail items that the tourism resources database contains are name, investigation date, investigator, reviewer, history, transportation, location, size, shape and additional note etc.

Principally, the tourism resources databases are supposed to be updated by local government's officer who is in charge of tourism affair. After initial input, each data has to be approved by



upper rank officers such as federal government officers and center administrator. The highest rank administrator (center administrator who is responsible for running the system) is supposed to make a linkage between attributes and spatial data of each updated tourism resource.

The locations of tourism resources can be displayed point or polygon. We can see distribution patterns of tourism resources through this point or polygon layers. In addition, if we overlay the point layer on topographical layer, we are able to see accessibility, contiguity, and supplementary relationship among tourism resources.

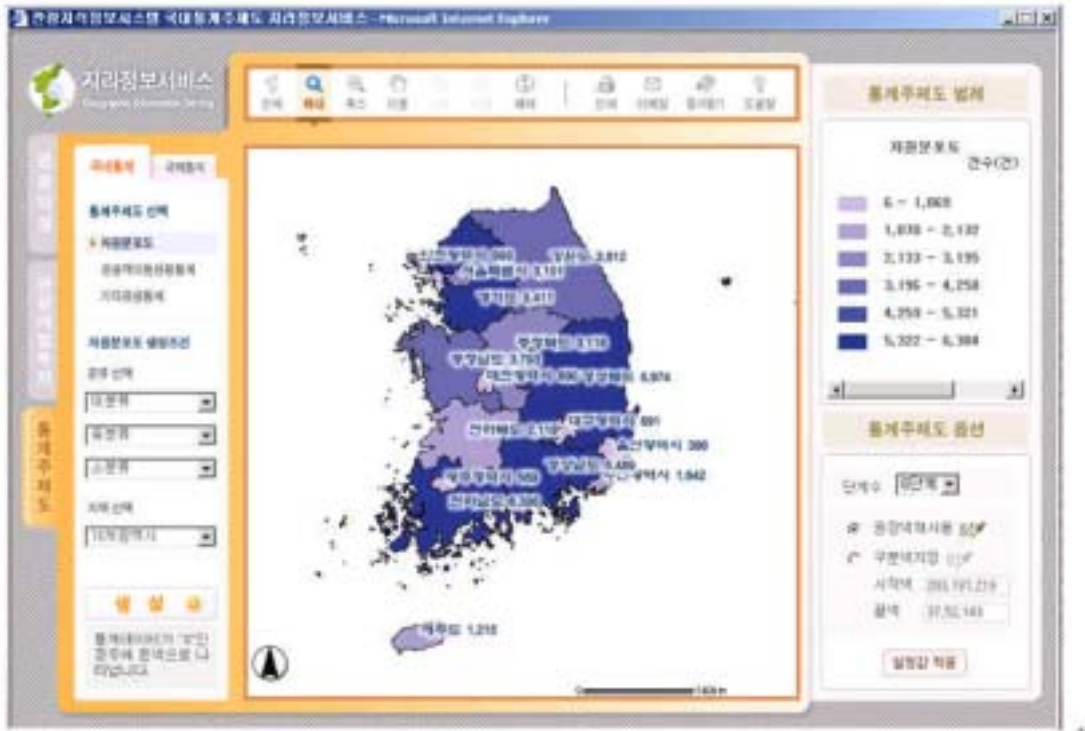
Besides, GIS for the tourism resources has a radius search function that makes travel planners at travel agencies be able to plan travel products. If users do a radius search with selecting certain tourism resources categories, the system offers the name of tourism resources corresponding to the category. For instance, the below picture shows that only museums corresponding to the user defined category and radius of 1 km in the downtown area of Seoul. It will help travel planner to make downtown museum tour. Likewise, it can be applied to search restaurants and loadings in and around sightseeing resort area. It will be a practical help to planner, if the system includes shortest path analysis among selected points in the future.

**Figure 6. Radius Search**



In addition, real-time tourism resources distribution map can help government officers be able to draw up tourism resources management plan.

**Figure 7. Real-time Tourism Resources Distribution Map**

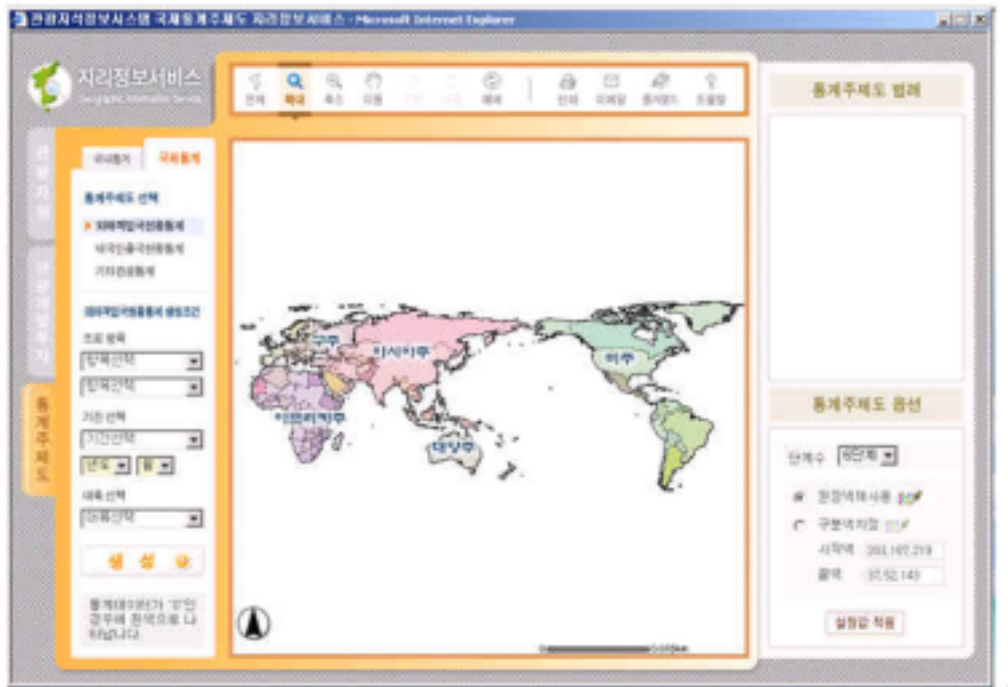


### (3) The Tourism Statistics and GIS

Major contents of tourism statistics are visit statistics for tourist facilities. GIS for the tourism statistics allows users to browse visit statistics by area. Real-time statistical thematic maps based on world map show an inbound tourist statistics by visit purpose, the length of stay, an age bracket, nations, entrance port etc. Likewise, outbound tourist statistics can be created using GIS

Additional data in the statistics are designated resort, tourism industry, and world tourism statistics etc. Among these data, spatially related data such as an international conventions record by area, domestic tourist visit by area use maps for generating the thematic maps.

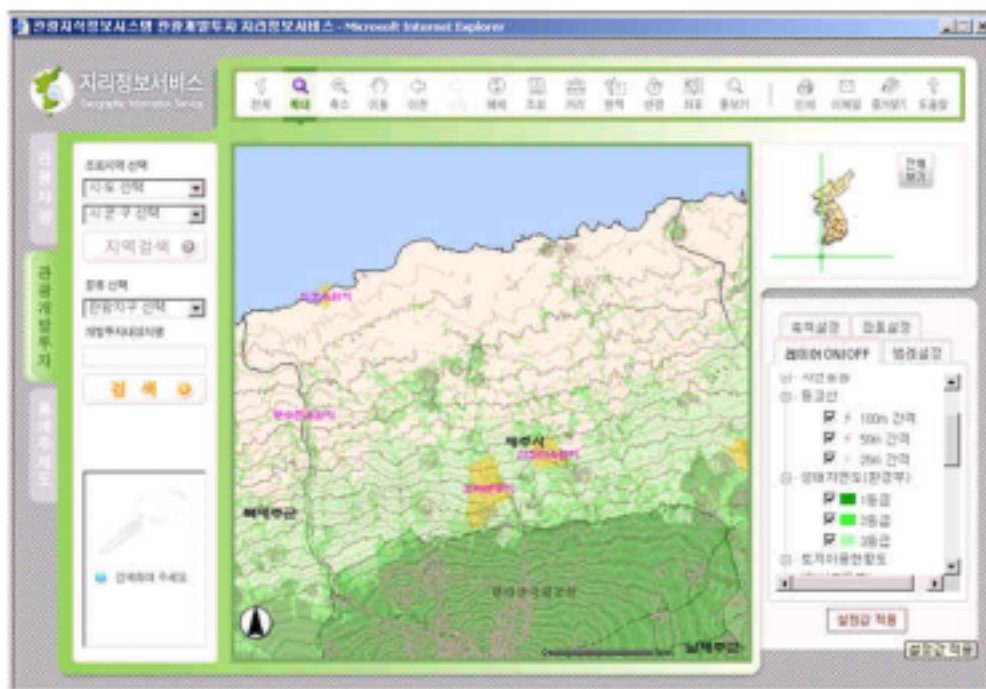
Figure 8. Inbound Tourist Statistics Based on World Map



#### (4) The Tourism Investments and GIS

Three major contents of tourism investment database have spatial data as a polygon and its attributes.

Figure 9. Overlaying Various Layers Around Investment Area and Its Vicinity



Generally, investors are interested in surrounding environments both in artificial and in natural for investment and development. Therefore, present land use map, natural environment map, contour map and conservative area map are very useful for figuring out conditions for development by overlaying these maps.

#### **(5) The Tourism Laws and GIS**

The tourism laws prescribe promotion and regulations matters on development or company operation, Linkage between the laws and GIS is very restricted. However, local government's regulations can be browsed by regions, based on administrative boundary map. In addition, if the system contains urban planning map (or zoning map) that regulates development guidance in the future, the systems enable user to confirm what kind of facilities can be installed or not.

### **IV. Conclusion**

According to the acceleration of competition, the advance of technology, high-class demands and diversity, economic conditions of the world is switching over to the knowledge-based society that the international competitiveness of county and company depend on technology and knowledge.

All countries of the world drive to knowledge based society by supporting creations and utilization of knowledge. In this trend, relative importance of knowledge-based economy is increasing.

This article illustrates tourism knowledge system in the viewpoint of how GIS help to make decision and what kind of comprehensive information can offers based on GIS.

Because decision making process are getting complex and the demands of interested bodies are getting various, supporting a decision-making using GIS is likely to increase gradually. Therefore, GIS will lead rational and scientific decision-making in tourism field.

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