

Management Information System of the Nanji Islands National Marine Reserve, China

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Abstract: A management information system of the Nanji Islands National Marine Reserve is designed and constructed based on method of integration of remote sensing and geographic information system (GIS). The system consists of two sub-systems, dynamic monitoring information system and general database system. The former is used for storage and manage fundamental geographical data (topographical and bathymetric map), satellite remote sensing data (IKONOS, SPOT, IRS, NOAA and SeaWiFS etc.) and multimedia data. The latter is used for storage and manage resource data (shellfish and alga etc.), environmental data (meteorological and hydrologic) and in situ data. As part of electronic government, this system will be submitted to local government for monitoring, management and decision.

Keywords: Nanji Islands, Remote Sensing, Geographic Information System

1. Introduction

The Nanji Islands National Marine Reserve, which is first marine reserve in China, lies in the southwest of the East China Sea. Its total area is 201.6 km², land area is 11.4 km². It is one of the five national marine reserves that were set up in 1990 in China. It joined the World Network of Biosphere Reserve of UNESCO (United Nations Educational, Scientific and Cultural Organization). There are 459 species of micro-algae, 397 species of fishes, 257 species of crustaceans and 158 species of other marine creatures in the reserve. These kinds of biological resources exist mainly at the tidal zone areas. The Nanji Islands nature reserve has not only the varieties of shellfish and algae, but also the flora and the fauna characters of both temperate zone

and torrid zone.

A management information system of the Nanji Islands National Marine Reserve is designed and constructed based on method of integration of remote sensing and geographic information system (GIS), in order to store, handle, recall, inquire, analyze and update the vast quantities of geo-referenced data and other information, and to realize timely monitoring, uniform programming and macroscopic decision-making.

2. System structure

There is abundance of base geo-data, remote sensing data, spot investigation information and general investigation data. There is both vector and grid data; there is a lot of attribute data by observing from ground and getting from state. The system consists of two sub-systems - dynamic monitoring information system and general database system (see Fig. 1).

3. Function

3.1 Dynamic monitoring information system

Dynamic monitoring information system is an application system. It is especially strengthened in function design and realization. The primary function of this system is as follows.

3.1.1 Supporting data format

This system is developed by using HTGIS control. It supports project file (*.prj), vector data (*.hed and *.shp), and image data (*.bmp and *.jpg).

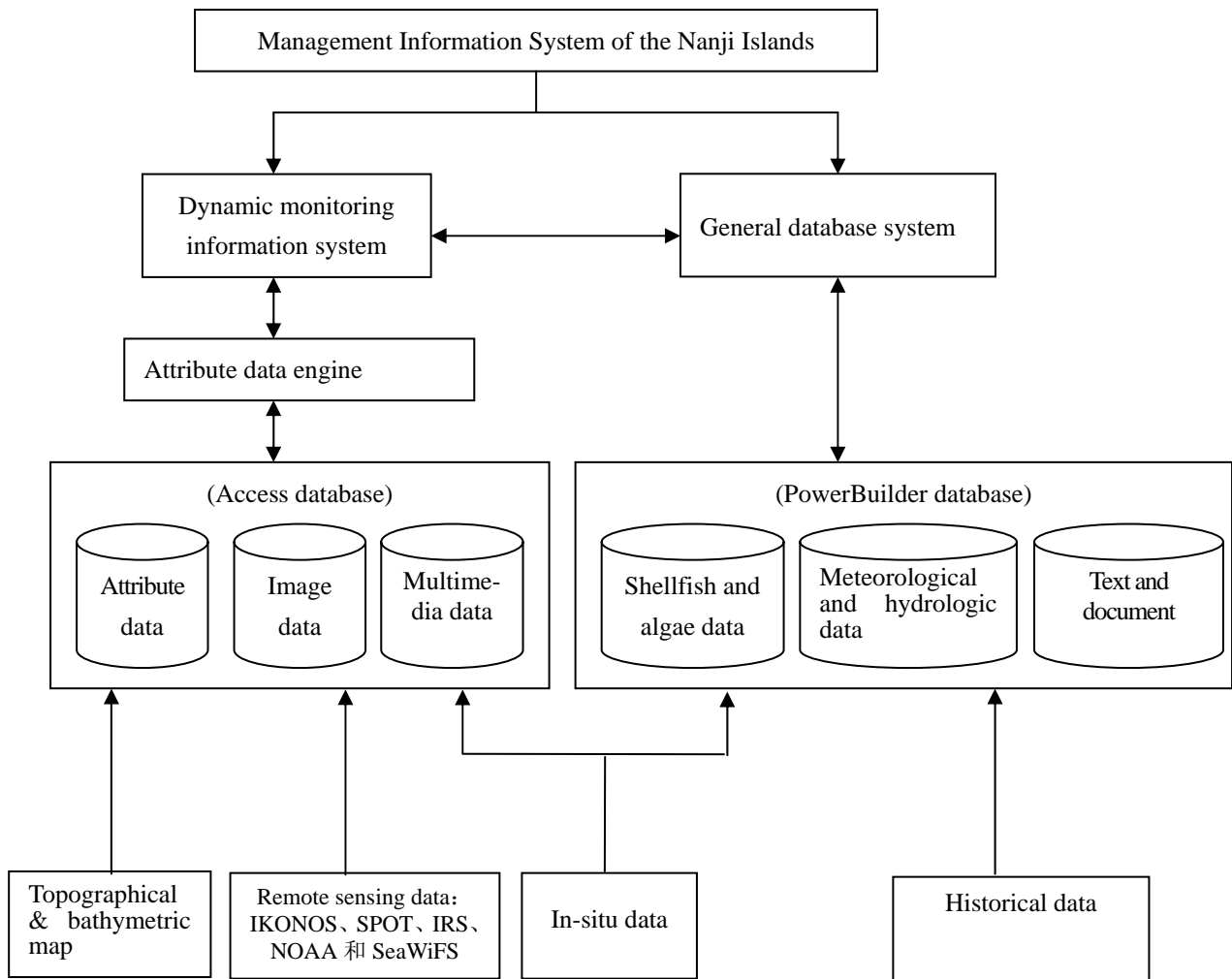


Fig. 1. Management Information System of the Nanji islands System structure.

3.1.2 Vector layer operation

Besides the basic function such as zoom out, zoom in, zoom interactive, pan, whole chart view, designate scale view and visible layer order change etc, it has other functions.

(1) View feature setting

This function includes for example frame background color, borderline feature property, length and area unit, tool bar switch, navigation chart and etc.

(2) Navigation chart

After opening project document, we can turn on or turn off navigation chart. In order to show region and view chart layer fleetly.

(3) Remote sensing image show

The remote sensing image is managed by catalog and can be opened easily.

3.1.3 Measure, calculate, query and edit

(1) Measure and calculate

Position, distance, angle, and etc. can be Measured and calculated.

(2) Information query

Length, area and general descriptive information of attribute information in each vector layer can be queried and showed.

(3) Attribute edit

We can edit and add the attribute information in each vector layer.

(4) Attribute query

Attribute query can be done based on attribute item, operating symbol (“>”, “=”, “<”, “>=” or “<=”) and etc.

3.1.4 Data output

(1) Attribute data output

Attribute information of the current vector layer,

including length, area, perimeter, general descriptive information and multimedia etc. can be viewed and printed.

(2) Thematic map export

The vector layer information can be exported as thematic map in *.bmp format. Four export style such as current scale whole chart, the appointed scale whole chart, current scale screen, and appointed scale screen are designed for selection.

3.2 General database system

The general database system has these primary functions which are query, delete, add, repair, save, export etc. in order to provide analysis and applied service. It has also the following characteristic: (1) complete data collection; (2) friendly interface design.

4. Features

In this system, we present a new fractal interpolation method to realize infinite-scale transform of the properties of geographical lines on the maps and management. After being dealt with, the curve keeps the same the feature and shape structure. General predigest degree and interpolation value amount is nearly relatively scale amplificatory times and fractal dimension, and we get quantified relation. The results show that this approach is feasible and valid [1].

The land type distinction is done by using fractal theory. The research indicates that the fractal dimensions of the shrubbery and of the meadow are very large while the fractal dimensions of the bleachery, of the village and of the farmland are small. This indicates the fractal dimensions are related to human activities [2]. In a word fractal theory provides a new idea and a new tool to research natural phenomena [3]

5. Conclusions

During the management information system of the Nanji Islands National Marine Reserve, it is the first time to build the pictures data of shellfish and algae at present in China. The pictures are clear and vivid.

It is the first time to design and construct he management information system of the Nanji Islands

National Marine Reserve. This system has independent copyright.

References

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