The Method of Multiple Spatial Planning Basic Map

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ABSTRACT:

The “Provincial Space Plan Pilot Program” issued in December 2016 pointed out that the existing space management and control information management platforms of various departments were integrated, and a spatial planning information management platform was established to integrate basic data, target indicators, space coordinates, and technical specifications. The planning and preparation will provide supportive decision support, digital monitoring and evaluation of the implementation of the plan, implementation of various types of investment projects and space management and control departments involved in military construction projects in parallel to approve and approve, and improve the efficiency of administrative approval.

The space planning system should be set up to delimit the control limits for the development of production, life and ecological space, and the control of use is implemented. On the one hand, it is necessary to clarify the functional orientation between various kinds of planning space. On the other hand, it is necessary to achieve “multi-compliance” of various space planning. Multiple spatial planning intergration need unified and standard basic map(geographic database and technical specificaton) to division of urban, agricultural, ecological three types of space and provide technical support for the refinement of the space control zoning for the relevant planning. The article analysis the main space datum, the land use classification standards, base map planning, planning basic platform main technical problems. Based on the geographic conditions, the results of the census preparation of spatial planning map, and Heilongjiang, Hainan many rules combined with a pilot application.

1. THE MAIN PROBLEMS OF THE EXISTENCE OF "MULTI PLAN COMPLIANCE"

The basic information on the basis of the planning is inconsistent, mainly includes the spatial datum, land classification standards, four inconsistent planning maps, planning platform.

(1) Spatial datum is not uniform. Taking Hainan's “multi discipline integration” as an example, the coordinate systems used in the planning include Beijing 1954, Xi'an 1980, Hainan Haikou, Hainan plane, Hainan Baisha, Hainan Wenchang and so on, up to more than ten kinds.

(2) Standard of land use classification is inconsistent. The content index of resources and ecological environment carried out by various planning departments is mostly for industry standard because of the needs of departmental management, and the semantic definition of the same geographical elements is inconsistent, which leads to the lack of universality of data. Among them, the planning of the main functional area mainly adopts the “land cover map of basic geographic information digital products ” (CH/T1012-2005). This standard divides the land cover types into 8 first class and 14 second class. Land use planning is mainly based on the “Current Situation of Land Use Classification ” (GB/T21010-2007), which classifies land use types into 12 first class and 57 second class. Urban (town) master plan and control detailed planning mainly use “urban land classification and planning construction land standard” (GB50137-2011), which divides urban and rural land into 2 categories, 9 categories and 14 subcategories. Urban construction land is divided into 8 categories, 35 categories and 42 subcategories.

Basic geographic information	Geo national information	Land use information	Urban land	Ecosystem information
arable land	arable land	arable land	residential land	forest
woodland	woodland	woodland	industrial and mining storage land	desert and bare land
garden	garden	garden	commercial and service Land	wetlands
field	field	field	industrial land	farmland
built-up area	housing area	business site	logistics warehouse land	city
unused land	structures	industrial and mining storage land	land for transportation facilities	
wetlands	road	residential land	public facilities land	
	manually excavated land	public management and public service land	green area	
	desert and bare land	Special land		
	water area	transportation land		
	geographic unit	other land		

Table 1. Comparision of land use classification system between main functional areas land use, ecological environment and urban planning

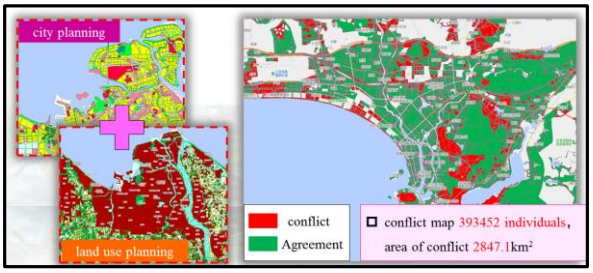

Figure 1. Statistics conflict maps of city planning and land use planning

Eco-environmental protection planning is mainly based on the ecological system, and its land cover classification system includes 7 first class and 27 second class. In addition, the geographical coverage system for geographic national surveys includes 12 primary classes, 58 secondary classes, and 133 tertiary classes. Through the land use classification analysis adopted by these four types of plans, it was found that the classification criteria are not uniform and are generally classified into two categories: One is a land use-based classification system, and it is based on the degree of land use and people's influence on it. For classification, data acquisition mainly focuses on field surveys in the field, such as the main functional areas, land, urban and rural planning; the other is a classification system based on land cover, focusing on the natural attributes of land cover. Take into account the characteristics of land use, such as environmental planning.

(3) Spatial planning map is not consistent. Space planning map refers to the geographic information database to support the planning, is the basic map division of towns, agriculture, ecological space three. At present, the main functional areas, land use, urban construction, ecological environment and spatial planning planning using different base map, and different means of investigation and preparation based on spatial accuracy. Among them, the scale of rural land survey is 1:1 million, and the scale of urban land survey is from 1:500 to 1:2000. The overall plan for land use is based on the detailed land survey data obtained through remote sensing and field verification and the update of land use change survey. The results; ecological environment planning mainly rely on 30 meters of satellite remote sensing image data; urban planning is based on the survey statistics of urban and rural planning departments.

(4) Basic platform of space planning is not consistent. Arelatively independent technical platform is used for the planning and the lack of compatibility between these platforms.

	urban master plan	land use master plan	environmental planning, environmental functional zoning
Data Sources	survey on current status of various construction lands	land second survey or change survey data	environmental statistics, various types of protected area data
Base map	topographic map	land use status map	Administrative division map
Data platform	AutoCAD	ArcGIS、MapGIS	ArcGIS

Table 2. Comparision of platform information system between main functional areas land use, ecological environment and urban planning

At present, the research and design of the “multiple-in-one” information platform in China focuses on the construction significance, functional requirements, and data content of the platform, or details the contents of the platform, and lacks a complete and comprehensive design from top to bottom.

2. THE METHOD OF MULTIPLE SPATIAL PLANNING BASIC MAP AND INFORMATION PLATFORM

Through the implementation of unified planning data coordinate system, land classification, spatial planning, spatial planning map drawing standards etc., and set up multi sectoral space planning information management platform sharing and related subsystem, to achieve interoperability more planning information “one” and the Department of business information. Among them, the “multiple-in-one” information platform is not only an auxiliary tool for “coordination, preparation, management, and updating” of “one map”, but also a carrier for the operation of “one map”, which is an important technical means for implementing “bottom line control” and it is to realize business linkage.

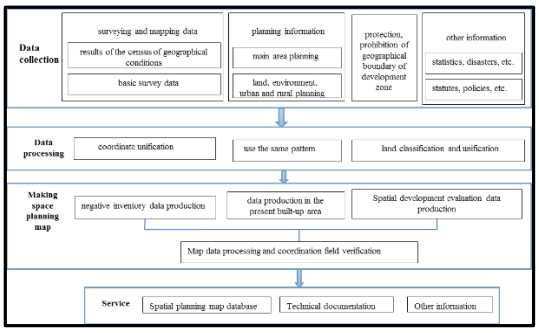

Table 3. Spatial planning map compilation process

3. EFFECT

The platform is to “paint” contradictions, complete the informatization of these work contents, and share the results of planning work, and provide appropriate technical means to assist the departments in resolving this contradiction. The main features include:

(1) Planning data display. Through unified management of various planning information data of the spatial planning system, it provides functional interfaces such as big data mining analysis and conflict detection, and provides basic data services and functional interface services for the business collaboration platform.

(2) Information sharing. Based on technology, it promotes the sharing of spatial information and data sharing, and strengthens the important means for linking up the various planning processes, eliminating sectoral barriers, and strengthening government functions.

(3) Business collaboration. The planning of national economic and social development, urban and rural planning, the overall planning of land use, and the planning of environmental protection are linked together, coordinated and shared by the planning information, and support the work platform of the cooperation of various departments.

4. UNIFORM SPATIAL REFERENCE

The basis of “combining multiple disciplines” is to unify spatial data related to various planning contents into the same spatial basic framework and ensure spatial consistency and uniqueness of each planning spatial element. The data base for spatial planning is composed of two links:

(1) Data collection. Including surveying and mapping data, planning data, protection and prohibition (restriction) of development area boundary data and other information. Among them, the surveying and mapping data includes the results of geographical national surveys and basic surveying and mapping achievements; the planning data includes national and provincial principal functional area plans, regional plans, city and county town system plans, city and county land utilization master plans, key industry layout plans, and transportation plans. Protection, prohibition (restriction) of development area boundary data includes protection, prohibition (restriction) of development area boundary data including basic farmland data, prohibition of development zones, natural (cultural) protected areas, natural (cultural) heritage, scenic spots, tourist areas, forests Parks, wetland conservation areas, swamp areas, etc., are data sources that complement the attributes of the relevant elements of the spatial planning basic map.

(2) Spatial data processing such as coordinate conversion and format conversion. Based on the 2000 national geodetic coordinate system, the 1985 national elevation benchmark was used to spatially process, format, and coordinate all types of thematic data.

5. SITE CLASSIFICATION UNIFIED

“Multi-in-one” must ensure that all planning contents use the same geographic data. Based on the surveying and mapping geographic information standards, combined with relevant standards and regulations in the fields of residential construction, land, water conservancy, forestry, transportation, and agriculture, a land-use classification standard system that meets the needs of the provincial-level spatial planning “multiple-in-one” will be formulated. The classification and processing of various types of protection and prohibition (restriction) boundaries of the development areas collected include the following:

(1) When the accuracy of all types of boundary data is better than that of geographical national surveys, or when the precision of the two is similar, the data is extracted according to all boundary data.

(2) When the accuracy of all types of boundary data is lower than the accuracy of the census data of geographic conditions, the data is extracted based on various boundary data, and the data is corrected using the census results of geographical national conditions.

(3) Basic farmland data of the basic farmland protection area from the land sector.

(4) Nature reserves, scenic sites, forest parks, world cultural heritage sites, wetlands, etc. lines of elements are referenced to geographical elements of geographical survey data.

(5) When all types of boundary data are paper diagrams, they are only for reference.

At the same time, we will build a model for updating data by domain. According to the dynamic characteristics of the planned space object and the characteristics of the ownership department, the “multiple-in-one” related data collection adopts a separate update mode. The spatial shape and position information of the related spatial objects are updated by professional departments, and the space objects in each professional field are updated. The attribute information is updated separately by each department, and is shared in the space according to the planning infrastructure through database technology.

6. SPACE PLAN BASIC MAP

The spatial planning basic map is based on geospatial framework data such as basic survey and mapping, geographic national surveys, and integrated data, data, and data such as population, economy, and space open negative list. To make a base plan for space planning, it is necessary to collect surveying and mapping, planning, and other relevant data and to make spatial reference consistent and vectorized, and then to make negative list data of spatial development, data of current built-up areas, and development of space development evaluation data. After verification of the fieldwork, the various types of spatial data produced were collated to form a spatial planning base map database.

(1) Negative list of space development. Based on the census data of the geographical conditions, we will combine the basic farmland, various types of protection, and the prohibition (restriction) of the boundaries of development zones to organize the development of negative inventory data.

(2) Current status of built-up area data. Refers to housing construction areas, plazas, green forest lands, green grasslands, hardened surface, hydraulic facilities, solidified pools, industrial facilities, and other structures etc. Extract the borders of these land types and generate the data of the current built-up areas.

(3) Space development evaluation data. It mainly includes data on single index elements such as administrative divisions, transportation, and water areas, as well as economic, population, environment, land resources that can be exploited and utilized, water resources that can be exploited and used, and disasters, and it can be used to develop traffic trunks, location advantages, population concentration, and Use of land resources, available water resources, assessment of ecosystem vulnerability, etc.

(4) Baseline data coordination and field verification. In accordance with the principle of accuracy priority (position, property, time, scale, etc.), the contradictory problems existing in various types of functional spatial data extracted are coordinated. At the same time, the production of the base map data for field verification and confirmation, at the same time to supplement the collection of information missing in the internal operations. The results of field inspections must be confirmed by the local planning department (government department).

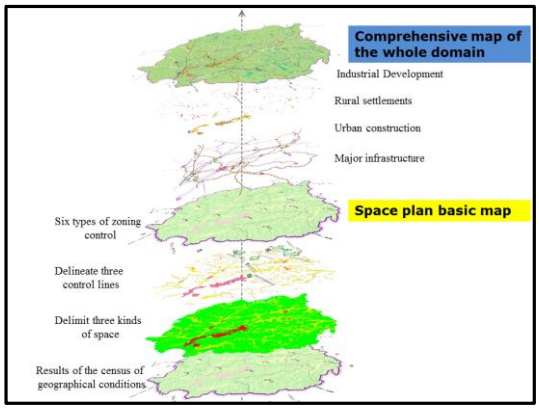

Figure 2.Space plan basic map

7. PLATFORM ARCHITECTURE DESIGN

Plan the construction of time and space information database, information sharing and collaborative management information system construction, the construction of “multi-in-one” public information platform, service planning management, project approval and supervision and law enforcement.

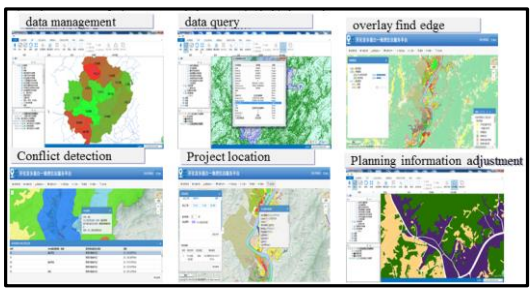

Figure 3.Interface of information of platform

8. APPLICATION

Hainan Province initiated pilot reforms of provincial multi-regulation integration on the overall plan for economic and social development, urban and rural planning and land use planning. In the same year, Hainan Province launched the development of a multi-information digital management platform in Hainan Province. The Heilongjiang and Hainan multi-regulatory one pilot showed that the census and other geographical conditions of Surveying and mapping results compilation of spatial planning map based on the construction of spatial planning based on spatial planning platform is feasible.