



Multi-planning integration advancing coastal zone management: a case study from Hainan Island, China

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Abstract

The establishment of multi-planning integration (MPI) and an orderly spatial planning system has been identified as one of the most important issues in China. Since 2014, 28 counties and cities have been selected as typical examples in China to launch MPI pilots. The Hainan Island MPI pilot is the only one that contains coastal waters, which makes it particularly valuable to coastal zone management research. In this paper, we present a qualitative study of the Hainan Island MPI pilot to gain insights into the methodological approaches of the MPI framework that have led to the integration of dozens of diverse planning initiatives in this coastal area, and summarize the significance of advancing integrated coastal zone management. The findings were drawn from comparisons of previous coastal spatial management scenarios, interviews of MPI-related government officials, and an overlay analysis of MPI achievements conducted using ArcGIS. These findings revealed that, as it was conducted in a coastal province, the Hainan Island MPI pilot considered the substantial relationship between the sea and the land, and the MPI advanced the coastal management through the use of several reform measures, including setting up the framework of an overall planning system to unify previous planning conflicts, forming a blueprint to optimize the coastal land and sea conservation and development, establishing a new provincial spatial management agency to instruct all spatial management, strengthening the legislation to guarantee the legal status of MPI, establishing a planning inspection mechanism to contain illegal land and sea use, establishing a comprehensive information platform to make spatial management convenient, and promoting the reform of an administrative approval system to accelerate the examination of coastal activity. Moreover, this study emphasizes the need for an integrated land and marine spatial planning framework to mitigate the conflicts of sectoral management to achieve more efficient coastal management, and MPI could be one option for the same; however, a more integrated planning method should be explored to further reflect the integrity of the coastal resources and environment.

Keywords Multi-planning integration (MPI) · Marine spatial planning (MSP) · Integrated coastal zone management (ICZM) · Hainan Island · China

Introduction

Marine spatial planning (MSP) “is a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political

process” (Ehler and Douvère 2009). MSP has become a widespread practice for steering sea use management towards ecosystem-based management (Douvère 2008, UNESCO 2018 website). Note that a maritime area is in direct interdependence with coastal zones, and all human activities at sea depend on land space, mostly coastal zones (Tsilimigkas et al. 2017). Accordingly, the prosperity of the sea is inseparable from the sustainable use of coastal space. In the last few decades, China’s coasts have been developed rapidly, which has created intense competition and conflicts, and have very often led to an inefficient and unsustainable use of coastal resources. The above mentioned conflicts are mainly of two types; namely, conflicts between human activities (user–user conflicts) and conflicts between human activities and the environment (user–environment conflicts) (Ehler and Douvère 2009). Therefore, how to deal with

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these two types of conflicts is also an important part of the sustainable use of coastal zones and should be an important consideration in coastal spatial planning.

Spatial planning in China guides the use of national space, is important in the determination of the blueprint of sustainable development, and is the fundamental basis for all types of development and construction programs (The State Council 2015a). Moreover, it is an important means to strengthen the macro-control and the governance of China's economic and social development, and has played an important role in the rapid development observed in China over the past few decades. Spatial planning in China is very diverse and is conducted in parallel to each other (Zhou et al. 2017). According to incomplete statistics, there are more than 80 types of plans in China (Su and Chen 2015); most of these plans have their corresponding legal basis and regulatory requirements, and their own supervisory sectors and planning systems. These plans vary in terms of objectives, functions, planning periods, planning contents, geographic boundaries, technical standards, and databases. With China's transition to a new stage of development, the current shortage of resources and the inefficiency of their allocation are very evident. The contradiction and conflicts between plans are becoming increasingly serious, and it has become difficult to allocate the limited land and sea resources appropriately. Therefore, we need to explore a more scientific spatial planning system to achieve more intensive and efficient allocation and utilization.

The 18th National Congress of the Communist Party of China (CPC) (November 2012), the Third Plenary Session of the 18th Central Committee of the CPC (November 2013), the Central Economic Work Conference (December 2014), the Central Urbanization Work Conference (December 2015), and other major conferences of the central government have all proposed reform issues to actively promote city- and county-planning system reforms, explore multi-planning integration (MPI)¹-specific approaches and practices, and establish an orderly spatial planning system. Both the National New Urbanization Plan (March 2014) and the State Council's Priority Tasks of Deepening Reform of the Economic System in 2014 (April 2014) require the acceleration of the integration of economic and social development planning, land use planning, urban and rural development planning, ecological and environmental protection planning, and other plans. In September 2015, the CPC Central Committee and the State Council issued the Integrated Reform Plan for Promoting Ecological Progress, and one of its main objectives was to establish a spatial planning system for optimizing spatial governance and spatial structure and to achieve national unity, mutual convergence and

¹ Thus far, MPI has not been clearly defined, but experts generally believe that MPI is a planning method that integrates the plans of all the sectors and establishes unified development objectives and the spatial blueprint. It is a platform that utilizes the informationization means to achieve overall spatial development and more efficient spatial management (People's Daily 2016).

hierarchical management. Certain specific tasks and requirements were defined, including the following. (1) Formulating plans for territorial space. All types of spatial plans established by different sectors will be integrated into unified spatial plans, which will be all-encompassing. The new plans will serve as a guide for the development of China's territorial space and the spatial blueprints for sustainable development. There will be three levels of spatial planning: national, provincial, and municipal (or county-level). Provincial-level spatial planning trials will be encouraged. (2) Integrating municipal-level (county-level) plans. Cities and counties will be supported in combining various types of plans into one single spatial plan, such that gradually, there will be one plan—one blueprint—per city or county. (3) Developing new approaches for formulating municipal-level (county-level) spatial plans. The standardized procedures for formulating municipal-level (county-level) spatial plans will be explored, public participation will be expanded, and planning will be made more effective and transparent. A single planning department will be encouraged to integrate the planning departments of the pilot cities (or counties) (Xinhuanet 2015).

Since 2014, 28 counties and cities have been selected in China to launch MPI pilots in order to explore the MPI mechanism and technical methods in practice; meanwhile, MPI has become an academic research focus. However, among China's current MPI pilot projects, only the one in Hainan contains maritime space; the other pilot projects only include land space. Accordingly, academic research has also only been focused on land space and not maritime space. Through the planning process of Hainan Overall Spatial Planning (2015–2030), Hainan Island and its surrounding coastal waters are planned as a whole, and the provincial-level MPI trial is being actively promoted. In this study, we considered the Hainan MPI pilot as an example to discuss the progress, experience, and the existing problems of promoting coastal management.

Data and methods

Case study area

The Hainan Island is the mainland of Hainan Province, is located in the South China Sea, is separated from Guangdong's Leizhou Peninsula by the Qiongzhou Strait, and is the second largest island of China. The Hainan Island has a 1823-km-long coastline, 68 bays, 487-km² tideland, and a large number of high-quality beaches. It has excellent marine ecosystems, with coral reefs, mangroves, and seagrass beds. Further, it includes 12 coastal and 6 inland cities (or counties) and covers an area of 35,400 km². Haikou on the northern coast of the Hainan Island is the capital, while Sanya is a well-known tourist destination on the southern coast. In 2015, the island's resident population was approximately 9.1 million, and 87% of them lived in coastal cities (Hainan Statistical Yearbook 2015). Hainan's successive

provincial party committee and government attach considerable importance to the construction of an ecological civilization. In 1998, Hainan first proposed the concept of “ecological province” in China and adhering to the “ecological province” is Hainan’s consensus.

Data

The various types of data used to empirically analyze Hainan were obtained by field research and by reviewing administrative documents, such as Hainan Overall Spatial Planning, Marine Functional Zoning of Hainan, Island Protection Planning of Hainan, Sea Area Utilization Planning, Marine Environmental Protection Planning of Hainan, General Land Use Planning of Hainan, Urban Master Planning of Hainan, the Twelfth Five-Year Plan Outline of National Economic and Social Development of Hainan, and Environmental Protection Planning of Hainan, and various types of planning data as well as the annual Statistical Yearbook. We also participated in the pilot process of MPI in Hainan, and one of us is a government official for coastal management.

Methods

This study was mainly based on qualitative methods and investigated the Hainan Island MPI pilot as the case study. In this research, we compared and analyzed the previous spatial management of the Hainan Island and the outcomes of the MPI pilot by reviewing policies, institutional arrangements, and numerous spatial plans that applied an overlay analysis using ArcGIS. Moreover, we used the results of panel discussions collected from the Hainan official MPI training seminar held in August 2017, which had as participants, all the directly related provincial departments leaders and the leaders of all the cities and counties and their relevant departments.

MPI in China: Case study of Hainan Island

Previous coastal spatial planning situation

Hainan is a coastal province of China, and its coastal spatial management basically reflects the general conditions of China’s coastal spatial management. The particularity of the coastal space—including both the land and the sea, and the coastline resources—revealed that coastal spatial planning is more complex and diverse than single land spatial planning or marine spatial planning.

At present, no integrated coastal zone spatial planning has officially been issued by the central or the local government in China. Instead, the coastal zone is managed by a number of plans issued by several sectors. For instance, if we consider the national planning level, the most important plans include the following:

- (1) Main Functional Area Planning (MFAP) under the charge of the National Development and Reform Commission. MFAP refers to the planning of the future population distribution, economic layout, land utilization, and urbanization according to the carrying capacity of the resources and the environment in different regions, on the basis of the existing development density and development potential. The pattern of land and resources is divided into four categories—optimization and development, key development, limited development, and no-exploitation development—to determine the main function orientation, define the direction of development, control the development intensity, regulate the development order, perfect the development policy, and gradually form the spatial development pattern of coordinated population, economy, and resources environment (The State Council 2011).
- (2) National Economic and Social Development Five-Year Plan (NESDFYP) under the charge of the National Development and Reform Commission. It mainly states the national strategic intentions and clarifies the main goal, major tasks, and major measures for economic and social development. It is the behavior orientation of the market players, an important basis for government to perform its duties, and the common vision of all peoples in China (The National People’s Congress of the PRC 2016).
- (3) Master Plan for National Land Use under the charge of Ministry of Land and Resources. It mainly expounds the national land use strategy during its planning period, which is normally 15 years; clarifies the main objectives, tasks, and policies of the land use administration; and guides the entire society to protect and rationally use the land resources. It is the most rigorous guiding document of the land administration system and is an important basis of the implementation of land macro-control and land use control, as well as urban and rural planning and construction (Ministry of Land and Resources 2008).
- (4) Urban and Rural Planning (URP) under the charge of Ministry of Housing and Urban-Rural Development. It is a layout plan based on the promotion of comprehensive, coordinated, and sustainable economic and social development in urban and rural areas, to promote the scientific use of land and the fundamental improvement of the living environment. It covers both the urban and the rural residential areas and includes urban system planning, urban planning, town planning, rural planning, and village planning (Urban and Rural Planning Law of the People’s Republic of China 2015).
- (5) Marine Functional Zoning (MFZ) under the charge of State Oceanic Administration. It divides the maritime space into eight categories of functional zones, and clarifies the management requirements and marine environmental protection requirements of each functional zone. It is an important basis and means to guide and regulate sea area use and to

protect and improve the marine environment. It is the scientific basis for compiling all types of marine special planning, rational allocation of marine resources, optimizing the layout of the marine industry, and improving the capability of marine comprehensive management (State Oceanic Administration 2012).

- (6) Marine Main Functional Area Planning under the charge of State Oceanic Administration. It is an important part of MFAP. It is the fundamental basis for advancing the layout of the main marine functional zones and the basic binding plan for the development of the maritime space. Its division unit is coastal waters under a county jurisdiction; the main functions of different waters are clarified, the marine spatial development activities are coordinated, and the marine industrial structure and spatial layout are optimized (The State Council 2015b).
- (7) Some of the other special plans include Environmental Protection Planning under the charge of Ministry of Environmental Protection, Transportation Planning under the charge of Ministry of Transport, Planning of Water and Tidal Flats for Aquaculture under the charge of Ministry of Agriculture, and Tourism Planning under the charge of Tourism Administration.

In general, all these plans of different sectors include the national, provincial, municipal, and county level, from top to bottom. Meanwhile, in addition to the abovementioned major plans, all of these sectors manage a number of other related plans. For instance, in the case of the Department of Ocean and Fisheries of Hainan Province, the spatial planning of the coastal area managed by this sector includes, but is not limited to, the following: Marine Economic Development Plan of Hainan Province, issued every five years to guide the province's marine economic development, involving all sea areas of jurisdiction and almost all types of marine industry; Island Conservation Planning of Hainan Province, to protect and guide the rational development and utilization of the island and its surrounding marine ecosystems; Marine Ecological Protection Red Line, the border control line of important functions to protect national and regional ecological security and improve the ecological service function; Marine Main Functional Area Planning of Hainan Province; Marine Functional Zoning of Hainan Province; and other special plans involving the sea, such as Planning of Water and Tidal Flats for Aquaculture and Marine Protected Area Planning.

As a result, different plans involving the coastal zone space have formed a "Grid" with many vertical and horizontal lines. Taking the coastal zone spatial plans of the Hainan Province as an example, in the horizontal direction, there are a number of different departments in charge of different aspects of the coastal zone; in the vertical direction, all the provincial-level plans of the Hainan Province are compiled according to the corresponding national-level plans. Meanwhile, the city and county governments formulate the corresponding municipal and county-level

plans in accordance with the various plans at the Hainan provincial level. Because of the fact that the same coastal zone involves the simultaneous control and management of multiple plans and has a lack of top-level design, each plan has its own technical standards and legal basis and is managed by multiple departments, thereby leading to several problems.

Major problems of previous coastal spatial management

The major problems of the previous coastal spatial management in the Hainan Island are as follows:

There is a low level of coastal space use and development. The existing spatial plans are not sufficient for integrating the use of the coastal space, resulting in the wastage of marine and shoreline resources. Because of the lack of integrated land and sea planning, there are many homogenization construction projects on the coast, such as tourism, port activities, and other infrastructure construction, leading to blind competition and a low level of homogenization construction. A number of land reclamation projects are deserted, and some of the lagoon and inner bays are occupied by aquaculture facilities, most of which are also deserted. The length of the Hainan Island coastline is approximately 1823 km, rich in high-quality beaches and various biological coasts. Because of the lack of systematic coastal planning and the superiority of coastal resources, coastal resources have been severely blindly exploited. For example,² in 2008, 62% of the artificial developed coastline is an aquaculture dike, and in 2016, the residential real estate occupied 266 km of the coastline, accounting for 45% of the developed coastline.

Contradictions among various functional sectors that involve coastal zone management were prominent. In fact, contradictions need to be resolved in a variety of spatial planning technical standards, different data formats, and frequent planning adjustment. For example,³ 721,000 land pieces and 1587 km² of contradictory land plots were found among the cultivated land, woodland, and construction during the MPI pilot.

The ecological basis has been eroded (Hainan Overall Spatial Planning outline 2015). Although the quality of ecological environment is generally at China's leading level, the protection of the endemic ecosystem and species resources has been insufficient, the area of the tropical rainforest has been reduced, the local area has been ecologically degraded, the potential risk of soil erosion has been increased, and the ecological environment of the mangroves, coral reefs, and seagrass bed has degraded.

In May 2013, Hainan Special Economic Zone Coastal Zone Protection and Development Management Act was promulgated; it is the overall regulatory basis for coastal zone management in the Hainan Island, originally designed to solve

² Data is from the provincial government internal work information.

³ Data is from the provincial government internal work information.

the abovementioned coastal problems. The Act proposed a coastal zone master plan at the provincial and county levels, but was not put into practice until the Hainan Island MPI pilot. Previous coastal plans were fragmented, effective synergies were lacking, and interdependent and overlapping information platforms of the spatial plans were not unified; further, the data were not well shared among the different sectors, and the control technology was primitive.

Framework of Hainan Island MPI

At present, the Hainan Island MPI has been completed and reported to the State Council for approval. The MPI framework is based on strategy, space, and implementation control, and a content system is formed, which includes strategic planning as the lead, spatial planning as the main body, and implementation control as the support. The specific approach is as follows:

Firstly, on the basis of the MFAP of the Hainan Province, various types of spatial plans of the Hainan Province need to be coordinated and fully connected with Hainan NESDFYP. The coordination of the MFAP, Ecological Protection Red Line Planning, URP, Land Use Planning, Forest Protection and Utilization Planning, MFZ, and other spatial plans have to be focused upon, and all of these plans need to be integrated in a single spatial plan to analyze and coordinate the conflicts and contradictions among these spatial plans, such that one plan-one blueprint for all the development activities of the province is achieved.

Secondly, the “three types of control spaces and three types of control lines” should be delineated to optimize the spatial layout. Protection of the ecological environment, effective allocation of resources, improvement of the infrastructure and public service facilities, and intensive land saving are considered the focus of MPI, and administrative boundaries and sectoral barriers are broken down to delineate the ecological space, living space, and production space, as well as ecological protection red lines, permanent basic farmland lines, and urban development lines.

Thirdly, a unified information platform providing technical support for space control needs to be built. MPI access to the management information systems of all the coast-related sectors at the provincial level and the municipal level (county level) needs to be facilitated to achieve centralized management of the spatial data, establish a data sharing mechanism, and enhance the capability of the spatial planning and control of the Hainan Island.

Fourthly, the planning legislation and institution should be strengthened to ensure MPI implementation. Legislation needs to be further improved to identify the MPI legal status and implementation body, modify conditions and procedures, and ensure that MPI plays the role of commanding the sectoral spatial plans. Meanwhile, a provincial department should be established to unify spatial planning and management.

Main achievements of Hainan Island MPI

The uncoordinated problems of the original plans have been solved. The Hainan Island MPI set up a framework of the overall planning system; unified a variety of spatial planning technical standards, coordinate systems, and data formats; and resolved the conflicts among the original plans. Therefore, the frequent adjustment of plans is no longer necessary to solve the contradictions. Incompatible land plots were resolved among the cultivated land, woodland, and construction land through land adjustment, replacement, and other methods.

The pattern of territory conservation and development was optimized, and “One Blueprint” was formed (see Fig. 1). Firstly, the ecological protection red lines and the other control lines were delineated, including the primary ecological function area,⁴ secondary ecological function area,⁵ and coastal water ecological function area.⁶ Secondly, various types of development boundary lines were delineated, including urban area, rural area, industrial parks, and tourism resorts, guiding the development and construction projects into the boundary lines to achieve an economical and intensive use of the space resources. Thirdly, an overall arrangement of various types of development spatial layouts was achieved, and the key industries and important infrastructure layout were planned.

⁴ Primary ecological function area is the area within ecological protection red lines and needs strict control; it is the core skeleton of the ecological function and ecological security, including Class I red line and Class II red line areas. It shall not engage in any form of development and construction in the Class I red line area, implementing strict space utilization control in the Class II red line area. The Class I red line area includes the core area and the buffer zone of nature reserves, wild species distribution area, other very important biodiversity protection red line area, Class I and Class II protected areas of drinking water sources, very important water conservation red line area, very important soil and water conservation red line area, and the coastal zone natural protection area. The Class II red line area includes the experimental area of nature reserves, aquatic germplasm resources protection area, other important biodiversity conservation red line area, drinking water source quasi-protected area, important water conservation red line area, lake area protection red line area, riverfront protection red line area, important soil and water conservation red line area, geological park, forest park, wetland park, coastal zone ecological buffer zone, and the nuclear safety buffer zone.

⁵ Secondary ecological function area refers to the area that needs ecological indicator control; it includes agricultural and forestry production space and important ecological space. A secondary ecological function area mainly includes cultivated land, forest land, water area, and other important ecological space outside the primary ecological function area.

⁶ Coastal water ecological function area is divided into Class I and Class II red line areas. The Class I red line area mainly includes the core area and the buffer zone of marine nature reserves, and the protection range of the territorial sea base point. The Class II red line area mainly includes the experimental area of marine nature reserves, marine special protection area, marine protection area of provincial marine functional zoning, coastal zone control area (seaward side), coral reef main distribution area, seaweed bed main distribution area, mangrove main distribution area, part of the lagoon, important river estuaries, natural landscape and historical and cultural relics, important shoreline and adjacent waters, important fishery waters, aquaculture area of marine functional zoning, and ecological reserves to maintain the natural ecological space attributes. To guarantee urban construction and port infrastructure construction, the shoreline and the sea area of urban and port construction are excluded from red line area planning.

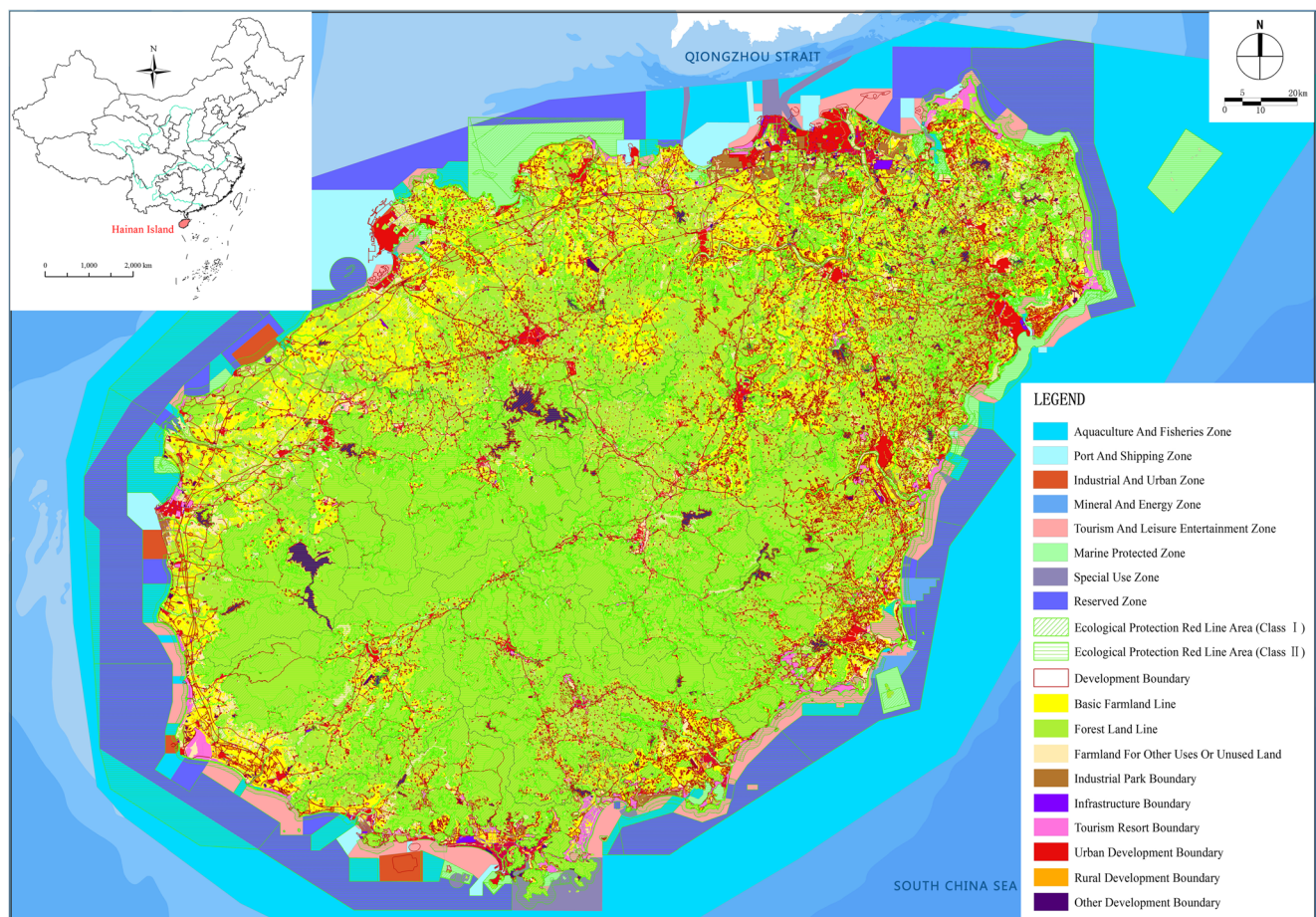


Fig. 1 Overall spatial planning of Hainan Island (2015–2030)

A provincial unified spatial planning management agency was established. In June 2017, the Hainan provincial government set up Hainan Planning Commission, which is currently the only provincial level planning committee in China and is a provincial government department, which is in charge of the editing and supervision of the province's spatial planning (Hainan provincial government 2017).

Several relevant regulations were promulgated. For example, to establish the legal status of the ecological protection red line, the Standing Committee of the Provincial People's Congress promulgated the revised "Hainan Special Economic Zone Coastal Zone Protection and Development Management Regulation" in June 2016 and the "Hainan Ecological Protection Red Line Provision" in September 2016; furthermore, the provincial government issued "Hainan Special Economic Zone Coastal Zone Protection and Development Management Implementation Details" in August 2016.

A planning inspection mechanism was established for the effective containment of illegal land and sea uses. Hainan Planning Commission set the duties of spatial planning supervision, and Comprehensive Law Enforcement Bureau formed the planning enforcement team for all the cities and counties.

A comprehensive information platform based on spatial planning and control was established, providing a scientific means for enhancing the utilization and management of spatial resources in the coastal areas. The comprehensive information platform includes three layers: The first layer is the basic data layer, including the status quo of the land and sea use, mineral resources, forest land, nature reserve, economic and social development status, and other data. The second layer is the planning layer, including "Hainan Overall Spatial Planning" (i.e., "One Blueprint") and six special spatial planning chapters, namely the main functional areas special chapter, land use special chapter, marine functional zoning and island protection special chapter, ecological protection red line special chapter, urban system special chapter, and forest protection and utilization special chapter. The third layer is the management layer, including requisition, transfer, storage, and supply of sea and land resources, construction project approval, sea and land law enforcement inspection, approval and management information of tax and other departments, and other management information. The comprehensive information platform is expected to eliminate the information island and achieve information sharing among the coastal management-related departments.

Based on “One Blueprint” and the comprehensive information platform, the reform of the administrative examination and approval system is promoted. In the coastal zone, landing a project often involves the duties of the Department of Ocean, Department of Land, Department of Planning, Department of Forestry, Department of Environmental Protection, Department of Water Resources, and others. Hainan is currently promoting “one approval window” to accept the applications of using land, sea, forest, etc. involved in a project, and all the related departments simultaneously review the applications and issue approval with only one document instead of with many documents as in the past, effectively shortening the approval time.

Discussion

Because of the tight schedule and the huge task of the Hainan MPI pilot, although a number of historical problems and contradictions were solved, the planning results were mainly based on the overlay of various plans. Furthermore, the systematic and basic research was not adequate, particularly in the case of the maritime space, and the control of the marine space is still limited. Meanwhile, it is necessary to further link land area planning and adjacent sea planning to explore a comprehensive land and sea planning model for the allocation of the land and sea resources with full consideration of the integrity of the coastal resources and environment and for the exploration of a more integrated coastal zone spatial planning method.

Conclusions

The Hainan Island MPI pilot is the only MPI pilot that contains coastal waters in China. In this research, we took the Hainan MPI pilot as a case to study the progress, experience, and existing problems of promoting integrated coastal management by MPI reforms, particularly the following promotion effects: (1) the uncoordinated problems of the plans in the coastal areas could be solved by MPI; (2) the pattern of territory conservation and development was optimized, and “one blueprint” was formed; (3) a provincial unified spatial planning management agency was established to solve the drawbacks of the sectoral spatial management; (4) several relevant regulations were promulgated to enhance coastal resource management; (5) a planning inspection mechanism was established for the effective containment of illegal land and sea uses; (6) a comprehensive information platform based on spatial planning and control was established, providing a scientific means for enhancing the utilization and management of spatial resources in the coastal areas; and (7) an administrative approval system was reformed to effectively shorten the examination time of the coastal projects. An important area to focus on in future studies is the development of a comprehensive coastal planning method that can strengthen land and sea associations,

highlight the special nature of the coastal zones, and promote the efficient use of coastal resources.

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