Analysis on the Characteristics of the Demand for Development and Utilization of Sea Space Resources

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Abstract. The analysis of the demand characteristics and suitability of elements for the development and utilization of sea space resources is the key content of Marine zoning and planning. Taking Liaoning Province as the research area, this paper analysis the characteristics of the demand for offshore areas through the superposition analysis of the current situation of sea area use and Marine function zoning, and analysis the suitability of the elements of Marine function zoning through the superposition analysis of the Marine function area with the elements of water quality, water depth and coast type. The differences in factor endowment and demand characteristics between regions will provide references for the research on optimal allocation of sea space resources.

Keywords: Marine spatial planning; Marine zoning; Marine function zoning.

1. Introduction
The analysis of the demand characteristics and suitability of elements for the development and utilization of sea space resources is the key content of Marine zoning and planning. Fanny Douvere (2008) believes that China's Marine function zoning has already started the practice or exploration of Marine space planning, and can realize the goals of economic and environmental protection through Marine function zoning. However, there are still many difficulties in coordinating the relationship between economic development and environmental protection in the implementation of Marine function zoning in China. In recent years, the research focus is the Marine functional zoning system design and evaluation methods [2-5]. Marine function zoning mainly takes into account the spatial differentiation and consistency of the natural environment and resources of the sea area, divides the sea area according to the suitability of the sea area, and combines the needs of Marine development and protection. The evaluation of the suitability of the sea area has been a hot spot in the study of Marine function zoning [6-8]. The comprehensive benefit evaluation study of sea areas is mainly aimed at the evaluation of a single sea project, and the comprehensive benefit evaluation of some sea areas is included in the evaluation study of sea area use status [9]. Accurately grasping the characteristics of the demand for the development and utilization of sea space resources and analyzing the suitability of factors is of great significance to optimize the allocation of sea space resources and realize the improvement of the comprehensive benefits of sea space utilization.

Taking Liaoning Province as the research area, this paper analysis the characteristics of the demand for offshore areas through the superposition analysis of the current situation of sea area use and Marine function zoning, and analysis the suitability of the elements of Marine function zoning through the superposition analysis of the Marine function area with the elements of water quality, water depth and coast type. The differences in factor endowment and demand characteristics between regions will provide references for the research on optimal allocation of sea space resources.
2. Demand Characteristics of Development and Utilization of Sea Space Resources

2.1. The Scale and Structure of Coastal Functional Areas in the Province Show the Future Demand for Offshore Areas in the Province

The total area of coastal functional areas in Liaoning province is about 8295km². The reserved area accounts for about 1/3, and the remaining 2/3 of the space has definite functional requirements. Port shipping area is the most important function type of coastal functional area, accounting for 27% of the total area of coastal functional area. The functional types with high demand are industrial and urban sea areas accounting for 12%, protected areas for 11%, and tourist areas for 8% respectively which is less than 4 per cent of agriculture, fisheries, special use zones, and less than 1 per cent of mining and energy zones.

There are obvious regional differences in the scale of coastal functional areas. Dalian's coastal functional area is 4300km², accounting for 52% of the province's coastal functional area. Dandong coastal functional area is about 850km², Yingkou and Panjin coastal functional area is about 630km², and Huludao and Jinzhou coastal functional area is about 560km².

The difference of functional area types in different regions shows the great difference of functional requirements in different regions. Dalian has a complete range of functional areas. The percentage of reserved areas is as high as 42%. Protected areas make up less than 2% of the population. The function of agriculture and fishery occupies the highest proportion in the province. Most of the functional areas of agriculture and fishery are located in Dalian. Dandong has fewer functional areas, with 75% of the protected area, 19% of the port shipping area and less than 4% of the reserved area. The proportion of industrial and urban sea area is only 2%.Huludao has a complete range of functional areas. The highest proportion is about 25% for tourism, leisure and entertainment areas, 23% for reserved areas, 20% for port and shipping areas, and 20% for industrial and urban sea areas. Protected areas account for less than 3%. There are few functional areas in Jinzhou. In addition to the seaport shipping area at the border with Huludao, the tourism, leisure and entertainment area and the industrial and urban sea area account for more than 90%, and the positioning characteristics of port city are prominent. The functional orientation of the border area of each region is single. The border area of Dandong in Dalian is a port shipping area, the border area of Jinzhou in Huludao is also a port shipping area, and the border area between Panjin and Yingkou is a reserve area.

The development and protection objectives of different regions are obviously different. Dandong and Panjin have tourism resources but do not demarcate tourism, leisure and entertainment functional areas, but demarcated as protection areas, more focused on the realization of protection objectives. Huludao and Jinzhou are mainly tourist leisure and entertainment functional areas, and the proportion of protected areas is very low. Yingkou has high-quality sandy coastal resources, which can develop tourism, leisure and entertainment functions, but it is more inclined to port, industry and town development.
2.3. The Current Use of Sea Areas Presents different Demand Characteristics from Functional Areas

According to the corresponding relationship between the actual sea area use type and functional area, the current situation of the sea area use in the coastal functional area is analyzed. The results show that the largest amount of sea is used for agriculture and fishery, accounting for about 77.5%, followed by mineral and energy (including 99.5% for salt industry), which accounts for about 15.7%, and about 5.3% for port shipping. The use of sea for tourism, recreation, industry and urban construction accounted for only 0.6 percent. Less than 0.3% of the special sea areas are mainly used for science and education and for sewage discharge.

Present situation of middle sea area use fishing with types mainly include sea bottom seeding breeding sea breeding facility farming and fishing port bottom farming scale of 937 km², wai sea aquaculture area of 389 km², facilities of aquaculture area of 75 km², fishing port area of 5 km² farming fisheries in the coastal area with the sea area of 291 km², area is 5 times that of the agriculture regionalization using status fishing in the sea are widely distributed in various functional areas.

The distribution of farming activities in tourist areas has caused adverse effects on tourism functions. In 2016, it was found in the survey that a piece of sea used for public tourism, leisure and entertainment in the Golden Coast tourist area in Dalian was occupied by the bottom planting breeding activities, and the breeding staff drove tourists away from the water, which caused the dissatisfaction of tourists. There is only a short stretch of the coastline where free tents are allowed, but the area is also occupied by farming activities. Visitors must cross the barbed wire fence from the tent area to swim in the water. Breeders watch the coast and drive away paddling tourists.

3. Element Suitability Analysis Based on Marine Function Zoning

Functional zoning reflects the suitability of various sea functions to regional conditions. Through statistical analysis of the management requirements and current distribution of various elements in various functional areas, the suitability of various functions to the conditions can be judged.

3.1. Water Quality Suitability Analysis of Functional Areas

The objectives of water quality management in functional areas reflect the requirements of water quality management by functions and the judgment of water quality suitability by experts and departments. The management objectives of various functional zones show the suitability of their functions for water quality. For example, port shipping areas are dominated by water quality level four, while industrial and urban sea areas, tourism and recreation areas, agricultural and fishery areas are dominated by water quality level three. There are regional differences in the water quality management objectives among various functional zones. The water quality level four area in tourism, leisure and entertainment areas are all located in Yingkou city. The water quality level four area in industrial and urban sea area are all located in Dalian city. The water quality level two area in reserve area are all located in Panjin city. The objectives and suitability of water quality management can also reflect the compatibility of various functional types under the condition of water quality factors. The port shipping function has the lowest requirement for water quality, so the compatibility of water quality elements is the strongest. Protected areas are the least compatible. The water quality conditions of industry and urban sea, tourism and recreation area, agriculture and fishery area are fully compatible. The reserved area can meet the requirements of major ports shipping function, industry and urban function, tourism and recreation function, agriculture and fishery function. These four functional zones account for 92% of the total area of marine function zones in Liaoning Province.

The analysis of the current situation of water quality in functional zones and the requirements of zoning management shows some differences. The water quality status of functional areas shows that the water quality status of agriculture, fishery and tourism is cleaner than that of port and shipping industry towns, and the area of severely polluted sea area is smaller. The current situation of water quality shows that agricultural and fishery tourism areas need cleaner water quality than industrial and urban sea area. Therefore, structural requirements should be put forward for water quality management in coastal waters to meet the suitability of tourism, recreation, agriculture and fishery areas. For example, the water quality of more than 60% functional areas should meet the management requirements of class II and above, which should also be set according to specific regional conditions.
The water depth distribution in each functional area reflects the judgment of experts and departments on the suitability of water depth in each functional area. The water depth distribution of each function type in the coastal functional area shows that the port shipping area is mainly distributed in the sea with a depth of 5-20 meters. Industrial and urban construction areas and Marine protected areas are mainly distributed in sea areas with a depth of 0-5 meters. Mineral and energy areas are mainly distributed in waters with a depth of 0 meters. Tourism and recreation areas, agriculture and fishery areas are located in a water depth of 0-20 meters. According to functional classification, the distribution of sea area use status in each depth range shows the adaptability of sea area use status. Port shipping zones are adapted to deep-water zones; Industrial and urban construction areas, tourism and recreation areas are mainly distributed in the sea with a depth of 0-5 meters. Mineral and energy areas are mainly distributed in waters with a depth of 0 meters. Agricultural and fishery areas are distributed in a water depth of 0-20 meters.

3.2. Suitability Analysis of Functional Area Coast Type

The coastal type distribution of each functional area in the functional zoning reflects the judgment of experts and departments on the suitability of each functional coast type. The mineral and energy areas in industrial and urban construction areas are mainly distributed along the headland bay silt coast. The agricultural and fishery areas are mainly distributed in the dike type sandy beach type headland bay silt coast type plain type silt coast type. The tourism and recreation areas are mainly distributed in the dike sandy bay bedrock coast and cape Bay sandy coast.

In conclusion, water quality and water depth are important factors affecting the use and functional positioning of the sea area. Except for sandy coast, which has a great impact on the positioning of tourism and recreation functions, but has less impact on the positioning of other functions, the suitability of the current use of the sea area for water quality, water depth and coastal types is stronger than the judgment of functional zoning.

4. Conclusion

Taking Liaoning province as the research scope, through the analysis of the superposition of sea area use present situation and the Marine functional zoning, analysis of the characteristics, nearshore sea demand by Marine functional areas and water depth and coast superposition type elements analysis, analysis of the elements of Marine functional zoning suitability results show: 1) the coast area scale present obvious regional difference 2) zone around the ribbon type difference shows of the functional requirements of each area bigger difference type 3) function area, more potential Marine spatial resources demand contradiction more 4) regional development and the protection goal difference is obvious5) The current situation of sea area use presents different demand characteristics from functional zones. 6) The suitability of sea area use is stronger than the judgment of functional zoning. The difference in factor endowment and demand characteristics between regions will provide reference for the research on optimal allocation of sea area space resources.

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