

# **A Study on Classification for Spatial Elements of Marine Resource and Environment**

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## **Abstract**

*This paper is written with some problems about classification for spatial elements of marine resources and environment. Geographic range of spatial elements should be firstly decided before classifying. the factors of classification are second what we discuss. the factors of classification play a very important role in building up the classification system. The final section of the paper discusses the construct of classification system.*

## **1. Introduction**

Entering 21st century, the world is confronted with more and more problems that threaten man's existence on earth. On the one hand, the limited land resources can hardly meet the needs of increasing population. The shortage of land resources enables people to turn the vision from land to immense ocean. Today people have got great benefit from the ocean. On the other hand, the ocean has suffered a series of problems of resource and environment from human beings activities. For example, the excessive commercial fishing has made halobios resources less and less, while more and more contamination has worsened marine environment. In addition, the variety of climate on the seven seas and ocean disaster also has result in some serious consequences. Therefore, to guarantee the steady development of human society, it is necessary for mankind to take effective measure. Today many countries have been making own marine management system in which the information system of marine resource and environment is one of important part.

The information system of marine resource and environment should be based on following aspects: information is offered to user in time and its completeness, nicety and system must be making sure. In the same time, the system also satisfies consistency of data on collection, storage, searches, analysis, output and communication within it or between system and others. Certainly, a series of standards is indispensable for sharing the information.

This paper is written with some problems about classification for spatial elements of marine resources and environment. I hope what follows will be of some interest. It is written from the study that we do. I believe that the classification for spatial elements is one of vital standards and it is indispensable for building the system. The paper begins by introducing the definition of the distribution of spatial elements of marine resources and environment: it is of great necessity to

decide the geographic range of spatial elements. The distribution of spatial elements of marine resources and environment has its own futures that are quite complex. Therefore, the geographic range of spatial elements will limit the amounts and kinds of spatial elements. That is to say, we should firstly decide on geographic range of spatial elements before classifying. the factors of classification are second what we discuss. The factors of classification play a very important role in building up the classification system. Selecting different factors of classification, we will get different consequence that is likely to useless. There are a variety of the factors of classification such as the spatial position of elements, natural properties, purposes and conditions. We should not only consider one factor, but comprehensive factors. The final section of the paper discusses the construct of classification system.

## **2. Spatial elements of marine resources and environment**

It is seen that marine resources and environment belong to marine geographic category. The object of study is ocean involved coast and seabed, and the range come down to atmosphere, water, biology and geospherereceive (Wang 1996). The coast is described as confined belt upwards-modern shoreline, and it divided three types: rock coast, plain coast and biology coast. Apparently, the concept looks overconfined from marine geographic angles. There are two reasons that is said: the first, studying ocean is namely researching the constitute of marine spatial elements of marine resources and environment, phenomenon, disciplinarian and interrelation. These relations not only involve that exist in the ocean, but also involve that among the ocean, land and islands. Therefore, the researching object of marine resources and environment should consist of the whole Ocean and coastal zone that is a belt along the coastline. The coastal zone has result from the interaction of land, ocean and human beings. It is defined that coastal zone is a area from up-limited to down-limited which is affected by seawater movement. That is to say, the coastal zone consists of uptidal zone, intertidal zone, subtidal zone, debouch and harbourbay coast. Actually, resources and environment is continual and variational from land to ocean. Take coastal zone geomorphy as an example. Coastal zone geomorphy is formed of coastal zone suffered from wind, wave, current, tide and biological action. The representation of coastal zone geomorphy is diverse which involve not only land geomorphy such as erosion-denudation low hill, lava hill, alluvial plain, delta plain, marine-deposition plain, steep, V-shaped valley and so on, but also the production of seawater movement to seashore such as marine-cut terrace, abrasion coast, spit, lagune, mud flat, submarine bar, erosion trough, tide delta and so on.

It is confirmed that the range of spatial elements of marine resources and environment involve coastal zone and whole ocean (seawater, halobios, marine atmosphere, seabed structure), which is a basic precondition for classification of spatial elements of marine resources and environment.

## **3. The factors of classification**

Marine is abundant with a variety of resources. According to different needs, classification of marine resources had been made from different angles. Generally, there are three kinds of classification as follows:

a. Marine resources are divided into biological resource and non-biological resource according to whether resources are live or not. For example, ocean animals and plants that are live belong to

biological resource; while seabed minerals, chemical elements and marine energy belong to non-biological resource.

b. Marine resources are divided into regenerative resource and non-regenerative resource according to whether resources are regenerative or not. For instance, marine energy such as biology, sea water, waves, tide, ocean current that can regenerate belong to regenerative resource; while seabed oil-gas resource and others that can not regenerate belong to non-regenerative resource.

c. Marine resources can also be divided into biology resources, mineral resources, chemical resources, energy resources and so on. Marine animals and plants are biology resources; seabed oil and gas, coastal sand mine are mineral resources, chemical elements dissolved in the sea water are chemical resources; tide, waves and ocean current are energy resources.

Classifications above have own merit and localization. Apparently, proper factors of Classification are very important for making classification system. To establish classification system, four factors should be considered:

Spatial positions of elements;

Natural properties;

Purpose;

The condition of exploitation and use.

It is not proper to take one factors into account on the classification of spatial elements of marine resources and environment. Exactly, multi-factors should be simultaneously considered.

## **4. Classification system**

Spatial elements of marine resources and environment are firstly classified as nine parts:

a. Marine basic geography;

b. Halobios resources;

c. Marine mineral resources;

d. Marine spatial resources;

e. Other marine resources;

f. Marine hydrology and weather;

g. Marine physics and chemistry;

h. Marine geology and geophysics;

i. Marine damage.

### **4.1 Marine basic geography**

The features of marine basic geography are the foundation of spatial elements of marine resources and environment. Before the research, there are already a series of interrelated national standards in China, such as various scales Specifications for cartographic symbols. In contrast, the standard that we do is more complex than others because it involves the components not only in ocean but also on land. The features of marine basic geography are firstly classified as two parts, namely ocean and land. After that, the land is divided into land water system, settlement, traffic, boundary, land relief, landmarks and others.

#### **4.2 Halobios resources**

halobios resources is a important part of marine resources. All of the creatures lived in the ocean should be involved in the halobios resources from generalized angles. The halobios resources can be classified as chlorophyll a and primary productivity, phytoplankton, zooplankton, intertidal zone organism, benthos, swim organism, marine microorganism, marine fishery, rare animals, defile organism and so on.

#### **4.3 Marine mineral resources**

Marine mineral resources can be classified as solid mineral resources, seabed heat liquid deposit, marine oil and gas resources according to their natural properties. Moreover, every part is also divided in detail such as solid mineral resources can be divided into coastal sand mineral, metal resources, non- metal resources according to their natural properties and spatial positions.

#### **4.4 Marine spatial resources**

Marine spatial resources comprise ports, sea transportation, coastal zone soil resources and plants resources. With rapid growth of population and the decrease of land resources, it is very important to take advantage of land resources. Therefore, the information of land utilization is a indispensable part of marine spatial resources. Owing to soil classification is a base of evaluating land resources, coastal zone soil information is ranked as important content of marine spatial resources. In addition, coastal zone plants information is also one of the important parts.

#### **4.5 Other marine resources**

Other marine resources can be classified as marine chemistry, marine energy, wind energy, nuclear energy, coastal tour and natural protection region according to their natural properties, purpose, the condition of exploitation and use. Because China is laid in the west shore of Pacific Ocean, the coast of China is greatly influenced by Pacific wind, waves, tide and flow, and is abundant with marine energy resources. Marine energy resources can be divided into tide energy, wave energy, ocean current energy, heat energy and salt energy. Owing to general energy are exhausted gradually, marine energy resources are increasingly catching the attention of people.

#### **4.6 Marine hydrology and weather**

Marine hydrology can be classified as seawater temperature, salinity, ocean current, tide, ocean wave, transparency, watercolor, ocean-shine, sea ice, and interaction between ocean and atmosphere. Marine weather involves various weather course, interchange of quantity of heat between between ocean and atmosphere, water vapor transportation and momentum transfer, influence of ocean on weather and climate change.

#### **4.7 Marine physics and chemistry**

Marine physics can be classified as seawater movement; heat exchange and heat balance among every layers or section; depth of transmission of sound and light in the seabed; density change of seawater result from the influence of temperature, pressure and salinity. Marine chemistry involves the distribution and change of organism and inorganism in the ocean; exploitation of chemistry resources. Recently, with the development of coastal area economy and oil exploitation, a great deal of industry wastewater is drained into ocean that leads to different pollution in some part of ocean. Therefore, the problems of marine pollution and environmental protection have been becoming a center of attention.

#### **4.8 Marine geology and geophysics**

Marine geology and relief consist of coastal zone geology, quaternary geology, hydrogeology, coastal relief, seabed relief, marine sediment, and seabed geological formation. Geophysics mainly comprises gravity and geomagnetism.

#### **4.9 Marine damage**

China is one of states that suffer from much more marine damage. The research of classification for marine damage is decision-making foundation of inspection, prevention and cure for marine damage. Marine damage can be classified as earthquake, tropic storm, storm tide, red tide, sea ice, coastal erosion, port and sea-route silt according to their natural properties and formation mechanism.

### **5. Conclusion**

The exploitation and environmental protection of marine resources need a series of decision-making to support. The classification of spatial elements of marine resources and environment is just foundation of a series of decision-making. With the development of science and technology, and further research for ocean, the cognizance of the concept and properties of elements of marine resources and environment will be deepen gradually, and new opinion will be come out.

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