

China is one of the countries which have the longest coastal lines in the world. It is blessed with rich coastal shoal resources with excellent conditions while the land resource in reserve has tremendous development potential and high economic efficiency. To ascertain the coastal shoal resources and make an overall arrangement and synthetical development in the light of local conditions is of much practical significance to mitigating the contradictions of large population with little land in coastal provinces and accelerating the realization of coastal economic development strategy formulated by the Party Central Committee at an early date.

From 1987 to 1989, a research into synthetical exploitation and utilization plan of national agricultural resources was carried out in national coastal provinces (cities or autonomous regions) in the charge of National Agricultural Regionalization Commission Office. The range of research from Heilongjiang river mouth in the north to Beilunhe river mouth in the south covers 11 coastal provinces (cities or autonomous regions) and the supralittoral zones, intertidal zones and shallow sea area (0 m—20 m) of 184 coastal counties (cities or districts). The focal points of the work include coastal landform, natural resources and social economic condition; the history, status quo and potential of exploitation and utilization; zoning of utilization; exploitation plan and base selection. The research results include such three parts as research report, charts and synthetical investigation and research report of each province (city or autonomous region). The chart is one of the important results of the whole research which needs to have the function of location and quantitative determination so as to clearly reflect the complete plan of exploiting and utilizing the coastal shoal, and provide scientific basis for the state departments concerned to plan and direct the synthetical exploitation of coastal shoal. During our item research, we consulted some relevant research data and carried out partial field study, and then designed series maps of status quo, zoning and plan of exploiting and utilizing the national coastal shoal resources, and attached maps of sea-bottom topography, marine sediment and coastal landform. In addition we worked out maps of offshore temperature and saline matter distribution as illustrations. This article will expound some questions discussed in this set of series maps as follows:

1. Compiling unitary geographical base map, carrying out charting test of maps of special subjects

This compilation should first solve two problems: firstly, to compile

a unitary geographical base map with an appropriate scale for the use of the data and unified plan research of 11 coastal provinces and cities; secondly, to study how to concisely and audio-visually reflect the main research results of the whole planning zone with fairly few sheets. Practical experience tells us, the key to improve the quality of series maps is to well compile a unitary geographical base map, and hold a charting test of maps of special subjects. Such maps may be compiled in the way of single element charting or multilayer plane charting in which each element coordinates and cooperates with each other under a certain subject. Both single element charting and multilayer plane synthetical charting need a precise geographical base map with a unitary scale so as to ensure the comparability to coordinate the design test of each content symbol.

We choose the Coastal Nautical Chart of China with a scale of 1:1,000,000 published in 1986 as basic material (Mercator map projection, 36° standard parallel), and Basic Relief Map of China with a scale of 1:1,000,000 and the newly published Relief Map of People's Republic of China with a scale of 1:4,000,000 as the supplement, and compile a geographical base map with a scale of 1:2,500,000 after rendition and contraction. This map mainly reflects the survey of sea areas of coastal line—0 m (shoal), 0—10 m, 10 m—20 m (shallow sea area) and sea area below 200 m, boundary lines of 11 coastal provinces (cities or autonomous regions) and main residential areas, rivers, lakes and roads. A 1:7,500,000 geographical base map is chromatographed on the upper left corner of a 1:2,500,000 geographical base map, and we designed plan map of exploiting and utilizing national coastal shoal for the use of coastal provinces (cities or autonomous regions) and made it standardize, which provides convenience to collect data and carry out charting tests.

We successively have compiled on the unitary geographical base map a large number of colored drawings of special subject series about status quo, zoning, plan, administrative division, population, per-capita cultivated area, sea-bottom topography, marine sediment and coastal landform, offshore sea-water temperature and salinity. And then after synthetical research, selection, classification and summarization of a vast amount of drafts, we finally determined to contract three series wall maps of status quo, zoning and plan of national coastal shoal exploitation and utilization with a scale of 1:5,000,000, while the other sheets were indicated as figures, charts and illustrations in the writing reports.

2. Closely centering on the main achievements of the

research, determining the theme content of each map.

Series maps consist of status quo map, zoning map and plan map, each map has a distinct theme, meanwhile, figures, charts are well used to supplement and enrich the content of main maps, which fully expresses the main achievements of the research and enables readers to get more information from each map.

"Exploitation and Utilization Status Quo Map of National Coastal Shoal" mainly reflects the administrative regionalization of 11 coastal provinces(cities or autonomous regions) and 184 coastal counties(cities or districts); distribution situation of shoal, shallow sea area and continental shelf; and status quo of shoal utilization, meanwhile a sea-bottom topographic map(scale: 1:15,000,000) is enclosed herewith which can clearly show offshore national boundary and supplement the shortage of main maps.

According to synthetical characteristics, environment conditions, utilization directions and administrative jurisdiction of our country's coastal shoal, "Exploitation and Utilization Zoning Map of National Coastal Shoal" divides the shoal in our country into 10 agricultural synthetical utilization zones from north to south, and 4 utilization belts from high to low. This map mainly reflects the distribution of the 10 agricultural synthetical utilization zones: 1) bedrock, sandy and muddy rice, salt, reed and aquatic products zone in Liaodong Peninsula; 2) sludgy grain, cotton, salt, reed and aquatic products zone in Big Bohai Gulf; 3) bedrock sandy forest, fruits and aquatic products zone in Shandong Peninsula; 4) sludgy grain, cotton, salt and aquatic products zone in North Jiangsu Plain; 5) sludgy and silty grain, cotton and aquatic products zone in Changjiang River Mouth and Hangzhou Bay; 6) sludgy grain, sugarcane and aquatic products zone in Zhejiang and Fujian harbors; 7) hilly and sandy grain, fruits and aquatic products zone in South Fujian and East Guangdong; 8) sludgy and silty grain, sugarcane, fruits and aquatic products zone in Zhujiang Delta; 9) sandy and muddy grain, fruits and aquatic products zone in Guangdong, Guangxi and Haikou; 10) sandy and muddy fracture rock, coral agriculture zone in Taiwan. It reveals the zone classification law of the national coastal shoal agriculture and the exploitation potential and development and utilization direction of each agricultural zone's shoal resources, while marine sediment and coastal landform map(scale: 1:15,000,000) and shoal resources exploitation chart are attached herewith. This chart vividly reflects the amount of the resources in the four belts in the order of height, supralittoral zone, intertidal

zone(shoal), radiation sandbar and shallow sea area, and the percentage of developed and undeveloped area, which presents a huge development potential of the national coastal shoal and enriches the content of the main maps.

"Exploitation and Utilization Plan Map of National Coastal Shoal" mainly reflects the overall arrangement of 35 production bases of such 6 categories as plantation, aquaculture, animal husbandry, forestry, salt industry and reed industry where the nation puts main investment. The distinct colors, pictograph symbol and notes strikingly shows shoal development area and middle and low production land transformation area of 7 production bases of rice, sugarcane and cotton and 12 aquaculture production bases, while shoal bases construction and latest increasing output value plan tables and various base development, transformation plan tables are attached herewith to enable base construction progress and plan to closely link up with economic efficiency, and provides important scientific basis for agricultural resources development plan during the "Eighth Five-year Plan" and "Ninth Five-year Plan".

3. Expression by means of combination of bright-colored drawing spots and number notes so as to reflect the distribution and features of such shoal zone

The expression of shoal drawing spots is an important item of this set of series maps, and is also an item difficult to tackle, because when the map scale is reduced to 1:5,000,000, the drawing spots of the area between coastal line and zero meter will be very small, especially, in the coastal line to the south of Hangzhou Bay, big lumps of shoal drawing spot are hardly found.

In order to highlight drawing spots of shoal, we appropriately enlarge the drawing spot as well as adopt bright red as its color. In addition, we dispose circle symbols of different sizes in each zone's range, and write down statistics of the shoal area of each zone as well as the percentage of developed and undeveloped area (data from the investigation statistics of shoal resources of each province, city or autonomous region), thus, we greatly strengthen the means of quantitative expression of shoal and enables readers to easily get the different distribution features of northern and southern shoal, as well as to find exact data of the shoal area of each zone from different circle symbols, and know the utilization potential of each zone.

This method of combining drawing spots, structural symbols with number notes results in good effects and enhances quantitative

expression after it is applied to zoning map and plan map. It is one of the most necessary informations for plan map of economic construction.

4. The expression method of combining figurative symbols and explanatory notes, to enhance the readability of series maps.

Considering from the theory of geographical information transmission, the map-making workers should be able to use accurate and effective methods to reflect geographical landscape information, which make complex geographical concept figurately. Whether a piece of map work is successful or not lies in whether it can enable readers to get actual geographical information and be most effective. Hence, while designing "Exploitation and Utilization Series Maps of National Coastal Shoal", we pay special attention to the readability of maps and make them have a strong appeal to readers. For example, in zoning map, we design combination figures of shoal development potential which vividly reflects the geographical concept of such four belts as supralittoral zone, intertidal zone, radiation sandbar and shallow sea area and the amount of each shoal resource area and the percentage of developed and undeveloped area; the inside circle of the circle structural symbols represents the total amount of national coastal shoal area, while outside circle represents the percentage of developed and undeveloped area by different colors, which strikingly shows a huge potential of national coastal shoal development and utilization.

The 35 production bases of 6 categories reflected in the plan map adopts the expression method of combining different pictograph symbols with colorful explanatory notes (bases names and the number of the shoal to be planned to develop and transform) in order to clearly show what it implies.

This set of series maps is an organic composition part of the achievements of "study of synthetic exploitation and utilization plan of national coastal shoal's agricultural resources", which is widely adopted by relevant departments of state and localities and provides important scientific basis for the plan formulation of agricultural resource development during the "Eighth Five-year Plan" and "Ninth Five-year Plan". The research achievements were awarded the first prize of "excellent scientific and technological achievements" by National Agricultural Commission and Agriculture Ministry of P.R.C and the second prize of "scientific and technological progress" by Agriculture Ministry. This greatly encourages and inspires the map-making workers. We

deeply realize that only if the map-making workers throw themselves to the main battlefield of economic construction and join in the whole process of study can they design more and better maps of special subjects so as to make new contribution to the realization of the grand goal of the "Eighth Five-year Plan" and "One-decade Plan".