

A Study of the Design of “Atlas of Shenzhen City”

He zongyi, Hou tao, Yu xia
Dept. of Cartography, Wuhan University
129 Luoyu Road, Wuhan, 430079,China
E-mail: Zongyi He@163net.

1. Abstract

This paper discusses the principle of the design of “Atlas of Shenzhen City”, the design of format, scale and projection of the atlas, the design and compilation of base map ,general map and thematic map of the atlas ,the design of color ,arrangement , cover and technical route .

2. Introduction

Cities are major districts where people implement economy construction. With the development of national economy construction, science, technology and culture industry, spatial information are rapidly rising. It is imperative for all levels of management office to learn about the environmental characteristic of their own cities and acquire the distribution, variation and mutual relation of all sorts of natural station and social economy phenomena. As one part of City Geography Information System, city atlas has very important effect on the management and decision of modern city, the plan and development of city, the analysis of geographic environment, the research of social economy and education of city situation etc.

As one of the most early founded Special Economy District in China, Shenzhen City has changed great in the last 20 years. From a poor and backward town on the frontier, it has become a flourishing-commerce, advanced-technology and modernized city. In order to show basic geographic information, social economy and natural environment of Shenzhen City by time and space these two aspects, Atlas of Shenzhen City is designed and manufactured. With plenty of pictures and texts, the atlas may be regarded as a rich-data, easily-read, practical and multiple information database.

3. The Principle of the Design of Atlas of Shenzhen City

3.1 On the option of content, emphasis were put on the great achievements obtained since the Special Economy District was established in many aspects such as city construction, development of economy, utility of resource, interflow of commodities, transference of information. It shows the important position of Shenzhen City in the whole nation even the world, the potential of development and fine perspective.

3.2 The main points that Shenzhen City lies in the frontier of South China and is a window, an important passage of association with foreign countries and a famous tourism attraction are stressed in the atlas. It reflects the mutual relation and support of the economy between Shenzhen and Hong Kong.

3.3 The latest and authoritative map data are adopted. The general map groups reflecting basic

geographic information are designed and manufactured to denote detailed region land utility and architecture height classification of the city proper, which can improve the practicability of the atlas.

3.4 Every map is fully utilized in the atlas to reflect more information quantity to the most extent. With some means such as graph, picture, text, annotation, multifarious expression ways are implied to increase the practicability and knowledge of the atlas.

3.5 Advanced science and technology of 90's should be embodied in the design of the atlas .The option of content, new ideas of science are expressed and linked up with the content of Information System of programming land of Shenzhen city. Some high technology such as remote sense , digital mapping and electron publish are adopted.

4. The Design of Format, Scale and Projection of the Atlas

The mutually restrict relation exists between the format and scale of atlas. In general, the format is defined by the utility, content, area and shape of the region mapped and has relevance to the map breadth of the region mapped and scale of the maps.

“Atlas of Shenzhen City” is both refined and popular tastes, synthetic production. It not only provides scientific basis for management departments to do macroscopic decision-making, but also can be regarded as a tool of foreign propagation, attracting businessmen and money. At the same time, it is a delicate present for feeding important guesses. Thinking of the shape of Shenzhen City, Eight Format (255*360mm) is adopted. So the full page is Four Format (510*360mm). The scales of the atlas are listed as follows:

(1) In the general map group: 1:10,000 of general maps group and of detailed maps of city zone. 1:40,000-1:60,000 of town maps. 1:60,000-120,000 of district maps. 1:200,000 of city maps.

(2) In the thematic map group: The scales of the city zone are 1:40,000, 1:65,000, 1:100,000, 1:140,000 and 1:200,000. The scales of the whole city are 1:200,000, 1:300,000, 1:400,000, 1:500,000, 1:600,000, 1:700,000 and 1:800,000.

Gauss projection is adopted in the maps of the city zone. Simple conical with one standard parallel projection is applied in the maps of the whole city.

5. The Design of the Content, Structure and Manufacture System of the Atlas

In this synthesis city atlas, many aspects such as base geography information, social economy, science and culture of Shenzhen City should be systematically embodied in detail by the choice of content. At the same time, the atlas should prominently show that Shenzhen City is one of the most early founded Special Economy District in China, an important foreign window, port and passageway. The atlas should prominently show that Shenzhen City has achievements focused attention upon of economy construction in the innovation and open policy and is striding forward modernization. Therefore, these emphasizes should be given prominence to on the choice of content and the sequence of manufacturing maps to reflect the characteristic of Shenzhen City.The atlas is divided into 5 map groups as follows:

Name of map groups	Page	%	Map	Chart	Picture	Air
---------------------------	-------------	----------	------------	--------------	----------------	------------

Satellite

Photograph photograph

Index Map	12	6.9	10	1	16	4
Detailed Map of Region	68	38.9	35		5	
Social Economy	64	36.8	92	142	118	
Natural Environment	20	11.5	29	11	14	
Programming of Development	10	5.7	11		9	2
Total	174		177	154	162	6

1

Major contents of each map group are as follows:

The geography cite, history, administrative region, hypsography, landform, architecture style and majestic vigor of Shenzhen city are included in the index map group, which also include the fields the most early reformed and industries taking the leader all over the country. All these necessary contents resources are provided so that people can learn about the basic constitution of Shenzhen city.

The 5 district maps of Futian, Luohu, Nanshan, Bao'an, Longgang districts, 20 maps of town, 20 maps of city zone are included in the detailed map group of region. Basic land information such as, residential area, water, geomorphy, traffic net, vegetation, frontier of the 5 districts are comprehensively denoted in district maps. Basic land information of Shenzhen city zone is expressed comprehensively in the detailed map of city zone. Utility of land of city zone is divided into 10 classes. At the same time height of architecture has 6 classes. The information connecting closely with the common work and life of people such as shop, post, bank, hotel, theater, school, tour sight, hospital, park and gas station etc. are denoted in detail on the map. Town maps made a more comprehensive expression of the basic land information of town than district maps.

The maps of quality and distribution of population, labor force, level of development of society, construction of city, road and traffic of city, water, electricity, gas, communication, quality of environment, industry, foreign trade, finance, commerce, real estate, agriculture, transportation, tourism, science, technology and physics belong to society economy maps group. In the maps group quality and distribution of population, level of development of society economy, strength, achievement of construction of city and radiation cover of economy are reflected in Shenzhen city .

The contents of geology, hydrology, soil, physiognomy, climate, water resource, water engineering, forest resource and utilization of land are included in the maps group of natural environment in which the status and distribution of natural resource are reflected.

The contents of development of city, holistic programming of utilization of land, programming of important item latest and center district of Shenzhen City are included in the map group of development and programming in which the progress and perspective of Shenzhen City are reflected.

According to the above sequence of design, two map groups of detailed and social economy

concerned by people are placed on the former half of the atlas. The natural environment map group reflecting the status and distribution of natural resource is placed on the latter half of the atlas. Because the sequence of edition according to the Occurrence Study has been altered, the transmission effect of map information is increased.

6. Design and Mapmaking of geography base maps

Geography base maps are orientation foundation of transferring the thematic content and can provide the relation between thematic features and round geography environment. The features affecting the selection of content geography base maps include thematic content, scale and means of expression. For instance, maps reflecting natural environment maps of geology, soil and land utilization should in detail denote such contents as river, residential area, road, etc. The bigger scale of maps is, the more detailed the contents of base maps are. The smaller the scale is, the more compendious the contents are. When the expression means of map are different, the demands to the contents of base maps will not be the same. In general, to the statistics maps the contents of base maps should be fewer. When selecting the contents of base maps, cartographer should not only nail down the position of spatial distribution but also think over others' reading maps easily. When the contents of base maps are too fewer, the relation between thematic features and geography environment will not be fully expressed. On the contrary, when they are too more, the major subject of maps will be disturbed and the perception effect will decrease.

The base maps of the atlas are divided into 5 categories, they are the city zone, the whole city, the programming, the whole country, the world by the theory of design. Based on the need of thematic contents of the atlas, the selection of contents of base maps and the series of scales are thoroughly thought over. In order to assure unify and harmony of contents, symbols, line and annotations among base maps of each scale, the maps of the same class are derived from the same base map. With the reducing of scales, the contents will decrease and the symbol, annotation and line will become smaller and thinner.

6.1 The Base Maps of the City Zone

Five kinds of base maps of various scales are designed and compiled including 1:40,000, 1:65,000, 1:100,000, 1:140,000 and 1:200,000. Based on the detailed extent of the contents of thematic features, the base maps of various scales are selected.

6.2 The base maps of the whole city

Seven kinds of the various-scale base maps of the whole city are designed and compiled. The Geography base maps showing the distribution of the thematic features of whole city include 1:200,000, 1:300,000, 1:400,000 maps. Four kinds 1:500,000, 1:600,000, 1:700,000, 1:800,000 are mainly applied in the base maps of statistics maps.

6.3 The base maps of the plan maps.

Based on the special need of the base maps of the plan, three kinds of base maps are designed and compiled, including 1:200,000, 1:400,000 and 1:500,000.

6.4 The base maps of the country

It was designed and compiled strictly based on the topographic map of People's Republic of

China published by Map Publishing House of China in 1989.

6.5 The base maps of the world

It was designed and compiled strictly based on the map of World published by Map Publishing House of China in 1992.

Because the digital mapping-technology is adopted, four colors are applied in the geography base maps of the atlas including the blue for water system, the red for symbols of city government, the black for important residential area symbols and annotation, the gray for the rest contents. So geography base maps become rich-layer and pretty.

7. Design and Mapmaking of General Maps Group

Because modern theory and technology of cartography are adopted, database of toponym, big-scale landform maps surveyed recently and up to date aerial photograph are synthetically processed to make up the present-situation detailed maps of region.

7.1 The design and mapmaking of district maps

The basic geography information of each district is expressed on these maps. Administrative village could be expressed. Based on the shape area and administrative position of mapping region, the design of splitting-maps and the sequence of arrangement are as follows:

Futian District and Nanshan District (on one map), Luohu District, Bao'an District and Longgang District. Moving-map expression method is applied on the Neiningding Island of Nanshan District. Breaking-outline expression method is applied on Bao'an District and Longgang District.

Topographics is expressed by contour line and layer-colored. Layer colors is green, which expresses not only landform but also the high extent of afforestation of Shenzhen City.

7.2 The design and mapmaking of the detailed maps of city zone

In order to show in detail the basic geography information of city zone, twenty detailed maps of city zone in 1:10,000 are designed and compiled. In front of detailed maps, an index map is placed for the reader to look through conveniently.

7.2.1 The design of key map

The range of Shenzhen city zone is expressed by map in 1:85,000. The detailed maps of city zone are split and encoded following the sequence from up to down, left to right. Each block is denoted by different similar color to make the whole page pert.

7.2.2 The design and mapmaking of detailed maps of city zone

The 1:10,000 topographic maps obtained by aerial photogrammetry and the infrared aerial photograph of 1:8,000 took in the December of 1995 synthesized the detailed maps of city zone. The detailed maps were surveyed and mapped on the sport in the August of 1996 to on emphasis update some changeful features such as architecture, road, crossroads, reservoir and river. At the same time toponym are updated by the database of place name. Single storied building and all streets are fully expressed. The height of buildings has 6 classes, they are flat buildings (1st floor), low buildings (2nd~5th floor), multi-floors buildings (6th~8th floor), medium and high buildings

(9th~17th floor), high buildings (18th~30th floor), super high buildings (above 30th floor). The reasons of classification are as follows. One floor building is flat one. Second to fifth floor buildings are mainly depend on the standard of architecture industry of city. Because the buildings below 5th floor are considered to be demolished and rebuilt and the architecture below 8th floor have not elevators, 6th~8th floor become one class. The buildings above 18 in Shenzhen City are regarded as lofty ones, so 9th~17th ones become one class. In general, buildings above 30th floor are regarded as super lofty ones, so the last two levels are 18th~30th floor and above 30th floor ones. Utilization of land is divided into 10 classes, they are space, land for architecture, shrubbery, garden, meadow, greenbelt of park, green belt of street, woodland and vegetation land. The different green coloration and symbols are adopted to denote the distribution of these vegetations.

7.3 The design and mapmaking of town maps

Eighteen towns and two street agency of Bao'an District and Longgang District are expressed by the map whose scale is 2~3 times than that of district maps. Natural village and important toponym are fully expressed. Water, traffic net, landforms are more detailed than that of the district maps. Based on the flat shape and area of each town, town maps are designed as 16 pages. The three maps of Songgang Town, Gongming Town and Guangming Street Agency are synthesized into one map oriented in diagonal direction. The Longgang Town, Pingdi Town and Kengzi Town are synthesized into one map. The map is oriented in diagonal direction and expressed in the breaking outline.

8. The design and mapmaking of thematic maps group

On the theory of thematic cartography and map aesthetics, thousands of statistics data are analyzed and selected, and in the end thematic maps and chart synthesis with scientific connotation and high experience force are made up.

8.1 The design and mapmaking of statistics maps

Most of the thematic maps in the atlas belong to statistics maps whose data come from statistics material. On the view of the purpose of the atlas, the thematic maps are provided for government and management of city to learn about the economic strength of each region to making comparing and analyzing. The economic status of each region is described from the relative and absolute aspects on these maps. Maps are not the background of all statistics data that are placed on the space of the main-topic map with the style of statistics chart. Statistics mapping method is adopted on complicatedly distributed phenomena or that whose respective distribution status are not easily obtained such as population, industry, agriculture, commerce, finance, real estate, quality of environment, education, sanitation, etc. Statistics mapping method of classification is adopted to denote the phenomena mainly depend on relative items, and zonal statistics mapping method is for the phenomena mainly relying on absolute items. The styles of statistics chart must be multi-form and changeful to make maps active and vital. Statistics mapping method of classification is the fittest to be combined with zonal statistics mapping method to respectively express the average level and total quantity of phenomena.

8.2 The design and mapmaking of distribution maps

Distribution maps are one main type in the atlas to reflect the distribution of phenomena characterized with spot, line and discontinues face shape. For instance, factory, power station,

commercial net spot, finance institution, hospital, school, hotel are characterized with spot shape. The character of various traffic routes and conduit is line shape. Industrial estate, vegetation base, tour region and forest show the character of discontinuous face shape. The contents and features distributing with spot shape on maps are expressed by the method of symbols whose shapes or colors reflect the character of quality and size shows the character of quantity. The contents and features distributing with line shape are expressed by the line symbols whose colors or veins reflect the character of quality and thickness shows the importance and difference of classification. The contents and features distributing with discontinuous face shape are expressed by the method of extent whose are denoted by contour line. Three phenomena characterized with point, line and face shape may be expressed on the same map. Point symbol method, line symbol method and range method could be cooperated

8.3 Designing and mapmaking of moving-line map

Line symbol with vector reflected the relation of Shenzhen City and overseas, HK, Macao, TaiWan and inland. Starting point and terminal point of Line symbol should be in the region. Line symbol trace didn't express the real route. Sometimes the trace expressed the moving route such as the expression of typhoon. The color of moving-line symbol reflected the character of quality. The width of moving-line symbol expressed the character of quantity.

8.4 Designing and mapmaking of isoline map

There are contour line in relief map, isotherm in climate map and isohyet reflecting precipitation in the atlas. The different color of isoline express different content The color and hue of isoline should be in same system so that when it was compared in different term it could get correct result. Change-distance interval used in Contour line. Constant interval used in others.

8.5 Designing and mapmaking of type map

Geologic map, physiognomy map, soil map and land use map are compiled based on large-scale maps by field surveying. There are precise circumscription and scientific classification system in large-scale maps. Pattern should be refined in cartographic generalization. The least pattern is 2 square centimeter. Selection or merging should really express distribution rule. The color of type map should be vivid. Type could be distinguished. The color of type map is designed according to the rule and the custom established by usage. Base color, filling line, pattern, point symbol and line symbol are cooperated using multi player mapmaking principle, which have map layer distinct. Geology, soil and land using which distribute global area are expressed types by bottom quality representation. The coordination between type maps mainly based on relation of nature phenomena.

9. The color design of the atlas

The map color not only increase the information content of map but also increase the art effect in transmitting visual figure. Besides abiding the general rule of color design. The author laid stress on using color as an important manifestation means and selected main tone according to map content. The picture contrast among colors was reinforced. The color of The Atlas not only shows the content of The Atlas exactly but also reinforces figure clear-cut and made reader have a fresh

feel.

10. The map format design of the atlas

In The Atlas, the rectangle maps and the island maps were arranged together. The maps that are complex or which content is in contact with near areas are in rectangular style. The thematic maps which content is simpler such as statistic maps are in island style. The Atlas is composed of map charts, photos and text. The maps are main, others are used as supplement. The format of The Atlas is nimble, beautiful and tidy.

11. The technical route design of the Atlas

Electron publishing technique is used in The Atlas production, which made The Atlas compilation design drawing and printing preparing press finish at the same time (Fig.1). Time of producing The Atlas is shorted. It lasted ten months from collecting material to printing publishing in the first edition. Usually it lasts about three years to produce such a large comprehensive atlas. The cost of the atlas was reduced, the quality of the atlas was raised. The quality of the atlas produced by conventional cartographic technique can not reach the quality of Atlas of Shenzhen City. The printing date can be used for correcting and publishing again and producing electronic atlas. The atlas was corrected one time and printed two editions. Most data are used to produce the electronic atlas of Shenzhen. The Atlas is first atlas that be compiled, designed and produced by means of DTP.

12. Conclusion

The Atlas of Shenzhen City is a scientific basis for policy-making of leaders and manager department. It is an important reference for researching Shenzhen. It is a window for people at home and abroad to understand and know Shenzhen. The multimedia atlas is a new style of atlas. The Atlas has created social benefit and economical benefit greatly.

Reference:

- 1.Zhu Guorui, Yin Gongbai: Compilation of General Map, Beijing, publishing house of surveying and mapping, 1983
- 2.Zhang Kequan, Huang Rentao ,ect: Compilation of Thematic Map, Beijing, publishing house of surveying and mapping, 1991
- 3.Li Haichen: Compilation of Thematic Map and Atlas, Beijing, publishing house of advanced education.1984
- 4.Chen Supen: Cartography-Researching of geology, Beijing, publishing house of science, 1982
- 5.Liaoke: The Map General Theory, Beijing, publishing house of science, 1985
- 6.Lu Quan, Yu Chang: Cartography Reference Handbook, Beijing, publishing house of surveying and mapping, 1988
- 7.A.H.Robinson R.D.sale: Element' s of Cartography(5th ed.) John whey & sons, Inc, 1985
- 8.Tian Desen: Modern Cartography Theory, Beijing, publishing house of surveying and mapping, 1991

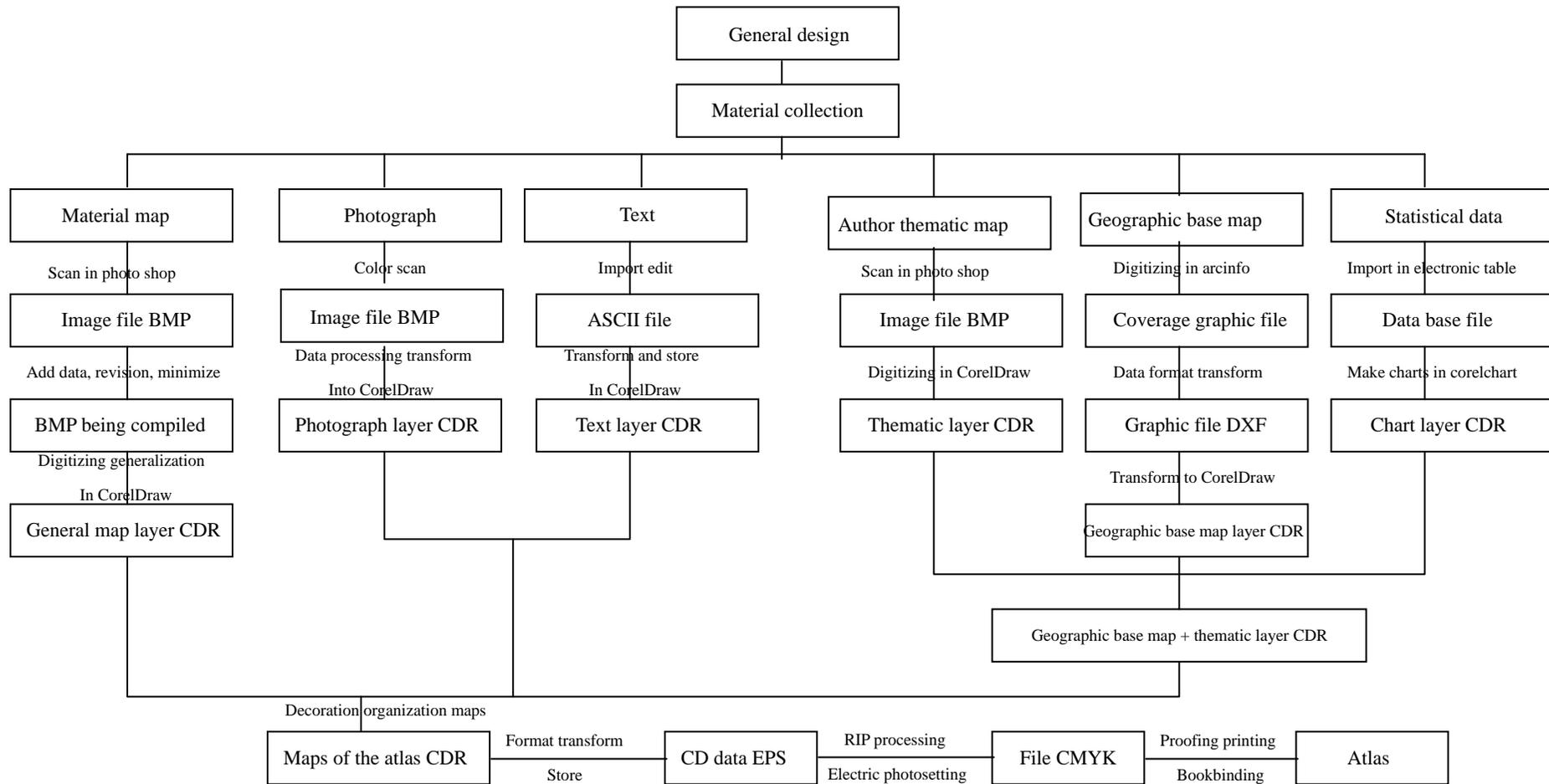


Fig.1 The technique route of The Atlas

