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Planning of the Geographic Information System Application to Agricultural Land Use

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Abstract

The land resources are an important resource for human survival; rational planning of land resources is conducive to the rational allocation and use of resources, promoting social and economic stability growth. Traditional land use planning results are generally in the form of drawings and documents, difficult to manage, and difficult to promote the public good. Traditional data management systems and methods in the face of complex systems generate vast amounts of data, especially large amounts of spatial information data, the system has been unable to efficiently handle. Therefore, in traditional data management methods cannot meet the social and economic development; we need to use information technology, new theories, new methods of agricultural land use planning. The study was conducted on agricultural land use planning in Guangdong Province in Geographic Information Systems study, which aims to make agricultural land use planning and management of information in Guangdong Province, scientific and systematic. Specific studies include: basic concepts and knowledge of geographic information systems and agricultural planning studies land; GIS how the actual space content digitizing method to explore; to build the relevant geographic information database and on the basis of agricultural land use planning GIS of the evaluation and Prediction of three parts. Purpose, background, domestic and international research profiles, GIS application in agriculture and basic application development process, from the topic of the article research methods, solutions, principles, processes and procedures digitized, implementation-dependent applications, as well as evaluation and prediction, construction and integration of database information, and other aspects of the main conclusions and recommendations are discussed.

Keywords: Land Resources; Agriculture Land Use Planning; Geographic Information System; Database; Evaluation and Analysis

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1. Introduction

Traditional land use planning results are generally in the form of drawings and documents, difficult to manage, and difficult to promote the public good. Traditional data management systems and methods in the face of complex systems generate vast amounts of data, especially large amounts of spatial information data, the system has been unable to efficiently handle. China is in a period of rapid social and economic development. Rapid economic development, which requires adapts with land-use planning [1]. Therefore, the land use planning of the need to find a way to adapt in line with the social and economic development needs. This method must be scientific, systematic, efficient, objective and practical. Therefore, in traditional data management methods cannot meet the social and economic development; we need to use information technology, new theories, new methods of land use, agricultural land planning. Our vast land, species of resources, so make science and technology more effectively serve agriculture, is related to people's livelihood event [2]. With its unique and GIS spatial information management and processing capabilities, utilizing the flexibility of the geographic information system and the corresponding powerful analysis application, built on the basis of spatial information above the legend agricultural use planning solution that can manage well a variety of data relating to geographic information, such as agricultural land divided, land prices, etc., and can Traditional land use planning results are generally in the form of drawings and documents, difficult to manage, and difficult to promote the public good. Traditional data management systems and methods in the face of complex systems generate vast amounts of data, especially large amounts of spatial information data, the system has been unable to efficiently handle. China is in a period of rapid social and economic development. Rapid economic development, which requires adapts with land-use

planning [1]. Therefore, the land use planning of the need to find a way to adapt in line with the social and economic development needs. This method must be scientific, systematic, efficient, objective and practical. Therefore, in traditional data management methods cannot meet the social and economic development; we need to use information technology, new theories, new methods of land use, agricultural land planning. Our vast land, species of resources, so make science and technology more effectively serve agriculture, is related to people's livelihood event [2]. With its unique and GIS spatial information management and processing capabilities, utilizing the flexibility of the geographic information system and the corresponding powerful analysis application, built on the basis of spatial information above the legend agricultural use planning solution that can manage well a variety of data relating to geographic information, such as agricultural land divided, land prices, etc., and can more effectively assist decision-makers to find the best solution. Because geographic information systems have unique spatial information management and treatment processing function, therefore for the modernization and sustainable development of agriculture to provide a strong technical support [3]. Guangdong province on China's agricultural land use with geographic information system platform and planning information management, providing the Guangdong Provincial Agricultural Land planning theory basis and foundation, improve work efficiency of land administration, to promote scientific and land-use planning, systematic, and efficient.

This study is the use of agricultural land in Guangdong Province applied research programs in geographic information systems, and its purpose is to make agricultural land use planning and management of information in Guangdong Province, scientific and systematic. Specific explore include: basic concepts and geographical knowledge systems and agricultural land planning study information; GIS how the actual digitized content space exploration methods; agricultural land use planning based on GIS assessment and prediction of three parts.

2. Research Methods

A) Regional Overview

Guangdong Province land 17,975,700 hectares total land area [including islands island beach area 11,400 ha; excluding islands Island Beach area, Guangdong Province, the land area of 17,964,300 hectares. Lying north to south, both land and sea, numerous bays, up to 3368 km mainland coastline, coastal beach resources are very rich; landform complex, with hills, known as the "seven mountains of water two minutes of cropland" say.

Including 4.34 million hectares of land suitable for agriculture and 11 million hectares of land suitable for afforestation, Guangdong Province, an area of 179,800 square kilometers. Guangdong Province belong to the East Asian monsoon region, from north to south were in the subtropical, tropical and tropical climates of South Asia, China is light, heat and water resources, one of the richest regions. From north to south, the annual average sunshine hours from less than 2300 hours to 1500 hours, the annual average temperature is about 19 ℃ -24 ℃. The provincial average sunshine hours for 1745.8 hours, annual average temperature 22.3 ℃. January average temperature of about 16 ℃ -19 ℃, the average July temperature is about 28 ℃ -29 ℃. Guangdong abundant rainfall, the annual average rainfall between 13002500 mm, the provincial average of 1777 mm. Uneven distribution of rainfall during the year, precipitation in flood season from April to September of the year accounted for more than 80%; inter annual variability is large, wet annual precipitation is more than 2 times drier years. Frequent floods and droughts, typhoons are also more frequent. Cold rainy spring, autumn and late fall to early spring cold dew winds of cold and frost, also in Guangdong multiple severe weather [4].

Figure 1: Guangdong Province Map

B) Data Preparation

Information includes: Administrative Map of Guangdong Province (Figure 1), land use maps, and the Guangdong Provincial land use planning documents, land use table, the amount of cultivated land area of sub-city index, divided city garden Anticipated targets points Woodland expected targets, sub-city grassland expected targets, on agriculture, forestry, fishery, deputy, animal husbandry output table, output rate tables and other access to relevant data.

Conducting research previously required to deal with two aspects:

(1) Under MAPGIS environment vector graphics processing various formats, in ARCGIS10.0 environmental applications data conversion functions convert SHP files to facilitate post-processing will be.

(2) A variety of data on agricultural land use planning at ARCGIS10.0 environment digitized on the basis of FIG.

C) GIS-based evaluation of land use planning in Guangdong Province

According to the evaluation of the purpose and requirements, combined with the actual situation in Guangdong Province, should follow the following principles:

(1) A combination of many factors, the principles of integrated treatment

Agricultural land is a comprehensive system of natural environment, and reasonable evaluation of agricultural land use planning involves many aspects of social, economic and natural environment, is a comprehensive reflection of the impact of various elements. And a variety of factors study on socio-economic factors, natural climatic factors, land area, and many other research, analysis and evaluation, in order to understand their situation. The so-called integrated approach to land use planning for agriculture to make a scientific and accurate evaluation of the results of various factors influence a comprehensive analysis of the overall research and find important decisions affecting the status of the species factors [5-8].

(2) The Principles of combination of quantitative and qualitative

Agricultural land system is a complex system, the study of quantitative and qualitative influence each other. Screening evaluation factors in the evaluation process, the use of computer technology and expertise, on the basis of quantitative mathematical model, make the necessary data entry and qualitative regulation of the interaction between quantitative and qualitative evaluation of the results so that accurate and reasonable. To ensure the results of the evaluation in the overall objective and reasonable evaluation of factors such as the need for their participation in food production value, the amount of cultivated land, various types of land prospective indicators calculation, quantitative evaluation, qualitative non-quantitative factors such as the regional terrain, etc. are quantized to determine its appropriate size, try to avoid the arbitrariness of human factors. Therefore, in order to ensure the objective and reasonable evaluation of the results, we should adopt the quantitative and qualitative evaluation of the combination method [9-15].

(3) The unity and relative combining original

There must be a uniform standard for evaluation in the same area, were a reflection of agricultural land with planning situation evaluation factors of selection and evaluation division, in order to make the evaluation results can be compared. In order to obtain scientific results of the evaluation to determine the selection and evaluation of the evaluation factors need uniform standards, relatively.

Evaluation Units of Division:

The unit division is to consider socio-economic factors, natural environment factors. Evaluation unit is agricultural land-use planning and reasonable evaluation of the base unit. There are large differences between the units, but each unit uniforms quality content.

When dividing unit should follow the following principles:

(1) Find the dominant principle in the multivariate

Many factors reaction is reasonable agricultural land-use planning, including socio-economic factors, natural environment factors. In a particular area, several factors play an important role, big changes; and small, some factors play a role, and is not itself change. Therefore, it should be based on the degree of influence of various types of factors, identify factors play a major role in dividing cells, such as consider the impact of the urban population, urban industrialization processes, etc. on agricultural land to divide the unit.

(2) The principle of seeking similarity in diversity

Evaluation unit inside the natural attributes, the basic characteristics of uniform content should be basically the same, in order to ensure internal unity of evaluation units to meet similar statistical tests.

(3) The principle closed

Agricultural land use planning evaluation units to ensure the study area in the picture is closed polygons; ensure border closure can be clearly distinguished.

Therefore, according to the above principles, the cell is divided as follows:

(1) Dominant performance for the selection of important influence factors. First, determine the factors on agricultural land use and regional planning which related to the scope of agricultural land use planning involves a wider and larger differences, rainfall, temperature, agricultural population; industrialization and so on will affect the unit zoning.

(2) The performance of similarity conditions reunification. When determining factors, these factors have differences, but there must be an appropriate basis to make the comparison in the evaluation. For the same factors, under what conditions the same analysis and comparison, in order to make the results meaningful. For example when the selected food production this factor, we first determined on the basis of the comparison is made base map administrative region of Guangdong Province through GIS Fig registration, correct, edit out the same map. To ensure that each area of the city, borders are the same.

(3) The area is a closed area using GIS to determine the scope of the process to determine the various provinces and cities, the same boundaries as only complete polygon to the same location in each city to determine the region, in order to love the same area can things are compared. This is also reflected in a place of unity.

Evaluation Selection Method

(1) Classification method:

By the nature of the same content, the same prerequisites, the contents of some single characteristic changes caused by different factors indicators into one class. Wherein a single different factors such as property and time. For example, in 2005 grain production, grain production in 2010, 2020 grain output indicators, are all indicators of food production, the single variables are different output values resulting from different years. There were obtained the status of food production in different years. Therefore, food grain production in the different years as an evaluation index. GIS in different years in food production, through the histogram show up at the same time, we can directly see the trends in food production each year in order to carry out yield analysis and yield forecast.

(2) The difference between the law:

For the same content by nature and is classified as a Class metrics contrast difference between the amount of content to get some kind of specific changes in characteristics due to a single factor caused by changes in the method. For example, between food production will compare different years can be obtained at different times, specific changes in the rate of food the same geographic area, changes in the size, by manually digitized content property, so the amount of change to give intuitive performance graph. Therefore, the amount of change in food production can be used as an evaluation index.

(3) Complementary Methods:

Classification method chosen by some indicators factors, will find that this indicator can reflect a certain period of land use, but do not reflect the current land use at this time and before the expected content are consistent, In this case not only need to get the amount of cultivated land, food production and other indicators of the status quo but also the need for government expected indicators. Know the existing indicators such as agricultural land in pasture, garden, woodland, grassland expected to find targets, expectations indicators garden, woodland indicators can be expected to respond better to different situations present situation and expectations. Meanwhile reuse difference method; the difference can be specific, further to find a solution. Another example is the actual situation of food production compared with the expectations index, rate of change can be seen from the difference in the case, it may indirectly reflect the current agricultural land use planning is reasonable. Such indicators can be expected and grain yield complementary status map, to fully reflect the current and expected situation of agricultural land-use planning, good land use planning is reasonable evaluation.

(4) Evaluation quantization process:

Evaluation factors impact on agricultural land use planning are single, because the evaluation of various factors data types and data units may not be the same, so during the evaluation to quantitative evaluation, the need to ensure the same internal units of each index. Since the classification method and the difference method is to compare the same internal indicators, so you can compare the same unit. And during the time complementary law requires two units to the same qualitative factors can be in the same graph analysis and comparison of similar observations.

(5) Analysis:

Because agricultural land use planning system is more complex, broad. So for the evaluation of agricultural land-use planning can be in many ways. In this experiment, when the agricultural land-use planning in Guangdong Province were evaluated, in Guangdong Province, the administrative map to add data, geo references, correction, add layers, edit attributes, based on the specific indicators manually digitized. In the digital approach, 22 municipal regions of Guangdong Province is selected for the evaluation unit for the quantification of each index, and then in the same chart with a histogram and other forms. According to this test a different evaluation, three basic results will be used to indirectly evaluate and two direct results of the evaluation. The results of which are three basic indicators of single status map different time under the same factors; the same factors in different years within the parallel comparison chart indicators; the same factors that make the difference between different time under comparison chart. Two kinds of direct results of the evaluation by a single status map derived from the use of arable land resources utilization efficiency indicators obtained land-use efficiency and land cropping index diagram in Fig evaluation and analysis. Thereafter After completing digitized, you can use the properties to build a database table, according to the database query capabilities, the use of query results for the region to study the evaluation and predictive analysis.

3. These assessment, forecast analysis principles

1. Digitized results of the evaluation analysis principles

By the results obtained after digitization process analysis, find some aspect of agricultural land use planning problems and find solutions to make reasonable use of the measures.

(1) The results of the three basic indirectly through the application of different objects obtained by digital implementation to be evaluated. For the same factors that make the difference comparison chart of different time and under different factors juxtaposed in the same year in which the comparison chart indicators can be seen in the recent years is increasing or decreasing trend, if a reduction of the phenomenon occurs, you need to make here through planning increase agricultural land or improve the utilization of agricultural land. What is the status quo for the same factors in a single diagram can be obtained within a specific time index distribution or the actual national macro-control trend.

(2) The application of two direct results of arable land resource efficiency indicators to evaluate the analysis. In this study is the use of arable land resource efficiency indicators of land productivity (LUE) and cropping index (P) index, direct evaluation of cultivated land.

2. Database query prediction analysis principles

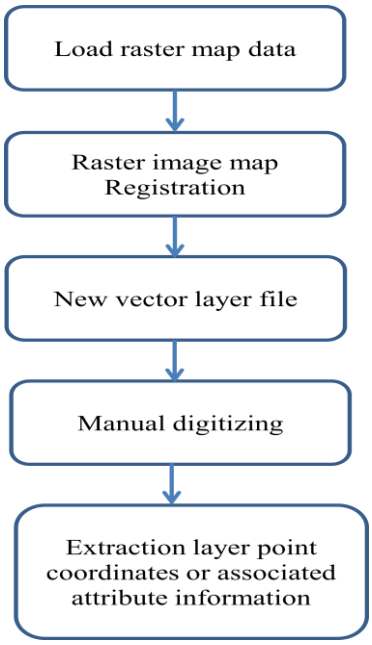
In use the database when the query results were evaluated, including two methods:

(1) The use of a database query function to find the difference, to give the desired targets and the difference between the actual situation and forecast trends in the government's macro-control.

(2) The use of a database query function to find the rate of change, the evaluation of food shortage or surplus by the rate of change in food production, by the rate of change can be more intuitive to see the specific value of the percentage change in accounts plan, to more intuitively reflect the status quo, propose trend forecasting macro-control government. With respect to the difference between the predicted rates of change predicted more accurately reflects the standard rate and non-compliance rate.

4. The digitizing process and steps

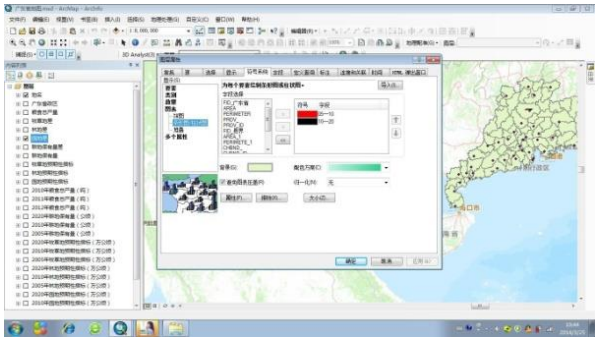
Figure 2: Process and Steps



5. The digital implementation and evaluation and analysis of three related applications

By changing the properties of an (Figure 3) the content and expression, can be different applications.

Figure 3: Properties



The following application and evaluation of the total grain output for example:

According to obtained from the agricultural part of Guangdong Province, 2013, 2012, 2011 Statistical Yearbook of Guangdong Province 21 cities and municipal regions crop yields three tables (including a total of three years 2010,2011,2012, 4, 5 and 6 shown)), total production of major food crops derive cities data. Table 1 below:

Table 1: The total production of major food crops in Guangdong Province cities

Municipalities major food crops production (amount: ton)			
City	**2010 Grain output**	**2011 Grain output**	**2012 Grain output**
Canton	430438	446559	449669
Shenzhen	49	18	5
Zhuhai	41789	43389	44349
Shantou	449738	464329	479193
Foshan	97006	97441	97331
Shunde	1018	888	621
Shaoguan	862017	892508	916583
Heyuan	878650	909762	933711
Meizhou	7798649	1232803	1259080
Huizhou	586789	609797	626570
Shanwei	446391	468371	484760
Dongguan	12482	12890	12476
Zhongshan	73128	76713	77468
Jiangmen	872002	917769	969187
Yangjiang	685174	710295	728828
Zhanjiang	1428370	1488710	1519453
Maoming	1449147	1488710	1511145
Zhaoqing	1105139	1139072	1151145
Qingyuan	781280	793819	811312
Chaozhou	268989	862378	878779
Jieyang	832185	862378	878799
Yunfu	665588	688390	708097

The data in the table manually digitized to build a layer in the property sheet, according to the city each year divided land quantity indicators digitized map to get three pieces of a pair of single status map, get side by side comparison of three indicators comparison chart, the poor indicators of different years do get to do poor comparison chart.

Single status map can be a good reaction to food production in a given year in different counties yield much, from the darkest shades can see most of the city on behalf of the food, the color of the light food in the city on behalf of the least intuitively to make a comparison, observe the distribution of food production throughout the province. For example, in 2012 the total grain output figure we can visually sea food production Zhanjiang is 21 counties in the darkest, the largest output, to 1,525,757 tons. Food production in Shenzhen is 21 counties in the lightest colour for five tons.

As can be seen side by side comparison chart icon in the same histogram in food production from specific counties in different years, it is possible to make a more intuitive way to observe the local production trends. Look for food production (2010, 2011, 2012, 7 and 8) juxtaposed map, you can see that in 2012 the biggest change over the previous two years, has increased. The province's grain output in 2012 is basically growth trend over the previous two years.

From doing difference can be seen in a comparison of the difference between two-year yield, directly reflects the change in food production. From the total rate of change of food (2012-2011 years Figure 9) map, you can see that there is change in the three cities of grain production rate is relatively large, which yields the rate of change of Shenzhen food up to -0.7222, indicating food reduced yield, and reduces the amount of 72 percent in 2011.

It should be noted that since the manual was digitized base map administrative area map Guangdong Province, and the data obtained in these three tables just food production 22 City of Guangdong Province, so food production in the rest of the city to add properties when that default is 0. Therefore, grain output in the figure shows that in addition to 22 cities 0, does not represent the actual grain yield of 0, but said that no input data.

Application one: single status map

Figure 4: The 2010 grain output

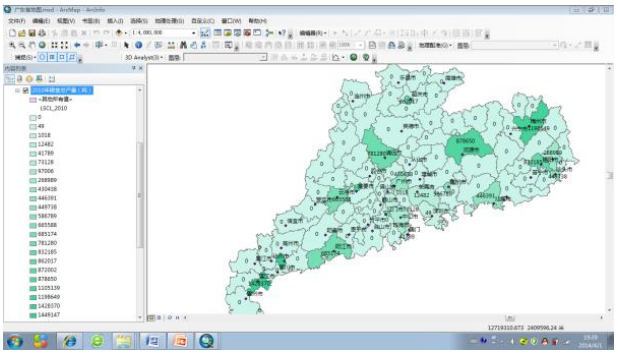


Figure 5: The 2011 grain output

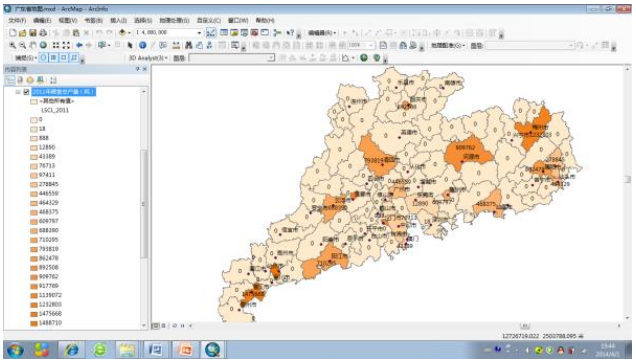
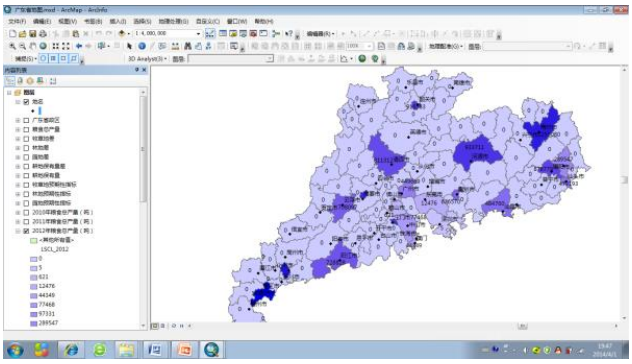


Figure 6: The 2012 grain output



Application 2: parallel comparison chart

Figure 7: The total grain output (2010, 2011, 2012)

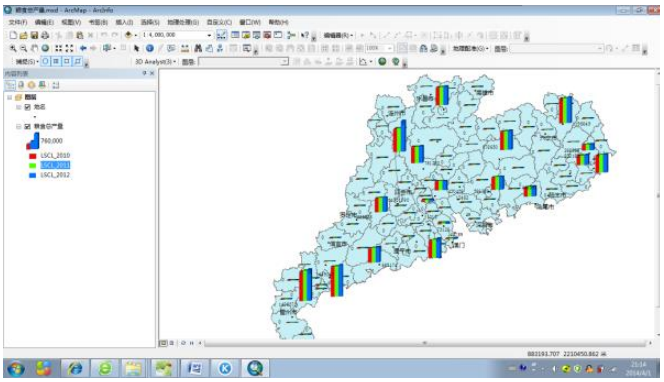


Figure 8: The total grain output rate of change (2011 - 2010)

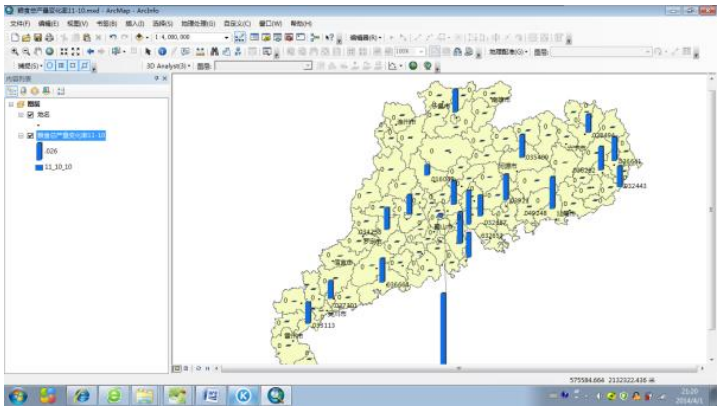
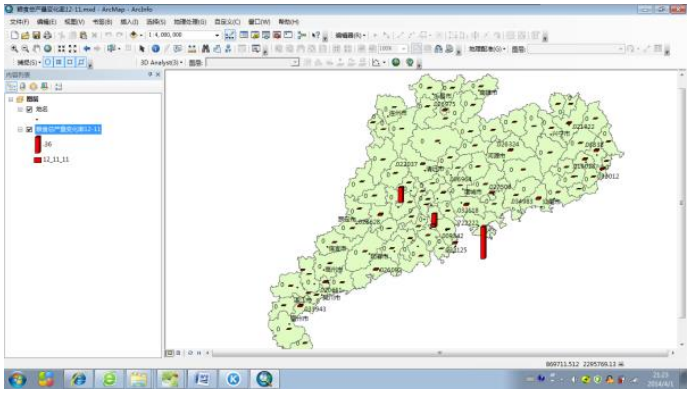


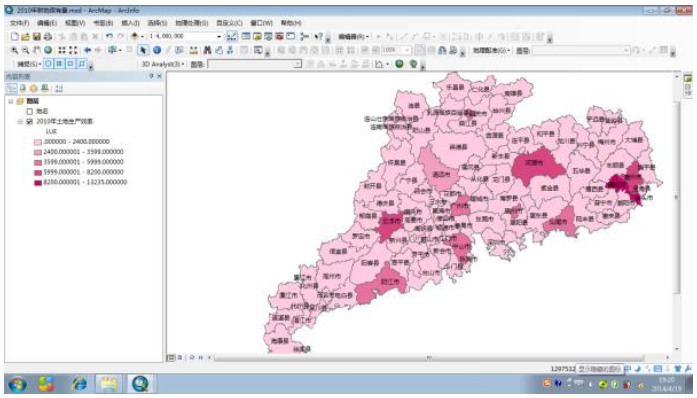
Figure 9: The total grain output rate of change (2012-2011)



More in-depth applications: resource utilization efficiency index evaluation of Cultivated Land (derived through the application and evaluation of arable land)

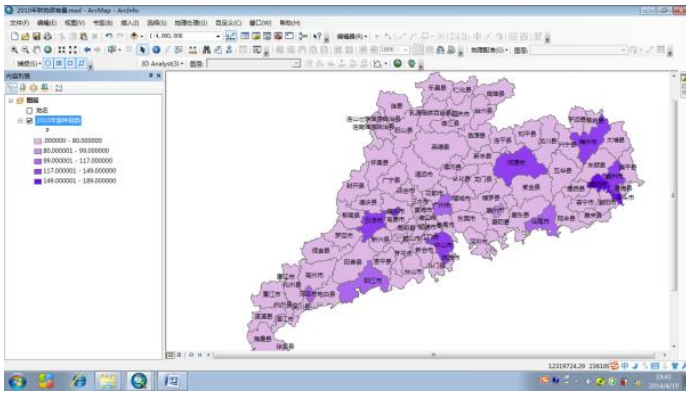
Efficient use of land resources utilization evaluation of land productivity (Figure 10) and cropping index (Figure 11), reflecting the carrier arable land productivity of agricultural production resources, land evaluation is important .

Figure 10: Figure 2010 land productivity



Production efficiency (LUE) is the ratio of total arable land obtained from crops, agricultural output per unit area represents the amount of arable land, in units of kg / hm2. The land productivity evaluation results into high, high, moderate, low and low-five rating. Party LUE <2400 when lower, when 2400 <LUE <3599 to a lower level, when 3600 <LUE <5999 when compared with the grade, when 6000 <LUE <8199 when for the more advanced, when 8200 <LUE <11836 when Senior. As can be seen, an indicator of the productivity of arable land apparent productivity performance of Shantou, Jieyang and at an advanced level, Chaozhou, Yunfu, Heyuan cropping index showed a higher level, Guangzhou, Shanwei, Shaoguan, Huizhou, Zhongshan, Jiangmen , Yangjiang cropping index showed moderate level, Qingyuan, Foshan cropping index showed a low level, Meizhou, Dongguan, Zhaoqing, Shenzhen, Zhuhai, Maoming, Zhanjiang cropping index showed a lower level. Jieyang, Shantou, Chaozhou, Yunfu, Heyuan, Guangzhou, Shanwei, Shaoguan, Huizhou, Zhongshan, Jiangmen, Yangjiang higher production level land, Qingyuan, Foshan, Meizhou, Dongguan, Zhaoqing, Shenzhen, Zhuhai, Maoming, Zhanjiang land low production levels.

Figure 11: Cropping Index



Multiple cropping index (P) refers to the ratio of the area planted with arable crops obtained, indicates the proportion of the unit of arable land reused within a year, is an indicator of arable land utilization, the unit is%. Multiple cropping index is greater than 100% means there is cropping on arable land, less than 100% means arable land fallow. The multiple cropping index evaluation results into high, high, moderate, low and low-five rating. Party LUE <80 when lower, when 80 <LUE <99 to a

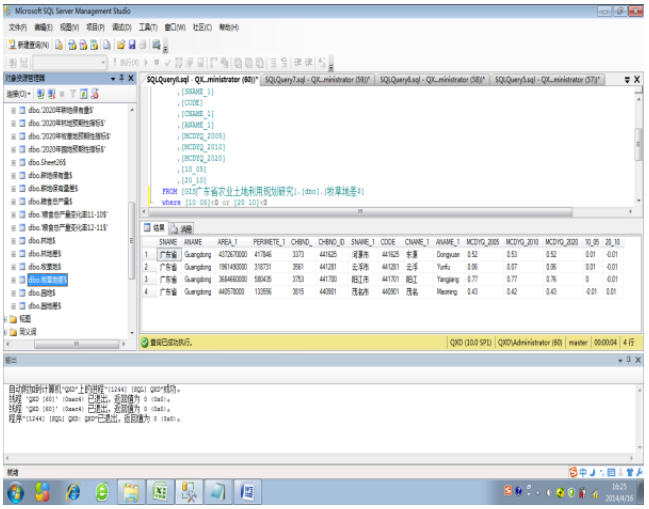
lower level, when 99 <LUE <117 when the rating, when 117 <LUE <149 when higher, when 149 <LUE <189 as advanced. Multiple cropping index is the ratio of the unit land area of reuse, it can be seen, the utilization index of arable cropping index performance reflects an important indicator of Shantou, Jieyang and at an advanced level, Chaozhou, Zhaoqing, Yunfu, Zhongshan, Jiangmen cropping index performance higher level, Guangzhou, Shanwei, Yangjiang, Maoming cropping index showed moderate levels, cropping index Huizhou showed a low level, Shaoguan, Qingyuan, Dongguan, Foshan, Shenzhen, Zhuhai, Zhanjiang cropping index showed a lower level . So Jieyang, Shantou, state, Zhaoqing, Yunfu, Zhongshan, Jiangmen, Guangzhou, Shanwei, Yangjiang, Maoming cropping index is greater than 100%, so there are multiple cropping on their farmland, and Huizhou, Shaoguan, Qingyuan, Dongguan, Foshan, Shenzhen, Zhuhai, Zhanjiang cropping index is less than 100 percent, so their arable land fallow.

6. Build databases, information integration and predictive analysis

Based on the above data and applications of GIS, we can export and import its property sheet and then processed in SQL Server, enabling better get the required information (see Figure 12). One of the applications: Find the difference between the government's macro-control and predict trends in land.

```
SELECT [SNAME]
    ,[ANAME]
    ,[AREA_1]
    ,[PERIMETE_1]
    ,[CHBND_]
    ,[CHBND_ID]
    ,[SNAME_1]
    ,[CODE]
    ,[CNAME_1]
    ,[ANAME_1]
    ,[MCDYQ_2005]
    ,[MCDYQ_2010]
    ,[MCDYQ_2020]
    ,[10_05]
    ,[20_10]
FROM [GIS Guangdong Province agricultural land use planning study]. [Dbo]. [Pasture difference $]
  where [10_05] <0 or [20_10] <0
```

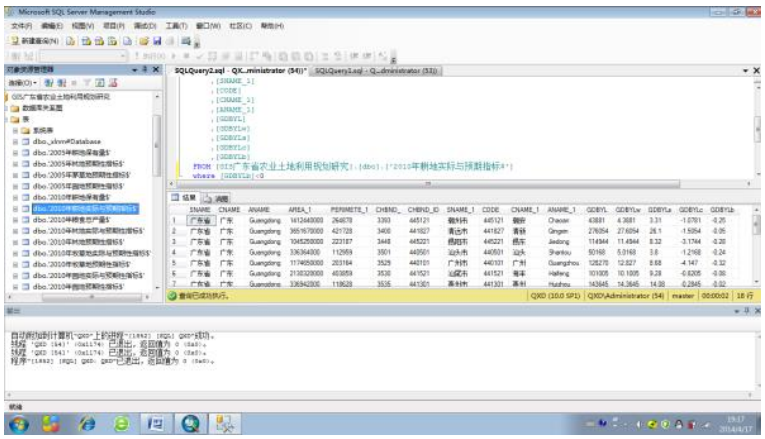
Figure 12: Query 2005 Scale of cultivated land in the programming of cultivated land of greater than 0



Programming content shown above query the database table pasture difference in 2010 and 2010 as well as the difference between 2020 and 2005 is expected to pasture indicators of poor. In this way you can find the expected reduction targets counties, indicating the government's macro-control grassland in the region need to be reduced. The query, in 2010 compared with 2005 expected targets Maoming City of reducing 00,100 hectares, Dongyuan County, Yunfu City and Yangjiang City have increased or unchanged; 2010 compared Dongyuan County, Yunfu City and Yangjiang the pasture is expected indicators have reduced 00,100 hectares, it is expected to Maoming City index increased by 00,100 hectares. Seen from 2005 to 2020, the current five-year increase in the index, five years after the anticipated targets is to reduce this; the previous five years to reduce the index is expected to index after five years is to make the increase, so the government the macro-control is to try to keep the pasture with the original balance. Application of the two: Find the rate of change to determine whether regulatory compliance and predict trends (Figure 13)

```
SELECT
    [SNAME]
    ,[CNAME]
    ,[ANAME]
    ,[AREA_1]
    ,[PERIMETE_1]
    ,[CHBND_]
    ,[CHBND_ID]
    ,[SNAME_1]
    ,[CODE]
    ,[CNAME_1]
    ,[ANAME_1]
    ,[GDBYL]
    ,[GDBYLw]
    ,[GDBYLs]
    ,[GDBYLc]
    ,[GDBYLb]
FROM [GIS Guangdong Province agricultural land use planning study]. [Dbo]. ['2010 actual and expected indicators of Cultivated Land $']
  where [GDBYLb] <0
```

Figure 13: Query 2005 SOUTH scale of cultivated land Xiongxian programming



Shown above for the standard rate of programming content to query the database in the "2010 actual and expected arable land Indicators Table" in 2010 and the ratio of the actual amount of cultivated land poor indicators of expectations and the expected targets represented less than 0 and the corresponding counties value. In this way you can find the county's compliance rate is less than zero, indicating that the actual amount of cultivated land to not achieve the desired targets. The query got there 18 counties have not reached the expected targets, Guangzhou, Shenzhen, Zhuhai, Shantou, Foshan, Huizhou, Shanwei, Dongguan, Zhongshan, Jiangmen, Yangjiang, Zhanjiang, Maoming, Zhaoqing, Qingyuan, Chaozhou, Jieyang Yunfu failed to achieve the desired targets, forecasting the next government to adopt measures to make at or near the expected macro-control targets. Especially arable land is too small to maintain the amount of Zhongshan City, Zhongshan City, did not meet the maximum rate, is 0.74, so to increase the amount of cultivated land to improve the local measures to reduce further increase of construction land. Huizhou City did not meet the minimum ratio of 0.02. Shaoguan amount of cultivated land is beyond the standards of 2%, Heyuan and beyond the standard of 1%, Meizhou just compliance.

7. Conclusions

(1) In this study, the first complete theory of knowledge agricultural land use planning and development in geographic information systems background and significance, especially in the development process and basic GIS applications in the field of agricultural resources and the environment were the main presentation .

(2) On this basis, we determine the principles and methods of this study, particularly the evaluation unit, and evaluation principles and methods. Principle followed by the completion of the evaluation and analysis of this study and forecasting analysis, including application of digital method to evaluate whether the existing standards and the application of the results of a database query results analysis and forecast the government's macro-control next trend.

(3) Foundation of this study is to apply ArcGIS10.0 and Microsoft SQL Server Management Studio to achieve related applications, the study explores in detail in application methods and achieve functions of these two software process steps, including the process of digitizing and step, and a step to build, integrate and query functions relevant information database written.

(4) By digitizing and database research, evaluation land, predict trends.

On the basis of proficiency to complete the software implemented on the basic operation of the related applications, which completed on Guangdong Province in 2010, 2010 and 2012 grain output and in 2005, 2010 and 2020, farmland, forest, garden in digitization and Three basic application thatch intended targets and actual indicators of arable land in 2010, including the single status map, side by side comparison chart comparison chart and make the difference. At the same time according to the intuitive digital results to determine the direction of the government macro-control for the future development of different land and whether the land area to meet the requirements of different indicators is expected to make a judgment. So, in respect to the government's macro-control trends, geographic information systems can contribute to the government's macro-control decisions.

(5) Under the premise of digitization, evaluation of land through land resource utilization efficiency indicators.

Cultivated land resources, for example, using the existing data processing to obtain land productivity indicators and cropping index indicators, using these two indicators of land resources utilization efficiency direct evaluation. Different data indicators limit land productivity evaluation results are divided into high, high, medium, low, and low land grade five.

(6) completed its data over the digitized results obtained and build 'planning studies in GIS application database agricultural land in Guangdong Province use ", by writing database queries easy programming complete're looking query in databases and, depending on the difference between the predicted look to get the government's macro-control and according to trends found to give the land to determine the actual rate of change indicator whether the target and predict trends in government regulation.

(7) Finally, the application of digital technology and database are two ways to evaluate the results of the analysis of land or land regulation forecast trends compare two methods to analyze the advantages and disadvantages drawn.

The evaluation results obtained by the two methods are similar, so you can judge the results of these two methods is correct. For digital, the digital approach can be compared to a database from the overall visual impression graphics, intuitive, simple features; and database approach with respect to digitization, the need for further inquiry programmed function, but want to get After the results of a database query to quickly and accurately presented, able to see the specific value of a specific city, and more to ensure the accuracy of the figures, but in terms of the overall observation seems relatively weak. Can also be seen from the other side, these two methods have their advantages and disadvantages, but in this study, while the use of these two methods, it can be said to play their respective advantages of the two methods in a complementary manner, while this time The results were complementary, when the evaluation of land use planning, when the results of a comprehensive evaluation of personnel by the two methods are fully conclusions.

(8) When this study further in-depth thinking, research and development as well as a great room for improvement.

Whether the results of the forecast are consistent with the actual situation, which is forecasting its accuracy, in this study, the data cannot be obtained due to limited resources. Because the data of this study includes only the 2005, 2010 and 2020 data of prospective indicators and indicators of actual data for 2010, for example, in this study, the actual data of the comparison between 2010 and prospective analysis of whether expected to reach 2010 targets, far from the time when predicting the direction of the next government's macro-control is such that the actual indicators tend to increase the expected targets, but because of the limited contents of this database, yet in 2010 after nearly two , expected targets for three years, so I cannot compare, you cannot draw accurate prediction accuracy.

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