AIM Interim Report (2003-2004)

March, 2004

China Project Team of AIM/IMPACT Model

Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences (CAS)

P.O.Box 9717, Beijing 100101, China

Telephone: 86-10-64889070 Telex: 86-10-64889266

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Work Plan

1. Work dedicated by AIM team
2. Research on spatialization of observed data(accumulated air temperature, precipitation etc.)
3. Research on spatialization of socio-economic (GDP, population)
4. 1 square kilometer level data developing (5days average high air temperature , etc.)
5. Further research on water Consumption in Chinese City

Work Done

1.Spatial data base establishing

1.1China administrative boundary maps with scale 1:1 million for 1999,2000 and 2001 (vector)

In order to create the raster data of socio-economic activity, statistical data with fine scale (ex. county-wise) should be required as the base data. In requirement of NIES team, 1:1million county boundary maps for year 1999,2000 and 2001 were produced based on CESIN's county boundary map and administrative boundary change information during the years.

1.1 China county level GDP regarding data and population data for 2000(vector)(see gdppop.rar)

In requirement of AIM NIES team, both GDP data and population need be put in a same spatial location (polygon in the GIS). Under the guide of NIES team, we allocate the data in each polygon of 1:1million county boundary map. Items in the map are as follow.

1.2.2 The contents of the dataset

- Total area of the polygons for the administrative region in the map;
- Code of the administrative region;
- ID of the Polygon;
- Name of administrative region in Chinese;
- Name of administrative region in English;
- Total of Gross Domestic Product;
- # Primary industry;
- # Secondary industry;
- # Tertiary industry;

- Households
- Number of population
- Number of male
- Number of female
- Numer of No-agricultural population
- Name of the province the administrative region belongs to in Chinese;
- Name of the province the administrative region belongs to in English;
- GB-code of the province the administrative region belongs to.

1.2.2 The method to process administration-wise and the polygon-wise data

In the data source, for each data item, one administrative region has one data. But in the map, one administrative region is composed of a few polygons. So we need to allocate the data to those polygons of the administrative region.

The main idea is to fill GDP and population data in one table then each administrative region has both GDP and population in one record. On the base of the table, if one administrative region has only one polygon, both data is given the region. While an administrative region has more than one polygon, both of its population data and GDP need to be calculated and allocated. Now the allocation was done according to the proportion of each polygon's area to the total area of the region.

The method to process administration-wise and the polygon-wise data see desc1204.doc

THE administration-wise see GDPPOP-ORI1204.XLS while the polygon-wise data see GDPPOP-COUNTED1204.XLS.

1.3 China county level population regarding data for 2001 and 2002(vector),(see ch011m-popu.rar and ch021m-popu.rar)

Following is the contents.

- Households
- Number of population
- Number of male
- Number of female
- Number of No-agricultural population

1.4 China Land suitability Type data(1km^2 grid)

The data set including eight land suitability types. They are :

- Land suitable for farmer land;
- Land suitable for farmer land, forest and animal husbandry;
- Land suitable for farmer land and forest ;
- Land suitable for farmer land and animal husbandry;
- Land suitable for forest and animal husbandry;
- Land suitable for forest ;
- Land suitable for animal husbandry;
- Land is not suitable for farmer land, forest and animal husbandry;

The data set was produced based on the vector map which is digitized from China 1:1millon Land Resources Map. The data from 1985 to 1988 was used to make the origional China 1:1millon Land Resources Map.

1.5 China air temperature data(1km^2 grid),for year 1957 to 1998,yearly

Many data sets (over 20 000 sets) were produced during the two years.

1.5.1 Data at year level

•Yearly mean temperature from year 1957 to 1998,year by year;

•Yearly mean lowest air temperature from year 1957 to 1998,year by year;

•Yearly mean highest air temperature from year 1957 to 1998,year by year;

1.5.2 Data at month level

•Monthly mean temperature from year 1957 to 1998,year by year;

•Monthly mean lowest air temperature from year 1957 to 1998,year by year;

•Monthly mean highest air temperature from year 1957 to 1998,year by year.

1.5.3 Data at ten days level

- Ten days mean air temperature from year 1957 to 1998,year by year;
- Ten days mean lowest air temperature from year 1957 to 1998,year by year;
- Ten days mean highest air temperature from year 1957 to 1998,year by year.

1.5.4 Data at five days level

- Five days mean air temperature from year 1957 to 1998,year by year;
- Five days mean lowest air temperature from year 1957 to 1998,year by year.

2.Attribute data

2.1 AIM/Water regarding dataset for some hundred cities in China, for year 2001 and 2002, yearly

Data regarding water supply system, water use, waste water treatment system for some hundred cities in China were collected and the database was established.

2.1.1 Water supply and water saving in cities, (see BA92.XLS)

12items

2.1.2 Level of facilities for supply, utilization and discharge water in cities,(see BA93.XLS)

34items.

2.2 AIM/WATER regarding dataset (Residential water consumption) for 2500 counties in China, for year 2000(see ptab8.xls)

Housing conditions of hololds(data in long table)

- Without Bath Facilities in House（household）
- Having Lavatories in House（household）
- Without Lavatories in House（household）
- Rooms Built（household）
- Rooms Bought （household）
- Rooms Rend（household）
- Others（household）

2.2 Water regarding dataset at province level and river basin level for year 2002

2.2.1 Precipitation and depth of naturalrunoff by province (Wtab2)

2.2.2 Total water resources by river basin (Wtab3)

2.2.3 Total water resources by province (Wtab4)

2.2.4 Water supply and utilization by river basin (Wtab6)

2.2.5 Water supply and utilization by river basin (Wtab7)

2.2.6 Water utilization index by river basin (Wtab9)

2.2.7 Water utilization index by province (Wtab10)

43items.

2.4 Environment regarding data at national, provincial and city level for year 2002

Over 300items.

2.4.1 Waste water discharge and treatment by province, *(rl34-2002.xls)*

2.4.2 Waste gases emissions and treatment by province, (see rl35-2002.xls)

2.4.3 Industrial solid waste production, treatment and reuse by province, (see rl36-2002.xls)

2.4.4 Industrial enterprises by province, (see rl39-2002.xls)

2.4.5 Regulating efficiency of "three" wastes from key industrial enterprises by province, (see rl30-2002.xls)

2.4.6 Industrial wastewater discharge and treatment at national level, (see rl61-2001.xls)

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2.4.9 Basic condition by industry branch of industrial enterprises at national level, (see rl69-2002.xls)

2.4.10 Industrial waste water discharge and treatment in major cities, (see rl51-2002.xls)

2.4.11 Industrial waste gases emissions and treatment in major cities, (see rl52-2002.xls)

2.4.12 ndustrial solid waste production and treatment in major cities, (see rl53-2002.xls)

2.4.13 Industrial enterprises in major cities, (see rl57-2002.xls)

2.5 China Fifth Population Census data set at county level, some 140 items

2.5.1 Total population, registered population, proportion by minority and non-agriculture, composition of population, composition by urban and county （all the data）,(see ptab1)
2.5.2 Population by age and sex（all the data）,(see ptab2)

2.5.3 Agee composition of population, number of households with elders, natural change and migration of population（all the data）,(see ptab3)

2.5.4 Population by education level, years of education and illiterate population （all the data）,(see ptab4)

2.5.5 Number of employed persons by occupation and unemployment(data in long table) ,(see ptab5)

2.5.6 Number of staff and workers by sector and proportion by type of industry(data in long table) ,(see ptab6)

2.5.7 Marital status of population and fertility of women(data in long table) ,(see ptab7)

3.Research on 1 square kilometer level Data developing

Paper: Comparison on Interpolation Methods for Air Temperature

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5. Research on Water Consumption in Chinese City

The primary analysis on the difference of Water Consumption in Chinese City*

Wei Donglan[1] Li Jianhong[1] Li Zehui[2] Sun Jiulin[2]

1 Liaoning Normal University, Dalian City, Jilin Province, China

2 Institute of Geographical Sciences and Natural Resources Research, CAS, Beijing100101, China

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Ever since 1980, especially since 1990 , Global climate has been getting warmer and warmer which affect human' s productions and daily life inevitably. And with the development of socio-economic as well as the improvement of people' s living standard, water demand increases accordingly. At present, many regions of the world are faced with the contradictory between water supply and water demand. So water can be a largely factor limiting future socio-economic development.

Here and now, fast development of economic and the increasing population stimulates water demand. Therefore, studies on the changes of water demand in cities especially on the relationship between climate changes and water demand in cities has been attached grate importance not only for the governments to design appropriate policy but also to reply to the global warming.

1. Data Preparation

The data mainly selected are total water supply, industrial water supply, water supplied for living, water consuming population，Per capital water consumption，sewage disposal rate, number of students in colleges and universities, number of hospital beds, gross domestic product of the city, total population, annual precipitation, annual average temperature of provincial capitals in China during the period from 1991 to 2000.In this study, Interpolation Method is used to add the data with the regard that some of which is not intact.

2. Analysis Method

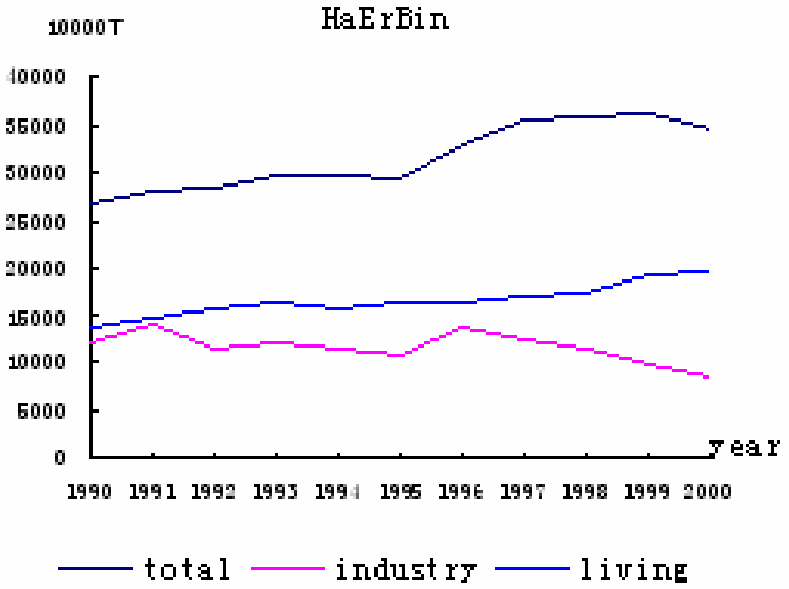
1) draw a linear chart of total water supply, industrial water supply and water supplied for living in each provincial capitals, to analyze the trend of the change of each sector from1991 to 2000 .

2)select the most significant impact factors with successive regression

3．Analysis

3.1.Analysis on changes of water supply

The table bellow shows the trend of the change of total water supply, industrial water supply, and water supplied for living in each provincial capital in China during the period from 1991 to 2000,in which X-coordinate is year, Y-coordinate is change of water supply.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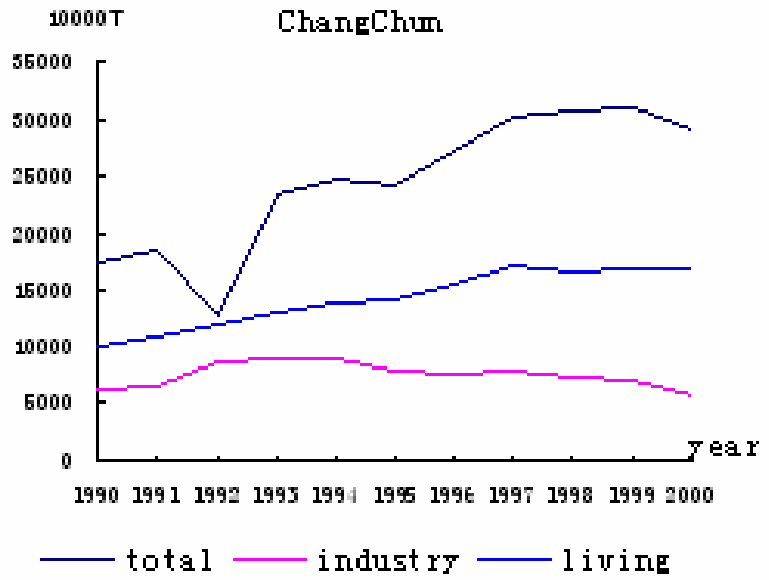
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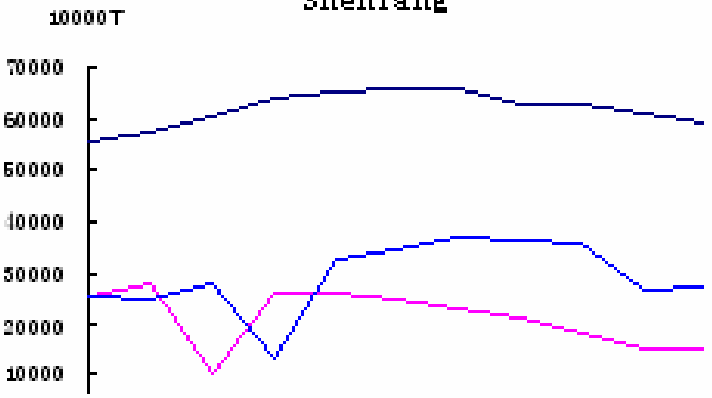
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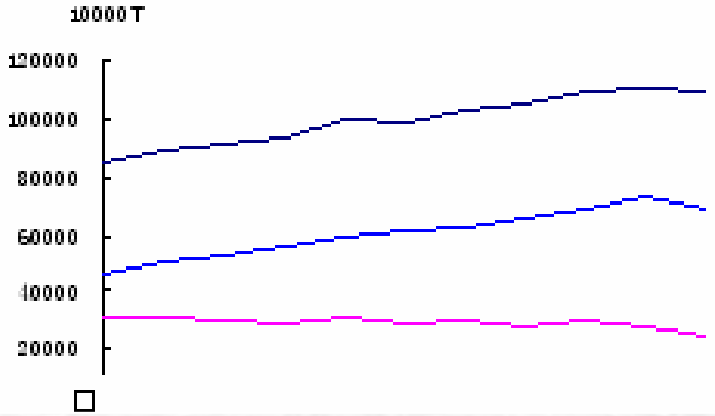
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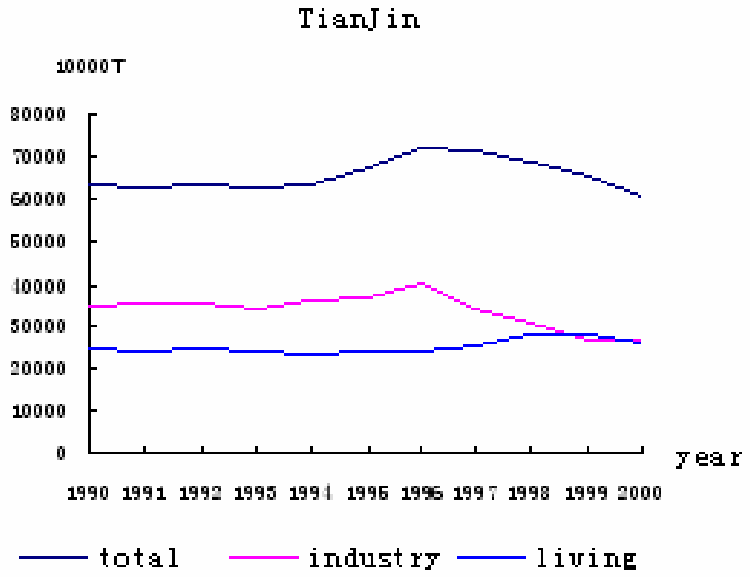
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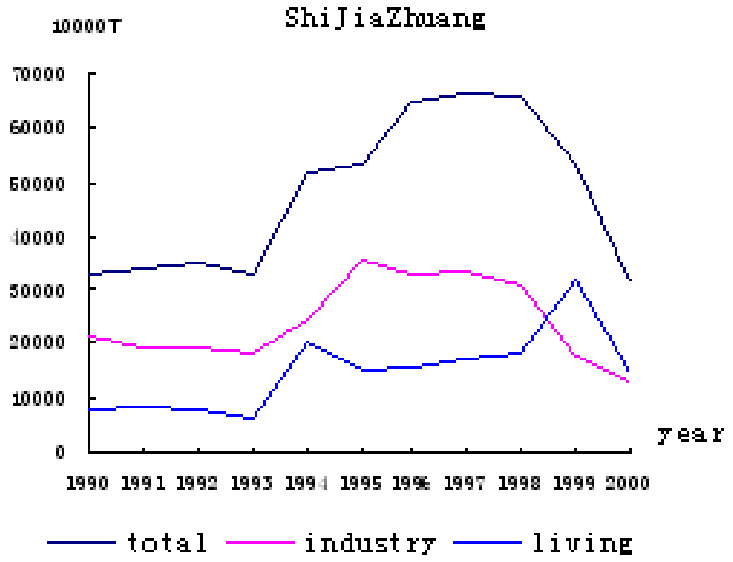
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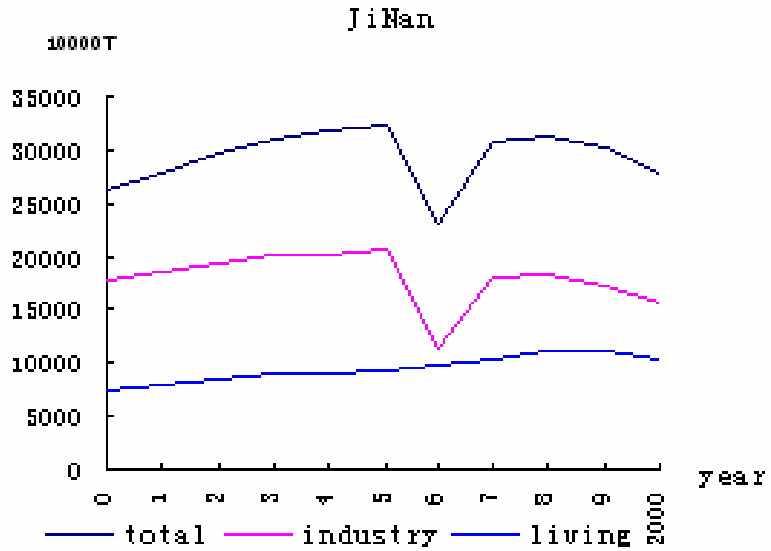
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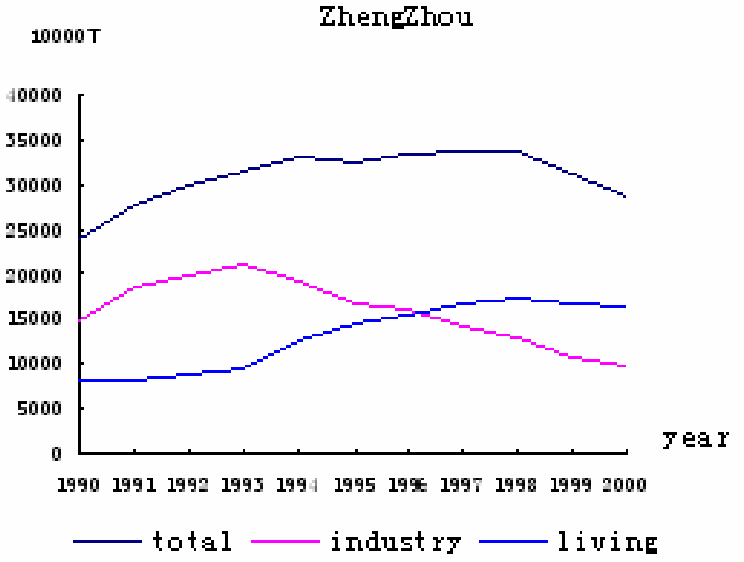
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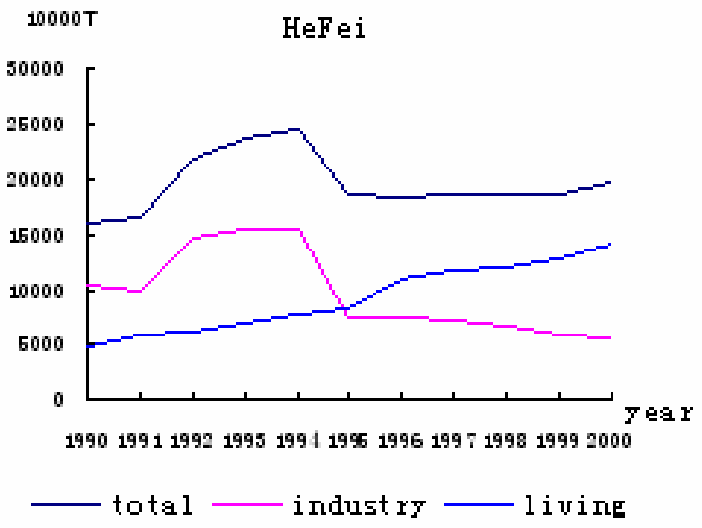
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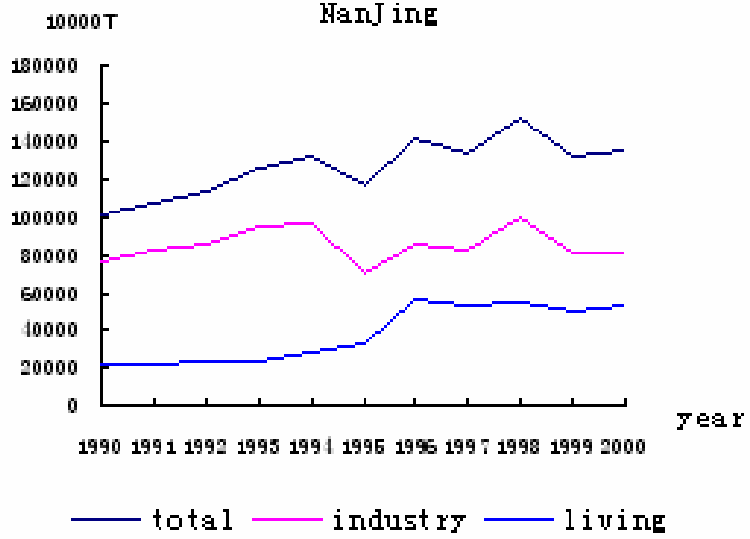
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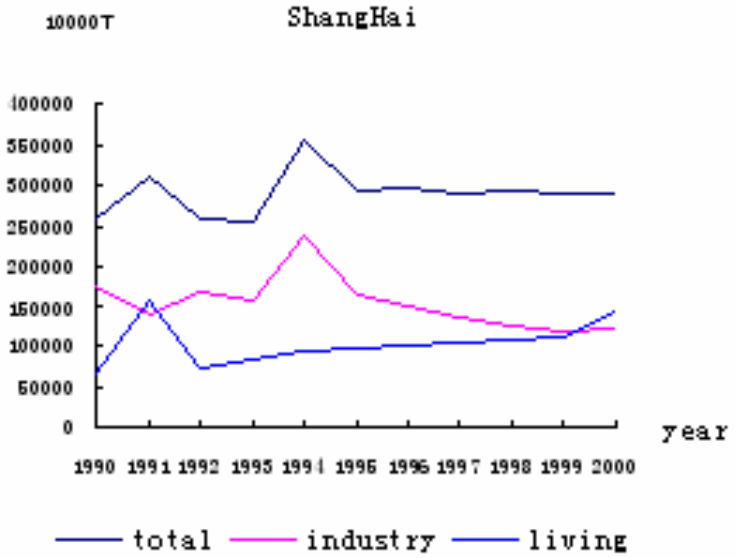
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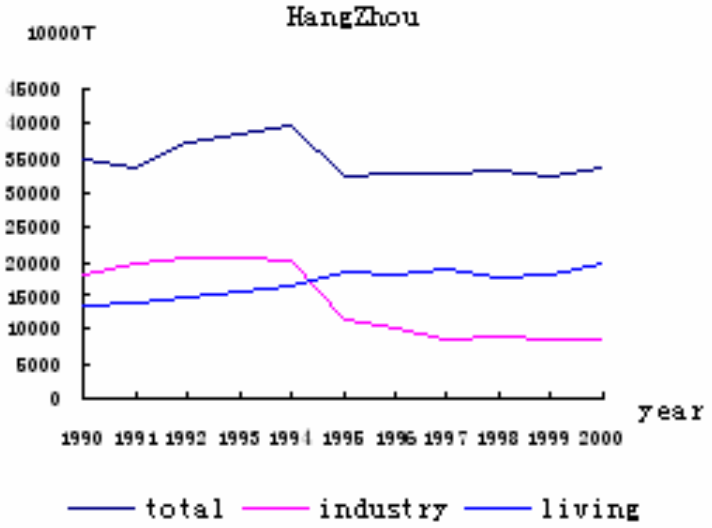
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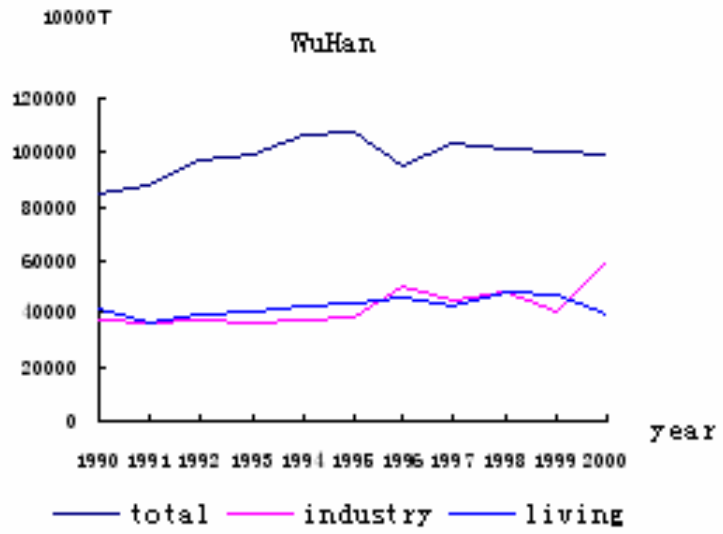
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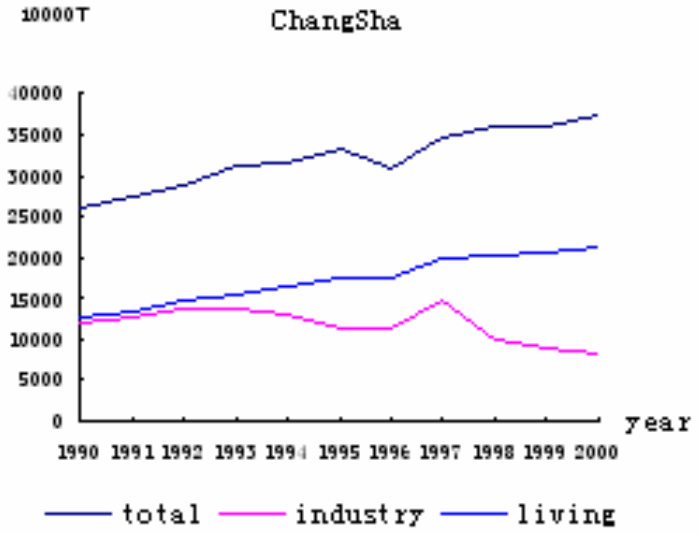
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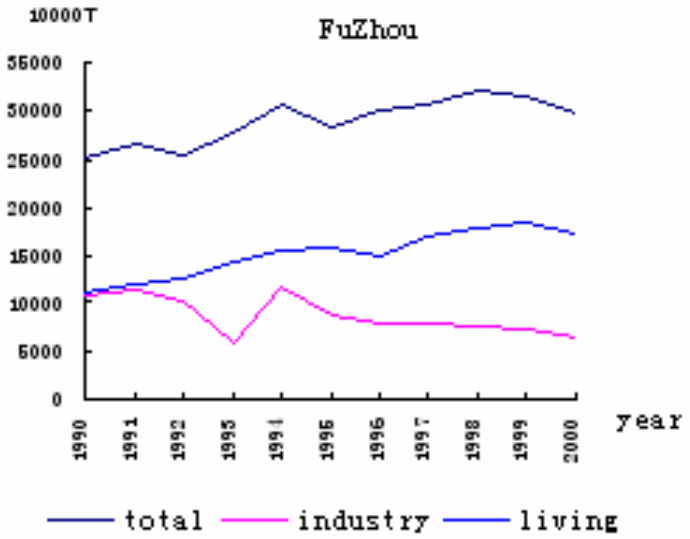
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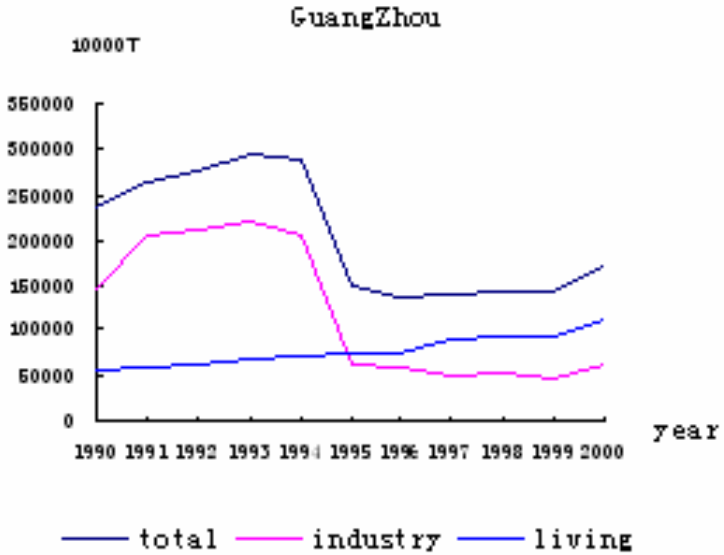
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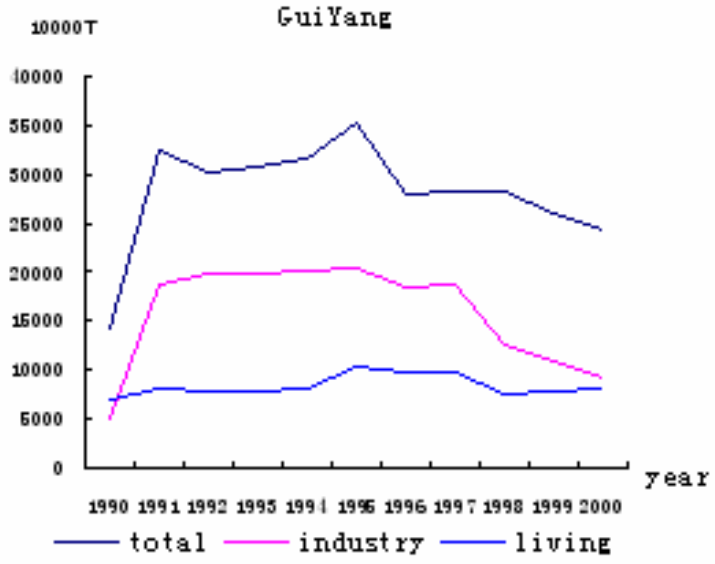
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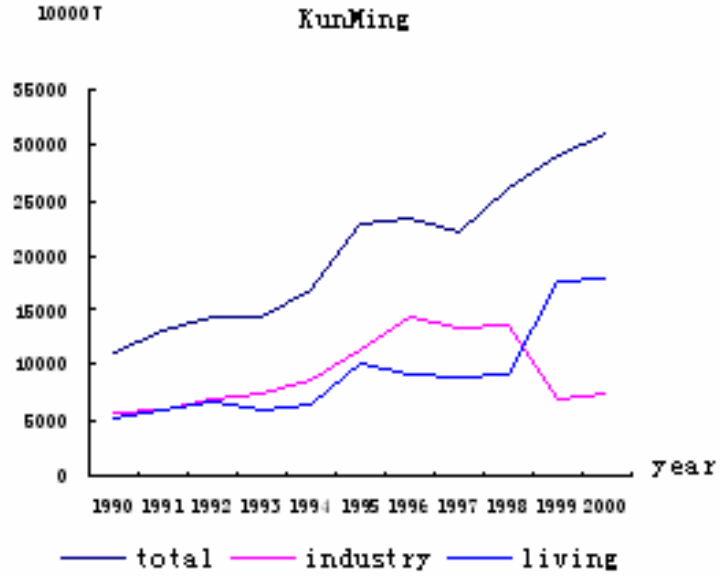
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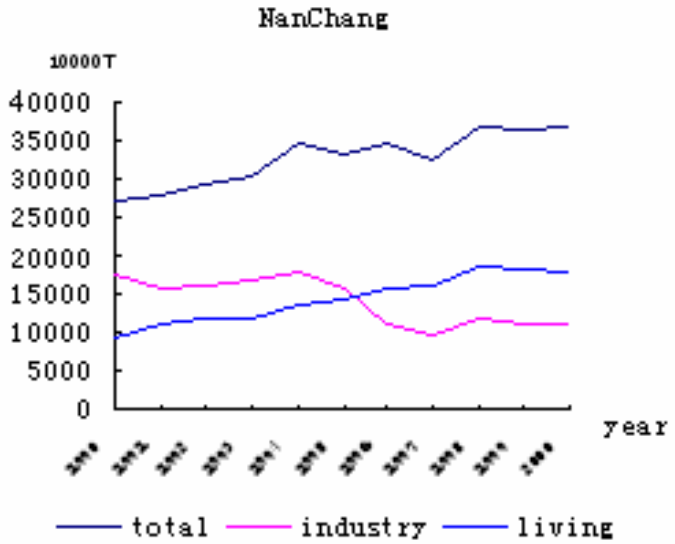
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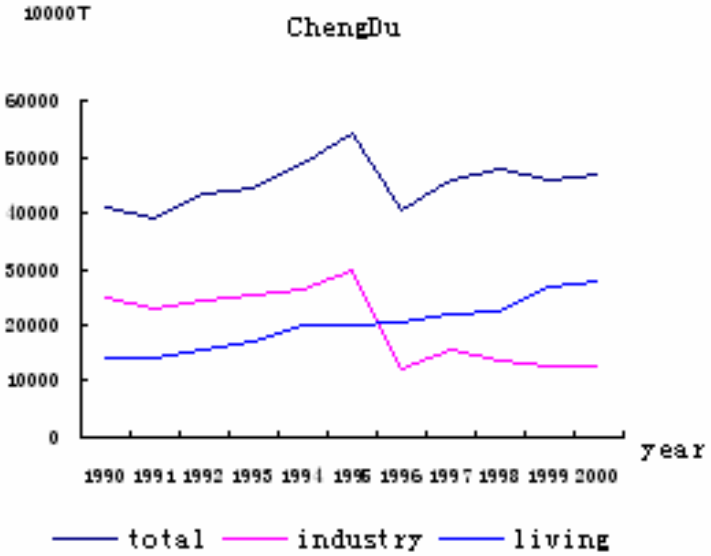
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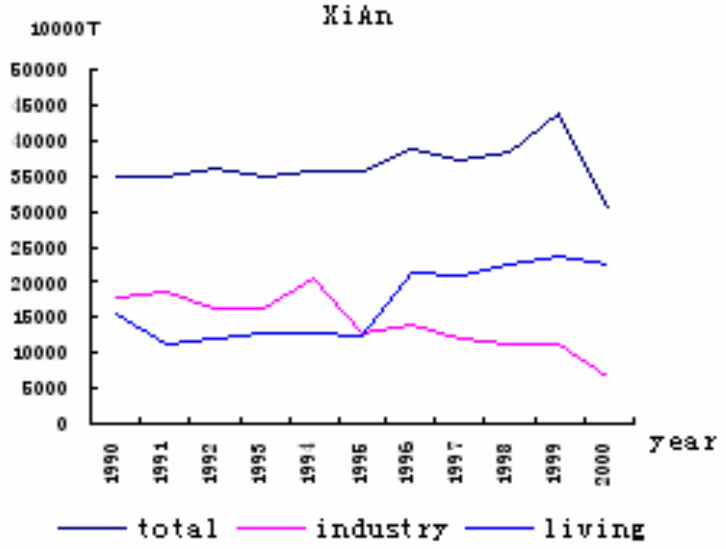
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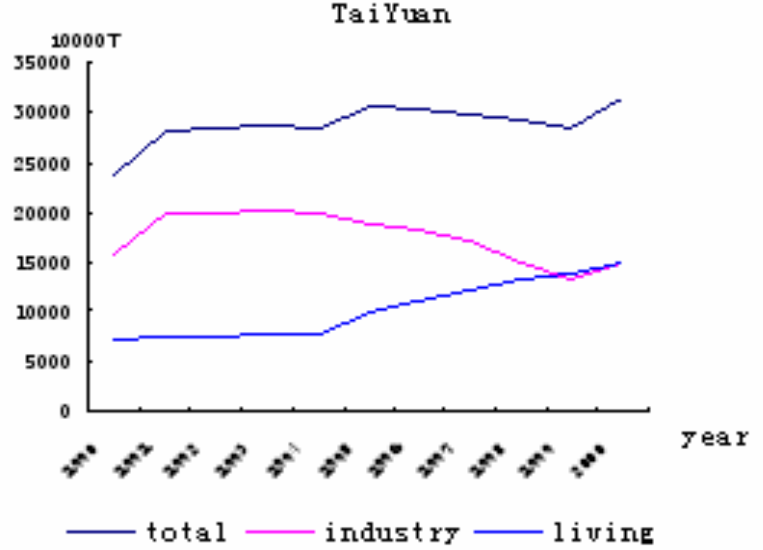
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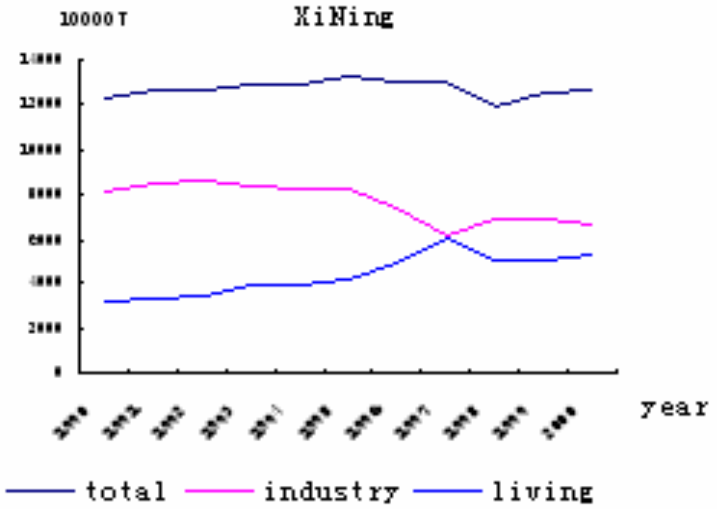
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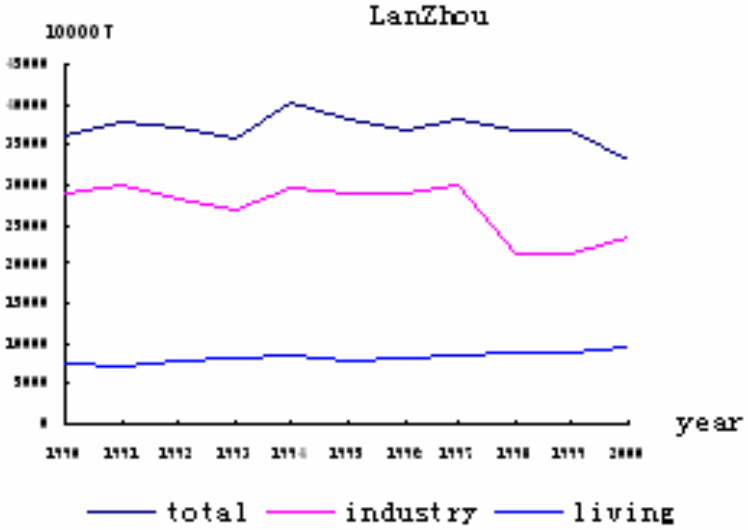
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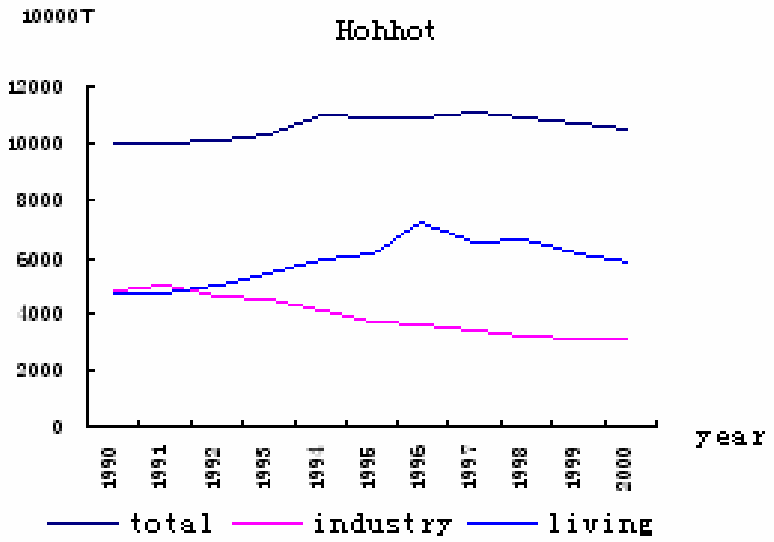
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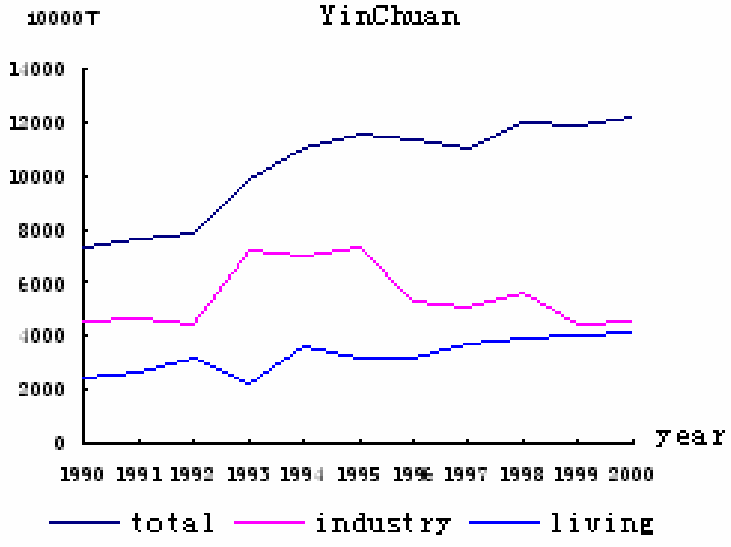
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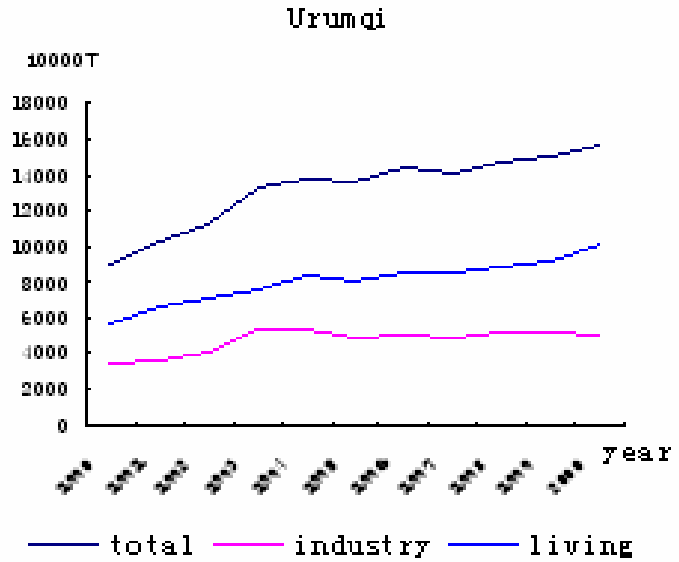
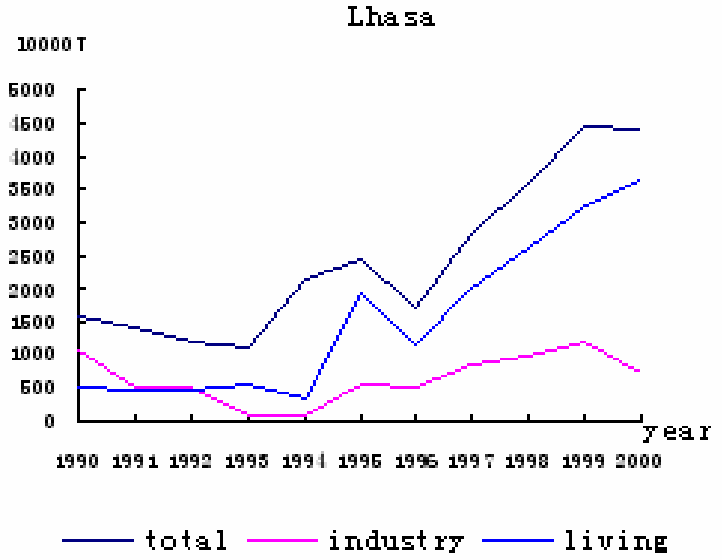

Urumqi
10000T
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
year
total
industry
living


Lhasa
10000T
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000
year
total
industry
living

From the chart of water supply situation all over the country, some striking characteristics of water supply situation can be attracted as bellows.

1. A common trend for the cities except Lhasa and Guangzhou is that the water supply is increasing stably. And the growth rate of northern cities is lower than that of southern cities.

2.Cities except Wuhan and Lhasa had an obvious increase in industrial water supply which is likely because of the improvements of industrial technology, increase of the amount of water recycled and the decrease of water pollution as well as the amount of water used per unit product.

1. Water used for living in each city has an increase trend, and outstrips industrial water use in quantity late in the 1990s,except several industrial cities such as Guangzhou, Nanjing and Wuhan. It indicates that water used for living increases in accordance with the high improvement of people's living standard in our country. And with the improvement of civilization, the development of socioeconomic as well as a further rise of the city residents's income level, water demanded for living will still increase, which stimulates the limited water resource.

3.2 Analysis on The Impact Factors of Water Supply of the Cities

Successive regression is used to total water use of each provincial capital and the 9 likely impact factors which are water consuming population, Per capital water consumption ,sewage disposal rate, number of students in colleges and universities, etc.

4. Conclusion

The conclusions below are drawn according to the analysis before.

4.1. During the recent 10 years, total water supply of the provincial capitals in our country will increase, among which industrial water supply shares an decrease trend, living water supply will increase yearly even with the exceeding to industrial water supply in most cities.

4.2. Annual average temperature affects total water supply significantly in the East of China.

4.3. With the global warming, water supply of the cities in the east of China especially region of Beijing and Tianjing will be affected greatly, if which is not solved well, daily life of the residents will encounter great influence.

Work Plan

1. Work dedicated by AIM team
2. Research on spatialization of observed data(accumulated air temperature, precipitation etc.)
3. Research on spatialization of socio-economic (GDP, population)
4. 1 square kilometer level data developing (5days average high air temperature , etc.)
5. Further research on water Consumption in Chinese City