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Sustainable Regional and Rural Development in China: Where do we stand?

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Abstract

This Interim Report (IR) gives a short overview of the current state of *regional* and *rural development* research in China, reflecting the international English language literature on the subject. Its aim is to identify leading themes and trends in current research. This should help us identify deficiencies and gaps in our knowledge, which could become areas for further investigation. In particular, the report outlines research topics that are policy relevant and could lead to recommendations on how China might promote development in interior provinces and rural areas.

About the Author

Dr. Gerhard K. Heilig is a Senior Research Scholar at the International Institute for Applied Systems Analysis (IIASA). He has been with the Institute for more than 15 years, at first working for many years at the IIASA Population (POP) project. Later he joined the Institute's Land-Use Change (LUC) project, doing research on China's food security and the socio-economic dimensions of land-use change. Then Heilig was leading IIASA's European Rural Development (ERD) project. Recently, he started the research activity on Sustainable Rural Development (SRD) in General Research.

Heilig has studied sociology and demography and has a doctoral and a post-doctoral dissertation (Habilitation) from the Technical University of Munich and the University of Bamberg in Germany. He has also developed various demographic software packages, web sites, and electronic publications, including the widely acclaimed ChinaFood CD-ROM and Web site
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Dr. Heilig has published more than 50 papers and books on relationships between population, development and environment.

Sustainable Regional and Rural Development in China: Where do we stand?

Gerhard K. Heilig

1. Background

Regional disparities between *urban-industrial* centers and the vast, predominantly *rural* hinterland are a serious problem in China (Tian, X. 1999; Xu, F. et al. 1997). The "economic miracle" of the past two decades was mainly generated by a small number of coastal provinces and special development zones in southern and eastern China (Fleisher, B. et al., 1997; Mody, A. et al. 1997; Wei, Y. 2000). Cities and towns in the East and South are growing rapidly due to rural-urban migration - despite a strict household registration system, which should (in theory) keep farmers from interior provinces in their villages. Credible estimates have placed the number of temporary rural-urban migrants (the so-called "floating population") in the order of 80 million. None of the big cities, from Beijing to Shanghai, could function properly without the huge "army" of unqualified migrant workers from the rural hinterland. These migrants work primarily in the urban construction industry, in waste collection, the transport industry, as well as in household services (Yao, Y. 2001; Zhao, Y. 2001). Those farmers, who could not get jobs in the major cities have often migrated to *smaller* towns and cities in the South and East, where numerous private companies – particularly in the textile and electronics industry - had opened up in recent years. The abundant labor supply has created the "low-salary" advantage, which economists have identified as one of the key driving forces of China's economic miracle.

Vast rural areas in the central and eastern parts of China, on the other hand, have seen little economic growth after the first wave of development in the early 1980s, when family farming was re-introduced after decades of centrally planned agricultural communes (Chen, J. et al. 1996). Initially, this reform greatly improved China's food security (Heilig, 1999; Heilig, et al. 2000), and reduced rural poverty. However, in recent years China's agricultural development stagnated, when compared to industrial and service sectors. Today, small-scale subsistance farming and animal husbandry are still dominating economic activities in China's agricultural areas. Typically, each family has a plot in the range of only 0.25 to 0.55 hectares, which is far too small for competitive commercial agriculture (Lu, W. 2001). With agricultural modernization, however, a large number of farmers would lose their subsistence. It is estimated that China has an agricultural *excess* population in the order of 200 million people, most of them in the central and western parts of the country. No wonder that the great majority of China's poor still lives in these interior *rural* areas (Lu, F. 2001; Liu, H. 2001).

There is a consensus among experts that the gap between increasingly prosperous coastal provinces and stagnating interior regions has been widening in recent years, with great risks for the political stability of the nation (Bao, S. et al. 2001; Aziz, J. et al. 2001; Jian, T. et al. 1996). In Table 1 we have compiled a small selection of indicators and diversity statistics covering various dimensions of development in China. They exemplify the country's staggering regional discrepancies. It is interesting to see that the diversity between provinces seems to be much greater in social and environmental dimensions (as measured by indicators such as "Marriages with foreigners", "Economic losses of pollution accidents") than in economic dimensions ("Per Capita GDP").

With its Western Development Program in the latest 5-year plan, the Chinese government has acknowledged the seriousness of this internal development gap and implemented a scheme of infrastructure investments and other measures to reduce disparities.

The reader might observe that we talk about both *regional* and *rural* development in the same context. Of course, in theory, these should be two different issues:

- Rural development typically deals with agriculture, animal husbandry and forestry, whereas *urban* development is usually concerned with industrial and service sectors.
- Regional development, on the other hand, deals with the *spatial* differences in development regardless of the economic sector. In regional development research one would typically analyze the geographical distribution of leading and lagging regions.

However, in the case of China (as in many other developing countries) this distinction is not very useful, because *lagging* regions are typically also *rural* regions. One can find lagging rural areas in prosperous coastal zones, but usually the two classifications overlap. By and large, poor regions are rural, while prosperous regions are more urbanized and have a high proportion of industry and service sectors. In the following discussion we will therefore deal with *both* rural and regional development disparities in China.

2. State of art in research on China's regional / rural development

The widening development discrepancy between (urbanized) coastal and (rural) interior regions is now seen as one of the most serious challenges for the Chinese government (Xu, F. et al. 1997). Not surprisingly, a lot has been published about the various aspects of that problem (see: Bibliography). Scientists from many disciplines have contributed to this field of research, including geographers, demographers, regional planners, political scientists, and, most prominently, economists - from agricultural economists to financial specialists in foreign direct investment. In a first overview of the literature, we have identified **five core themes** that dominate the discussion:

1. There are numerous **economic studies** on regional disparities, which emphasize the role of differences in economic conditions (Aziz, J. et al. 2001; Chan, R. et al. 1996; Chen, J. et al. 1996; Fleisher, B. et al. 1997; Jian, T. et al. 1996; Lu, F. 2001; Lu, W. 2001 and 2002; Lyons, T. 1991; Mody, A. et al. 1997; Taube, M. et al. 2002; Tian, X. 1999; Tuan, C. et al. 2002; Zhao, X.1996). Most researchers have used descriptive statistics at the level of provinces or economic regions to analyze the diverging *regional trends in key economic indicators*, such as regional GDP,

industrial output or income level (Knight, J. et al. 1999). There are also analyses of regional differences in *public investment programs* (Cheung, P. et al. 1998; Nyberg, A. et al. 1999; Fan, S. et al. 2002), which might have contributed to the regional discrepancies in economic growth. An important subject of economic research is, of course, the question of *poverty reduction* in China's rural areas (Lu, F. 2001; Fan, S. et al. 2002). Some economists have tried to develop *multi-regional models* of the Chinese economy or its sub-sectors, such as general-equilibrium models of the Chinese agricultural sector. In these models, regional development disparities are a function of differences in productivity between economic sectors.

2. Some studies have pointed out and analyzed **geographical and geophysical factors** (such as distance to seaports, difficult terrain, altitude, climate, etc.) that may be responsible for China's regional development disparities (for instance: Bao, S. et al. 2001; Démurger, S. et al. 2002; Gallup, J. et al. 1999; and Goodman, D. 1989). Many of China's rural areas are land-locked, such as the large agricultural basin of Sichuan or the agricultural areas at the upper and middle reaches of the Yellow River. They are far away from potential markets at the population centers on the Chinese East coast. Many rural areas in China are located in arid or semi-arid climate or at very high altitude (such as Tibet). Some authors believe that these *natural* factors can explain most of the regional development disparities in China.

3. Another field of research deals with **demographic and social driving factors** of regional disparities in China, such as analyses of the rural population structure (Jing, Y. 1998), or studies of rural unemployment (Yao, Y. 2001; Zhao, Y. 2001). The basic idea is that human resources in lagging rural regions are usually not well developed and thus perpetuate underdevelopment. Not much is available (in English-language literature) on the human resource dimension of regional disparities, such as the level of education and training in rural areas (Han, D. 2000). On the other hand, the labor migration to urban areas, the so-called "floating population", has received considerable attention (Cai, F. 1999; Fan, C. 1999; Fernandez-Stembridge, L. 1999; Ma, Z. 1999; Roberts, K. et al. 1999; Zhao, Y. 1999 and 2001). Rural-urban migrants are often young and highly motivated to improve their living conditions. Often, only old men and women with children remain in the villages. The increasing loss of economically most active population segments is certainly a handicap for many rural areas. However, rural-urban migration might also have a positive side: Rozelle, for instance, investigated, how the remittances from rural-urban labor migrants can promote rural development (Rozelle, S. et al. 1999). Returning migrants might also bring know-how and new perspectives from the cities back to their village. A special research topic in that context is the unique Chinese household registration, the so-called *hukou* system, which tends to prevent or discourage rural-urban migration (Chan, K. et al. 1999; Wong, L. et al. 1998).

4. Many authors have mentioned the potential threat of increasing regional disparities to China's political stability, but few (English-language) studies have systematically investigated **consequences for the political system** and the stability of the nation. Typically, the discussion of China's political dilemmas is at the national and international level - with only limited consideration of the country's *internal* political diversity (see: Fleisher, B. et al. 1997; Lam, W. 1995; Lieberthal, K. 1995; Lu, F. 1999; Nathan, A. et al. 2002, Ogden, S. 2002). We also found only few papers dealing with *institutional* reform and its impact on regional disparities (Oi, J. 1999).

Table 1: Slected indicators and statistical measures of regional (inter-provincial) diversity in China, 2001

Provinces	Human Dimension			Natural Dimension			Economic Dimension			Infrastructure			Environment		
	Marriages with foreigners and citizens of Hong Kong, Macao, and Taiwan per 1000 marriages in 2001	**In-migrants from outside the Province** in % of total changes in household registration, 2001	**Births per woman age 15-19** (age-specific fertility rates, age 15-19), 2001	**Areas affected by flooding** in % of cultivated area, 2001	**Areas affected by draught** in % of cultivated area, 2001	**Average annual temperature** (based on main cities) *1	**Per capita GDP** 2001	Percentage of employed persons in **primary industry** (agriculture, forestry, etc.), 2001	Changes in the number of **domestic tourists**, 1991-2001	**Traffic Accidents** per 100,000 Inhabitants 2001	**Electricity consumption** in 100 Kw per yuan of GDP, 2001	**Daily disposal capacity of city sewage systems** in tons per 100 persons, 2001	**Economic losses due to pollution accidents** 10,000 yuan 2001	**Emissions of sulfor dioxide from daily life** in tons per yuan of GDP, 2001	**Nature reserves** in % of total area, 2001
Beijing	0.065	53.1	1.4	0.3	15.1	12.9	25,523	11.2	9.6	130.0	14.1	40.3	n.d.	26.1	5.1
Tianjin	0.028	33.7	2.3	1.0	19.2	13.0	20,154	20.0	2.6	100.3	13.5	27.7	14.1	37.6	11.4
Hebei	0.003	19.1	0.7	0.2	25.1	14.4	8,362	49.6	4.4	61.0	15.6	19.1	66.9	34.6	0.9
Shanxi	0.003	17.9	12.9	0.5	35.3	11.0	5,460	46.9	4.9	79.4	31.3	15.3	13.1	167.0	0.7
Inner Mongolia	0.007	14.3	4.4	1.0	25.2	8.2	6,463	53.9	-0.1	41.9	18.2	8.4	7.2	104.1	7.6
Liaoning	0.068	16.1	4.6	1.6	27.3	10.0	12,041	37.2	7.8	59.3	15.2	11.3	138.3	46.1	10.1
Jilin	0.154	10.5	3.1	0.7	36.5	6.1	7,640	50.7	1.8	60.7	14.5	7.8	3.5	36.7	10.8
Heilongjiang	0.108	10.3	4.3	1.0	18.0	4.8	9,349	49.6	2.1	34.2	12.8	32.2	227.3	20.5	7.8
Shanghai	0.212	58.2	3.4	15.9	n.d.	17.2	37,382	12.5	9.4	256.5	12.0	71.0	15.0	34.9	8.9
Jiangsu	0.018	27.9	2.8	2.1	9.5	16.6	12,922	41.4	24.6	73.4	11.3	38.9	39.1	6.4	5.2
Zhejiang	0.078	42.9	2.4	6.3	1.5	17.3	14,655	35.7	30.1	149.7	12.6	26.7	8,071.8	5.4	1.3
Anhui	0.016	6.5	2.0	1.3	26.1	16.8	5,221	58.7	13.1	47.2	10.9	24.9	263.7	14.5	4.1
Fujian	0.636	36.3	1.5	2.6	1.9	20.6	12,362	45.8	55.0	105.2	10.3	13.2	62.1	3.2	2.5
Jiangxi	0.042	7.5	12.3	4.2	9.2	18.2	5,221	51.6	12.1	43.8	10.2	15.6	126.8	21.4	2.9
Shandong	0.010	13.8	0.1	4.1	17.3	13.9	10,465	52.3	18.1	72.0	11.7	13.2	134.0	33.2	4.9
Henan	0.012	9.2	2.1	0.9	19.0	15.1	5,924	63.1	7.5	44.6	14.3	12.3	8.2	24.4	2.8
Hubei	0.034	10.7	2.8	4.8	34.4	18.0	7,813	48.4	5.0	34.2	11.3	20.3	53.7	12.0	3.1
Hunan	0.073	7.9	3.2	9.8	15.9	17.6	6,054	60.5	24.7	37.2	11.0	17.5	380.8	44.0	3.8
Guangdong	0.138	59.5	3.3	6.5	0.7	22.5	13,730	40.0	566.9	81.6	13.7	10.8	67.2	3.6	3.8
Guangxi	0.097	13.2	7.6	11.8	0.9	20.3	4,668	61.8	35.2	36.6	14.9	64.0	723.1	15.5	6.5
Hainan	0.204	39.0	15.8	5.5	1.4	24.9	7,135	60.3	16.3	30.9	7.9	26.9	15.2	1.2	5.1
Chongqing	0.082	15.4	9.1	n.d.	n.d.	18.8	5,654	54.7	2.1	46.6	12.6	8.6	61.6	87.2	9.7
Sichuan	0.037	8.0	13.4	3.6	16.3	17.3	5,250	58.8	16.3	47.5	13.3	8.1	196.9	43.8	13.0
Guizhou	0.028	16.9	26.8	2.4	6.8	14.5	2,895	66.4	11.0	11.5	30.9	1.8	151.8	746.4	2.6
Yunnan	0.016	30.1	26.9	3.6	4.4	16.0	4,866	73.6	33.7	46.8	15.5	25.5	192.2	30.4	7.1
Tibet	0.001	50.8	14.7	2.8	2.8	8.8	5,307	71.8	0.9	30.7	n.d.	n.d.	n.d.	n.d.	33.4
Shaanxi	0.014	18.0	4.9	0.5	18.2	15.0	5,024	55.7	1.7	37.3	17.4	4.9	108.0	41.5	2.9
Gansu	0.004	14.6	6.5	1.4	17.0	11.0	4,163	59.4	6.3	31.6	28.5	9.6	1,117.2	51.2	17.7
Qinghai	0.006	23.8	27.7	3.1	14.5	6.0	5,735	60.0	2.0	31.6	37.2	8.5	n.d.	38.0	28.6
Ningxia	0.007	28.5	22.8	0.2	12.6	10.1	5,340	56.5	0.2	242.7	50.9	22.9	0.4	106.3	4.4
Xinjiang	0.008	49.9	20.1	0.7	8.2	7.7	7,913	56.6	3.9	57.0	13.3	20.4	13.2	74.7	12.8
Minimum Value	0.001	6.5	0.1	0.2	0.7	4.8	2,895	11.2	-0.1	11.5	7.9	1.8	0.4	1.2	0.7
Maximum Value	0.636	59.5	27.7	15.9	36.5	24.9	37,382	73.6	566.9	256.5	50.9	71.0	8,071.8	746.4	33.4
Range	0.635	53.1	27.6	15.7	35.8	20.0	34,487	62.4	567.0	244.9	43.0	69.2	8,071.4	745.2	32.7
Average	0.071	24.6	8.6	3.3	15.2	14.3	9,377	50.5	30.0	69.8	16.9	20.9	438.3	63.7	7.8
Skewness	**3.8**	**0.9**	**1.2**	**2.0**	**0.4**	**-0.1**	**2.6**	**-1.2**	**5.4**	**2.3**	**2.3**	**1.8**	**5.1**	**4.9**	**2.2**
Kurtosis	**16.9**	**-0.5**	**0.2**	**4.2**	**-0.6**	**-0.5**	**7.6**	**1.6**	**29.9**	**5.2**	**5.3**	**3.5**	**26.4**	**25.3**	**5.3**
Diversity Index	**20.6**	**0.4**	**1.4**	**6.1**	**-0.2**	**-0.4**	**10.1**	**2.8**	**35.3**	**7.5**	**7.5**	**5.3**	**31.5**	**30.2**	**7.5**
Diff Max/Min in %	**55,108**	**821**	**27,610**	**8,302**	**4,881**	**413**	**1,191**	**556**	**809,943**	**2,124**	**547**	**3,775**	**2,017,850**	**60,008**	**4,539**

*1 Liaoning province includes city data for Shenyang and Dalian, Shandong includs city data for Jinan and Qingdao, and Guangxi includes city data for Nanning and Guilin.
Source: China Statistical Yearbook, 2002 (Beijing)

A few studies of regional and rural development in China have also included practical suggestions or even detailed **concepts on how to achieve a better regional balance** in China's development process. A most prominent example is the Western Development Program of the Chinese government (British Consulate-General, 2001; Filson, G. 2001).

3. Where are deficiencies and gaps in China's regional research?

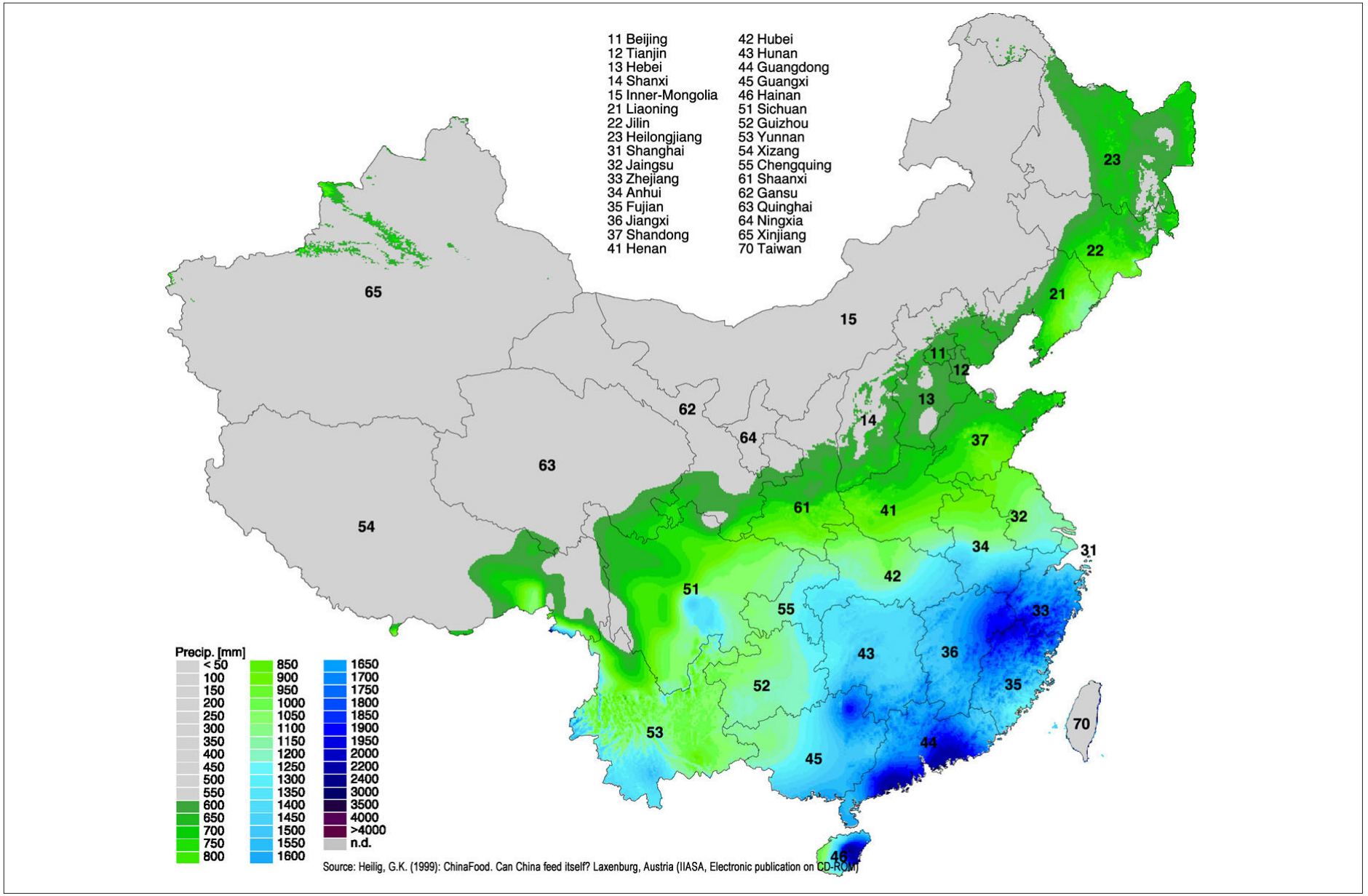
Research on sustainable regional and rural development in China, as reflected by the English-language literature, certainly spans a wide field of interests and methodological approaches. However, certain deficiencies and gaps are obvious:

a) Regional discrepancies, and in particular the gap between *rural* and *urban* areas, are primarily seen as **an *economic problem*, while other dimensions are often ignored or underestimated**. This neglect is particularly true for geographical and bio-geophysical conditions, which are hardly ever taken into account in economic analyses. For instance, Bao and co-authors have pointed out that in particular geographic factors have been "overlooked" and "not thoroughly discussed" in relation to China's economic modernization (Bao, et al., 2001).
China is a country of vast distances where large areas in the West are landlocked or separated from population centers by natural barriers (such as mountains or rivers). Even today, it takes almost two days to travel from Shanghai to Sichuan by train. This problem of distance is not only relevant in terms of market access and logistics – it is also a question of *social*, *cultural* and *political* distance. The ancient Chinese saying that the "emperor is far away in Beijing" characterizes this problem. Another, largely ignored, dimension of regional diversity in China is, of course, the climate. There is a strong gradient in precipitation from the Southeast (where precipitation reaches more than 3000 mm per year) to the Northwest, with almost no rainfall (see map 1). Consequently, large areas of China are arid or semi-arid, which not only severely restricts possibilities for agriculture or livestock production, but also affects water availability for industry and settlements. Many (economic) disadvantages in western China are simply related to the lack or extreme scarcity of rainfall. Yet another natural factor of diversity is the topography: much of China is covered by steep mountains and hills – which not only hampers or prevents agriculture (terracing), but also increases the costs of infrastructure construction and maintenance - in particular roads (see map 2). These natural conditions are reflected in China's population distribution (see map 3), which clearly mirrors the country's terrain and climate conditions. Most of the population is concentrated in coastal areas, in the North China Plain, and the Sichuan basin. However, there is also population concentrated along the Yellow river and in central and northeastern China, where precipitation is very low. Geographers are very familiar with all these natural conditions of China's regional diversity, but they have rarely *combined* the natural aspects with the analysis of economic, social and political divergences. Economic (or econometric) analyses of regional diversity, on the other hand, usually seem to operate in a *virtual* space, where all physical characteristics of the various regions have evaporated, and the regions are actually treated as *categories*, rather than areas with certain physical characteristics (an exception are Démurger, S. et al. 2002, who do *combine* economic and geographic variables).

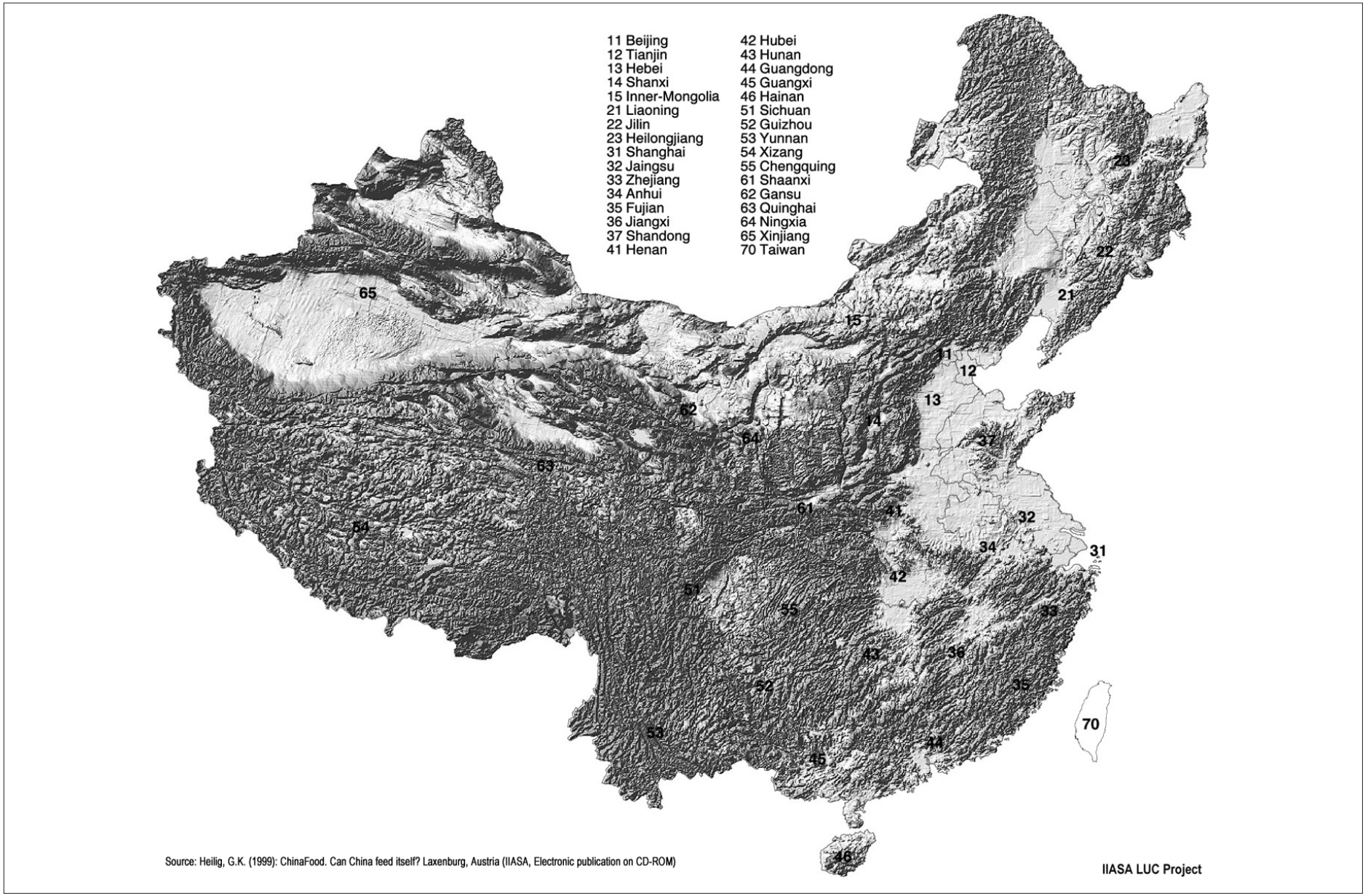
b) Another obvious deficiency in the reviewed literature is its **focus on the "diagnosis", while little is published on "therapy"**. Politicians, however, are not so much interested, *why* regional divergences are so big in China, but *what they can do* about it. They need recommendations on how to reduce the income gap between rural and urban areas; and they need viable ideas for income *alternatives* in rural areas, so that the huge agricultural excess population would not migrate to coastal cities in search for labor. What regional planners and decision makers need is scientific support for the development of rural and regional development concepts.
Currently, the Chinese government is focusing on *largest-scale* infrastructure projects in its Western Development Program – such as the south-north water diversion, the Qinghai-Tibet railway, west-to-east natural gas pipelines, north-to-south highways, and high-capacity power generation and transmission lines (in particular from western parts to the population centers in the South and East). These top-down projects, designed and implemented by the central government in Beijing, are in the tradition of centrally planned campaigns and mega-projects (such as the Three-Gorges dam). While they may provide essential infrastructure for regional development in China, it surely needs additional *bottom-up* development schemes, devised and implemented by the counties and regional governments. This *intrinsic* regional development can only work, if it is initiated by *regional* politicians and planners and driven by the local business community. Unfortunately, bottom-up development in China often lacks a strategic vision and is poorly coordinated. In many regions of China one can see the replication of costly prestige projects - from unnecessary town halls to oversized water treatment facilities (which are sometimes not even connected to the sewage system). In more prosperous regions, counties and towns often compete with each other by building enormous industrial parks and business centers, which later stand half empty due to lack of (foreign) investors or customers. China would need coordinated *regional* development plans with a long-term perspective for bottom-up local development. Applied regional research could contribute to these efforts.

c) The third obvious deficiency in China's regional research and planning **is the lack of reliable, easy-to-access *regional* data**. While it is straightforward – even for a foreigner – to get relatively detailed *province-level* information, access to *county*-level data is difficult, costly or impossible. Unfortunately, China has not (yet) overcome the tendency of keeping regionalized economic and social information secret, biased or so vague that it is meaningless. This, of course, is not a problem restricted to China. Europe's bureaucratic and (for the user) excessively expensive statistical data service by EUROSTAT is an example that China should *not* follow. While the lack of detailed regional data may be a nuisance for (foreign) researchers, it is a serious handicap for local politicians, development planners and – especially – private entrepreneurs. The enormous advantage of free and straightforward access to statistical information (concerning all spheres of life) can be studied in the United States of America, where *everyone* (even from a *foreign* country) can access the most detailed statistical information at *regional and even local levels* – directly through the Internet. Quite detailed statistical data is even available at the block-size level, which may consist of only a few dozen *households*. This easy access to statistical data has not only triggered a huge information industry, which is providing various data products and specialized analyses to their regional or local clients, but has also promoted numerous regional and local studies of academic researchers.

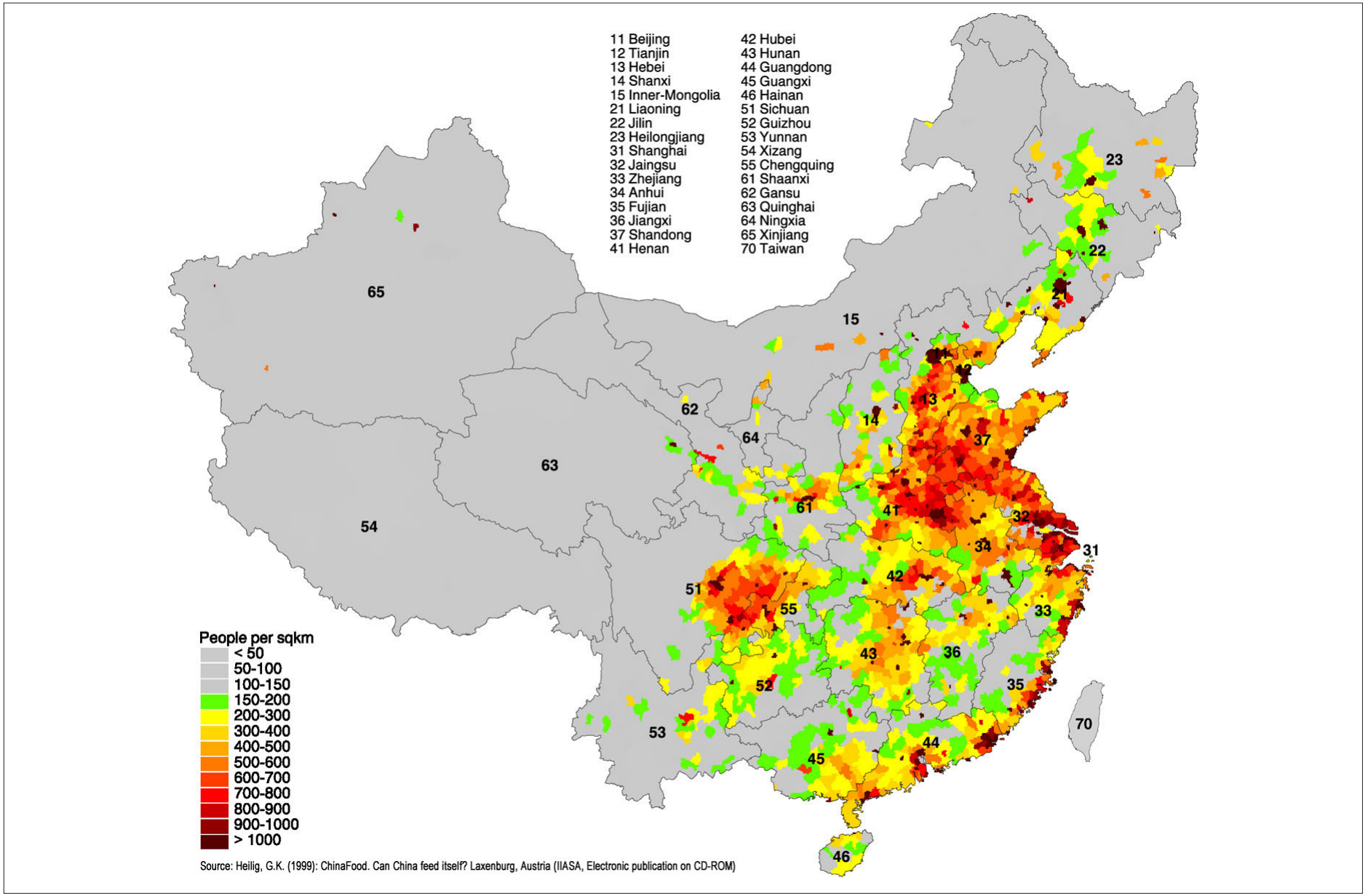
Map 1: Average annual precipitation in China: Areas with more than 600 mm precipitation per year (minimum for rainfed agriculture)



Map 2: Digital elevation model (DEM) of China: Shaded relief map



Map 3: China's population density by County in 1992: Only areas with a population density of more than 150 people per km^2



Map Explanation

Map 1 shows the distribution of annual precipitation in China. However, the map only includes those areas, where average precipitation is more than 600 mm per year (all other areas are intentionally left gray). This is a critical threshold for agriculture, because rainfed agriculture is usually not possible with a precipitation level of below 600 mm. If this "rule-of-thumb" for rainfed agriculture is correct, the map would indicate that very large areas in the provinces of Shanxi, northern Shaanxi, Ningxia, or parts of Hebei province, western Jilin and Liaoning provinces are unsuitable for rainfed agriculture - in addition to all western (with exeption of a few small valleys) and all north-western provinces. In particular, it is interesting, that the 600 mm threshold is very close to the west of Beijing and the North China plain, which are the main population and agricultural centers of China. This partly expains the very fragile agro-climatic situation in these areas.
Sources and technical details: The map is based on a gridded climate database of China, which was developed by IIASA's LUC project in collaboration with the Potsdam Institute for Climate Impact Research (PIK). It has a grid-cell size of 5 km for monthly mean precipitation and temperature and minimum and maximum temperature for the region of the Former Soviet Union, Mongolia and China. IIASA's LUC project provided W.Cramer at PIK with the longitude, latitude and altitude information of each 5 km grid cell and he performed the interpolation procedure for the climatic data, using a methodology described in Leemans and Cramer, 1991. For China the yearly precipitation map had inaccuracies in the difficult terrain of south-western China on the Tibetan plateau where only few station data are available. Therefore, in this area apparent inaccuracies in yearly precipitation were manually corrected in a GIS environment, using hardcopy atlases from a Chinese source (see: Institute of Soil Science, 1986). The annual changes were translated into the monthly rainfall data applying the same ratio of yearly distribution as the original data.

Map 2 displays the shaded contour of a Digital Elevation Model (DEM). It is based on the 30 Arc seconds (approximately 1 kilometer) elevation grid data from the EROS data center. It shows that China is a very mountainous country. Only few areas in the East and North-East and in the North-West are flat and of low altitude. In fact, much of the East China plane is only a few meters above sea level, which makes the area highly vulnerable to a possible sea-level rise due to climate change. In the Northwest the flat plateau of the Gobi desert is visible, which is surrounded by steep mountain slopes.
Source: U.S. Geological Survey, EROS Data Center: GTOPO30 Digital Elevation Model (Data downloaded from EROS web site)

Map 3 is based on county-level data from the Chinese household registration system (hukou). It displays the population density in 1992. However, we have only colored those counties, where the population density was higher than 150 persons per square kilometer (all other areas were intentionally left gray).
Source: People's Republic of China (1993): Population by County and City. Beijing. Ministry of Public Security

Detailed regional and local statistical information is especially important and valuable for the market research of businesses. Only with reliable demographic and income statistics can they estimate the potential number of customers or the purchasing power of a region. Regionally operating businesses need this market information if waste and inefficiencies should be avoided. The same is true for infrastructure planning. If China wants to *de-centralize* development and promote *bottom-up (private) initiatives*, it must provide the necessary information not only to (regional) government officials, but also to private businesses and developers – and to independent scientists, who can contribute their ideas and concepts for China's regional and rural development.

4. What are interesting research questions?

In this paragraph we will discuss some ideas for regional and rural research that would be attractive not only from a scientific point of view, but would be also relevant to political decision makers. Each idea is outlined only briefly; detailed methodological discussions of selected research problems will be undertaken elsewhere.

1. One of the most frequently raised questions in regional research concerns the **causal factors for regional disparities.** Why is there such a big gap between coastal and interior provinces; why are agricultural incomes stagnating or falling, while the average income in urban industry and service sectors are rising? Some economists have argued that this is primarily due to the modernization of the economy and differences in infrastructure investment (Démurger, 2001). Others believe, foreign direct investments (into industry) are responsible for the discrepancies. A few authors have emphasized geographical factors. What is missing is an *integrated* analysis (Heilig, 1997 and 2002), that takes into account a broad range of factors – including economic, demographic, social, and political factors, as well as infrastructure investments and geo-biophysical conditions.
2. From a political perspective, the most pressing problem is probably the lack of income alternatives in rural areas, particularly in the central and western provinces. China's leaders are concerned that the huge agricultural *excess* population (of perhaps more than 200 million) will eventually try to migrate to urban and industrial centers in the East and South, which may cause serious social, economic and political frictions with the original urban population (particularly with the new urban unemployed, that were released from state-owned enterprises). The core problem of the migratory pressure from rural to urban areas is the lack of *non*-agricultural income alternatives in the countryside. It would be interesting to systematically collect and **analyze *successful* economic initiatives outside the agricultural sector in China's rural areas**. This could lead to a case study collection of "best practices" for the various regions. There are many related questions such as: For which areas is tourism a viable alternative? Could foreign direct investment be encouraged for interior and rural provinces? Can economic development in rural areas be triggered by investments into infrastructure?
3. The lack of non-agricultural employment in rural areas is, of course, not a new problem. Since the foundation of the Republic several attempts had been undertaken to promote the industrialization of China's interior provinces. Most well-known is the

campaign for *village industrialization* during the "Great Leap Forward", which failed dramatically. One can still see the remains of steel furnaces crumbling in Chinese villages. The campaign badly hurt the agriculture without speeding up industrialization. Even before, in the 1950s (heavy) industries, often from the defense sector, were established in western and central provinces by Mao, who believed they would be safer there than on the coast. Today, many of these large state-owned industries are highly unproductive and just another burden in China's economic modernization.
It is obviously not so easy to initiate industrialization in places, where it does not emerge by itself. Failures such as these, and some principal theoretical considerations, have motivated economists to suggest a completely different development model: Not the work should be moved to the people, but the people to the work. Their credo is the free migration of rural populations to the urban-industrial centers. Obviously, this raises an interesting question: What is more *efficient*: to concentrate development in the most suitable places (this is the idea of "special development zones") and allow large-scale labor migration? Or, to promote economic development *everywhere* (including the rural areas and the western and central parts of the country), so that people can find work where they live? Economists have considered this **optimization problem** frequently, however - as can be expected - primarily in *economic* terms. It would be interesting to also evaluate the *social*, *demographic* and *political* advantages and disadvantages of the two development concepts.

4. Another problem in China's rural areas is the **structure of agriculture**. Average farm size is *extremely* small - in many parts of China less than one hectare. This may be sufficient to feed the farmer's family, but leaves little room for market production. As a consequence, millions of farmers have very little *monetary* income. They are simply short on cash. If they want to buy modern consumer goods or advanced agricultural inputs, they (or their sons and daughters) have to find *non*-agricultural labor in the next town or city. In other words: a large part of China's agriculture is traditional subsistence farming, which contributes little to a modern economy. We have a similar situation in some countries of Eastern Europe such as Poland, where a large number of small-scale farmers either lives very poorly at the subsistence level or depend on income sources from outside agriculture. In the long run, there is only one solution to this problem: farm sizes must *increase* to allow competitive market production – at least in those areas, where the natural conditions are suitable for commercial agriculture. With China's special situation in land ownership (where farmland is formally owned by the state, but rented to the farmers according to need) it will be difficult to solve this problem. The system minimizes the landless rural population, which is certainly a great achievement (in history, landless rural population was always a factor of political and social unrest and conflict). But the system is also inefficient, which – in the long run - undermines the primary economic basis of the countryside. China must find a way to increase average farm size, *without* creating an "army" of landless rural inhabitants, who have little chance of finding employment outside agriculture. It is certainly a most relevant and interesting research question, how this could be achieved.

5. The regional distribution of economic development has also many political implications. We have already mentioned the problem of growing income disparities between rural and urban areas – which could fuel discontent and unrest among the

rural population. But there are other political implications, in particular the situation of **ethnic minorities**. For the past decades China has avoided serious *ethnical* conflict – at least as it appears from the outside. (Some colleagues might disagree with my assessment, but I believe that China has at least avoided the kind of violent ethnic / religious conflicts that have plagued Europe from Northern Ireland to the Basks areas and down to Israel and Palestine.) This relatively peaceful situation might change, if disadvantaged regions overlap with the traditional settlement areas of certain ethnic groups. It might be a very good long-term investment to promote *real* economic development particularly in places like Tibet, Inner Mongolia, or Helionjiang, where significant ethnic minorities live under clearly disadvantaged conditions. A regional development strategy for China should certainly incorporate such ethnic considerations. Regional research could help identify the *critical* regions and develop *specific* measures for reducing disadvantages for ethnic minorities.

6. Since China has opened up to the global economy, ***outside* economic factors** begin to play a role in the country's *regional* development. This is particularly obvious in foreign direct investment, which is heavily concentrated in a few coastal provinces, especially in the southern province of Guangdong. Provinces in central and western China receive almost nothing. It is certainly an interesting (and highly relevant) research question to study the reasons for this concentration of investments. Is it the availability of qualified labor, good infrastructure, short distance to oversea harbors? Or, do other factors play a major role – such as family ties, regional promotion schemes, etc.? What could be done to attract foreign direct investment to lagging regions and rural areas? So far these questions have often been analyzed in economic terms, but it seems that social, cultural and personal factors also play a major role for the investment decisions of foreigners in China.
7. A special outside factor that certainly will affect China's regional development in coming years is the country's **accession to the World Trade Organization**. WTO's import tariff systems will favor the production of certain agricultural products and "punish" others by lowering prices. These impacts will be different for the various agricultural regions in China - simply because production conditions for various crops are also different in these regions. For instance, in one region wheat production might be competitive at the international level, while in another region chances may be better for soybeans or cotton – depending on environmental conditions, the level of agricultural technology, etc. In other words: international market conditions will affect the competitiveness of various regions. With cheap imports for maize or soybean from international markets certain regions might get into trouble. These relationships can be studied with regionalized economic models (Lu, W. 2002).
8. Finally, an *applied* research idea should be mentioned that could serve regional policy making and planning. The lack of reliable, easy-to-access regional statistics in China was already mentioned above. A **GIS-based regional database and interactive data retrieval system** could certainly improve this situation. The regionnal and local statistical information available in China is dispersed among numerous statistical reports and data sources (with often contradicting data). This makes it difficult or impossible for politicians, planners, researchers, and businesses to find and access detailed regional or local statistics. As outlined above, China would greatly benefit from a *unified*, clearly structured and integrated system of

regional and local statistics that can be easily accessed via the Internet (according to the US model). An applied research project could develop the prototype of such a system, which might later be implemented in expanded or modified form by official statistical agencies. The main objective in this research would be to develop a "show-case" system, which utilizes the technology of the information age - rather than a traditional paper-based statistical yearbook approach. This would include *electronic* data sets, Internet technology (html- or xml- formats), embedded GIS links, *interactive* data access, CD-ROM distribution, etc. The research should demonstrate the state of art in electronic data dissemination.

5. Conclusion

All experts agree that *sustainable* regional and rural development in China is only possible, if the enormous regional diversity is taken into account in development concepts. Like Europe, China has all possible extremes in climate (from the desert to the hot tropics), terrain (from the Himalaya to the North China Plain), population (from the staggering population density of Hong Kong to the almost empty Goby desert), ethnic composition, and infrastructure availability. It is therefore essential, that detailed regionalized analyses are undertaken for understanding the specific development constraints and options of various regions. Economic performance by itself is an insufficient indicator for understanding this regional diversity. The analysis has to include the whole range of dimensions (from physical to social and political conditions) that determine a regions development potential.

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