China Council for International Cooperation on Environment and Development (CCICED)

Good City Models
Under the Concept of Ecological Civilization

Urbanization Development Pattern and Institutional Research in the Context of Ecological Civilization

CCICED Special Policy Study Report

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Report Summary

China's urbanization will continue to be at an enormous scale, characterized by quick changes and a short window to implement policies. The policy objectives include the permanent settling of 100 million migrant workers and their families; improved housing for another 100 million urban dwellers; rural-to-urban migration and new employment for yet another 100 million people. The target is to reach these goals before 2020, soon after which population aging will have shrunk the possibilities for undertakings at this scale. This development places a great burden on environmental and natural resources in and outside China. At the same time, it offers the opportunity to apply the best insights about how to reach an Ecological Civilization and a Beautiful China.

Key Findings

The key challenges China faces in working towards an Ecological Civilization are:

1. Due to **lack of coherence** among government bodies, the current planning system fails to sufficiently protect the environment and control the use of natural resources.

2. Urbanization is fast and expansive, leading to excessive resource consumption that **cannot be sustained**. Growth causes significant damage and risks when it intrudes into natural areas such as mountain areas and river flood beds.

3. Urban development does not take **climate change** into consideration. Chinese cities are therefore unprepared for an increase in extreme weather events such as heat waves and floods.

4. Large scale and fast construction of residential housing causes a **loss of environmental services to inhabitants**. This is exacerbated by liveability problems related to urban design and building typology.

5. In many rapidly expanding agglomerations, the **urban transportation system** is unbalanced and a major cause of air pollution. This self-perpetuating problem quickly escalates.

6. The natural and cultural heritage of cities is being lost at a large scale, eroding their **identities and attractiveness**. Liveability and the human scale are weak in current Chinese urban design and are under further pressure due to lack of coordination, imbalances in planning and increase in automobile traffic.

7. China **lacks regulatory and fiscal mechanisms** to incentivize efficient resource use and recovery. Efforts to promote judicious use of natural resources in urbanization are handicapped by the multitude of agencies to be coordinated and an absence of clear sustainable development guidelines from the central government to provincial and municipal governments.

8. **Mechanisms for public participation** in environmental aspects of urban development are in need of updating and improvement to encourage people-oriented urbanization.

This Special Policy Study analyzes these challenges, in the light of international experiences. From this analysis, the following was found.

Firstly, the findings support the need to **integrate sectoral and spatial policies** at the city level. Integrated diagnostics should become the basis for improving policy coherence, increasing public participation and measuring performance.

Secondly, this study underlines that around the globe, **cities lead** in their own development and on other issues. The national level in China should create a holistic framework to support urbanization at the provincial and local levels.

Thirdly, this report underlines that due to the multitude of dimensions to consider, there is no single best city model. Despite this, there are **key issues** that should be considered in every well-planned urban design.

Fourthly, it finds that urban spatial layout **endures for centuries**, and buildings are generally financed and endure for several decades. Therefore, sound planning must allow room for foreseeable future needs such as new infrastructure and new public facilities to care for an older population.

Finally, this study identifies the need for Chinese cities to base their development on stable **financial resources** more than is currently the case. This should reduce over-reliance on land development as a source of local public finance.

Summary of Main Policy Recommendations

Know what is going on and set objectives and limits based on integrated spatial planning

- Establish and improve a spatial control system at the provincial and municipal level to promote efficient developments in the urbanization process and protect ecosystems. At the provincial level, establish ecological redlines.

- Prioritize an urban spatial layout favouring the health of the environment and its residents.

- Strictly implement of national standards for the per capita built-up area. Check unreasonable growth and random sprawl. Encourage re-use of existing buildable land and old building stock.

- Promote regional collaborative governance. At the city level, use a selection of existing pilot cities to test multi-sectoral collaboration for ecological civilization.

Plan for financially-sound and adaptive development

- Financing for local government operations and initiatives must become much more independent from selling and developing land. Alternatives should be explored such as rule-based transfers from the central government's budget. When land markets are set up in China, provision should be made to ensure that environmentally sensitive or high priority green space lands will remain in public control.

- Greater attention should be given to climate resilience and other urban environmental planning issues within an adaptive risk assessment framework.

- Cities should be permitted and even encouraged to engage in green bond markets as a means to invest in green urban infrastructure.

Adhere to people-oriented urbanization

- Provide administrative officials, especially mayors, with more in-depth training on implementing resource-saving, environment-friendly and low-carbon green development. Support public awareness campaigns and urban educational initiatives under the concept of ecological civilization.

- Let the human scale prevail in urban design. Promote and ensure cities' own identities through deliberate protection of natural and cultural heritage.

- Establish a system to monitor and assess urban developments in relation to environment, nature and resources. Establish a fuller set of environment and resource use targets for the performance evaluation of city officials. Regularly publish up-to-date projections and assessments of future health risks to urban populations. Provide a reliable legal basis for public participation in urban social governance.

Contents

1. THE FEATURES AND IMPACT OF URBANIZATION ON REGIONAL RESOURCES AND ENVIRONMENT

1.1 Trends in Urbanization in China

At the end of 2013, the urbanization rate in China was 53.7%, a growth of 4% since 2010. The average annual increase of 1.3% represents the migration of 18 million people per annum which is a speed and scale of growth rarely seen in the world. This massive migration from rural to urban China impacts the structure and spatial planning of cities and towns throughout the entire country.

1.1.1 Migration and Social Change

1.1.1.1 Gradual shift from large-scale cross-region to inter-regional migrations

China's long-distance, large-scale population movements associated with rapid urbanization have continued for almost 20 years. By the end of 2013, 62%[1] of laborers were migrant workers. Mega-cities, such as Shanghai, Beijing, Shenzhen, Dongguan, attract over 43.5 million floating workers, which accounts for 51% of inter-provincial migrants. Rural populations, especially the young, are hoping to move to mega-cities.

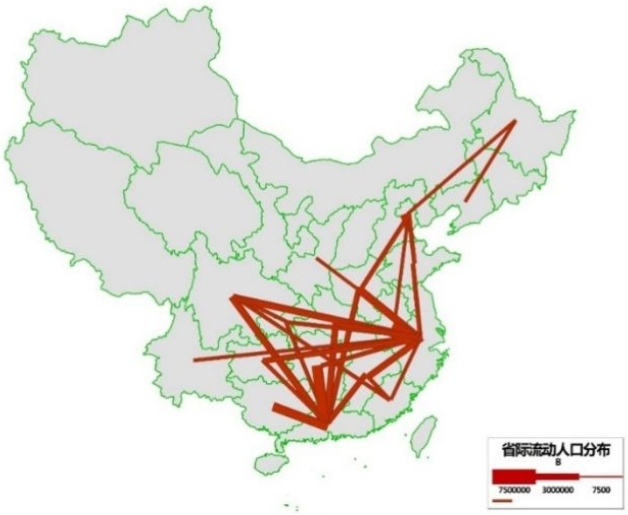


Figure 1-1: Direction and scale of inter-provincial population flow in 2010

Scale above 500,000 migrants per year.

Source: Drawn by author, according to statistics of the 6th demographic census

China's aging population will result in a reduction of the total workforce and a narrowing of the wage gap. Future population movements will vary from region to region and will tend to move within the county. Inter and intra-regional movements

[1] Source: 2013 Annual Monitoring Report of Migrant Workers

will center on economically developed urban clusters, with an inflow of population from nearby provinces. For example 2013, 78% of the migrants from Anhui province entered the Jiangsu-Zhejiang-Shanghai region; 85% of the outflow from Guangxi and 64% of outflow from Hunan entered the Guangdong province; 66% of the migrants from Hebei entered the Beijing-Tianjin region. At the same time, there has been a significant increase of intra-regional migration within provinces, which increased from 47% in 2008 to 53% in 2012[2].

1.1.1.2 Living in both the city and the countryside, working in industries and in the fields

A large percentage of the rural population is employed in non-agricultural sectors in nearby counties or small towns[3]. These people live in rural areas and commute daily to their work. With the economic growth in counties and towns, non-farming employment opportunities have grown rapidly, prompting an increasing number of rural laborers who choose to work close to home and commute daily. According to a survey across 20 counties by the China Academy of Urban Planning and Design, 80% of people over 40 work near their residences, in farming and non-farming occupations. This statistic increases to over 90% for people above 60 years of age. At the same time, with increased savings and advancing age, more and more migrant workers chose to return home; and more rural households invest in homes near towns while still retaining their rural housing. Despite these movements, the continuous migration away from rural areas, and an aging population means that villages are likely to continue to be increasingly abandoned.

Table 1-1: Survey of employment sectors for rural workers in 2013

	Farming	Farming & manufacturing	Local manufacturing	Migrant worker	In school or army
16-19 years old	3%	2%	5%	15%	75%
20-29 years old	9%	9%	23%	46%	12%
30-39 years old	13%	25%	26%	34%	2%
40-49 years old	22%	37%	20%	20%	1%
50-59 years old	30%	43%	15%	9%	3%
60-64 years old	37%	46%	8%	4%	5%

Source: Research data collection of CAUPD in 2013 in 20 counties in China

[2] Source: 2008 and 2012 Annual Monitoring Report of Migrant Workers

[3] For a detailed overview on rural-urban development in China, see China Small and Medium Towns Overview. International Bank for Reconstruction and Development / The World Bank, Washington, D.C., 2012.

1.1.1.3 Separation of families and aging population are becoming prominent social issues

China's urbanization has resulted in separation of families among migrant workers. High housing costs and living expenses in large cities make it difficult for migrant workers to move with their families. Only 0.6% of migrant workers are able to become home owners in the cities where they work. Migrants often suffer from prolonged separation from their families, especially between migrant worker parents and their children. A large number of elderly parents, women and children are stranded in rural areas, often without any able-bodied younger family members to take over farming responsibilities.

Issues associated with the aging population have become more pronounced. In 2011, the number of people over 60 was 178 million, or 13% of the total population. In rural areas the percentage was 15%, 2% higher than the national average. In the future, the proportion of the population over 60 will increase 0.35% per year. After 2030, the proportion of people over 60 will exceed 20%. China will reach a turning point for population dependency in 2015, when the elderly population will exceed that of the children. This will put considerable burden on Chinese society.

1.1.2 Characteristics of Population and Industry Clusters

1.1.2.1 Pattern of agglomeration in coastal and mid-western regions

At present, the Yangtze River Delta, Pearl River Delta, and Beijing-Tianjin-Hebei regions have the highest population density with the largest clusters of cities and towns. These urban regions are anchored on key cities with international influence (Beijing, Shanghai, Guangzhou, and Tianjin) with smaller cities in key supporting roles. This forms a pattern of "multi-centered and urban networked regions". In the future, urbanization will continue in these locations, which are key regions for China in terms of their global competitiveness. These regions will increase their pace of industrial upgrading by attracting technical professionals instead of manufacturing laborers. The national economic development strategy shift from export oriented development in coastal regions to balanced national development will create more opportunities for cities in the central and western regions of China. China is actively promoting the Yangtze River Economic Belt and the Silk Road Economic Belt. Border Region Opening-up and Development strategies are generating development opportunities in inland urban agglomerations, along regional transportation corridors and in border ports. New urban clusters will gradually form in the Yangtze River area, the Chengdu-Chongqing area and the Central China area.

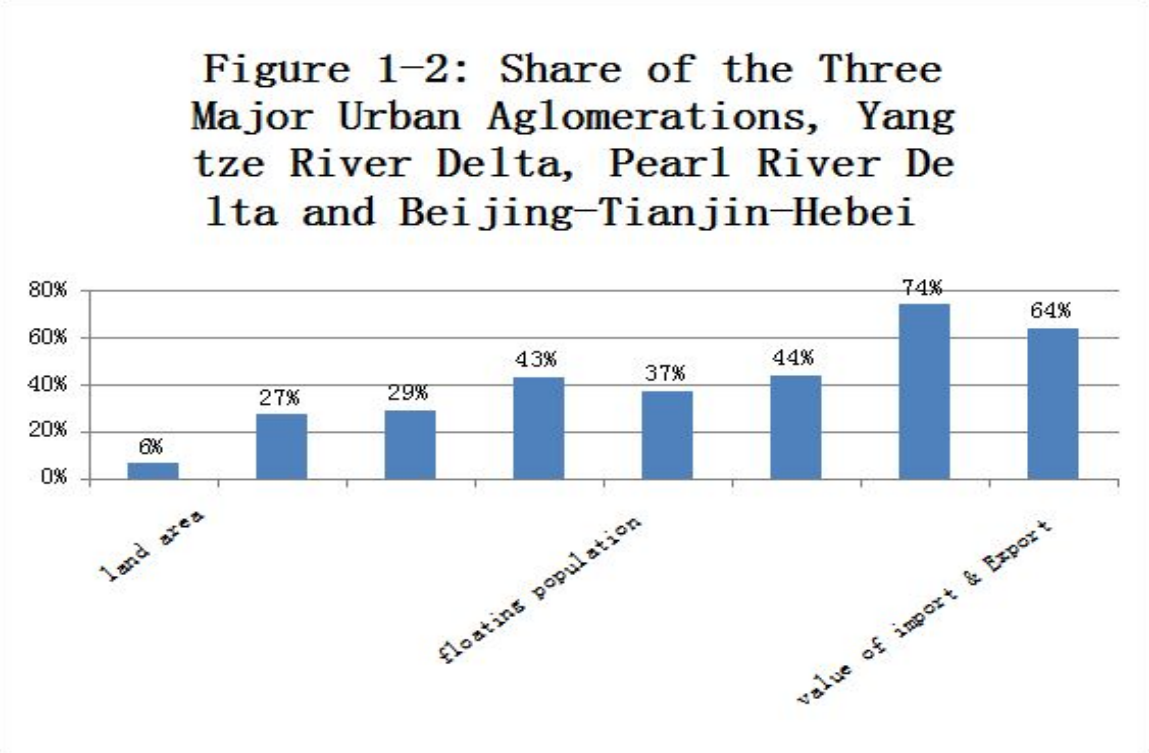
1.1.2.2 Pattern of towns agglomerating around central cities

China has gradually formed a development pattern that focuses on towns clustering

around cities. While the upgrading of the industrial structure in central cities allowed them to become service oriented economies; the processing and manufacturing industries have shifted to less expensive parts of Western and Central China.

1.1.2.3 Pattern of agglomeration in counties

In recent years, county towns have increased their population and industrial capacity. In 2010, the proportion of urban population growth in county towns in central and western regions was 70% and 60% of the region's total urban population growth. Rural migrants and investors for new businesses have been attracted by the rapid development of industrial park sites and the availability of key social services, especially education and medical services. Despite these gains, small towns have much poorer service levels compared to larger cities. For example, in 2011 in smaller towns there were only 2.8 hospital beds per thousand, far below the average in large cities of 6.2 beds per thousand.



Source: CAUPD Report 'Optimizing the Layout and Pattern of Regional Urban Agglomerations

1.1.3 Development Trends and the New Demands of Urbanization

1.1.3.1 Projection for the scale and speed of urbanization in 2020 and 2030

Population projections indicate that overall China's speed of urbanization will slow down, but that the urbanization in Central and Western regions will speed up significantly. In the Central and Western regions the urbanization rate is expected to

increase by 0.8 to 0.9 percent annually between 2013 and 2020, reaching 60% urbanization in 2020. The national annual increase is expected to be lower at between 0.4 to 0.5 percent after 2020, reaching 65% urbanization in 2030. Even though the speed of urbanization will slow down, the growth is still huge. The urbanization processes which took place in OECD counties over a period of 100 to 150 years are happening within 15 to 20 years in China, which is a compression of "space-time"[4]. China's urbanization will face enormous challenges for a long time in the future.

1.1.3.2 Employment and accommodation demands of rural migrants

Before 2020, 100 million additional migrant workers and their families will settle in cities and towns, the housing and living conditions for 100 million people residing in urban areas will have been improved, and employment will have been provided to 100 million people who will transfer from rural areas to cities and towns. To solve the "citizenization" of such massive migrant populations, the *National New Type Urbanization Plan* (2014-2020) proposes ways to diminish the gap between census registered urban populations and the permanent resident urban population, from 18% in 2013 to 15% in 2020.

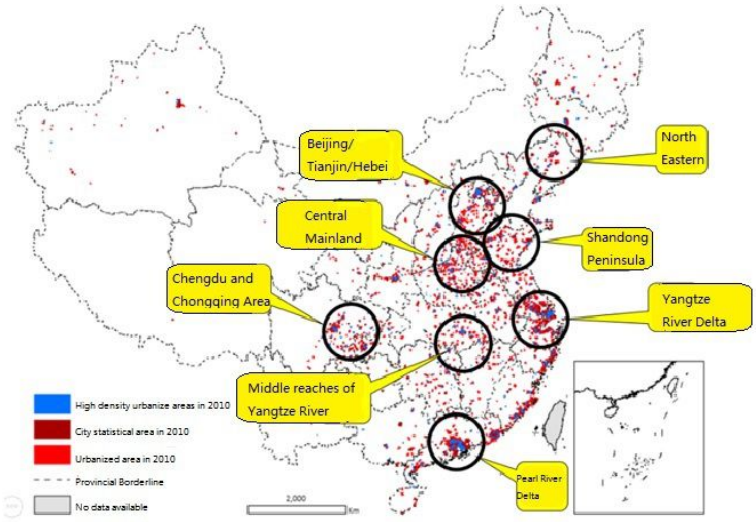


Figure 1-3: Distribution of Eight 100-Million-Population Urban Agglomeration Regions

Source: BCL data base of population density (county, town and street)

[4] Marcotullio, Peter. Urbanization, Biodiversity and Ecosystem Services: Challenges and Opportunities. Springer Open. 2013.

1.1.3.3 New demands of the existing urban population

The urban middle class is one China's fastest growing demographics. This group demands improved quality of life and more diversified consumer products. The growing demands include matters such as living space, living environment, expenditures on health care, education, culture, entertainment, fitness, recreation and spaces for social interactions. The consulting group Euromonitor forecasts the growth of the middle class[5] in China, India, Brazil, Indonesia and other countries. China's middle class is expected to increase from 18 million in 2000 to 200 million in 2020.

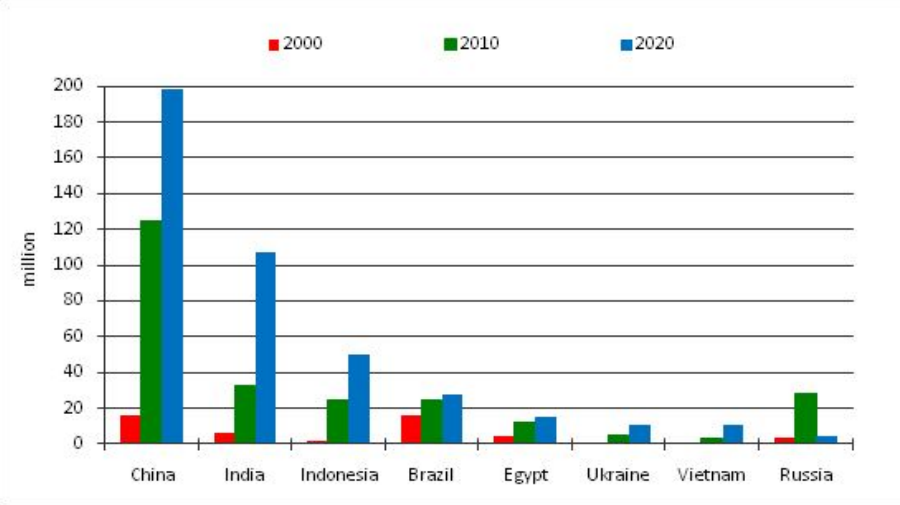


Figure1-4: Development of the size of the middle class

Source: Euromonitor

The chart by Euromonitor (2010) provides comparative figures about the size of the middle class for three decades starting in 2000.

Taking stock of vacant lands:

There is significant inefficiency in urban land use. According to the Ministry of Land and Resources, the amount of underutilized lands in China's cities and towns account for 5000 km^2, which is 11% of the total built up urban area. In 2012, vacant land accounted for only 5% of the total land approved for development.

Taking stock of vacant houses:

The Urban Housing Vacancy Rates and Housing Market Trends survey conducted by Southwest University, suggests that the overall vacancy rate of China's urban housing market reached 22% in 2013, up 1.8 percentage points from 2011. Even after accounting for renovations, sublets and special rural housing, the percentage is still 18%.

[5] According to purchasing power, with average annual household income between USD 5000-15000.

1.2 Urbanization will increase pressures on land resources, the environment and municipal finances

1.2.1 Steady Increase in Pressure on Ecological Resources

China's process of rapid urbanization, will produce an extra housing demand of 450 million square meters and a demand for 120 to 150 million cars. This will spur significant production of steel, cement, building materials and mineral resources.

Energy and water consumption is growing in cities and towns. At the present time, although China's GDP per capita is half of world's average, the consumption of energy per capita is the same as the world's average. Demand for water and the pollution caused by inadequate wastewater treatment in urban centres is putting pressure on the country's limited water resources, particularly in eastern China.

Urban expansion reduces space available for the regeneration of plants, animals and other biota, which has led to a substantial transformation of the natural environment. In addition, the increased demands of urban residents for leisure, exercise and sports will put a strain on the natural environments of the cities' surroundings.

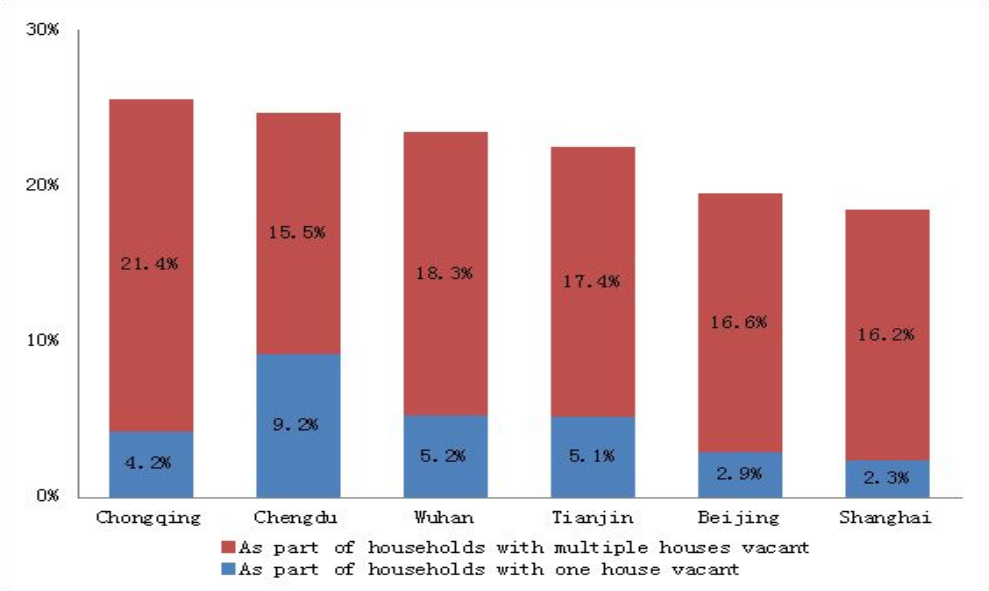


Figure 1-5: Urban housing vacancy rates in six cities

1.2.2 Environmental pollutants will continue to increase and spread to surrounding regions

With the shift of China's industrial economy from the coast to inland along with accelerated development of inland towns and cities, China's pollution will gradually shift from the coastal to inland regions. As China's major rivers flow to the west, the

transfer of industries upstream along rivers is bound to increase the pressure on these water resources. Pollution will gradually expand from cities to the countryside. In recent years, persistent atmospheric haze across regions means that health problems are becoming more prominent for urban and town residents. This will increase the burden on public finance and households for medical expenses. Over the past 30 years, the rate of malignant diseases caused by water, land and air pollution have skyrocketed. If environmental quality continues to deteriorate there will be alarming consequences.

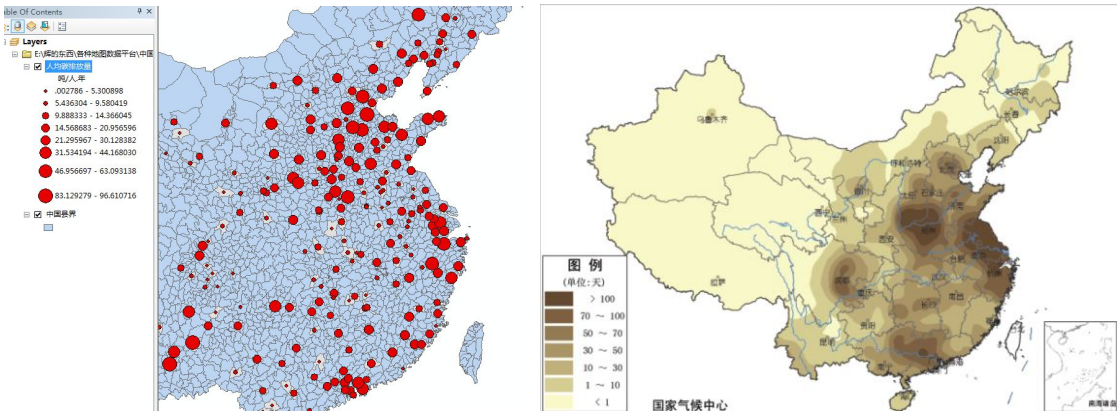
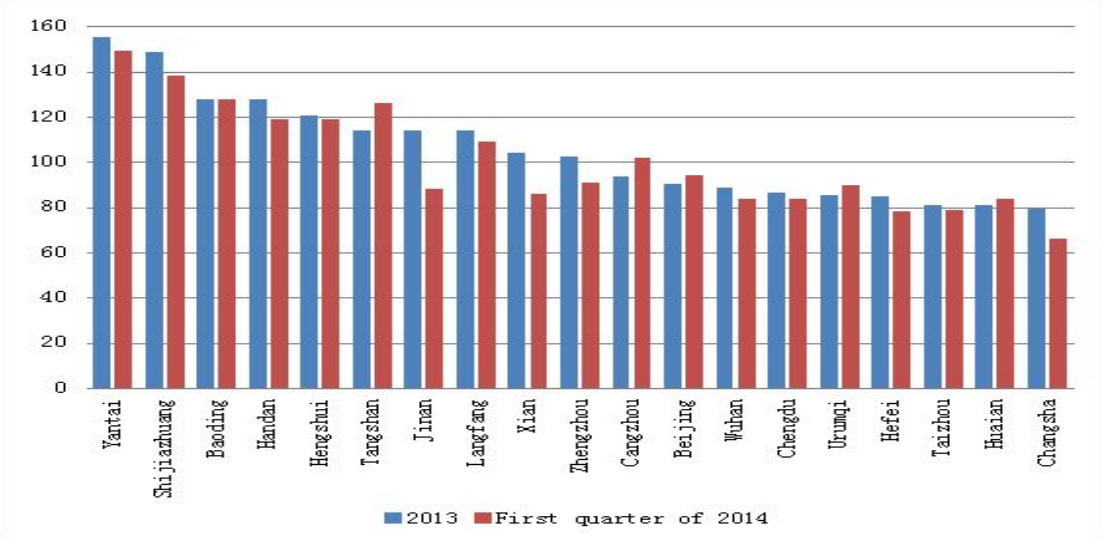


Figure 1-6: 2013 Per capita carbon emission (tons/year) and the number of days of heavy smog

Source: Left, drawn by author according to local statistic yearbooks. Right, National Climate Center

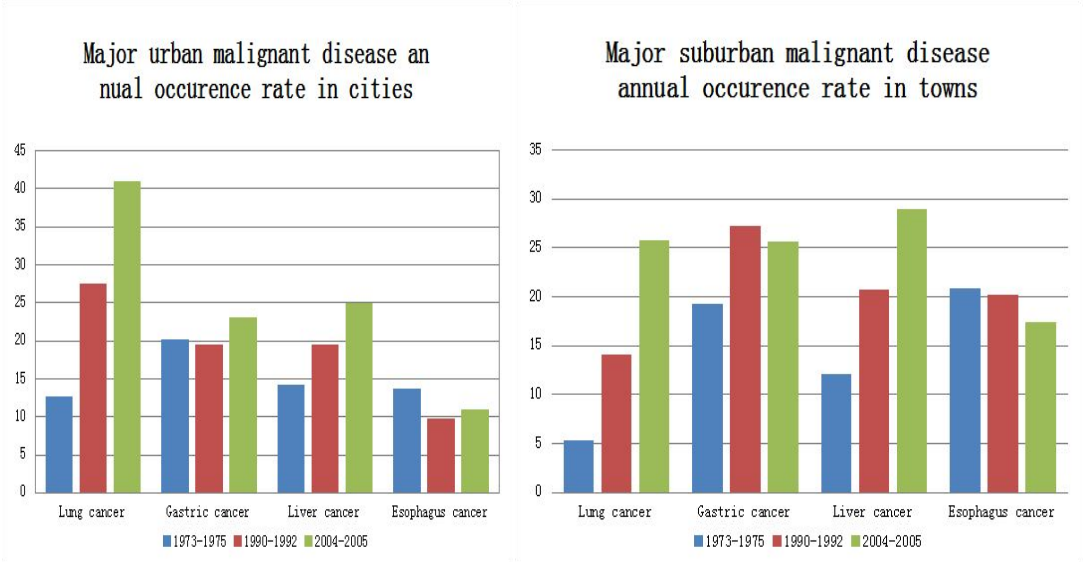
In 2013, the top ten cities with the worst air pollution were Xingtai, Shijiazhuang, Handan, Tangshan, Baoding, Jinan, Hengshui, Xi'an, Langfang and Zhengzhou. Seven of which are located within the Beijing-Tianjin-Hebei region. The average concentration of PM2.5 in Beijing is 89 micrograms / cubic meter, 1.6 times more than the safe standards set by the Chinese government.

Source: 'Air quality report for 74 Chinese cities' in 1st quarter of 2013 and '2013 Air quality report of urban agglomeration, direct-control municipality, and provincial capital'



Unit: microgram/cubic meter Source: Draw by author, according to National Environmental Monitoring Center

Figure 1-7: PM2.5 index for the main air monitored cities



Unit in both charts: 1/100000 Source: 2012 China Health Statistic Yearbook

Figure 1-8: Major urban malignant disease occurrence rate in cities and towns

1.2.3 Increased Pressure on Urban Public Finances

There will be future pressures on the public finances of cities on two levels: i) investments from governments in environmental protection, ecological restoration, industrial upgrading will significantly increase; and ii) investments in public services

by government will increase, with expected annual investments reaching USD 1,800-2,200 million. In this way it is expected that urban China can provide housing, employment and social security for 10 to 12 million rural migrants/ per year. Overall, this government expenditure will account for 16-20% of local public revenue.

Ratio of government debt in proportion to land: Data from the National Audit Office indicates that the four levels of governments are in debt by over RMB 14 trillion, the majority of which are new debts. A report called *The Debt Burden of Chinese Government Show Varying Degrees of Credit Risk* indicates that the provincial levels of government debt range from 69% to 156% of revenue. Due to government's financial dependence on land finance, land debt still accounts for a majority of the debt of local governments. Currently, the proportion of land debt in Zhejiang, Tianjin, Fujian, Hainan and Beijing are ranked in the top five and exceed 50% with Zhejiang at 66.3%.

2. NINE CHALLENGES OF URBANIZATION UNDER THE IDEOLOGY OF ECOLOGICAL CIVILIZATION

2.1 Environmental resources inadequately managed by current planning system

The three government agencies currently principally responsible for urban space, resource use and urban development are: the National Development and Reform Commission; the Ministry of Housing and Urban-Rural Development; and the Ministry of Land and Resources. Their respectively key plans are: social and economic development; urban master planning; and land use planning. Due to the breadth of these large portfolios and lack of coordination, contradictions frequently occur in spatial and resource utilization, guidance and control methods. The current urban planning framework has been unable to provide sufficient support for environmental protection and sustainable use of resources.

China has adopted the *Environment Impact Assessment* process (1980s), and *the Strategic Environmental Impact Assessment* plan (1990s) as evaluation mechanisms. The *Environmental Impact Assessment* process is now becoming legally binding. China has not yet established a statutory environmental planning process that engages all stakeholders from the central government to the cities and towns. For a new vision that promotes economic development and safeguards China's natural resources, new policies and regulatory structures are required.

2.2 Speed and scale of development creates excessive consumption of resources

From 1978 to 2013, China's urbanization rate increased by 1.02 percentage points each year. Between 2003 and 2013, China's GDP growth averaged 10.7% anually. Increase in investments led to the growth of cities which increased reliance on

resource consumption rather than conservation. Resource-intensive industries account for a large portion of GDP and industries with high energy use account for 50% of total energy consumption. The land used in urbanization is unreasonable. For example, from 2001 to 2010, the annual growth of urban areas was 6.0%, while annual urban population growth was only 3.8%.

The transfer of state-owned construction land increased from 1787 km^2 in 2001 to 4326 km^2 in 2010[6]. Per-capita rural-urban construction land increased to 176 m^2 per capita in 2010 from 153 m^2 per capita in 2000. The fact that local governments gain significant income from the land market is the main motivation for cities to expand. Reliance on land for financing has favoured the development of the real estate market at the expense of more inclusive urbanization processes.

More Information:
Some resource-based Chinese cities have long relied on the low-cost of resources by using a low input-and-output efficiency model. They are less motivated to contribute to industrial transformation and improved efficiency of resource use. Once resources are depleted, cities will quickly fall into a recession. Currently, most Chinese cities are enjoying dividends brought by land and high property prices, which poses large risks.

2.3 Urbanization poses serious threats to the environment

During the past 30 years of China's rapid urbanization some towns and cities have severely affected the balance, quantity and quality of regional water supplies. Some towns and cities are located in river flood and flood retarding basins, which disposes them to flood risks. Other cities and towns have acquired land through large-scale demolition of mountains, thus damaging forests and causing soil erosion and flood risks. Other cities and towns have expanded into formerly highly productive farmlands, and in some cases forced farmers to relocate to less favorable places on mountain tops by implementing the policy of "occupy one and compensate one". Such actions damage eco-systems, while the waste generated by the cities damages the natural environment, disrupts eco-balance and degrades bio-diversity.

China has varied climate zones, topographic features and biodiversity. Thus, different cities face different natural disaster risks. China's fast urbanization ignores these unique features and follows a one-track model, which lacks planning and coordination at the regional level. This results in higher occurrence of floods, water logging, air pollution, poor water quality and damage to the eco-system. Recent reports about pollution incidents include those in the Han River, Wuhan stream of Yangtze River, and in Changzhi, Shaanxi.

[6] China Land and Resources Statistical Yearbook 2011.

More information

China has tropical, subtropical and temperate areas and is classified into 21 climate zones. These zones have varied sunshine, wind, rainfall and other climate conditions which make them vulnerable to different natural disasters, like typhoons, rainstorms and drought. Cities in different climate zones must have different building types, energy consumption methods and levels, and disaster response systems and facilities.

The varied landscapes where cities are located, such as upstream of a river, on hills, in river plains or in an estuary, mean that they must protect the different species which live in these unique environments. Some cities introduce foreign species in order to attract public attention but this is harmful to local species and is wasteful. For example, Northern cities introduced species from Southern China, but their mortality rate was nearly 80%. Flooding, water logging and other natural disasters frequently occur due to the mono-development approach and poor urban development practices.

2.4 Climate change leaves cities unprepared for natural disasters

The expansion of cities has worsened the effects of climate change. An increase in extreme weather, as well as the intensity of precipitation, heat islands and winds has made environmental events more destructive.

Without effective actions, the urban heat island effect will worsen as urban areas increase in size and scale. Research indicates that the urban heat island effect is important in Northern China. Many coastal cities and regions of marine reclamation are not planning for the effects of climate change including rising sea levels and the impact on flood drainage plans. At the present time Chinese cities consider land demands only with respect to minimizing investment costs. The capacity to respond to disasters is poor in these cities.

Many Chinese cities suffer from oversaturation of the soil with water and poor drainage due to poor planning and inadequate urban spatial configuration. A Ministry of Housing and Urban-Rural Development survey in 351 cities found that between 2008 and 2010, water logging occurred in 62% of cities, occurring more than three times in 137 cities. Over saturation resulted in unwanted pooling of water in tunnels, interrupted roads, traffic jams and drowned garages and vehicles. Coastal cities frequently hit by typhoons, experience water logging due to strong rainfall and storm tide.

According to *the 5th Assessment Report* released by IPCC on June 7th, 2013, longer and hotter weather and more torrential rainfall will occur during the summer in China. The influence of extreme weather and natural disasters will intensify.

2.5 Blind urbanization neglects derelict land and vacant buildings

In areas of rapidly increasing population, public service facilities and infrastructure fail to meet the needs of people, especially for the large number of migrant workers who do not have equitable access to urban public services and affordable housing. New town housing and infrastructure construction, which is the aim of housing investors, results in a large number of vacant commercial housing and waste of resources. In 2012, there were 32.9 square meters per capita for urban housing, and 37.1 square meters per capita of housing area in rural areas, which is more than the average in developed countries. Local governments and developers still have the impulse to develop new towns and districts, without being fully aware of the huge demand for the transformation of old buildings and the urgency to improve the efficiency of existing industrial land.

2.6 Insufficient support for public and green transportation

As cities expand, mobility between residence and work becomes increasingly expensive, and many begin to rely on private motor vehicles. This leads to an unbalanced urban traffic structure which reduces walking and bicycle travel and minimizes growth of public transport. Private cars worsen traffic jams in cities, leading to more energy consumption and higher emissions. People have not fully realized the advantages of electric bicycles due to factors including technology standards, disordered production and usage.

The development of low carbon Transit Oriented Development (TOD)[7] such as public transport, bicycles and pedestrian lanes is not yet taken seriously. The efficiency of conventional public transportation is increasingly compromised due to traffic jams and Right of Way regulations. Pedestrian sidewalks and bicycle lanes have been squeezed and have insufficient multi-modal connections to public transport.

2.7 Urbanization neglects nature, cultural heritage and the human-scale

In the absence of a regulatory framework, profit driven investments in large-scale construction projects often damage urban and rural natural environments and cultural heritage. Many traditional districts and villages suffer from further loss of local culture through the disappearance of traditional neighborhoods. The memory of traditional cities and villages is diminishing. Newly built districts and buildings copy the model of “economically developed” cities without any local innovation, resulting in thousands of cities with the same appearance. Cities are full of zebra crossings, high-rise buildings and large-scale squares without human scale features or a sense of belonging. In these kinds of environment, residents can lose their identity and awareness of homeland, which can lead to urban crisis and serious social problems.

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[7] TOD (Transit Oriented Development) is the development of mixed-use areas along public transport systems. TOD densities are highest around centrally located public transport stops.

2.8 Lack of regulations and guidance for the sustainable development of cities

The following points illustrate why government measures and guidance to promote sustainable development continue to be insufficient:

First, China lacks a regulatory and fiscal mechanism to incentivize resource recovery. This has created perverse incentives for urban residents to adopt high-consumption life-styles which consume large amounts of energy and produce waste.

Second, there are insufficient effective eco-compensation mechanisms. Contradictions between protection of environment and economic development do not have a mechanism for resolution at the regional level through measures such as emissions and water trading and fair compensation.

Third, the multiplicity of implementing agencies makes coordination very challenging.

Fourth, in the absence of clear guidelines from the central government, the provincial and municipal governments do not have the incentives to adopt administrative measures to guide districts, towns and villages to implement sustainable development practices.

2.9 Lack of social governance in promoting eco-civilization

Between now and 2020, an additional 220 million migrant workers will have moved into Chinese cities. Migrants require a long period of social integration before becoming urban residents. In the past, Hukou obstacles have meant that migrants earned less income and had fewer residential and public services available, creating long-term vulnerability. The 2010 Central *Document No. 1* used the term "new generation of migrant workers" for the first time to describe people who have secondary or higher education, are computer literate, have networks and other tools. Although the total number of migrant workers is increasing, the difficulties and demands they face are often ignored by cities.

In addition, environmental awareness among the public must improve. A public participation system with broad participation and supervision has not been established. The government has not done enough to publish environmental information, or allow public access to sufficient environmental information. The government is not yet fully aware of the important role of NGOs in environmental and social governance and has not established effective mechanisms to support the role of NGOs.

3. VISION

"Until recently nature performed benignly. It functioned as a wonderful 'hinterland'

for cities that could be drawn upon for all those things needed to make urban society excel. It provided the input of building materials, fuels, water and food. On the 'output' side nature seemed to function as a sink, which cleared away whatever we produced in terms of waste or emissions. For some decades we were able to live in the illusion that nature was resilient. Nature supplied the cities with what they needed, in the way of food, abiotic resources and energy. And the rivers, soils and air cleared away the urban muck[8]."

3.1 Value Proposition

At a World Economic Forum meeting hosted in Tianjin in 2014, Premier Li Keqiang stated that China will "promote a people centered, new type of urbanization (that) will itself be the biggest structural re-adjustment. This will leverage the role of cities in galvanizing hinterland development, promote rural-urban integration and a gradient development of different regions and bring about a synchronized progress of the new type of industrialization, IT application, urbanization and agricultural modernization.[10]"

This value proposition includes three objectives to be achieved simultaneously:

- A **People Centered** approach that puts citizens at the heart of the development agenda, providing quality public services, reducing risks from environmental pollution, equalizing social welfare and improving urban livability,
- **A Beautiful and Prosperous China,** with blue skies over its vast urban and rural areas, in which people benefit from economic prosperity, the convenience of modern life, and the natural beauty of the surrounding environment, and
- Sustaining an **Ecological Civilization** that prioritizes resource efficiency, environmental protection and ecosystem restoration, with a green, circular and low-carbon development trajectory.

Figure 3-1 represents Premier Li Keqiang's words, "not only technology but more of institution, management and growth models" by describing the planning and policy formulation processes required.

The center of the circle describes two key areas that require city-focused processes. The first relates to giving citizens a voice in the governance and planning process through:

(a) *Transparency* in institutional and regulatory processes so that equitable access is maintained to every member of the society.

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[8] Maarten Hajer, Ton Dassen "On being smart about cities" nai010 publishers/PBL publishers Rotterdam 2014, p. 25

[10] Speech from Opening Ceremony of the Annual Meeting of the New Champions 2014, in Tianjin, September 11 2014

(b) *Accountability* of public officials, both externally to their clients and internally within the organizational structures. This suggests that the performance of public officials be judged in terms of achieving the triple bottom line of economic, social and ecological sustainability.

(c) *Participation* by all stakeholders in the design, planning and implementation of urban programs.

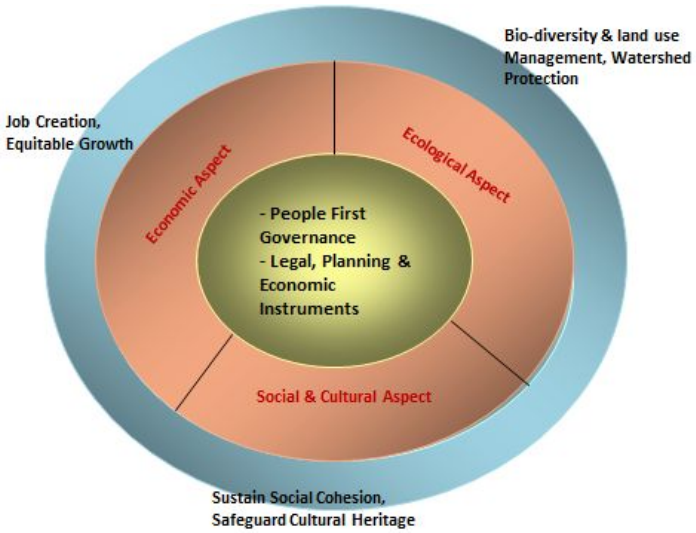

Figure 3.1: requirement of planning and policy formulation process

The second area relates to the management and planning aspects in terms of economic, social and ecological sustainability.

The outer circle in the chart describes key outcomes of good city models in promoting an ecological civilization.

- Economic: job creation and equitable access to urban services by the poor;
- Social: sustaining social cohesion and measures to support a city's unique cultural heritage; and
- Ecological: the city's regional impacts on bio-diversity, land use and forestry.

3.2 Install a System of 'Measuring to Manage Performance' to achieve Good City Models

Chinese eco-cities tend to focus on ecological parameters while ignoring the human scale. In Tianjin eco-city for instance, residential towers are repeated over 10 times, pedestrian routes are very lengthy and streets are difficult to cross. There is no direct connection from the residential areas to the sea and the lake, depriving residents of naturally symbiotic relationships with their surroundings.

The new vision highlights the importance of moving from an object-oriented to a human-oriented approach, in which the city's interface with its regional natural resource environment is a central part of the planning process. Central to this 'people first' approach, cities take the lead in: (i) articulating their specific vision, and defining and prioritizing the three components; (ii) developing measurements of sustainable outcomes that matter to the people; and (iii) creating opportunities for investment and finance at the appropriate scale.

This vision implies that while there is a planning process for "good city model for ecological civilization" which traces the impacts of urbanization on the economy, society, regional ecology and energy, water and land ecosystems. The proposed approach utilizes a spatial lens to integrate the way in which resource and investment flows are monitored and managed throughout the city's jurisdiction. Each track must create outcomes that are priorities for the community. For example:

- The energy ecosystem should include cost savings and GHG footprints of major energy users (buildings, transport, water and waste);
- The water ecosystem should suggest how to minimize water risks and manage the water footprint of household consumers, industries, other private consumers public sector consumers, and
- The urban form and regional ecosystem should assess how land is used, including green space, built infrastructure, housing, population density and land asset value differentials.

While sectoral interventions usually focus on inputs and outputs, the suggested approach measures outcomes, and how these meet the goals of the three ecosystems. There is considerable benefit in learning lessons from cities in OECD countries that have had several decades of experience in undertaking such processes and reporting the outcomes achieved.

4. AN AGENDA FOR ACTION

The preceding chapters presented the difficulties in China's urbanization. Chapter Two noted nine important challenges. Chapter Three connected these to the vision of ecological civilization and provided an overview of how to advance strategically. This chapter elaborates on opportunities represented by the nine challenges in Chapter Two by identifying for each a set of principles, criteria for action, and recommended approaches.

Introduction: Achieving a good city model under the concept of ecological civilization

Numerous concepts for urbanization have been developed in China over the past twenty years. Planners describe new cities with adjectives such as green, resilient,

low-carbon, smart, healthy, vital and sustainable. These concepts tend to address single environmental issues, ignoring economic and social dimensions. A focus on "sustainable" development requires integrating economic and social factors into environmental and ecological development. Urban planning can act as a comprehensive horizontal layer which combines all vertical interests into one plan. Good urban design plays a significant role by revealing synergies between sectors and mitigating competing demands for land and ecological resources.

Good Cities

Many city rankings are published each year. Mercer, EIU and Monocle[11] for instance, publish yearly Quality of Life and Liveability indices. Siemens publishes its green city index and the EU selects cities for the Green Capital Award[12] every year. Cities like Vienna, Zurich, Munich, Auckland, Copenhagen, Melbourne and Vancouver are often leaders in such lists. The qualities in these cities include leisure in the direct neighbourhood of the city (water, mountains), good public transport, a vibrant urban life, culture and a green urban policy, including strategies on water management, energy saving, use of renewable energies, waste reduction, and protecting bio-diversity. None of these qualities can be simply copied and reproduced somewhere else. They depend on their local, spatial and historical context and are therefore tailor made.

While all of these qualities have multiple dimensions which can sometimes all be optimized, urban design cannot always mediate between conflicting demands. Spatial demands such as diversity, orientation, density and mixed functions have external effects that can influence other demands in a positive or negative way. For example, if all buildings have the same orientation to the sun, all buildings are perfectly conditioned to use less energy, but the overall result might be monotonous because the orientation of the buildings is repetitive. Monotony can lead to liveability problems. Another example is high density, closed building blocks which enhance urbanity but are less compatible with the generation of renewable energies. Environmental requirements, people-oriented needs and economic demands sometimes strengthen each other and sometimes compete. **There are valuable processes for good city models.**

Concepts and experience with ecological civilization in urban planning and design are found in other cities. Participating in national and international city networks should be encouraged to exchange ideas and experiences.

Time

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[11] See more about the rankings:
www.mercer.com/insights/view/2014/quality-of-living-rankings-spotlight-emerging-cities.html,
www.eiu.com/public/topical_report.aspx?campaignid=liveability2014,
http://monocle.com/film/affairs/quality-of-life-survey-2014

[12] See more about the award: http://ec.europa.eu/environment/europeangreencapital

Time is very important in urban planning: Buildings are generally written off in economic terms after 20 to 30 years, though they often last for a few more decades before being replaced by new structures. It is the location and urban design of the buildings which lasts for centuries[13]. Once built, the layout of the streets lasts forever. Changes in street patterns are very expensive: all buildings have to be demolished and rebuilt, all proprietors should be compensated and the underground infrastructure (sewage, cables etc.) must be relaid. This high price means that changes in the urban design rarely occur and that the original urban design will structure the life of people for decades or even centuries.

Large-scale urban plans should be flexible so that they adapt to future demands. The introduction of new technologies from developments in agriculture, defence systems, transportation (the automobile), and communication (the internet) have all had serious spatial consequences for urbanization. In the future, new technologies might have significant but unknown impacts: 3D printing, new transportation systems, and life extension. In addition, the demands of people change over time. As soon as people become wealthier, they ask for more residential living space, better housing conditions, healthier surroundings and greater access to recreational facilities.

Urban design and architecture follow trends of new visions and lifestyles. Economic stagnation and political changes influence and can halt future developments.

Population ageing is a special consideration for new towns/ new districts as they are generally populated by young people in the beginning. Though schools are needed initially, eventually the generation gets old and there is less demand for schools and greater demand for housing for the elderly.

If changes of functions for specific buildings or urban areas are not foreseen, it becomes very expensive and resource-intensive to adapt them at a later phase. Therefore, room for the needs of the foreseeable future such as infrastructure and public facilities should be accounted for in urban plans. These community resources should remain in public hands.

A good city model is not necessarily a new town or a new city extension. A good city model can also be achieved by upgrading an existing city. Land previously used for industrial purposes offers possibilities to turn an area with a bad reputation into a newly developed urban district while upholding the concept of ecological civilization.

4.1 Comprehensive planning must guide sectoral policies

Principle

Policy coherence at an urban level is most easily depicted as collaboration between

[13] Philibert and Pershing, Beyond Kyoto: energy dynamics and climate stabilization, OECD/IEA 2002

sectors such as housing, water, transportation, economic policy, energy, environment, and land and resources. When criticizing the lack of policy coherence, the term 'silos' is often used.

Spatial planning can be an important means of increasing policy coherence between these 'silos', in medium and long term planning, at large and small scales. In the urban context, we speak about urban planning. This is a comprehensive style of planning, combining the various spatial demands and contributions with the existing context (the substratum, the networks and the occupation). It is a horizontal layer which connects all of the 'silos' with a spatial impact. Urban planning is about weighing various interests and ideas, identifying potential synergies and developing these ideas not only into a plan with rules and regulations but also into a convincing story.

Criteria

The promotion of policy coherence through integrated urban planning should be based on a clear demand from the top leaders.

Integrated urban planning should provide a framework for the performance evaluation of local governments and any independent urban development agencies, as well as individual cadres such as mayors.

Choices considered, choices made, as well as the risks involved have to be transparent and actively communicated to the public.

Approach

Policy coherence should be promoted through:

- Improved integration using the idea and method of Strategic Environmental Assessment ('plan Environmental Impact Assessment') into urban planning. Optimizing the ability of such an assessment to inform and structure discussions to deliver different options to balance urban, industrial and ecological development and to create a framework for monitoring and performance evaluation of planning decisions. This method offers accountability to the government and informs the public.
- Integrated spatial planning for China's urban developments. Implications and choices should be fed back to sectoral plans, such as the planning of transportation infrastructure.
- Social impact assessment of urbanization strategies. This is an active and full-blown assessment that provides a fair view of the social impacts of the strategies and provides a framework to engage with stakeholders.

It is suggested that in the application of these planning/assessment systems to the various urban agglomerations, at least the following five topics will always be given proper consideration: the built environment; mobility and transport; demographic changes; availability of resources (such as energy and water); urban/rural economic policies. *Research by design*[14] is a good method to explore the possible consequences of the spatial claims in urbanization and to look for synergies.

In situations where existing cities and adjacent development areas are governed by separate bodies, the principles of policy coherence and integrated spatial planning mean that old and new should be considered in the same plan and assessment system.

Good City Model

Reserve space for future development. The Dutch new town Almere, founded in the 1970s, consists of a centre surrounded by several nuclei. Space was reserved in the master plan to allow the city to upgrade and expand the city centre.

Red and green lining can be used as a means for a more sustainable land use. It can help to prevent the uncontrolled use of green fields for urban development and to stop the development of urban sprawl. When combined with regulations to reuse existing urban areas, it could lead to a sustainable use of existing stock and protection of farmland. The concept of green lining has the same objectives but focuses more on the protection of certain green areas. In this way green areas are protected while at the time development in other areas is still possible. In this way policy makers are able to appoint which green areas are of explicit value for urbanized areas.

In the Netherlands the concept of green lining was used to maintain green areas in proximity to urban areas. Restriction of new housing and succeeding urbanisation concepts managed to prevent sprawl. The Green Heart of the Randstad area in the Netherlands can be a relevant case study.

4.2 Make local public finance less dependent on land development

Principle

Development of land has always been a means to urbanization, but it now seems to have changed from a means to an end goal. Chinese municipalities use their land development as an ATM. Land revenues represent an enormous share of the income stream of local governments.

This cash cow creates a perverse incentive for city expansion. It has led to an enormous building boom – very likely a bubble – resulting in a high vacancy rate.

[14] Research by design is a research method used in urban design and architecture research. It takes design as a part of the research: designing variants can explore the scope of the research and the research can limit or widen the number of design variants. It is an iterative method.

The demand for land might decrease in the future which will likely result in heavy public budget cuts and a decrease in the provision of public services.

Criteria

When derelict industrial or residential land is available for city developments it should be prioritized over greenfields. Targeted investments and legislative support for the redevelopment of derelict land are needed as well.

Approach

Local governments should refrain from selling and developing greenfields. Options for local governments to make their financial situation independent from land sales include:

- The provision of local public services which can alternatively be financed through cost recovery measures under the law or by (increased) local property taxes.
- Applications for green funding from international sources. If a local government can demonstrate that there is a global interest for their "good city" it will attract global funds.
- Make more use of Public Private Partnerships (PPP) in order to attract investments and share risks with private actors. PPPs do not fully remove the incentive for city expansion and still carry financial risks.

It must be ensured that all levels of government get appropriate financing to avoid unwanted negative effects on urban development.

4.3 Risks to population health, environment and ecoservices in China's urbanization

4.3.1 Decouple urbanization from the use of resources

Principle

Measures for energy conservation and efficient use of resources must be incorporated into urban planning, infrastructure and building design. "Urbanization, with its direct and indirect effects, is considered one of the principal causes of the threat to global biodiversity."[15]

It is essential for cities to develop financial mechanisms to pay for the ecological services they enjoy and bear the cost of damages to ecosystems through

[15] McKinney 2002, Olden et al. 2006, p. 56 <www.bfn.de/0502_siedlung.html?&no_cache=1>.

"Eco-Compensation."[16]

Criteria

City and resources interact: The city consumes resources, and resources shape the city. The form, density, mixture and typology of a city has a big influence on its consumption of resources and its demand for eco-services from the outside. Densely populated cities use less energy than sprawled urbanization, because of shorter distances, more efficient use of buildings and a better business case for public transport. Location and orientation of the building mass in relation to water resources and sunlight reflect constraints as well as elementary choices for the conservation of energy, water and other natural resources.

Cities account for enormous flows of energy and material while they also embody innovative methods which are key to sustainable management of these resources. The body, or an ecosystem, can be used as a metaphor for the city. The concept of urban metabolism compares the flows of resources in and out of a city to the metabolism of a living creature. The metabolic approach of a city serves to improve the city's governance in relation to resources by identifying possibilities for improved efficiency, recycling and reducing resource use. Related indicators should be institutionalized in the performance evaluation scorecards of cadres. Since cities and streets remain for centuries, an urban layout that makes inefficient use of resources can do harm for centuries. The current wave of urbanization in China provides a unique opportunity to put in place resource-efficient designs.

"Ecosystem services" are the benefits that cities receive from the environment. Although urban planners have long been attentive to ensure harmony between nature and human activities in cities and the concept of ecosystem services has become popularized, it has not yet been incorporated into urban design and planning. Ecosystem services in a city are provided from both ecosystems within and outside the city boundaries, and they include products such as food, water, minerals, energy (hydropower, biomass fuels), raw materials and so forth, as well as benefits obtained from the regulation of ecosystem processes such as carbon sequestration and climate regulation, waste decomposition and detoxification, purification of water and air and pest and disease control. There are also nonmaterial benefits such as recreational and amenity values.

Approaches

- Use of resources (energy, water, building materials, land) and production of waste from a city should be minimized.

[16] CCICED Task Force Report on "Eco-Compensation Mechanisms and Policies in China", 2004.

- Tracking throughputs enables city stakeholders to appreciate the harmful effects of untreated liquid and solid waste as well as air pollution. Resource use and waste production should be monitored and compared to historic performance, contemporary standards (best practices), and targets for the future attainment of ecological civilization. Assessments for these should be within public domain.
- Minimal resource use should be a prominent criterion in deciding the location for the expansion of urban agglomerations or the establishment of new towns. Resource use in the construction phase (energy, water, cement, land, ecosystems) should unequivocally be monitored and accounted for.
- A lifestyle of smart, modest resource use and livability in the framework of 'Beautiful China' should be promoted as part of a city's identity and as a pull factor for a desirable place to live.
- Planning of urban mobility should be integral to urban design and be accounted for by the top local authorities in order to minimizing resource use.
- With a resource use framework, cities will be able to better monitor expansion of the built environment. High level and local authorities should actively discourage the – construction of buildings due to speculation as this risks having long-lasting vacancy and the need for resource-intensive conversion.
- The integration of ecosystem services into urban planning can consist of two pillars- the integration of energy and material flows into spatial planning and the enhancement of environmental capitals in cities.

Good City Model

Vancouver chose a really holistic approach to deal with the matter and it included the whole agglomeration together with Portland. They based their activities among others on the economic effect of becoming attractive for private and economic settlement. All involving county and/ or agglomeration are in efforts.

Singapore creates innovative means of communication and precise knowledge exchange to measure change and progress. Apart from the Biodiversity Index the Biodiversity Portal is outstanding, a blog with information, photography, conservation projects, books, news and events. (www.biodiversity.sg). And it installed a National Biodiversity Centre as a branch of the National Parks Board serving as Singapore's one-stop agency for biodiversity-related information and activities.

Sources: Greater Portland-Vancouver Region:
www.theintertwine.org/biodiversityguide and
http://en.wikipedia.org/wiki/National_Biodiversity_Centre_%28Singapore%2

4.3.2 Justify choices for size and shape of cities in terms of their influence on population health

Principle

The lay-out of a city can mitigate public health issues and support adaptation measures to promote greater wellbeing. The shape, size, structure, building typology and materials used in buildings all influence winds and the accumulation of heat. Winds can circulate fresh air to improve the air quality.

Criteria

Population health in an urban environment reflects key aspects of a good city:

- Lifestyle, behavior and work environment. This includes smoking and choices for modes of transportation.
- Ambient quality, such as outdoor air quality
- Climate change, particularly the expected increase in frequency and severity of heat waves in very large urban agglomerations
- Aging population. The older population is more vulnerable to environmental conditions. Within decades, levels of air pollution in Asian cities will cause more health problems and two or three times more mortality.

The guidelines for policies which promote health for the urban population in China should simultaneously address: (i) Risks due to environmental contamination and specific ways to reduce pollution (mitigation, see 4.3.1.). (ii) Rational size and layout of future agglomerations design which ensures population health, (adaptation).

Approaches

Boundaries for urban agglomerations can enhance wellbeing for vulnerable people by reducing the accumulation of air pollution and the severity of future heat waves. Key indicators concerning the health of the urban population, such as average life expectancy, should be disclosed to the public, even though not all of the factors are under the control of local authorities. Permits to erect large and extensive structures in cities should be given after considering effects on air circulation and air quality. The former Tempelhof airport in Berlin was intentionally left vacant after such deliberations. The orientation of main street canyons and green corridors in relation to

wind directions is an efficient and inexpensive way to ensure better air quality. This may require modifications in the regulatory framework so that spatial planning is based on integrated diagnostics, and strategic environment assessment.

Sunshine can be reflected by painting roof tops white or can be absorbed by creating green roofs. By doing so the heat stress can be reduced. Trees can also provide shadows to temper the heat.

4.4 Chinese cities must prepare for climate change

Principle

Evidence is mounting that climate change presents challenges for urban areas and their growing populations. UN Habitat published the *Global Report on Human Settlements on Cities and Climate Change* in 2011 and the IPCC specifically addressed urban areas in the *Fifth Assessment Report*.[17] Climate change will likely affect water supply, physical infrastructure, transport, ecosystem goods and services, energy provision, industrial production and human health.[18] Mitigation, through more efficient use of resources (see 4.3.1), and adaptation should be included in comprehensive planning.

Criterion

China's capacity to address climate change is weak, particularly in small and medium-sized cities with poor infrastructure and planning.[19] Climate adaptation and mitigation require long and systematic projects that require scientific and technological inputs, policies and sufficient supporting capabilities. China has strong scientific and policy input at the national level, but still lacks capacity at the local level.

Approach

China's national strategy for climate change adaptation (National Adaptation Strategy, NAS) was guided by the 12th FYP and will last from 2013 to 2020.

The New Strategy has identified a number of gaps in infrastructure that must be addressed. It divides its focus into three areas- urban, agricultural and ecological- with priorities as follows: infrastructure, agriculture, water resources, coastal zones and maritime waters, forests and ecological systems, tourism and other industries, human

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[17] UN-Habitat (2011), Global Report on Human Settlements 2011 Cities and Climate Change. IPCC Working Group II, 2013, Impacts adaption and Vulnerability. See especially Ch. 8, Urban Areas.

[18] Nadin R., Lashford S., Street R., Liu Y., Cardenes Trujillo I. "Climate Resilient Low Carbon Frameworks", INTASAVE and WWF, 2014.

[19] UNDP, "2013 Sustainable and Liveable cities: towards Ecological Civilization", China National Human Development Report, Beijing, 2013. ; China's National Adaptation Strategy, 2013.

health.

In the coming years, an important agenda will be to mainstream climate resilience, and adaptation capacity in Chinese cities[20]. The NAS identifies guiding principles, priority areas and pilot provinces for adaptation in response to climate change. This provides an opportunity for the country – including cities – to address climate change in a more holistic manner, and to involve the concerned central/local authorities to align the existing policies and institutions with the Strategy.

Resilience of cities to extreme weather can be strengthened through investments and institutional measures that incorporate citizen participation.

Good City Model

Shenzhen was the first mainland Chinese megacity to join the C40 Cities Climate Leadership Group.

Suzhou fosters urban liveability combined with cultural heritage and received the Lee Kuan Yew award for 2014.

The **Rotterdam Climate Change Adaptation Strategy** is relevant for climate impact and adaptation needed, and a **Connecting Delta Cities** network set up within C40 (2008) Development of mechanisms to co-ordinate adaptation efforts, including funding, encouraging neighboring regions and areas of the same basin or similar climatic conditions to set up communication and coordination mechanisms

Curitiba, Brazil, resilient city for sustainable urban revitalization. Introduced the world's first bus rapid transit system which is used by 70% of Curitiba's daily commuters. Curitiba is tied with Copenhagen for the lowest emissions per capita (2.1 Tons CO2).

Several cases from both Europe, North America, Latin America and S & SE Asia at the Rockefeller 100 Resilient Cities.

Sources:
www.c40.org/cities/shenzhen/blog_posts
www.deltacities.com/cities/rotterdam/climate-change-adaptation
www.triplepundit.com/2011/06/top-10-globally-resilient-cities/

4.5 Build liveable cities

Principle

A balanced planning and implementation process that respects the needs of job creation and economic development while promoting social harmony and

[20] "Shaping China's Climate Finance Policy", Climate Group and the Central University of Finance and Economics, 2013.

environmental sustainability.

Criteria

The Prime Minister's announcement of the 100+100+100 million strategy provides an opportunity to re-think the urban policy, spatial planning and resource management process so that Chinese cities can become good models of ecological civilization. Three principles implemented through spatially referenced actions:

(1) Support economic prosperity for residents,

(2) Conserve and recycle land, water and atmospheric resources, and

(3) Compensate nature when necessary through strategic environmental policy and investment interventions.

Approaches

- *Re-develop urban lands with low value usage instead of using green fields*

Many Chinese cities provide opportunities to re-develop urban land and industries that have relocated to Western China. These lands are already well-serviced by infrastructure, and offer opportunities for mixed use re-development. Redevelopment could be more expensive than greenfield development in the short term, but much more sustainable in the long term because of land value capture potential.

- *Systematically incorporate risks in the planning process*

As cities generate wealth through their buildings and infrastructure assets, it is important to understand the various risks these assets face, from changes in the economic structure, weather and climate related events. This requires re-assessing spatial plans whenever there are changes in the economic structure of the city.

Industries grow and contract depending on their competitiveness. Valuable real estate in many European cities becomes low value derelict industrial sites once the related economic activities end. This was the case for steel making and coal production in the Ruhr valley in Germany.

- *Measure with integrated diagnostics:*

Integrated spatially referenced diagnostics can identify sustainability outcomes that need to be managed by public officials, and install an objective data gathering system which reports the performance of city agencies in achieving the desired outcomes. This requires developing legal, governance and economic instruments that create the planning, financing and implementation frameworks to deliver the outcomes. Equally important is to design participative governance arrangements, so that the

opinions, preferences and feedback from city level stakeholders are continuously fed back to policy makers.[21]

- *Demand, instead of supply driven real estate development*

Reckless behavior and blind investments leading to ghost cities can be prevented by a demand driven planning. Only start planning after an inventory of the real needs of the real estate market.

- *Provide new towns with a vital economic base.*

The British new town Milton Keynes, founded in the 1960's created favourable conditions so that it became home to several national and international companies. Due to local employment, Milton Keynes is more self-sustaining than other new towns.

4.6 Adopt Transit Oriented Development as a main concept for urban development

Principle

Transit-oriented development (TOD) should be emphasized. TOD is the development of mixed-use areas along public transport systems. TOD densities are highest around centrally located public transport stops. The strategy of waiting until the urban population grows to construct mass transit systems is dangerous. Creation and renovation of city centers must be accompanied by investment in mass transit systems. "Green corridors" should be developed as they improve connections between transit stations and neighborhoods. Thoughtful traffic control and effective spatial planning will control air pollution. New technologies decrease traffic and the use of fossil fuels: E-bikes reduce the air pollution, smart car-sharing systems reduce the number of parked cars in public spaces and broadband internet reduces travel by offering possibilities for working from home and teleconferencing.

Criteria

Sustainable models of urban transport differ depending upon the population size and financial abilities of cities. Cities with more than a few million people can use railways and subways, while small and medium cities can use compact systems such as light rails, monorails, BRT (Bus Rapid Transit), trams and buses and their combinations. These systems are popular in Europe. Transit and land-use should be integrated so that they can generate revenue, vitalize the local economy and enhance

[21] The principle of subsidiarity says that decisions should be taken at the lowest appropriate level. In order to achieve the triple bottom line this is either the city level, or in the case of large cities at the neighborhood or district level.

convenience. Mobility of people in rural and suburban areas can be improved by using electric motorbikes instead of cars.

Approaches

Cities can select sustainable models of urban transport depending upon their population sizes, financial and other conditions. Cities with successful transit and land-use integration can generate revenue and capture value through the development of property and air rights. High quality TOD generates higher profits and fiscal revenue which can go into creating additional high quality TODs. This cycle will provide an effective value capture tool and encourage private sector to participate in the investment and it will help ease the financial burden of the government.

Good City Model – London

The mayor's Transport Strategy in London includes transport planning, financing and pricing, travel demand management.

London has developed a multimodal public transport system containing national railway, subway (or tube), over ground rail, light rail, buses and trams. Most of the stations around the central area are integrated transfer terminals providing seamless connection with other modes. It also has an integrated fare system based on zonal fare with different types of tickets such as peak and non-peak ticket, long- and short-distance ticket and transfer discounts.

In February 2003, London began to charge vehicles entering the 21 km^2 downtown area with a congestion fee. In February 2007, the area was expanded to 40 km^2, which reduced traffic by approximately 30% and decreased concentrations of nitrogen oxide, suspended particulate matter (PM10) and carbon dioxide by approximately 15%. The Government built a lot of parking areas near the railway and metro stations around the city, and reduced parking fees.

Recommendations:

- Promote the integration of a variety of public transportation modes.
- Develop a flexible fare policy.
- Develop public transport in priority; promoting the other supporting policies at the same time, including district differentiated policy, congestion charging policy, emission control policy, park and ride policy, etc.
- Broaden the channels of investment funds, strengthen government guidance and encourage private sectors to participate.

4.7 Identity through human scale urban design, natural and cultural heritage

Principle

Identity is important in city planning. People may identify with a region, city, district, street or dwelling. When people identify with their surroundings, they feel proud, responsible and take better care of their surroundings. A city or a district with a strong identity has better chances of attracting investments and tourists.

The protection of natural and cultural heritage contributes to the identity of a city and region. A human, or small, scale of public space is crucial for people to feel comfortable in a city.[22] If the urban design of a street is pleasant, people will more readily go outside, feel safe and enjoy walking on the pavement.

Criterion

A city, region, district, street or building must differ from its neighbour in order to have its own identity. This means that cities and regions should celebrate their existing qualities such as landscape, nature, culture, human capital and building heritage and that districts, streets, universities/industries and buildings should be different from their neighbours.

If there is space available on derelict industrial sites there is no spatial need to develop greenfields. In many cases, vacant buildings can be transformed for new uses so that they maintain the identity of a district. Adjacent apartments can be merged in order to provide larger living spaces.

When reusing vacant buildings, retrofitting and changing floor plans require specific knowledge and craftsmen.

The pedestrian scale is critical to feel at home in a city. For the pedestrian, the public space should be lively, beautiful, safe and full of variety, especially at eye-level. These will promote slow modes of transport over taking the car.

Approaches

- Make an inventory of all vacant land in a city is the first step in redeveloping them.
- Make a small gridded road network to ensure pedestrian crossing and the safety of non-vehicular travel
- Make sidewalks and bicycle lanes safe
- Orient buildings with their entrances and windows towards the streets, in order to evoke mutual social security between the people in the streets and in the buildings

[22] Reimagining China's cities towards sustainable urbanization, China Dialogue, p.55 "Chinese cities feel loss of streetlife and community", London.

- Prevent fences along the streets
- Prevent large distances without entrances
- Make lively 'urban plinths' along the streets, for instance with shop-windows or public services. The plinths might cover only 10% of the building, but determine 90% of the experience.[23]
- Vary buildings along the streets instead of repeating. Diversity can be reached by designing each building in a different style or typology, by mixing functions (housing, recreation, working, shopping) and adding buildings to existing monotonous urban fabric. This usually means less repetition, meaning less profit from the economy of scale, so more expensive.
- Plant trees and other vegetation.
- Organize participation, this leads to identity, raises awareness and develops ownership. Self-building or self-commissioning of buildings is method to let people directly identify with their surroundings through their responsibility.

Good City Models

IBA Emscherpark (Germany) was a project in 1990s that transformed the contaminated and derelict industrial landscape of the Ruhr area, into an ecologically restored landscape full of industrial icons that hosts cultural and leisure activities, attracts visitors and makes local people proud of their industrial heritage. Brownfields that had negative reputations in the past (industrial structures such as gas holders, blast furnaces and factories) were redeveloped and became regional icons. The IBA Emscherpark used marketing and branding opportunities to promote the region.

Port redevelopments in Amsterdam, Antwerp, Hamburg, London, Rotterdam

The scale of port activities has grown over the years. The recent large container ships are no longer able to enter the historic port areas in Western Europe. That's why the port areas expanded towards the sea and left the port areas in the city vacant. These vacant areas were redeveloped in cities such as London (*Isle of dogs*), Rotterdam (*Kop van Zuid*), Hamburg (*Hafen-city*), Amsterdam (*IJ oevers*) and Antwerp (*Eilandje*) with mixed use functions, all taking advantage of the waterfront and historic relicts.

Recommendation of Institutions and Policies:

- Limit greenfield development in favour of brownfield development. Former port areas, especially have many spatial qualities.

Renovation and transformation of factories, churches and office buildings

All over the world vacant historic buildings have received a new function: industrial buildings and religious buildings have become shops, museums, libraries, schools or ateliers. Vacant office buildings are being transformed into residential buildings. The central location of these buildings, along with their characteristic structure and facades make these building very attractive for "a second life".

[23] For further reading: www.thecityateyelevel.com

Recommendation of Institutions and Policies:

- Make use of existing buildings that keep the memory of the place alive and diversify the area.

4.8 Develop a coherent national framework of tax incentives to significantly promote resource efficiency and test this for effectiveness in the context of urbanization

Principle

Because of the speed and visibility of the process and the related political commitments, China's urbanization is a once-in-a-lifetime opportunity to align the essential actors to move towards sustainable development. China's urbanization also touches on incentives for resource efficiency; the growing importance of the middle class in terms of consumption; and coordination among government bodies with different ambitions.

Criterion

Resource efficiency provides suitable, quantifiable targets in order to focus efforts for more effective policies towards sustainable urbanization.

Approach

Cultural education as well as economic incentives should be brought into play. Greater efforts are needed to strengthen integrated planning and monitoring (Section 4.1), urban initiatives and role models to promote decoupling (Section 4.3.1). It is therefore recommended that the central government develop a framework of tax incentives for key natural resources and compensation rules according to the principle of 'the polluter pays'. In as far as such measures exist, it is recommended to unite them in a coherent framework. In addition to pollution, a focus is recommended on three categories of resources that are important in China's urbanization, namely land; fresh water; and fossil energy. The effectiveness of this framework should be analyzed in the context of current urbanization.

4.9 People oriented urbanization: participation

Principle

Any form of citizen participation requires a great deal of time, communication, debate and cooperation. Citizens can make valuable contributions based on their professional and life experience. Irritation caused by globalization and the economic and social changes in the lives of many people can be counteracted by stabilizing the identity in

the personal environment through meaningful activity, and by the "self-at-home-feeling".

Criteria

Participation requires transparency, decision-making power, a clear mandate, defined tasks, and a firm time frame. Experience shows that external facilitation is needed to negotiate critical issues/topics and tasks. Sufficient organizational support and clear background information must be provided to citizens and other participating stakeholders in order to encourage their participation.[24] Local administration must be well prepared and professionally trained to fulfil this task.

Large cities have more problems with citizen participation than medium-sized cities, which generally are highly innovative[25]. These findings support Chinese plans to encourage the urbanization of cities up to 500,000 inhabitants to absorb immigration into the cities.

Approaches

- *Red lining is considered as a means to a more sustainable land use*. It can help to prevent the uncontrolled use of green fields for urban development and to stop the development of urban sprawl.
- *Provide for clear responsibility of individuals by having dialogues with citizens.* Ireland is a strong model, it emphasizes the role of Government, "the key element in any form of participation is the willingness to hold a government-citizen dialogue[26]".
- *Define procedure to follow by law.* Finland's "Building and Land Use Act" requires an approved "Public Participation Plan" prior to starting a planning process[27].
- *Make use of the knowledge and expertise of other cities by joining city networks worldwide to accompany the process over the years.* Examples for citizen participation described by the "International Council for Local Environmental Initiatives" (ICLEI) include Porto Allegre (small city known for its participatory budgeting), Sao Paulo and Tokyo (major participatory efforts regarding reduction of Green House Gas (GHG) emission), Durban (global leader in providing measures to protect ecosystem services).

[24] P 85, how can city governance change? China Human Development Report, 2013: Sustainable and Liveable Cities: Towards Ecological Urbanization. Beijing, UNDP.
[25] ICLEI
[26] See: http://eprints.nuim.ie/272/2/Paper_Local Government_Draft.pdf and http://ec.europa.eu/regional_policy/archive/innovation/innovating/terra/expplan/sruna.pdf
[27] Communication with Kaarin Taipale, Architect, City Planner, Helsinki, 2014.

Good City Model

Since the early 90s **Heidelberg** (Germany) has adopted a policy for citizen participation for all major development plans and projects involving the decision on the nature of participation by the City Council, depending on the subject matter. Thus the most important political strategies of the city for overall development or the one of single districts, on traffic, economic or touristic development, on cultural activities or social aims are prepared with broad participation of all stakeholders: academia, the private sector, social-, cultural-, and environmental non-profit organizations, women- and immigrant minority groups etc. A special example is the intensive participation by Industry and Academia within the city´s project "Sustainable Management" which encompasses crafts and small and medium enterprises. This enabled environmental management with more than 100 enterprises.

5. RECOMMENDATIONS

China's cities can serve as engines for growth, as models for innovative development, as leaders in environmental protection, and as places that have a high quality of life, prosperity, and health. Cities that embody these aspects could be considered good city models in the context of ecological civilization. This study recognizes there is no single blueprint for a good city. However, it identifies key characteristics of a good process for reaching good cities. These attributes to some degree already are present in many of China's cities but need to be strengthened so that cities can take more responsibility in steering China towards an ecological civilization.

For cities to assume this important leadership role, they must be supported to make the best possible use of their financial, human, social, natural and built capital. They should be helped to access tools and networks that can help them to make and implement informed decisions. Many of these tools are related to monitoring, of, for example, urban population and environmental health issues, status of brownfields, and energy conservation. Urban eco-indicators should be compared with historic performance as well as with national and international best practices.

- **Know what is going on and set objectives and limits based on integrated spatial planning:**

China is still in the process of rapid industrialization and urbanization. Reasonable spatial layout and an increase in resource use efficiency are the main priorities for urbanization towards ecological civilization. Currently, there is a lack of communication and collaboration between departments with important decision-making ability. As a result, it is difficult to implement guidance and control in a process with rapidly changing space and fast resource consumption. The way to address this important issue should be: to strengthen spatial information systems and accurate data acquisition and integration of multiple departments; strengthen the comprehensive assessment and diagnosis; improve multi-sectoral policy and planning

coordination, and ultimately environmental protection and sustainable resource as a common goal.

Recommendation 1. Set up or strengthen geographical information systems at **provincial level** to monitor and visualize urban changes in relation to the environment and adjacent ecosystems. Use these systems to timely identify potential problems in view of choices and priorities set in the urban plan, or potential compensation issues, as well as challenges that require new policy coordination initiatives**.** At the provincial level, establish ecological redlines for conservation areas of ecological importance and sensitivity. Further strengthen the permit licensing system in areas with construction limits, e.g. specify upper development limits for cities with ecological sensitive areas or important ecological functions. Create a list of offenders. Based on these provincial spatial control systems, institute integrated urban and rural plans for mega-city regions and town clusters; determine urban growth boundaries; and integrate the spatial plans for the ecological space, production space and living space.

Recommendation 2. Use all options to achieve an **urban layout** favouring the health of the environment and its residents. Control the size and shape of urban agglomerations. Instead of continuous sprawl, develop for example multi-centered urban and town clusters and, for example, protect their green cores. Use the development of public transport systems to guide these spatial developments. Promote the development of green transportation. Use current opportunities to develop cities with properly oriented main streets and open spaces that provide low-cost, effective urban ventilation corridors for fresh air. Set aside land of strategic importance, for example with a view to future important transport facilities.

Recommendation 3. Strictly implement national **standards for the per capita built-up area.** Encourage the use of the existing stock of urban land and utilization of brownfields, improve industrial land use efficiency and promote renovation of old town and existing buildings To cities whose urban built-up land is projected to exceed 130% of the national standard per capita, the central government should issue a policy to limit new construction sites. This should help to avoid "ghost cities, " resulting from unreasonable investments and developments. In addition, make sure reliable information is collected on housing needs, real estate needs and vacant dwellings and other buildings in order to assist demand-oriented planning.

Recommendation 4. At the regional level, establish **collaborative mechanisms** for environmental governance and the sharing of core resources. In particular, introduce regional collaborative pilots in the Beijing-Tianjin-Hebei area (air pollution and industrial reconstructing), Yangtze River Delta region (regional water pollution and waste allocation), the Pearl River Delta region (soil pollution and comprehensive management). At the city level, use a selection of existing pilot cities to test and promote multi-sectoral collaboration. Strategic environmental assessment (SEA) is a tool that should be used more effectively in urban planning to: (1) involve all relevant

government bodies and other stakeholders in decisions; (2) provide major design choices for discussion; and (3) provide a basis for measurement and performance evaluation follow-up.

- **Plan for financially-sound and adaptive development:**

A good urban plan should set aside enough space and room to manoeuver in order to accommodate future demands and new developments, such as demands to build climate resilience, new infrastructure and public facilities for elderly population. In order to enable cities to take higher levels of responsibility for their development, long term sustainable financing is needed. However, many cities in China are sinking into an over-reliance on finance from selling and actively developing land. Therefore, a restructuring of governmental finance and tax system is needed to lessen the reliance on land revenues and to cater to uncertain future demands.

Recommendation 5. Financing for local government operations and initiatives **must become much more independent from selling and developing land.** Alternatives should be explored such as transfers from the central budget according to objective allocation rules, local property taxation, and construction permit fees. When land markets are set up in China, provision should be made to ensure that environmentally sensitive or high priority green space lands **will remain in public control**. Only in exceptional cases should local governments be permitted to participate in the risks of selling and actively developing land.

Recommendation 6. Greater attention should be given to climate resilience and other urban environmental planning within an **adaptive risk assessment framework.** This framework should consider both potential hazards and the adaptive capacities and financing required to deal with increasingly extreme weather events and other aspects of climate change that can cause major damage to property and infrastructure, loss of life, and adverse economic consequences.

Recommendation 7. Cities should be permitted and even encouraged to engage in **green bond markets** as a means of financing investments in for example public transportation, waste management systems, and other long-term public services appropriately linked to green economy and development. Green bonds are suitable when they can be repaid through user fees, rent or taxation. Long-term incentives should be established in order to reduce the consumption of resource and energy. For example, appropriate financial subsidies and tax breaks to encourage energy-saving and insulation improvement for existing buildings.

- **Adhere to people-oriented urbanization:**

To achieve people-oriented urbanization, changes are needed in governance, improvements in legislation, administration and monitoring systems, as well as

support to relevant performance evaluation and accountability. Mechanisms of information dissemination and public participation need to be established. Awareness and concrete understanding of ecological civilization need to be improved in both government officials and general public. People-oriented urbanization should respect people's feeling for and attachment to places, such as cities and neighbourhoods and their specific identities.

Recommendation 8. Provide administrative officials, **especially mayors**, more in-depth training on implementing resource-saving, environment-friendly and low-carbon green development. Set out a greater array of specific environmental goals as a scorecard that can be used as binding obligations in assessment and promotion of officials. Create awards for mayors and city officials who are innovative in ensuring greener cities. Support **public awareness** campaigns under the concept of ecological civilization, advocating resource-saving and low-carbon lifestyle at community level, for example on green travel or waste sorting. Support **urban educational initiatives**. These should be tailored to the new and more diverse urban populations of China's cities, including the many newcomers and enable the skill sets required in an urban, environment-friendly economy.

Recommendation 9. Let the **human scale** prevail in urban design. Guide it to **d**evelop urban layouts and road networks at a reasonable scale, suitable for pedestrians and bicycles. Streets should be easy to cross by foot and slow-mode routes should be short. The plinths of buildings should relate to pedestrians. Promote and ensure **cities' own identities** through deliberate protection of natural and cultural heritage. By fully utilizing existing buildings and facilities, a city's history and culture diversity can be sustained; by building residential buildings with local materials, a city's characteristics can be reflected; by encouraging small-scale, incremental, multi-stakeholder involvement urban regeneration, living conditions for residents can be greatly improved, while giving benefits to property owners and preserving the historical context and collective memory.

Recommendation 10. Establish a **system to monitor and assess** urban developments in relation to environment, nature and resources. Based on a generic format, its contents for a specific agglomeration should mirror the strategic focus in the urban plan. Pollution, extreme weather and climate risks would be among the standard contents. This is a fundamental element in people-oriented urban planning. It should permit consistent reporting to officials from various agencies; information dissemination to the public; as well as support to performance evaluation and accountability of government officials. Projections of **future health risks** to the urban population by air pollution and climate change should be regularly updated and made available, including their underpinning, as part of performance evaluation. Individual citizen and social organization participation rights should be defined clearly in relevant laws and regulations at the provincial and municipal level. They should provide a reliable legal basis for **public participation** in social governance. The

public ‘right to know’ and to be consulted needs to be spelled out in the regulation and laws for urban planning and in performance evaluation systems for local governments.

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