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More than 100 papers and articles published since 1980s, a.o.:  
1. International empirical lessons in urbanization, City Planning Review, 2004, 4: 8-12  
2. Evolution of regulation on public utilities in western countries and its enlightens, Urban Studies, 2004, 2: 4-17  
5. Industrialization, urbanization and enterprises aggregation, Modern City Studies, 2004, 1: 17-23  
6. Role analysis city and town system planning in China, City Planning Review, 2004, 1: 8-16  
8. Protection policy of historic and natural resources as high quality entity of cities, Urban Development, 2003, 12: 15-18  
Compactness and Diversity
— Core Concepts on Sustainable Urban Development of China

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Dr. Qiu Bao-xing  Vice-minister，MHURD，PR China
一、我国紧凑型城市发展模式的意义与统计悖论
I. Significance and statistical paradox of compact urban development mode of China

二、城市多样性的真义和面临衰败的主要原因
II. Actual significance and main decline causes of urban diversity

三、实践这两大核心理念的对策选择
III. Policy selection for implementation of the two core concepts
I. Significance and statistical paradox of compact urban development mode of China
(1) Significance of compact urban development mode

- **Limited amount of arable land:** Per capita arable land in China is 1.413 mu, only about 37.3% of the world average.
- **Uneven spatial distribution:** High speed urbanizing areas and high quality arable land resources completely coincide in space, and the arable land stock is leading to near exhaustion.
- **Over fast speed of arable land reduction threatening food security:** 100 million mu arable land reduced in past decade. Just in the year 2003, 2,537,400 hectares of arable land was lost, including 2,237,300 hectares due to ecological conservation and 427,800 hectares for new construction (accounting for 7.8%).

- **Urban land use modes exert rigid and large influence on consumption of resources and energy and, once established, are difficult to modify.**

- **Total: Compact urban development mode can comprehensively reflect the resource-saving and environment-friendly social development target with land, energy, water and material saving as the objective.**
(2) Over-low urban compactness arguments

- On July 13, 2006, Lu Dadao, an academician of CAS (Chinese Academy of Sciences) and president of Geographical Society of China, citing data of Ministry of Land and Resources in a letter to leaders of the State Council, said: land area for national urban construction is approximately 240,000Km$^2$ in total and more than 130m$^2$ per person, it is far larger than 82.4m$^2$ per person in developed countries and 83.3 m$^2$ per person in developing countries. In the most prosperous cities in the world, the per capita land occupation is only 112.5m$^2$ including suburban areas.
2006.3.6，国土资源部咨询中心主任刘文甲：我国城市建设用地突出的特点是不但总量多，
而且人均量也特别多。城市人均建设用地已达130多平方米，远远高于……。2004年全国
村庄建设用地2.48亿亩，按当年农业人口计，人均村庄用地218平方米。香港总面积1068
Km²，人口约600万，建设用地200 Km²，人均30平方米。

2005.6.28，国土资源部土地利用司副司长束可欣：据北京大学城市与区域规划系教授董
黎明所提供的数据，我国人均城市建设用地130多平方米……

On March 6, 2006, Mr. Liu Wenjia, Director of Consulting and Research Center, Ministry of
Land and Resources, said: urban construction land of China is characterized by not only large
total area but also large per capita. Now the urban construction land area is more than 130m² per
capita, and it is far larger than…. In 2004, nationwide village construction land area was 248
million mu, and, calculated by total agricultural population, the village construction land was
218m² per capita. In Hong Kong, which has a total area of 1068Km² and about 6 million
population, but the construction land area is 200Km² in total and 30m² per person only.

On June 28, 2005, Mr. Shu Kexin, a vice director of Department of Land Utilization, Ministry of
Land and Resources, said: according to data provided by Prof. Dong Liming from Department of
Urban and Regional Planning of Peking University, the per capita urban construction land area
in China is over 130m²…
我国城市紧凑度过高论
(3) Over-high urban compactness arguments

2004.3.1，《2002—2003中国城市发展报告》指出：中国城市发展面临的五大挑战，首先就是中国城市群的人口密度过大。报告指出：目前上海浦西区的人口密度为3.7万人/平方公里，北京和广州城区的人口密度分别为1.4万人/平方公里和1.3万人/平方公里。而目前世界主要大城市如东京只有1.3万人/平方公里，其余城市如纽约、伦敦、巴黎、香港的人口密度也只有8500人/平方公里。报告专家团的首席科学家、中国科学院可持续发展战略组组长牛文元在报告首发式上指出：城市人口密度过大必然给城市可持续发展带来挑战。

On March 1, 2004, China Urban Development Report (2002-2003) indicated: urban development of China is faced with five challenges, the priority of which is the over-large population density of China urban groups. The report suggested that, currently, the population density of Puxi area of Shanghai is 37,000 head/Km², and the population densities of Beijing and Guangzhou urban areas are respectively 14,000 and 13,000 head/Km². But in some major cities of the world, the population density is small, for example 13,000 head/Km² in Tokyo and only 8,500 head/Km² in New York, London, Paris and Hong Kong. Mr. Niu Wenyuan, a chief scientist of the report panel and header of Sustainable Development Research Team of Chinese Academy of Sciences, pointed out on the publishing ceremony of the report that too large urban population density will necessarily bring challenges to sustainable urban development.
(4) Statistics on per capita land use in 36 cities of China

- Statistics of China Academy of Urban Planning and Design on 36 cities entrusted to compile the general urban planning showed: the per capita land use is controlled between 90 and 110 m² in 70% of the cities, between 110 and 150 m² in 22% and between 80 and 90 m² in the other 8%.

Per capita urban construction land in each planning period
(5) 影响紧凑度统计的主要误差因素

(5) Major error factors influencing compactness statistics

- 城市人口数据（是否计入流动人口数量）
- 城市区域的确定（城市规划区、都市区、城市建成区）
- 昼夜影响因素
- Urban population data (whether floating population included)
- Urban region determination (urban planning regions, metropolitan regions, urban buildup regions)
- Day-night influencing factors

<table>
<thead>
<tr>
<th>地区</th>
<th>年份</th>
<th>面积 (Km²)</th>
<th>夜间人口</th>
<th>人口密度（夜间）</th>
<th>白天就业人</th>
<th>白天人口</th>
<th>人口密度（白天）</th>
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<tbody>
<tr>
<td>东京</td>
<td></td>
<td>60.33</td>
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<td>8600</td>
<td>2835105</td>
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<td>中心4个特别区</td>
<td>4 special zones in the center</td>
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<td>757447</td>
<td>15300</td>
<td>1136161</td>
<td>1648621</td>
<td>33299</td>
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<tr>
<td>中心外4个特别区</td>
<td>4 special zones out of the center</td>
<td>506.51</td>
<td>6658955</td>
<td>13100</td>
<td>3296664</td>
<td>6236078</td>
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<tr>
<td>外围15个特别区</td>
<td>15 special zones in the outskirt</td>
<td>621.15</td>
<td>7935211</td>
<td>12800</td>
<td>7267930</td>
<td>11191345</td>
<td>18017</td>
</tr>
<tr>
<td>总计</td>
<td>Total of the 23 zones</td>
<td>621.15</td>
<td>7935211</td>
<td>12800</td>
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<td>曼哈顿</td>
<td>Manhattan</td>
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<td>纽约</td>
<td>New York</td>
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<td>8800</td>
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</table>

注：面积单位是平方公里，人口密度单位是人/平方公里，白天人口数为白天就业人数加居住人口。资料来源：http://www.mid-tokyo.com/map_e
Remarks: area unit, Km²; unit of population density, persons/Km²; day-time population = employment + number of residents. Data source: http://www.mid-tokyo.com/map_e
### (6) International comparison of urban compactness

<table>
<thead>
<tr>
<th>City</th>
<th>Population Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bombay</td>
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</tr>
<tr>
<td>Singapore</td>
<td>1.07</td>
</tr>
<tr>
<td>New York</td>
<td>0.40</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>3.67</td>
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<tr>
<td>Tunis</td>
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<tr>
<td>Los Angeles</td>
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<td>Seoul</td>
<td>3.22</td>
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<td>Atlanta</td>
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</table>

Data Source: Alain Bertaud, 2003, “Order without Design”
中美城市紧凑度历史变化比较
Historical comparison of urban compactness changes between China and United States

中国 China

美国 United States

（每平方公里人口密度 1949-2004年）
(population density: per Km², 1949-2004)
(7) 未来影响我国城市紧凑度的主要因素

(7) Major factors influencing urban compactness of China in the future

- **各类园区开发失控。** 2005年统计，开发区整顿前全国各类开发区6866个，规划面积386万平方公里。整顿后，国家级开发区222个，规划面积2323.33平方公里；省级开发区1346个，规划面积7878.25平方公里，总共为10201.58平方公里。

- **Uncontrolled spread of various development zones.** According to 2005 statistics, before execution of rectification measures, there were 6,866 various development zones with a planning area of 38,600Km²; after the rectification, there were only 222 state-level development zones with a planning area of 2,323.33Km² and 1,346 province-level development zones with a planning area of 7,878.25 Km². The total area of development zones was 10,201.58Km².
过多的高速公路网。我国高速公路总里程已达3.68万公里，比2001年翻了一番还多，总长度仅次于美国。最近公布，2035年将建成8.48万公里高速公路。中国将会成为全球高速公路占地面积第一、交通耗能第一的国家，但美国农民户均占有耕地200公顷，我国占0.5公顷；美国人均石油储量是全球平均的1倍以上，我国仅为1/10。

Excessive expressway networks. The total length of expressways in China has reached 36,800 kilometers, more than twice that in 2001 and next only to that in US. According to recent publication, 84,800 kilometers of expressways will be built in 2035. Then, China will be the country with the largest expressway land occupation and traffic energy consumption in the world. The arable land per household is 200 hectares in US but is only 0.5 hectare in China; the per capita petroleum reserve is double more than the world average in US but only 1/10 in China.

从用地来看，与铁路比较，单线（每公里）占地为25亩，复线（每公里）占地为40亩，而高速公路四车道（双向）占地为120亩。

From the land occupation, it is 25mu/km single-track railway, 40m/km double-track railway but as large as 120mu/km four-lane (bidirectional) expressway.
近郊农村“以租代征”。在一些城市郊区，“以租代征”占用耕地的数量比“计划内”用地指标高出3-5倍。

“Land leasing in lieu of acquisition” in suburban areas. In some suburban areas, the area of land leased in lieu of acquisition is three to five times higher than land use indices “in the plan”.

独立工矿区用地模式粗放。“十五”期间，我国新增建设用地3285万亩，其中新增独立工矿区用地1315万亩，占40%；新增城镇建设用地618万亩，占18.8%。

Extensive land use modes in independent mining areas. The “tenth five-year plan” period saw total 32,850,000 mu construction land was increased, comprising 13,150,000 mu (40%) for independent mining areas and 6,180,000 mu (18.8%) for urban construction.

居住密度的下降趋势。据对36个城市的分析，居住用地比例大多保持在25-35%之间，平均高于国标 (20-32%) 近5个百分点。

Decline tendency of residential density. Analysis on 36 cities indicated that the ratios of residential land are mostly maintained between 25% and 35%, nearly five percentage points higher than the international standard (20-32%) on average.
二、城市多样性的实际意义和面临衰败的主要原因

II. Actual significance and main decline causes of urban diversity
(1) 多样性与城市可持续发展能力
(1) Diversity and urban sustainable development capacity

如果说紧凑型城市是以对大自然、生态环境最小干扰的城市化空间模式，是一种着眼于区域及国家整体利益的“外向的”可持续发展模式之一的话，那具有多样化特征的城市则是一种着眼于城市自身“活力”的“内向的”可持续发展模式。

If compact city is an urbanization spatial mode with minimal interference with the nature and the ecological environment and an “outward” sustainable development mode caring general interests of regions and the state, diversification can be said to be an “inward” sustainable development mode with consideration of “self-vigor” of cities.
可持续发展的两种内涵：

**Two connotations of sustainable development:**

之一：人们满足当前需求不能以削减子孙后代满足同样需求的能力为代价（布伦特兰委员会，1987）。

i. People should not satisfy current demand at the price of reducing capabilities of descendents to satisfy the same demand (Brundtland Commission, 1987).

之二：留给子孙后代的机会应该与留给我们自己一样多。如果不是更多的話（撒拉格尔丁，1996）。

ii. As many, if not more, opportunities should be left to descendents as to ourselves (Serageldin, 1996).

进入城市时代之后，城市成为创造绝大多数“机会”的载体，其创造机会的能力取决于多样性。

After entering the urban times, cities should act as a carrier to create most “opportunities”, while the opportunity-creating capability depends on the diversity.
来自生物界的启示：越是具有生物多样性的生态系统，其稳定发展的特征和抗外界干扰的能力就越强。

Enlightenment from the living nature: an ecological system with the more bio-diversity always has the more distinguished characteristic of stable development and the stronger ability to resist external interference.

在人类世界中，呈现多样性的城市远比单一性的资源依赖性城市更有活力。

In human being’s world, a city with diversity is far more dynamic than single resource dependent cities.
Rise of the US Silicon Valley city group is directly related to the diversity abundance. After more than a half century’s development, the economic strength of Silicon Valley, if weighed by country, has surpassed that of France, Italy and China and ranks the fifth of the world. The speedy development of Silicon Valley’s economy is attributed to the diversity demonstrated by the following six groups.
青木昌彦：在任一城市中，帕累托最优的产业结构的特征是组织形式的多样性。只有一种经济组织形式的城市，是难以创造可持续发展能力的。

Masahiko Aoki: in any city, the characteristic of an industrial structure with Pareto optimality lies in the diversity of its organization forms. Cities with only one economic organization form can hardly create sustainability development capability.
(2) 多样性的自身特征
(2) Characteristics of diversity

- 城市多样性既存在于明显的物质结构之中（如城市建筑、街区风格、地形地貌和可利用资源的多样性等等），又根植于无形的社会资本（如文化习俗、创业精神、包容能力、社会网络、法规制度、政府行为等等）。

- City diversity resides in tangible material structures (e.g. city buildings, block styles, topography and geomorphology, available resources, etc.) and also in invisible social principles (e.g. culture and customs, enterprising spirit, capacity, social network, legislation and institution, government behaviors, etc.)

- 多样性自身所具有的动态性和自组织性，很难用传统的方法去清晰地、完整地描述和界定，或对其效用进行精细的测量。

- With traditional methods, hardly can the dynamic property and self-organization nature inherent in diversity be described or defined clearly and completely and its efficacy measured precisely.
多样性作为一种社会资本，它与实物资本的不同点在于，对它的使用不会消耗它，而不使用才会使它消耗。

As a social capital, diversity differs from material capital in that idleness, rather than employment, will consume it.

多样性作为城市的一种内在素质，很难通过外部输入得到丰富和发展。没有任何两个城市的“多样性”是相同的。沙里宁：城市如同一本打开的书，从中可以读出市民们的文化气质和抱负。

Diversity as an inherent quality of a city, can rarely be enriched or developed via external input. No “diversities” of two cities are the same. Mr. Saarinen said: a city is like an open book, from which we can acquire cultural makings and aspirations of citizens.
各级政府的决策会强烈影响城市多样性的滋长或消亡。

Decisions of governments at different levels will intensively affect development and dissolution of urban diversity.

“城市的多样性，不管是何种类型，都与一个事实有关，即城市拥有众多的人口，人们的兴趣、品位、感觉和偏好五花八门，千姿百态。”容忍并激励这些产生多样性的元素，无疑有利于培育多样性，从而增进城市的活力。

“Urban diversity, whatever the type, relates to a fact, that is, cities have large amounts of people with a variety of interests, grades, feelings and favors”. It will doubtlessly facilitate diversity cultivation and thereby enhance urban vigor to bear and motivate these factors responsible for diversity production.
(3) Major factors inhibiting urban diversity

- 盲目追求华盛顿、堪培拉等震撼人心的景观和技术美，或土地单一用途的僵化观念，从而肢解了有利于产生多样性的相互联系的复杂机制。

- Blind pursuit of grand views and technical beauty of Washington and Canberra or obsolete concept of single land use dismembers interrelated and complicated mechanisms conducive to diversity production.
- 推倒重来，喜新厌旧式的错误的旧城改造政策，造成了大批历史文化名城风貌的丧失和多样性的消亡。
  - Inappropriate old-city reconstruction policies characterized by toppling and rebuilding and abandoning the old for the new lead to disappearance of numerous historic and cultural views and extinction of diversity.

- 过多的创业场所限制和土地、建筑的用途管制，扼杀了多样性的本源——人的主动性和创造性的发挥。
  - Excessive enterprising location restriction and use management of land and buildings strangle the display of diversity development foundation—human activity and creativity.
三、实践这两大核心理念的对策选择

III. Policy selection for implementation of the two core concepts
(1) 倡导土地混合使用的新理念
(1) Advocate new concept of mixed land utilization

- 有利于增强城市各相关服务机构的联系，促进多样性的成长
  - Conducive to intensifying communication among relevant service organs of cities and promoting growth of diversity
- 有利于住宅和就业岗位的均衡分布，减少钟摆式的交通引发的能耗和污染
  - Conducive to balancing distribution of residence and employment posts and reducing energy consumption and pollution caused by pendulum traffic
- 有利于推广环境绩效规划（Performance Zoning），提高整体人居环境质量。
  - Conducive to spreading the environment performance zoning and improving the general quality of human inhabitation environment.
(2) Construct diverse transportation systems and walkable cities

Automobiles provide better transportation capacity, but the limitation of urban road resources leads to the inherent conflict between automobiles and cities. When the automobile number exceeds a certain critical point, what they provide will not be drive but stagnation.

Experience of Bogota, Columbia: the mayor should not only consider how to improve the life of the 30% car owners, but also do something for citizens with no cars who account for 70% of the population. Hundreds of kilometers of bicycle lanes and sidewalks in the city have reduced the peak traffic volume by 40%.
Experience of Curitiba, Brazil: the city is equipped with a free-transfer, low-cost and passenger-friendly bus transportation system, which bears 2/3 of the urban traffic even though most families have private cars. Since 1974, the population of the city has doubled, but the car traffic volume has decreased by 30%.

Road occupation of a private car can accommodate six bicycles, and the parking space can contain 20 bicycles.

Carry out TOD mode to realize effective integration of traffic passage and compact urban development.
(3) Spread low impact development mode to promote cyclic utilization of water resources

- Rainwater: from “flushing” treatment to interception and utilization
- Industrial and domestic water: from the “one way” use-discharge-pollution mode to cyclic utilization and zero discharge
- From terminal treatment to optimal land utilization and source pollution reduction
- Make out coordinative development programming for city groups so that regions and cities can share resources and jointly protect the environment, set up facilities and establish industries for common development.
(4) Consider city as a system with comprehensive ecological functions

- Integrate cities into local ecological systems rather than place them above.
- Make full use of blue, green and yellow lines for regulatory protection of open fields, forests, parks, greenbelts, lakes, rivers, coasts, wet lands and other natural places.
- Perform various types of greening actions to enlarge the green land area and build a green ecological system with multiple species.
- Restore the original river systems.

城市应当被融合进当地的生态系统之中，而不是凌驾于它们之上。充分运用蓝线、绿线和黄线管制性保护开敞的田园、森林、公园绿地、湖泊、河流、海岸、湿地以及其他自然斑痕。
（5）尽可能保护历史文化遗产和风貌，传承历史文脉
(5) To protect historic and cultural heritages and features as much as possible to inherit historical contexts

（6）创建简洁明了、有公信力的城市规划管理体系，真正做到对本地历史文化、普通民众和大自然的尊重
(6) To develop a simple transparency and confidential urban planning management system so as to truly express respect to local historic culture, common people and the nature
（7）消除创业的限制因素，倡导创业文化和激励民众开展创业型就业，充分发挥城市作为技术创新、孵化器和市民创业服务器的功能

(7) To eliminate restrictive factors in undertaking and advocate enterprising culture for motivating citizens to receive and perform pioneering employment so as to bring into full play the functions of cities as technology innovation incubators and citizen enterprising servers.

（8）从绿色建筑、绿色基础设施、绿色小区规划建设入手，使城市逐步成为构筑资源节约型、环境友好型社会的坚强支点

(8) To start from setting up green buildings, green infrastructure and green communities to develop cities gradually into strong fulcrums for constructing a resource-saving and environment-friendly society.
总之：城市的紧凑型和多样性不仅是城市可持续发展的两大核心理念和活力之源，而且也是实现健康和谐的新型城镇化的必由之路。同时，“紧凑型”和“多样性”两者也具有共轭、互动的功能，传承、创新和发展这两大“核心理念”是当代中国规划师的历史使命。

In conclusion, compactness and diversity are not only two core concepts and vigor sources for sustainable urban development, but also the necessary way for realizing healthy and harmonious new urbanization. In addition, compactness and diversity also have conjugated and interactive functions. Therefore, to inherit, innovate and develop the two core concepts is the historic mission of contemporary Chinese planners.
谢谢！
Thank you!
18. Utilization and protection of scenic and heritage resources, *China Landscape*, 2002, 6: 3-10

**Selected books**

24. *Integrative planning of urban and rural development of Jinhua city*, Hangzhou: Zhejiang University Press, 1999