Hypothesis of densification for a sustainable urbanization in a wealthy Chinese city

Dr. Paola Pellegrini, Jinliu Chen, PhD candidate
Xi’an Jiaotong – Liverpool University, Department of Urban Planning and Design, 111 Ren’ai Road, Suzhou Industrial Park, 215123 Suzhou, People Republic of China

paola.pellegrini@xjtlu.edu.cn

Abstract. The Central Government of China is promoting both urbanization and urban sustainability beyond mere growth. These two goals clash if the agricultural land consumption for urbanization is drastically reduced. A re-consideration of urban density and compactness, supported by the UN-Habitat's Urban Agenda III can contribute to address the problem. What existing developments can be densified and how? The research has considered some hypothesis of densification in the city of Suzhou, a wealthy area in the Special Economic Zone of Yangtze River Delta. The research has targeted the compounds where farmers were relocated when the land was massively urbanized since the ’90s, because they are low density, have a strong obsolescence and do not match anymore the living standards achievable in this part of contemporary China. The research has drafted some options of densification.

1. Introduction. The clash of policies for urbanization and sustainability in China

In the last Five-Year Plan for economic and social development of the People’s Republic of China 2016–2020, the 13th, the Chinese Central Government keeps promoting urbanization, that remains the greatest driver of socio-economic progress in the Country [1]. The Government has promoted as well urban sustainability since 2014 with the strategy “New-Type Urbanization beyond mere growth” in the National New Urbanization Plan (2014–2020) [2, 3]. This national strategy proposes a transition from the reckless booming development of the past, which has to be achieved with some actions and measures, including to increase efficiency in land use, avoid sprawl and reduce agricultural land consumption, eco-mobility strategies and the increase of public transportation use, sponge cities for a better use of water. This path is coherent with the Sustainable Development Goal n.11 of the UN Sustainable cities and communities adopted in 2015 [4].

Especially for the conservation of agricultural land for food production, which is a major public health issue in China [5], the National Guidelines on urban planning released in February 2016 prohibit to expand the city beyond what its natural resources can support, enforcing urban growth boundaries also known as the “Red Line of China’s cultivated land”; this boundary is due to the National Land Planning Outline, which requires that by 2020 the amount of cultivated land is maintained at 1.865 billion mu, when at the end of 2017 China’s cultivated land area was 2.023 billion mu [6].

The combination of these two national goals – expanded urbanization and sustainable development – should produce sustainable urbanization in China and should be adopted and realized by every local city plans. But these two national policies can easily clash when applied in real local contexts; in fact
urbanization means more inhabitants and almost always the growth of the urbanized area and of the real-estate market [7], while sustainability requires the reduction of land consumption and the conservation of the spaces for water.

2. An evergreen parameter of land use intensity: density

In order to realize millions of housing units for newcomers and preserve land, the parameters of density and compactness of the settlements must be considered. Appropriate compactness and density is supported by the UN-Habitat’s Urban Agenda III [8] and considered one of the most important topics of this decades by several scholars. The issue “what density is proper” is subject of a constant debate in urbanism and it is not possible to determine what the optimal density for sustainability is in absolute terms because the local cultural approach must be considered [9].

The main cities in main land China do not rank among the densest in the world and the density is generally medium, i.e. 10,000-4,000 People/SqKm (100-40 People/Ha) [10-11]. It must be added population density in several cities with more than 1 million people in China, which have skyrocketed [12], has been declining in recent years because urban land expands faster than population grows [13]. Because fertile land is a limited resource, to re-consider how intensely land should be used in allocating people in China can help the definition of new perspectives; it means to assess compactness and density in the housing communities built after the opening-up, which are usually standardized in limited typological and morphological solutions [14].

Densification means to realize dwelling units for a larger number of people than in the existing conditions on a given area. Recently urban densification for saving agricultural and natural resources has been implemented in several cities, as an example in Paris in connection to public transportation, in Seoul and in Rotterdam with small scale transformations of the existing buildings, in London with infill, demolition and rebuilding. Steps towards a more intense land use have been taken also in China, as an example since 2003 the “prohibition of villas” has been issued nationwide to stop low density developments [15], but a general debate about densification and compactness today is missing.

3. A case study for densification in wealthy China, the medium density city of Suzhou

Assuming that densification is a option for not developing more agricultural land, this paper contributes to answer the following research question: what strategy should be adopted for densifying the existing development in a wealthy Chinese city? This short paper does not enter into the discussion of advantages and disadvantages of high-density, but explores its feasibility. How to deliver successful densification must be explored in relation to specific local conditions [16]. The research has taken Suzhou, Jiangsu Province, 10,721,700 inhabitants, as a relevant case study because:

- it is a wealthy part of the Special Economic Zone of the Yangtze River Delta and very likely will keep attracting new inhabitants for the highly competitive ongoing shift from cheap manufacturing to innovative industrial production promoted by the local government [17]. This shift means raising the salaries of the expanding middle class as well as of the lower income people and expectations of higher living standard [18];
- it is a dense city, but not a high-density city. The population density is 2,304 People/SqKm, the built area is 22.8% of the total land, water surfaces are 36% according to the local government [19]; this density is less than one third of Singapore, half the density in Shanghai, almost like Paris [10-11];
- the Master Plan for Suzhou 2017-2035, adopted in 2018, not available to consultation [20], promotes sustainability, but does not mention the clash between new urbanization and preservation of land resources, does not define a threshold of the future population as in the previous plans, always proved to be under-estimated, and does not mention densification.

The research has explored if, how and where Suzhou can be densified. The research has taken into consideration the resettlement communities, i.e. the compounds built cheap and fast from the ‘90s for relocating people when the farmland was massively urbanized and the villages demolished, because:
• the structures and devices of the resettlement communities have a strong obsolescence and their spaces, both indoor and outdoor, are not appropriate for the higher living standards reached with the “end of cheap China” [21]: no air conditioning, no thermal insulation, no elevator, no proper parking space, very limited privacy are the most relevant problems [22];
• differently from what perceived they are medium or low density: in the 25 compounds studied in the 5 districts of the city the average Floor Area Ratio ranges from 0.8 to 2.3, slightly increasing in time: from 1994 to 2004 FAR was 1.29, from 2004 to 2014 FAR was 1.75;
• they are a standardized solution frequently adopted, a copy-paste design of multi-storey buildings and similar open spaces; the local government did not provide the actual number, but in Suzhou there are tens of them for an approximate but reliable esteem of around 800,000 people.

4. Densification as a substantial solution
For the problems related both to the quantity of built surface and the quality of housing standards the research proposes three options of densification of the resettlement communities which are obsolescent or very soon will be.

4.1. Option 1, Substitution
This option requires a large investment and the upheaval of people’s lives justified only if the quantity of people on the same area is substantially increased and the public and private environment increases in quality and sustainability. In Suzhou one densification has already been tested, transforming in 2013 Nanhuan Community in Nanhuan New Town: it was demolished and rebuilt with a Floor Area Ratio more than three times the former one, from 1.1 to 3.8. Obviously if all the resettlement villages in Suzhou were densified tripling their Floor Area Ratio, it would be possible to triple the inhabitants, +1.6 million people.

4.2. Option 2, Selective Substitution
Option 1 is greatly effective but expensive and disruptive; to avoid these disadvantages some reasons can be proposed for selecting which communities should be densified: the ones which
• do not use land efficiently: the first communities to be replaced should be the ones with a very low FAR, such as where FAR is lower than 1; the ones with FAR lower than 1.5 should be considered for densification; these parameters should be defined according to the planning goals;
• are within 400 m from the subway gates and transport interchanges in order to exploit the good connectivity the site has;
• have a built coverage higher than 25% and a green coverage less than 30% and the quality of the open space is not satisfactory: invaded by cars or fragmented in spaces too little to be of any use; should be considered for transformation.

4.3. Option 3, Infill the Existing Structures
Densification can be achieved maintaining the existing structures, when these are in good conditions, with infill, build over, build between the existing buildings. These actions invest a small amount of resources, do not demolish the houses of the ones who have already experienced one resettlement from their village, reduce the negative impact of replacement on the environment, but can not increase substantially the amount of people in the communities and require investment in innovative architectural design, which often is not the case in China. These small actions indicate how to grow denser might mean to build a compact city, not a super-high city, which is an option the local government would like to avoid.

5. Conclusion
Residential stock represents about 80% of the total floor area in China and it is projected to increase by nearly 70% by 2050 [22]. The scientific community agrees the less fertile land is urbanized the
better for the food safety and the sustainability of the development. To address the contradiction between further urbanization and conservation of non-replaceable resources densification can substantially contribute to a better use of land. In the areas of mature urbanization and wealthy condition such as Suzhou the communities of relocated farmers have the conditions to be densified. This transformation is a good opportunity to realize higher housing standards suitable for a middle-class Country.

The proper density must be site-specific; the research proposes in Suzhou low density means FAR less than 1.5, and the goal can be FAR 4. To fully rate the potential impact of the densification of the resettlement communities some pilot projects can be proposed, a comprehensive overview of the conditions of every community must be produced and a strategic plan must be drafted of future expansions and densification actions according to the planned future population in the city.

References

[1] Central Government of China 2017 The 13th Five-Year Plan for economic and social development of the People’s Republic of China 2016−2020 (Beijing: China Central Compilation & Translation Press)

[2] Central Committee of the Communist Party of China 2014 国家新型城镇化规划 National New Urbanization Plan of China 2014−2020

[3] Chen M, Liu W and Lu D 2016 Challenges and the way forward in China’s new-type urbanization Land Use Policy 55 334−39

[4] https://www.un.org/sustainabledevelopment/sustainable-development-goals/

[5] Lam H, Remais J, Fung M, Xu L and Sun S 2013 Food Supply and Food Safety Issues in China The Lancet 381 2044-53

[6] Central Committee of the Communist Party of China 2016 中央国务院关于进一步加强城市规划建设和管理工作的若干意见, http://www.gov.cn/zhengce/2016-

[7] Wu F 2015 Planning for Growth: Urban and Regional Planning in China (NY: Routledge)

[8] Habitat III Secretariat 2017 New Urban Agenda (United Nations) p15, 19

[9] Ng E 2009 Designing High-Density Cities For Social and Environmental Sustainability (NY: Routledge)

[10] Demographia 2019 World Urban Areas 15th Annual Edition, www.newgeography.com/

[11] Shlomo A, Blei A M, Parent J, Lamson-Hall P and Galarza Sánchez N 2016 Atlas of Urban Expansion, vol.1: Areas and Densities (Cambridge: Lincoln Inst. of Land Policy)

[12] World Bank data: https://data.worldbank.org/country/china

[13] Xu G, Jiao L, Yuan M, Dong T and Zhang B 2019 How does urban population density decline over time? Landscape and Urban Planning 183 59−67

[14] Hassenpflug D 2011 The urban code of China (Basel: Birkhäuser GmbH)

[15] Chinese Ministry of Land and Resources 2003 Urgent Notice “No. 45”

[16] Rowe P G and Kan H Y 2014 Urban Intensities: Contemporary Housing Types and Territories (Basel/Berlin/Boston: Birkhauser) p.7

[17] Suzhou Government Research Institute and Li Z 2019 Orientation of Suzhou under the regional integration in the Yangtze River Delta Workshop at UPD XJTLU Suzhou

[18] Zhang L 2010 In search of paradise: middle-class living in a Chinese metropolis (Ithaca: Cornell Univ. Press)

[19] 苏州市土地利用总体规划 (2006−2020年), http://www.szxc.gov.cn/szxczwgkinfo/

[20] Urban Renewal Center, CAUPD and Miu Y 2018 The masterplan of Suzhou from 2020 to 2035 and its sustainable development strategy Workshop at UPD XJTLU Suzhou

[21] Rein S 2012 The End of Cheap China (Hoboken: Wiley)

[22] Cimillo M, Calcerano F, Chen X, Chow D and Gigliarelli E 2019 Energy modelling and retrofit of the residential building stock of Jiangsu Prov. KnE Social Sciences 2019 1–10