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Spatial Green Belt Development Report in China

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ABSTRACT

The green belt, located on the outskirts of a metropolis, has many characteristics such as good location, better landscape environment than urban areas, high availability in an original environment, low development costs and large and concentrated open spaces. With the huge population in China, this has led to a shortage of green space per capita and the shortage of recreational space. In view of such conditions, the recreational function of the green belt is very important, and can compensate for the shortcomings of tight urban recreation space. However, there has always been an important question about the scientific aspects and rationality of green belt use and control measures. In this paper, some outcomes of the Chinese green belt policy will be introduced. Then, three advantages and two disadvantages will be shown. Finally, reasons analyse and comparisons between China's main cities and cities with a successful green belt will be given.

1. Introduction

Since the Chinese Reform and Opening-up Policy in the 1980s, the trend has been rapid urbanization in China, at a growth of 1171.4 square kilometres of urban construction each year.^[1] This rapid urbanization has caused a series of urban problems such as urban-rural conflicts, deteriorating environment, heavy traffic and chaotic urban areas. With the rapid development of Chinese cities, methods that can relieve the problems have increasingly drawn attention. Against this background, some cities and regions in China, such as Beijing, Shanghai and the Zhu River Delta region, have begun to incorporate construction of green belts into urban planning programmes and urban development management programmes.^[2]

Green belt can be traced back to the theory of Garden

Cities, proposed by Howard in the late 19th century.^[3]

It refers to green land or afforestation having a higher proportion of land, with a shape or a line formed around the city or city area.^[4] There are two main objectives for the green belt, firstly it is to prevent urban sprawl, which is the expansion of low-density, dispersed, and automotive-dependent development into rural land, by ensuring the permanent opening of green land. According to The Draft National Policy Planning Framework (2011),^[5] the limitation of urban sprawl has some idealized contributions to prevent neighbouring towns from being integrated, to protect rural areas from urban embezzlement and to promote urban regeneration by reusing urban land. The second aim is that a green belt always has the role of providing recreation space in urban areas.^[6]

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In China, the first city to put the green belt policy into use was Beijing. Set out in Beijing's General Planning in 1958, the thinking of green belt has been practiced in Beijing for nearly half a century.^[7] In that planning, the policy of a green isolation area was introduced and continued to be followed in many future editions of Beijing's General Planning document. In recent years, many Chinese cities, such as Shenzhen, Beijing and Wuhan, have adopted green belt management through space control and basic ecological control. Furthermore, cities, such as Hangzhou and Chengdu, have made great innovations in delineating the boundary of urban growth through the green belt policy.^[8]

2. Critical Analysis

2.1 Spatial Development Outcomes in China

Many cities in China, including Beijing, Shanghai, Chengdu, Tianjin and Wuhan, have begun to consider restricting the rapid expansion of urban space through having a green belt and maintaining a compact spatial pattern. However, the green belt policy, which comes from Britain, has encountered many difficulties in its "localization" process. Beijing's first Green Isolation Area was generally considered to have evolved into an urban construction area like the Tokyo green belt^[9] and the green belts in Shanghai are actually just a few kilometres wide around the Shanghai Ring Expressway.^[10]

Due to the conflict from the rapid urbanization, the control of urban construction land is not enforced, leading to a large amount of green belt land having been invaded. This is the most prominent problem in the planning and construction of Chinese cities' green belts.^[11] For instance, an area of green land in Zhengzhou, in the city's general planning for 1995-2010, was 187 square kilometres. However, with the pressure of rapid urbanization, the 2010-2020 Zhengzhou General Planning reduced this green land to 91.8 square kilometres. At the same time, the urban development land in Zhengzhou has continued growing (Table 1).

Table 1. Green land change and urban development land change in Zhengzhou

	1995-2010 Zhengzhou General Planning	2010-2020 Zhengzhou General Planning
Green Land	187 km ²	189 km ²
Urban Development Land	91.8 km ²	400 km ²

Sources: 1995-2010 Zhengzhou General Planning. 2010-2020 Zhengzhou General Planning

In terms of difficulties in a green belt "localization" process, major cities are also exploring new ways for green space development. The Beijing government pro-

posed the construction of a second green belt area in 2013, and the Shanghai government expanded the "green belt around the city" to the "urban open space ring". These indicate the preliminary exploration of the implementation of the green belt policy in local areas.^[12] Through changes to the "localization" process, the impact of the methods, which limit construction activities, such as green belt policy and the urban growth boundary policy are more directly focussed on the size and structure of cities than traditional planning methods, which arrange and guide construction activities.

2.2 Advantages

After the implementation of the green belt policy based on a combination of worldwide practices and related research, it has both advantages and disadvantages on China's urban planning policies. The main advantages are:

- (1) Significantly reducing the urban development land unplanned expansion rate and the formation of a reasonable urban morphology;
- (2) Providing recreation space around the city and metropolitan areas which makes urban living environments more liveable and more sustainable;
- (3) Reducing the impacts of an urban heat island effect, storm and flood and other extreme climate changes in urban areas.

Firstly, a green belt can control the speed of the urban sprawl and make the urban morphology more reasonable. There are three major urban containment policies: urban growth boundaries, urban infrastructure service boundaries, and greenbelts.^[13] The rapid expansion of a city has become an engine of rapid economic growth in China because of Chinese Land Finance. However, the over quick urban expansion leads to the unsustainability of urban development planning in addition to incongruous urban morphology.^[14] Therefore, the method for resolving the urban sprawl is very important in rapid urbanization. In the Greater London Planning of 1944, Abercrombie proposed a green belt for London of 8-15 km wide, with a total area of over 2,000 km², which has a history of being effective in achieving its purposes, such as to control urban growth, to enhance landscape protection, to improve the landscape (Figure 1). The implementation of the green belt policy eased the unreasonable expansion of urban development land areas in London after World War II.^[15] In Beijing, to date, the change of land use and reduction of urban sprawl reflects the spread of the green belt in controlling the city.^[16] The green belt is the organic combination of city and natural ecology, which can effectively control urban over-expansion and promote the sustainable development of the city.^[17] Therefore, a green belt policy, as a green

field open space set up around cities to control their expansion is the first major advantage effectively mitigating a city's uncontrolled sprawl.

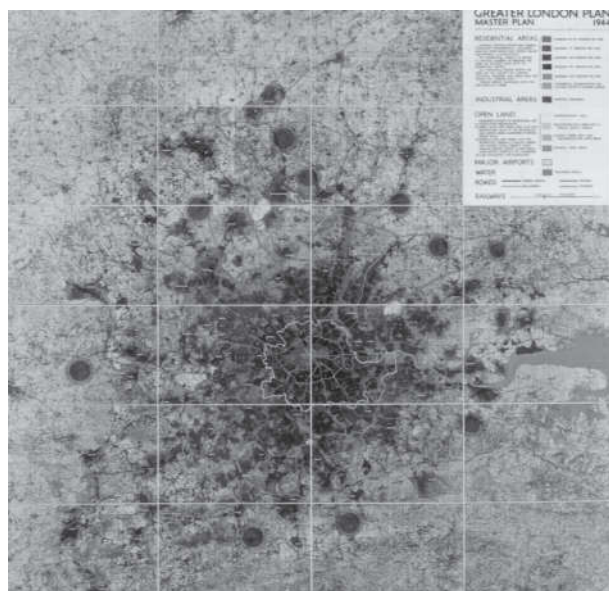


Figure 1. Greater London Plan

Sources: 1944 Greater London Plan

Secondly, as with the objectives of setting up green belts, providing urban recreation space efficiently is the second key advantage of green belts. Torkildsen^[18] states that with the advent of the leisure era and the development of Internet technology, the changes in people's habits have expanded the connotation of recreation; increasingly urban spaces are beginning to integrate into recreation functions thereby making urban recreation space to the cities more important. In Berlin, the economic utility of the green belt is that it serves as an open space that preserves agricultural and forest landscapes as its original landscape features and provides space for recreation in the rural areas surrounding the city and metropolitan area^[19]. In China, the recreation space has been in a disadvantageous position in the urban space competition with other industries, resulting in a significant convergence of the leisure and recreation space in the metropolis. Green belt policy can solve the contradiction between the supply and demand of urban recreation space efficiently, which is the second significant advantage of a green belt policy.

Thirdly, green belts can maintain urban ecological stability. With the rapid development of urban scale and the rapid expansion of urban populations, the urban heat island effect, caused by the drastic changes of urban underlying surface structures and the rapid increase of anthropogenic heat emission in cities, has gradually become a key factor impacting on urban living environments and residents' health.^[20] Therefore, it is very important to be

able to alleviate the ecological changes in cities and stabilize the urban ecological balance. Amati^[9] states that the green belt policy in Paris reduces its urban heat island effects, storms and floods on urban centres through the protection of open space and changing the ecological environment in urban areas, which is always an evaluation of the urban environment. Furthermore, the Paris green belt reduces the spread of central areas to reduce the total resident commuting volume and finally reduces the burning of fossil fuels, which reduces man-made damage to the urban environment. As the green belt can improve the urban environment, the advantages of the greenbelt in improving the ecological environment in urban areas are obvious, given that environmental problems have become increasingly serious.

2.3 Disadvantages

Firstly, the most serious disadvantage of green belt is generally the "leapfrog" land use structure, which is defined as a low-density urban sprawl with intermittent faults and disorganized features.^[21] Due to the authority and permanence of the green belt policy, it is extremely difficult for construction within the green belt area, especially residential construction.^[22] However, with the continuing development of cities, the number and quality of existing residential buildings cannot meet the growth of the Chinese urban population and variation of family structures^[23]. Daniel et al.^[24] states that although more residential land development is needed, the extent of the urban area is limited by the presence of the green belt. Developers are more focused on agricultural land outside the green belt, resulting in a "leapfrog" land development model, which will lead to land-use confusion in the marginal areas and the occupation of agricultural land.

In addition, when the green belt has become an obstacle between the centre of the city and the fringe, it will inevitably bring increased, unnecessary transportation costs.^[25] There is more land needed for traffic construction within a green belt, which causes the green belt to be gradually cut and fragmented. Additionally, this not only hinders the traffic, but also damages the integrity and stability of the green belt. Therefore, the disadvantages come from the misuse of green belt policy leading to "leapfrog" land use structures, which then leads to an increase in urban commuting and infrastructure construction, and causes disorder of the urban land use structure.

3. Reasons and Lessons

In the context of China's rapid urbanization, urban planners have tried to incorporate the construction of the green belt into urban planning and urban development management. Several decades of green belt construction in

China have seen some achievements. For instance, part of the expected results has been achieved in Beijing's green belt and the green belt in Guangzhou, but these have not completely reached the goals or expectations. However, in reality, the urban green belt areas in China are mostly formed under the double structure of urban and rural areas. In these areas, there are a large number of natural villages and plots of land. Furthermore, there are many serious contradictions, which make the green belt policy in China unsuccessful between the trend of continuous urban development land sprawl and the original intention of green belt restoration and ecological environment restoration.

The first reason for these contradictions is that the green belt institutional system is incomplete. Although the demand for green belt construction in Chinese cities has risen rapidly in recent years, due to the lack of theoretical guidance, a systematic approach has never been formed. In comparison with the United Kingdom, where the 1947 Urban and Rural Planning Law of the United Kingdom explicitly proposed the Green Belt Policy and in 1988, the British Environment Ministry released Planning Policy Guidance Note 2: Green Belts, to fully illustrate the legal nature and status of the Green Belt Policy in the UK.^[26] However, in China, the ordinances are set too rigidly, resulting in poor compatibility in the process of construction. Apart from that, there has been a serious lack of public participation and a significant departure from the original intention of construction. The Chinese green belt policy is based on local regulations. The discrepancy of the policy system is an important reason that has led to the differences in the performance of the Green Belt policies between China and the United Kingdom.

The second reason is the unfair land system in rapid urbanisation. In China, unequal opportunities for state-owned land and collective land to enter the market have left a huge space for rent-seeking, which has led to the repeated banning of enclosure.^[27] At the same time, China is experiencing rapid urbanization and is inevitably facing the multiple needs of economy, population and space growth. As the green belt limits the supply of land, it leads to an increase in land and housing prices, which will produce many social conflicts because of the unfair land system. When compared with a developed country, such as the UK, which completed urbanization as early as 1911, the different national conditions mean China has more problems in promoting a green belt policy and these needs to be resolved.

These two reasons represent China's unsuccessful green belt policy, indicating that the green belt policy has its limitations. Achieving the dual goal of protecting the

ecological environment, restraining the spread of cities and promoting economic and social development probably cannot be realized only through the construction of the green belt.

4. Conclusion

In summary, a green belt policy is a method to ease urban sprawl and add urban recreation space. The green belt has some advantages, such as its efficiency in inhibiting the spread of the city, improvement of recreation space and maintaining urban ecology systems. However, the Chinese green belt has not had a great success largely due to the institution system and land system in China's rapid urbanization.

References

- [1] Jaros, K.A., 2016. Forging Greater Xi'an: The Political Logic of Metropolitanization. *Modern China*, 42(6), pp.638-673.
- [2] Le, L.I., Jiaming, L.I.U., Tao, S.O.N.G., He, Z.H.U. and Hui, T.A.O., 2014. Research progress of urban green belt and recreational use. *PROGRESS IN GEOGRAPHY*, 33(9), pp.1252-1261.
- [3] Ping, W., Bin, L. and Pengjun, Z., 2015. Planning and Practice of Urban Green Belts: Cases of London, Tokyo and Seoul. *Urban Planning International*, p.91.
- [4] Taylor, J., Paine, C. and FitzGibbon, J., 1995. From green-belt to greenways: four Canadian case studies. *Landscape and urban planning*, 33(1), pp.47-64.
- [5] Hulme, J., 2011. The draft National Policy Planning Framework. *Journal of Urbanism: International Research on Placemaking and Urban Sustainability*, 4(3), pp.199-199.
- [6] Amati, M. ed., 2008. *Urban green belts in the twenty-first century*. Routledge.
- [7] Tan, M., Guy, M.R. and Li, X., 2011. Urban spatial development and land use in Beijing: implications from London's experiences. *Journal of Geographical Sciences*, 21(1), pp.49-64.
- [8] Sit, V.F., 1996. Soviet influence on urban planning in Beijing, 1949-1991. *Town Planning Review*, 67(4), p.457.
- [9] Yokohari, M. and Amati, M., 2005. Nature in the city, city in the nature: case studies of the restoration of urban nature in Tokyo, Japan and Toronto, Canada. *Landscape and ecological engineering*, 1(1), pp.53-59.
- [10] LI, W., Paulussen, J., WANG, R. and LI, D., 2009. The structure and ecological function of greenbelt in mega-city. *City[J]*, 2, p.02.
- [11] Shuzhan, Q., Weibing, J. and Jiaying, W., 2017. Ring Road Greenbelts in China: Problems, Countermeasures and Prospects. *Journal of Chinese Urban Forestry*, 3, p.003.
- [12] Li, Z., Li, C., Wang, X., Peng, C., Cai, Y. and Huang, W., 2018. A hybrid system dynamics and optimization

- approach for supporting sustainable water resources planning in Zhengzhou City, China. *Journal of Hydrology*, 556, pp.50-60.
- [13] Pendall, R., Martin, J. and Fulton, W.B., 2002. Holding the line: urban containment in the United States. Center on Urban and Metropolitan Policy, the Brookings Institution.
- [14] Cao, G., Feng, C. and Tao, R., 2008. Local "land finance" in China's urban expansion: challenges and solutions. *China & World Economy*, 16(2), pp.19-30.
- [15] Longley, P., Batty, M., Shepherd, J. and Sadler, G., 1992. Do green belts change the shape of urban areas? A preliminary analysis of the settlement geography of South East England. *Regional Studies*, 26(5), pp.437-452.
- [16] Wang, H., Cai, Y.M. and Zhang, W.X., 2011. Evaluation of implementation of the first greenbelt's policy in Chaoyang District, Beijing City. *Scientific and Technological Management of Land and Resources*, 28(2), pp.6-12.
- [17] Abercrombie, P., 1944. Greater London Plan. London [UK].
- [18] Torkildsen, G., 2005. Leisure and recreation management. Psychology Press.
- [19] Kühn, M. and Gailing, L., 2008. From green belts to regional parks: History and challenges of suburban landscape planning in Berlin. *Urban Green Belts in the Twenty first Century*, pp.185-202.
- [20] Satterthwaite, D., 2007. Adapting to climate change in urban areas: the possibilities and constraints in low-and middle-income nations (Vol. 1). Iied.
- [21] Yue, W., Liu, Y. and Fan, P., 2013. Measuring urban sprawl and its drivers in large Chinese cities: The case of Hangzhou. *Land use policy*, 31, pp.358-370.
- [22] Gant, R.L., Robinson, G.M. and Fazal, S., 2011. Land-use change in the 'edgelands': Policies and pressures in London's rural-urban fringe. *Land Use Policy*, 28(1), pp.266-279.
- [23] Champion, A.G., 2001. A changing demographic regime and evolving poly centric urban regions: Consequences for the size, composition and distribution of city populations. *Urban Studies*, 38(4), pp.657-677.
- [24] Arribas-Bel, D., Nijkamp, P. and Scholten, H., 2011. Multidimensional urban sprawl in Europe: A self-organizing map approach. *Computers, Environment and Urban Systems*, 35(4), pp.263-275.
- [25] Taylor, L., Martichenko, R. and LeanCor, L.L.C., 2006. Lean Transportation—Fact or Fiction? Fedex and LeanCor White paper.
- [26] Amati, M. and Yokohari, M., 2006. Temporal changes and local variations in the functions of London's green belt. *Landscape and urban planning*, 75(1), pp.125-142.
- [27] MIN, X. and YANG, B., 2003. THE SECOND GREEN BELT AND BEIJING SPATIAL DISTRIBUTION [J]. *City Planning Review*, 9, pp.17-21.