

Comparison of the Garden City Concept and Green Belt Concept in Major Asian and Oceanic Cities

Kayoko Yamamoto

Abstract—The purpose of this study is to review representative cases of green space development in order to compare the Garden City concept and Green Belt concept as applied and to examine its direction in major Asian and Oceanic cities. The results of previous studies and this study show that there are two major directions in such green-oriented city planning. One direction is toward Multi-Regional Development, and the other focuses on an Environmentally Symbiotic City based on the Garden City concept. In large cities and the suburbs where extremely strong pressure to urbanize makes it impossible to keep Green Belts, it is essential to strictly control land use and adopt the Garden City concept to conserve the urban environment.

Keywords—Garden City, Green Belt, Green City, Green Space Development, Major Asian and Oceanic Cities

I. INTRODUCTION

MOST large cities in Asia are considerably high-density compared with their counterparts in Europe and North America. An acute lack of green spaces in metropolitan areas in Japan, in particular, has given rise not only to problems in land use but also to deterioration of the quality of the urban environment [1]–[3]. Quite apart from the problem of environmental conservation, green spaces fulfill a number of diverse functions for recreation, disaster prevention and local topography, and are thus one of the most important elements in urban areas. Furthermore, in Japan, the potential danger of high-density cities was made very real in people's minds in the Great Hanshin Earthquake in 1995, and several proposals have since been made strongly arguing for the necessity of disaster prevention city planning based on the provision of green spaces [4]–[7].

The idea of city planning based on green space development is not at all new, having its origins in 17th and 18th century Europe. The construction of modern urban parks began as early as the 19th century. In recent years, securing green spaces has become an indispensable element of urban development. Among previous studies on green space development in the academic field of city planning and regional planning, a

particularly large number have focused on examples in the U.K. and the U.S., but there have been no case studies of Asian and Oceanic countries nor studies on the history and mutual relevance of green space development throughout the world. Based on the viewpoints described above, the purpose of this study is to review representative cases of green space development in order to compare the Garden City concept and Green Belt concept as applied and to examine its direction in major Asian and Oceanic cities.

II. FRAMEWORK AND METHOD

In this study, Section III takes representative major cities in Asian and Oceanic countries as case study cities and clarifies their characteristics based on the results of literature research and field surveys (2001-2009). Section IV outlines the Green Belt concepts in Japan and South Korea, the Garden City concepts in Singapore, Malaysia, Australia and New Zealand, and green space development as the national strategy of China as reprehensible cases of green space development in Asia and Oceania, and presents their characteristics based on the results of literature research and field surveys (2002-2009) in addition to interviews (2002-2009).

Furthermore, Section V summarizes the genealogy of green space development in Asian and Oceanic countries and in the U.S. and European countries which affect Asian countries. Furthermore, it compares the Garden City concept and Green Belt concept as applied and examines its direction in major Asian and Oceanic cities. Finally, Section VI presents the conclusions of this study and suggests ideas for future research.

III. CASE STUDY CITIES

A. Outline of Case Study Cities

In this study, 8 major cities in Asia and Oceania are discussed as case study cities: Tokyo in Japan; Seoul in South Korea; Beijing and Shanghai in China; the city state of Singapore; Kuala Lumpur in Malaysia; Melbourne in Australia; and Christchurch in New Zealand. Tokyo, Seoul, Beijing, Singapore and Kuala Lumpur are the capitals of their respective countries. Shanghai is the economic center of China; Melbourne is the second largest city in Australia; and Christchurch is the third largest city in New Zealand.

In Tokyo and Seoul, the Green Belt concept has been the primary choice used to prevent the disorderly sprawling of the metropolitan areas. In contrast, Singapore, Kuala Lumpur,

Kayoko Yamamoto is with the Graduate School of Information Systems, National University of Electro-Communications Tokyo, Japan
1-5-1 Chofugaoka, Chofu City, Tokyo 182-8585, Japan
(Tel & Fax: +81-42-443-5728, e-mail: k-yamamoto@is.uec.ac.jp)

Melbourne and Christchurch are famous all over the world as Garden Cities. In large Chinese cities such as Beijing and Shanghai, green space development is promoted as the national strategy.

TABLE I shows the outlines of the case study cities. The population density of Tokyo is more than 10,000 persons/km², which is much higher than that of other major Asian cities. The population density of Kuala Lumpur is more than 7,000 persons/km², and Seoul and Singapore are more than 6,000 persons/km². However, the population densities of Beijing, Melbourne and Christchurch are less than 1,000 persons/km², with Melbourne's being particularly low.

Fig. 1 shows the locations of the 8 cities whose green space development I describe in detail in Section IV.

TABLE I
OUTLINES OF CASE STUDY CITIES

Area	Nation	City	Population (Person)	Area(km2)	Population Density (Person/km2)
Eastern Asia	Japan	Tokyo(23 Cities)	8,641,764	621.8	13,898.0
	South Korea	Seoul	10,356,202	605.3	6,573.0
	China	Beijing	14,930,000	16,808.0	888.0
		Shanghai	18,670,000	6,340.5	2,945.0
Southeastern Asia	Singapore	Shingapore	4,353,893	698.0	6,283.0
	Malaysia	Kuala Lumpur	1,800,000	243.7	7,386.1
Oceania	Australia	Melbourne	3,806,092	8,806.0	432.2
	New Zealand	Christchurch	382,200	452.0	845.6

Note) Population and area data are taken from the websites of each city.



Fig. 1 Locations of case study cities

B. Japan and Korea

Fig. 2 shows Yoyogi Park and Meiji-jingu Shrine, which are located near the Shinjuku sub-center of Tokyo in Japan, viewed from Tokyo Metropolitan Government Building.

part of Tokyo, except for these, there are no large-scale parks and green spaces, and the high-density urban areas continue to the suburbs.

Fig. 3 shows the city center of the capital Seoul in South Korea viewed from Seoul Tower. Although Seoul has one of the highest urban densities in the world shown in Fig. 4 and unipolar concentration in Seoul is high as in Tokyo, its green coverage rate is comparatively high among major Asian cities due to the many gardens around palaces and religious facilities in the city center.



Fig. 2 Shinjuku sub-center in Tokyo viewed from Tokyo Metropolitan Government Building (November 2006)



Fig. 3 Central Seoul viewed from the Seoul Tower (January 2004)

C. China

Beijing and Shanghai are under the control of national government. The former is the center of national politics and the latter is the economic center. Fig. 4 shows Tiananmen Square as a representative urban park of Beijing, and Fig. 4 shows a small park in Shanghai's city center. In Beijing, there are a lot of gardens, not only Tiananmen Square (Fig. 4) but also those of the dynasty period, and green space development was being promoted in preparation for the 2008 Olympic Games.

In Shanghai, many foreign-affiliated firms have offices and there are clusters of skyscrapers, especially in the central commercial districts. However, as can be seen in Fig. 5, there

are large-scale parks and green spaces with abundant greenery in the city center. Moreover, since an international exposition is going to be held in Shanghai in 2010, the international exposition meeting place is being developed centering around the Huangpu Jiang, the mother river of Shanghai.



Fig. 4 Tiananmen Square in central Beijing (October 2004)



Fig. 5 A small urban park in central Shanghai (June 2005)

D. Southeastern Asia

Fig. 6 shows the harbor area of the southeastern part of the city viewed from Mount Faber Park, one of Singapore's representative urban parks. As this figure shows, there are middle- and high-rise buildings even in the harbor area. However, as mentioned above, many very large urban parks such as Mount Faber Park are distributed all over Singapore. In addition, since not only parks and green spaces but also wide roads with plentiful roadside trees have been developed, Singapore is described as a Garden City as explained in detail in Section V.

Fig. 7 shows KLCC (Kuala Lumpur City Center) Park and the city center viewed from the Petronas Twin Tower in Kuala Lumpur. This figure shows that, even in the city center, there are many green spaces as well as large-scale parks like above-mentioned KLCC Park, and that there are not so many clusters of high-rise buildings.



Fig. 6 Harbor area in southeastern Singapore viewed from Mount Faber Park (May 2002)



Fig. 7 KLCC Park and the city center viewed from the Petronas Twin Tower (November 2007)

E. Oceania

Fig. 8 shows the center of Melbourne viewed from the tower of the Melbourne Observation Deck. Stone buildings and modern buildings coexist, and very large, green, open spaces are distributed in the outskirts. Parks occupy about 25% of the area of this city. The city center (called "the City") is divided on a grid.

Fig. 9 shows the center of Christchurch viewed from the tower of the Christchurch Cathedral. The urban area is formed around the Christchurch Cathedral, and the roads are constructed on a grid. All around this city, traditional British rowhouses have been preserved. The Avon River meanders slowly through the center of Christchurch, which is dotted with large, green, open spaces. Among these are the Botanic Gardens, which are very large and have large trees that are more than 100 years old.



Fig. 8 Central Melbourne viewed from the tower of the Melbourne Observation Deck (February 2009)



Fig. 9 Central Christchurch viewed from the tower of the Christchurch Cathedral (December 2008)

IV. REPRESENTATIVE CASES OF THE URBAN PLANNING BASED ON GREEN SPACE DEVELOPMENT

A. *Green Belt Concept: Comparison between Tokyo and Seoul*

First, let me compare the Green Belt concepts of Japan and South Korea. Like the U.K., both Japan and South Korea considered the establishment of green spaces as a Green Belt to prevent the disorderly sprawling of the metropolitan areas.

1) *Tokyo in Japan*

According to Ide [8], Japan's green space development can be broadly classified into three phases. The first phase is the period of some 35 years from 1932 to 1968, during which the Green Belt concept was introduced in Japan and efforts were made toward its realization. The second phase is the subsequent period of about ten years from 1968 to 1977. In this period, the New City Planning Law was enacted whereby the Green Belt concept was replaced by a new concept, the Urbanization Control Area. The third phase covers the period from 1977 to the present. In this phase, the urban green space planning system was established and a Master Plan for Parks and Open Spaces

was formulated whereby greening on a small district level became subject to planning.

Of these three phases, let me examine the first and second phases in more detail. With the launching of the green space plan in Tokyo in 1939, the Green Belt concept was introduced in Japan. In 1946, the Law for the Conservation of Suburban Green Zones in the National Capital Region was enacted. However, due to strong opposition from landowners, the Green Belt plan was turned into a feeble program that managed only very modest development of green spaces. Within the Greater Tokyo Metropolitan Area in particular, there was a plan to develop Green Belts in areas some 20km away from the center of the city but it was realized only partially. Miyashita Park (Fig. 10), a very small park near JR Shibuya Station in Tokyo, is said to be a remnant of the Green Belt developed at that time.

The Green Belt concept changed with the enactment of the New City Planning Law in 1968. The law introduced a demarcation system dividing the urban planning area into two types of areas, the Urbanization Promotion Area in which urbanization is promoted and the Urbanization Control Area in which urbanization is restricted. Of these, the Urbanization Control Area inherited the idea of the Green Belt concept in that the designation of such an area was aimed at preventing the sprawling of urban areas. However, because the Urbanization Control Area was also defined as a candidate for future development, the original purpose of the Green Belt concept was lost. Then, in the third phase, the whole scope of a city was made subject to urban planning to promote the greening of urban spaces – including those under private ownership – on a small district level, rather than trying to develop green spaces of a certain designated scale or greater.



Fig. 10 Miyashita Park near JR Shibuya Station in Tokyo (October 2007)

2) *Seoul in South Korea*

Referring to the study results of Suto and Koshizawa [9], let me now will review the Green Belt concept in the cities of South Korea, particularly Seoul. First, we need to outline the development of the South Korea's urban planning, which is closely related to the Green Belt concept. From around the mid-1940s, South Korea began to promote urban planning

primarily under the initiative of the government. The revision of the City Planning Law in 1981, however, underlined the importance of citizens' participation in urban planning. This resulted in the implementation of public hearings as part of the decision-making process to ensure that public opinion was reflected in urban planning. In the initial stage, there was lack of understanding of the importance of citizens' participation and various problems arose, such as insufficient efforts to disseminate information on the part of the authorities and indifference on the part of the general public.

In South Korea, the city planning areas are sub-classified into six categories: the Restricted Zone, Urbanization Control Zone, Detailed Planning Zone, Multi-Regional Planning Zone, Development Control Zone, and Prospective Development Zone. Of these, the Development Control Zone corresponds to the Green Belt. South Korea began to designate Green Belt areas in 1971 and today a total of 166.8km² within the Seoul Metropolitan area are designated as such. South Korea's Green Belt control is implemented to prevent the disorderly sprawling of urban areas as well as to secure favorable living conditions for urban dwellers by preserving the natural environment in the outskirts of urban areas.

In recent years, however, South Korea has begun to release some areas from Green Belt control amid the rapid expansion of the Seoul Metropolitan Area. By 2020, a total area of 100,000 m² will be gradually released from Green Belt control and become an area subject to adjustments, thereby paving the way for residential development. Furthermore, under multi-regional urban development plans and urban development master plans, areas released from Green Belt control are defined as those subject to development. Fig. 11 shows a group of high-rise buildings that were constructed in the suburbs of Seoul following the lifting of Green Belt control.



Fig. 11 Group of high-rise buildings constructed in the suburbs of Seoul following the lifting of Green Belt control (January 2003)

B. Garden City Construction: Comparison among Singapore, Kuala Lumpur, Melbourne and Christchurch

In this section, I'll compare the Garden City construction of Singapore, Kuala Lumpur in Malaysia, Melbourne in Australia, and Christchurch in New Zealand. The Garden City concept

originated with a proposal by the British urban planner E. Howard at the end of the 19th century. Combined with the comprehensive residential estate idea systematized by the American C. A. Perry in the first half in the 20th century, the Garden City concept became important for new urban construction in the 20th century. Sugio [10] points out that E. Howard got the Garden City concept from cities in Australia and New Zealand that have park Green Belts, which were built based on E. G. Wakefield's plan of the New Colony City. From this it is clear that the construction of colony cities in such countries had a great influence on E. Howard's Garden City concept.

Singapore and Malaysia were the same nation until Singapore became independent in 1965. Because these two countries had been British colonies from 1789 to 1957, they were greatly influenced by British urban planning. However, Malaysia (including present-day Singapore) adopted the zoning systems of the U.S. and Europe in its Town Planning and Zoning Act of 1923.

The British began constructing colonies in Australia in the latter half of the 18th century, and Australia itself was a British colony from 1828 to 1900. New Zealand was a British colony from 1840 to 1947. The city planning carried out in these two countries was therefore heavily influenced by the U.K.

1) Singapore

Based on the study results of Ide [8] and Marutani [11], let me examine Singapore as one of the world's leading examples of Garden City construction. Among Southeast Asian countries located in the tropical zone, Singapore is perceived to be the most advanced in terms of the greening of urban areas. However, being a small island country with half of its land urbanized and roughly 90% of the population living in apartment complexes, Singapore is also an extremely urbanized city state. Following its independence from Malaysia in 1965, Singapore launched the Garden City Movement in 1967 under the strong initiative of the government. The purpose of this movement was to promote the greening of urban areas focusing on city-wide greening activities and green space development as a means of coping with rapid urbanization and development.

Singapore also protects green spaces in cases of development under the Park and Tree Law enacted in 1975. At present there are 39 urban parks with a total area of 13km², and the national government aims to secure more than of 8m²/person of urban parks. There are many very large urban parks in Singapore, and they employ various means to provide wetlands and bird sanctuaries.

Garden City construction in Singapore has been cited as one of the most successful green policies undertaken in a tropical city. The most distinctive characteristic is that Singapore, through the implementation of this scheme, sought to enhance the attractiveness of the country as a tourist spot in addition to improving the living environment for its people amid rapid urbanization. The fact that Singapore is a small city state – a situation which makes it easier for the government to exercise centralized control – has been cited as one big factor behind the

success of the scheme. Therefore, it is necessary to take this success of Singapore as a special case that has been made possible in a very distinctive political and economic environment, rather than being a typical case representing Southeast Asian countries. Meanwhile, it is said that Beijing, in preparation for the 2008 Olympic Games, was trying to promote Garden City construction modeled on Singapore.

Singapore formulated the Concept Plan as a long-term program for the entire city and, based on this, the Green and Blue Plan for laying out a park and greenery system was drawn up. The Green and Blue Plan, which incorporates the idea of a park connector network, is aimed at building a water-and-green network with well-landscaped waterways and green open spaces over the entire area of the city state. With this, Singapore has been acclaimed not only as a successful Garden City but also as a role model in creating an Environmentally Symbiotic City in a humid tropical environment as well as in greening tropical cities. The plan is also perceived to be one of the most innovative in the world in that it seeks to conserve the environment as a living space not only for human beings but also for wildlife.

Fig. 12 shows Orchard Street, the largest street in central Singapore. From this figure, we can see that Singapore attaches great importance to the planting and maintenance of roadside trees as well as to the placement of green spaces.



Fig. 12 Orchard Street in central Singapore (May 2002)

2) Kuala Lumpur in Malaysia

On the basis of the results of the City Planning Institute of the Japan Kyushu branch office [12], Ikuta and Matsuzawa [13] and Ikuta [14], let me now look at the example of Kuala Lumpur. Kuala Lumpur was built by vermilion miners in 1857, and economic growth and population increase began through the discovery of a vermilion mine in its environs. Under the control of the U.K. in the 18th-19th centuries and the occupation of Japanese armed forces during World War II, the Malaya Federation became independent from the U.K. in 1957, and the Federation of Malaysia was born in 1963. In 1974, Kuala Lumpur became a federal special ward under the direct control

of the national government. Urban area redevelopment including many huge projects have been promoted through the wealth of the capital which has rapidly flowed from foreign countries such as Japan on a large scale since the middle of the 1980's.

Through the above-mentioned beautification movement that aimed at the urban area redevelopment and the creation of a modern beautiful city space, Kuala Lumpur has become a modern city, although the traditional Kampong (Malay village) still exists inside the city. In addition, a very large-scale green space around the Lake Perdana, a man-made lake, was developed in the latter half of the 19th century in the hilly areas to the west of the center of Kuala Lumpur. In this area known as the Lake Gardens, the Hibiscus Garden, Bird Park and Butterfly Park are located. Based on the Putrajaya plan adopted in 1996, Kuala Lumpur is aiming at the construction of the new administrative city of Putrajaya by 2010, and the prime minister's official residence and the Ministry of Finance have already taken the lead by moving in 1998. Putrajaya (Fig. 13) is being built as a Garden City in the man-made lake developed by infilling the wetlands left by the vermilion mine, and a unique city planning project is being carried out. Under Vision 2020 (Wawasan 2020; a vision for Malaysia to become like a developed nation by 2020) which was started under the guidance of the ex-Prime Minister Mahathir, based on the concept of a Multimedia Super Corridor, urban infrastructure development is being promoted to link up a new airport, Putrajaya and Kuala Lumpur. The Multimedia Super Corridor is the comprehensive development area around the southern part of Kuala Lumpur where the latest IT infrastructures have been installed. The hi-tech industrial area Cyberjaya, the new administration city Putrajaya, and Kuala Lumpur International Airport are located in its core. This urban infrastructure development is being rapidly promoted mainly by the BOT (Build Operate Transfer; a kind of PFI; Private Finance Initiative) method, and the government is only responsible for the site purchase and compensation. In 2006, a green space protection plan will be included in the Kuala Lumpur structure plan that determines the urban development plan until 2020.



Fig. 13 Putra Lake, Putra Mosque and the prime minister's official residence in Putrajaya (November 2007)

3) Melbourne in Australia

Let's look at the example of Melbourne from the perspective of the results obtained by Sugio [10]. In Australia, colonial construction was begun by the British in the 18th century, centering on individually developed communities located on or near the coast, such as Sydney, Perth, Melbourne, Adelaide and Brisbane. They set the division of 1 mile (about 1.6km) every direction to get settlement, and they divided their land to 6 miles every direction called a township to build a town.

Melbourne was the Australian capital from 1901 to 1927, and, since parks occupy about 25% of its area, it deserves to be called a Garden City. It grew rapidly during the gold rush that began in 1850, when gold was discovered in the inland area of the State of Victoria. In the city center, modern buildings and solid British-style buildings coexist on a grid pattern that was originally prescribed by Governor-General Darling in 1829. Called the Darling Type, the grid is nearly perfect and modeled after colonial cities in the U.S and Canada. Melbourne is only one of many cities built in Victoria that have the highly regular Darling grid system.

Other grid systems are also in use. For example, the Low Type of grid adopted in Perth in Western Australia uses east-west streets running in parallel as its main axis. In Adelaide, W. Wright designed the Parklands in 1836, which has urban areas surrounded by parks. City planning during this time changed greatly in Melbourne and other Australian cities because of increases in population and in the number of settlers who could purchase land.

Melbourne's center is surrounded by large green spaces such as the Fitzroy Gardens (Fig. 14), Albert Park and King's Domain. In Wallnumpool, which is located about 230km southwest of Melbourne, the outskirts are surrounded by reservations that function as Park Green Belts dotted by ponds, racetracks, cricket grounds and lakes.



Fig. 14 Fitzroy gardens (February 2009)

4) Christchurch in New Zealand

In New Zealand, under the influence of the Parklands in Adelaide, a Park Green Belt (Town Belt) was formed in 1840. It is designed with three structural levels: the Capital Town (city center), Surrounding Park Land and a Rural Zone. Town Belts

in New Zealand were first reserved in the British colonial period, and in later years they became a historical inheritance for citizens with the legal system related to it.

Town Belts can be roughly classified into two types: complete and incomplete. Complete Town Belts can be further divided into the Natural Type (Adelaide) and the Road Type (Christchurch). In the former, the capital town is completely surrounded by Park Lands; in the latter, it is surrounded by roads. Incomplete Town Belts, which are suitable for communities facing the sea, can be subdivided into the Horseshoe Type (Wellington and Dunedin), and the Straight Line E Type (Invercargill).

Christchurch was founded by a British settler in 1850, and is the largest city on New Zealand's South Island. Built according to the ideals of the early settlers and arranged on a grid around the meandering Avon River, it's called "the most English city outside of England." Its beautiful parks and gardens have also earned it the epithet Garden City, and a Festival of Flowers and Romance is held every year in February.

In Christchurch, the three Town Belt structural levels described above were not included in the planning stage, and the Town Belt became a border between the Capital Town and the suburbs. The Town Belt's Park Land takes the form of one, massive park that functions in a way similar to Rural Zones by preventing the expansion of urban areas. Hagley Park (Fig. 15) provides a representative example. Beyond this Green Belt (actually, Rural Zone), satellite cities have been constructed that advance urban expansion.

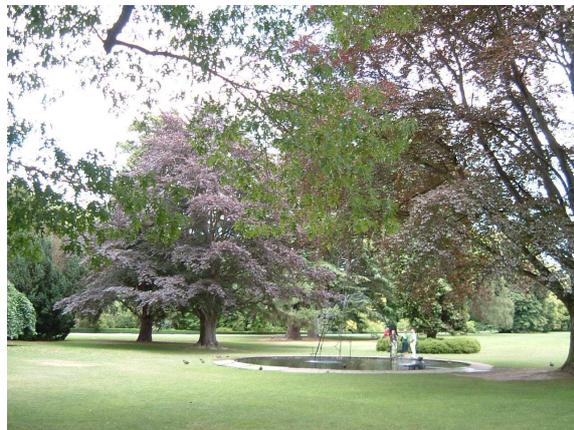


Fig. 15 Hagley park (December 2008)

C. Green space development as the national strategy of China

Thirdly, on the basis of results of a study by the City Planning Institute of Japan Kyushu branch office [12] and Ueda and Furusawa [15], let me examine the example of China. China places great importance on tree planting in urban areas, and is positively promoting the expansion of the area of green spaces per population and the green coverage rate. Moreover, evaluation based on the objectives of a "Garden Forest City" and "Hygiene City" has been performed. For example, it is

required that the green coverage rate in cities and the green space rate in newly constructed urban areas should not be less than 35% and 30% respectively.

In China in recent years, large-scale green space development has been conducted as a national strategy for national enterprises such as the Beijing Olympic Games (2008) and the Shanghai World Exposition (2010). The 1st China Urban Forest Forum was held in 2004, where the objectives of China's city forest plan were decided. The short-term goal is to increase the forest coverage rate to more than 30% and green space rate to more than 35% in 70% of all cities so that the public green space per population becomes more than 10m² in cities overall and more than 6 m² in the city centers.

In Beijing in particular, a dispersed cluster-type city structure was proposed in 1959 just after the Beijing Master Plan 1958 was completed. This proposal was mainly made under the influence of the Great Leap Forward, but the following reasons can also be cited. By adopting a dispersed cluster-type city structure, (1) the city structure could flexibly cope with frequent changes in city planning scale; (2) the rapid expansion of continuous urbanization could be halted and Green Belts kept outside urban areas; and (3) environmental conservation and ecological balance could be promoted. Since the development of Green Belts ran into difficulties and the area scale of Green Belts was revised downward whenever the Beijing Master Plan was changed, its scale was reduced from about 300km² in 1958 to 240km² in 1993. However, the detailed plan for Green Belts has been revised from the middle of 1990's, and the Beijing municipal government has been positively promoting it.

Moreover, Beijing has recently been developing a Garden City based on the Singapore model as mentioned in Section III and a forest coverage rate of up to 50% by the Beijing Olympic Games in 2008. In the 662 urban administrative divisions, the total population was about 480 million as of 2004. In these divisions, the green space rate was 23.7% and the public green space per population was 6.8m², both considerably lower than the above-mentioned short-term objective. By accelerating forest maintenance in urban areas and including it in the development plan for urban areas, Beijing is promoting the developing of Green Belts in urban areas and their environs and the maintenance of forests in outer cities with the aim of creating a safe, beautiful, natural and comfortable residential environment. Fig. 16 shows the planting area in Beijing. From this figure it can be seen that residential areas with rich green spaces and abundant wooded areas have been developed in the suburbs. Shanghai has been authorized as a "National Forest City" by the national government and aims to establish a framework for developing a green city by 2010. In Shanghai, because the green space area was less than 10,000m² before the 1990's, urban redevelopment including the construction of a zoo and large-scale parks was conducted through the 9th 5-year plan (1996-2000, known as the "95"). As a result, 30 parks covering a total of about 41.6km² were constructed in 2003. Moreover, green space development has been energetically promoted.



Fig. 16 The planting area in Beijing (October 2005)

As of 2004, the green space rate was about 30%, the green coverage rate was about 35% and the green area per population is about 20m². About 18km² of green space such as parks and promenades are planned to be newly developed along the Huangpu Jiang and the Suzhou River, and the target for the tree planting coverage rate was 36% by the end of 2004.

V. COMPARISON OF THE GARDEN CITY CONCEPT AND GREEN BELT CONCEPT

A. Genealogy of Green Space Development

In this study, I have discussed city planning based on green space development while introducing case examples in Asia and Oceania. Based on the results of both this study and those of Yamamoto [5], [6], Jenks, Burton and Williams [16], Roo and Miller [17], Persons and Schuyler [18] and Kahn [19], I have examined city planning based on green spaces. From these results, I found that there have been two major directions in green-oriented city planning: the establishment of the concept of Multi-Regional Development and the birth of the concept of an Environmentally Symbiotic City based on the Garden City concept.

First, let me focus on the Multi-Regional Development concept. The Green Belt concept and the Garden City concept, which emerged mainly in the U.K. in the 20th century, merged with the American concept of a Park System established in the 19th century to develop multi-regional urban planning in the 1920s. According to Ishikawa [20], the contents of multi-regional urban planning are clearly shown in the declaration of seven articles in the 8th International Residences and City Planning Conference held in Amsterdam in 1924. Based on the premise that infinite expansion of large-scale cities is by no means desirable, this declaration adopted three principles: the construction of satellite cities, introduction of Green Belts, and solution of traffic problems.

Next, let me take a look at the birth of the concept of the Environmentally Symbiotic City, which evolved from the Garden City concept. Here the emphasis has been shifted from the Garden City concept to the Green City concept based on

green space development, which was then influenced by the City Beautiful Movement in the U.S. in the 19th century, giving birth to the concept of the Environmentally Symbiotic City was born. As mentioned above, Singapore is the representative case of an Environmentally Symbiotic City in a humid tropical environment, and its remarkable characteristics depend on seeking to conserve the environment as a living space for many kinds of wildlife by building a water-and-green network. The term "Environmentally Symbiotic City" is synonymous with "Sustainable City" and "Compact City" - the Ecopolis which Jenks, Burton and Williams [16] and Roo and Miller [17] have already proposed.

B. Comparison and Examination of the Garden City Concept and Green Belt Concept

Based on the above-mentioned consideration result, I compare the Garden City concept and Green Belt concept. As mentioned in Section IV, the Green Belts concept has been mainly adopted to prevent the disorderly sprawling of the metropolitan areas. In Garden Cities, it promotes the greening of urban areas focusing on city-wide greening activities and green space development as a means of coping with rapid urbanization and development.

It is impossible to keep Green Belts in large cities and the suburbs where the urbanization pressure is tremendously strong, as seen in the cases of Tokyo and Seoul. In such cities and the suburbs, it is essential to control land use severely and adopt Garden City concept to conserve urban environment. Especially in Japanese large cities, it is extremely difficult to create new green spaces within the existing urban districts there. It is thus necessary – and important as a way to alleviate the heat island phenomenon and to conserve urban environment – to promote the greening of urban areas, not only public land but also land under private ownership, by means of rooftop and wall gardening of buildings.

VI. CONCLUSION AND FUTURE RESEARCH

The purpose of this study is to review representative cases of green space development in order to compare the Garden City concept and Green Belt concept as applied and to examine its direction in major Asian and Oceanic cities. The findings of this study can be summarized in the following four points.

- (1) The Green Belt concept was promoted in Japan in the latter half of the 1930's, South Korea in the early 1970's, and Beijing in China in the latter half of the 1950's. However, the Green Belt was converged into an urbanization control area in Japan in 1968 when the New City Planning Law was enacted, and the lifting of Green Belt control has been performed step-by-step in South Korea in recent years. In Beijing, although the maintenance of the Green Belt ran into difficulties, the detailed plan for the Green Belt was revised from the middle of the 1990's and the Beijing municipal government has positively promoted it.
- (2) The construction of colony cities in Australia and New Zealand had a great influence on E. Howard's Garden City

concept. In Melbourne, the central parts were developed from the early 1830's on a Darling grid system, and the outskirts are dotted with very large green spaces. In New Zealand, Park Green Belts (Town Belts) were introduced in 1840 under the influence of the Parklands in Adelaide, Australia. In Christchurch, the Capital Town in the city center is surrounded by roads that constitute the Town Belt.

- (3) After it became independent in 1965, Singapore launched the Garden City Movement to promote green space development to cope with rapid urbanization and development after independence in the latter half of the 1960's. Beijing developed a Garden City based on the Singapore model, and Shanghai is also aiming at the development of a Green City. Kuala Lumpur has developed the Lake Gardens, a man-made lake and very large green spaces, and it now aims to construct a new administrative center as a Garden City in a man-made lake.
- (4) The results of previous studies and this study show that there are two major directions in such green-oriented city planning. One direction is the establishment of the concept of Multi-Regional Development, while the other has resulted in the concept of an Environmentally Symbiotic City based on the Garden City concept. In large cities and the suburbs where extremely strong pressure to urbanize makes it impossible to keep Green Belts, it is essential to strictly control land use and adopt the Garden City concept to conserve the urban environment.

One possibility for future research might be to examine cases in areas other than Western, Asian and Oceanic countries, and to take a view of city planning based on green spaces after determining global trends.

HOME PAGES REFERENCED

- [1] Tokyo Metropolitan Government <http://www.metro.tokyo.jp/> Accessed on February 17, 2009
- [2] City of Seoul http://japanese.seoul.go.kr/ja/index_j.cfm Accessed on February 17, 2009
- [3] City of Beijing <http://www.beijing.gov.cn/> Accessed on February 17, 2009
- [4] City of Shanghai <http://www.shanghai.gov.cn/> Accessed on February 17, 2009
- [5] City of Singapore <http://www.gov.sg/> Accessed on February 17, 2009
- [6] City of Kuala Lumpur <http://www.kualalumpur.gov.my/> Accessed on February 17, 2009
- [7] City of Melbourne <http://www.melbourne.vic.gov.au/info.cfm?top=23&pg=966> Accessed on February 17, 2009
- [8] City of Christchurch <http://www.christchurch.org.nz/> Accessed on February 17, 2009

REFERENCES

- [1] K. Yamamoto, Evaluation of the Degree of the Sufficiency of Public Green Spaces as an Index of Density in Metropolitan Areas in Japan. 46th Annual Meeting of the Western Regional Science Association, Presentation Paper, P.28, 2007.
- [2] K. Yamamoto, Evaluation of Public Green Space Placement Plans as Indicator of Urban Density of Japan's Three Major Metropolitan Area. 20th Conference for the Pacific Regional Science Conference Organization (PRSCO), Presentation Paper, P.25, 2007.
- [3] K. Yamamoto, Evaluation of Public Green Space Placement Plans as Indicator of Urban Density of Japan's Three Major Metropolitan Areas Using GIS. Proceedings of Joint International Symposium and Exhibition

- on Geoinformation 2007 & International Symposium on ISG/GNSS 2007, P.15 (CD-ROM), 2007.
- [4] K. Yamamoto, A Study on the Method for the Evaluation of the Locations of Public Open Spaces from the Viewpoint of Disaster Prevention in Areas. *Environmental Science* Vol.13, No.4, pp.1-16, 2000.
- [5] K. Yamamoto, Genealogy of City Planning based on Green Spaces. 45th Annual Meeting of the Western Regional Science Association, Presentation Paper, P.24, 2006.
- [6] K. Yamamoto, Genealogy of Urban Planning for Green Space Development. Proceedings of Ecocity World Summit 2008, P.10 (CD-ROM), 2008.
- [7] K. Yamamoto, City Planning based on Green Space Development in Major Asian Cities. Proceedings of the 3rd International Conference on Sustainability Engineering & Science: Blueprints for Sustainable Infrastructure, P.12 (CD-ROM), 2008.
- [8] H. Ide, Ryokuchi Kankyo Kagaku (Green Spaces and Environmental Science). Asakurasyoten, Tokyo, 1997.
- [9] T. Suto and A. Koshizawa, A Study on the History and Effects of the Greenbelt System in Korea. *Journal of City Planning Institute of Japan*, No. 39-2, pp.95-104, 2004.
- [10] K. Sugio, Keikan Toshi no Sousyutsu (Creation of Urban Scenery). Bio City, Tokyo, 2007.
- [11] H. Marutani, Tosiseibisennsinnkoku Singapore –Sekai no Tyumoku wo Atsumeu zyutaku/syakaishihonseibi– (Singapore as an advanced Country in Urban Development –The Development of Residences and Social Infrastructures Which is Paid Attention from All Over the World). Asian Institute of Economy, Tokyo, 1995.
- [12] The City Planning Institute of Japan Kyushu branch office, Ajia no Toshikeikaku (Asian City Planning), Kyushu University Publication Society, Fukuoka, 1999.
- [13] M. Ikuta and T. Matsuzawa, Ajia no Daitoshi 3 (Asian Major cities 3) Kuala Lumpur and Singapore, Nihonhyoronnsya, Tokyo, 2000.
- [14] M. Ikuta, Malaysia no Toshikaihatu - Rekishiteki Approach- (Urban Development in Malaysia –Historical Approach-). Kokonsyoten, Tokyo, 2001.
- [15] M. Ueta and K. Furusawa, Ajia no Daitoshi 5 (Asian Major cities 5) Beijing and Shanghai, Nihonhyoronnsya, Tokyo, 2002.
- [16] M. Jenks, E. Burton and K. Williams, *The Compact City: A Sustainable Urban Form?*. Oxford Brookes University, Oxford, 1996.
- [17] G. Roo and D. Miller, *Compact Cities and Sustainable Urban Development: A Critical Assessment of Policies and Plans from an International Perspective*. Ashgate, Aldershot, 2000.
- [18] K. C. Parsons and D. Schuyler, *From the Garden City to Green Cities: The Legacy of Ebenezer Howard*. The Johns Hopkins University Press, Baltimore and London, 2002.
- [19] M. E. Kahn, *Green Cities: Urban Growth and the Environment*, Brookings Institute Press, Washington, D.C., 2006.
- [20] M. Ishikawa, Toshi to Ryokuchi (City and Green Spaces). Iwanamisyoten, Tokyo, 2001.



Kayoko Yamamoto received the B.H. Degree and M.H. Degree in Geography from Ochanomizu University in 1992 and 1994 respectively, and Ph.D. Degree in Social Engineering from Tokyo Institute of Technology in 1999. She is currently an associate professor in the Graduate School of Information Systems, National University of Electro-Communications, Tokyo, Japan. Her research interests include city planning and regional planning, environmental science and GIS (Geographic Information Systems).