Singapore’s new towns as models of sustainable built environment for China

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1 Introduction

In today’s society, the concepts of sustainable development and sustainability have become very important with the recognition that current consumption and living habits may lead to problems such as the overuse of natural resources, ecosystem destruction, urban heat islands, pollution, growing social inequality and large-scale climate change (14). Therefore, town planning, which is the integration of the disciplines of land use planning and transport planning, to explore a very wide range of aspects of the built and social environments of urbanized municipalities, as become a very important area of focus in many cities in order to achieve continued growth. (14)

In Asia, China is one of the biggest rapidly developing country and many parts of China are faced with problems caused by rapid urbanization as well as urban decay. Slums habitation has accelerated, environmental degradation worsened and quality of living has fallen. Hence, there is a significant need for planning resources and strategies to address these issues.

On the other side of Asia, Singapore has proven to be capable of solving the problems of urbanization by engaging in serious town planning since its 43 years of independence. It has come a long way in making this achievement when we take a look at Singapore’s history and into a glimpse of her past environment when she started her journey in 1819.

Therefore, in this report, we will like to study Singapore’s concept plan in town planning and then focus on studying the transferability of Singapore’s New Town model to China. Tampines New Town will be the model that will be proposed to China as it has gained recognition from the United Nations by winning the 1992 World Habitat Award for Excellence in Housing Design from the Building and Social Housing Foundation of the United Nations for its outstanding design and contribution to human settlement development. A recent co-operation between China and Singapore to build a Sino-Singapore Tianjin Eco-city will be studied as well. We will also discuss some of the criticisms of the Singapore’s model and if there are any aspects of the model that are unsuitable for implementation in China.
China’s Problems

China is one of the fastest growing developing countries in the world. Since free market reforms in 1978, China’s GDP has grown an average 9.9% a year. Along with the rapid economic growth, China also faces a lot of problems:

Population Problems:

Population Growth

With over 1.3 billion people, China is the world’s largest and most populous country. Even with the introduction of the One Child Policy since 1979, China’s population still continues to grow at a rate of 0.6% annually. (5)

Internal Immigration and Urbanization Growth

The success of the agricultural reforms under Deng Xiaoping in the late 1970s and early 1980s dramatically increased the food supply in China’s cities, making it possible for more people to come in from rural areas and survive without food ration cards. The increased in food supply caused the authorities to relax the enforcement of migration restrictions. (15)

At the end of 2006, China’s total population was 1.3 billion, with 737 million (56%) and 577 million (44%) residing in the rural and urban areas respectively. The rural population fraction was 64% in 2001 and 74% in 1990. This means that about 230 million people moved from rural areas to urban areas in 16 years. (15)

In the long term, China faces increasing urbanization; according to predictions, nearly 70% of the population will live in urban areas by 2035. (15)

Urbanization Problems:

Overpopulation in municipalities and subprovincial cities has created great challenges for China:

Housing Shortage:

With millions of people moving to urban areas from rural areas each year, housing especially affordable housing has become one of the biggest issues in China.

Since 1980s, China has started its urban housing reform as part of a comprehensive economic reform. Today, most housing projects are done by the private
sectors. Hence, the problem of housing shortage and overcrowding has lessened considerably. (21)

In addition, China has also launched many policies in succession such as the welfare housing project, affordable housing policy and low-rent housing policy, etc. since the mid-1990s when it tries to solve the housing problems of low-income households. However, there is still a shortage of affordable housings and people are still complaining that the government should take a more active role. (21)

Traffic Congestion:
The traffic problem is an integral part of the entire process of China’s modernization. Many Chinese cities are now experiencing serious mobility problems.

Huge increase in the private cars and lack of mass transportation contribute most of the traffic problems today. Chinese government has been trying to improve its transportation system. However, improvements are not rapid enough. Many cities also lack the foresight. Only 9 Chinese cities have an underground or light rail system: Beijing, Changchun, Chongqing, Guangzhou, Nanjing, Shanghai, Shenzhen, Tianjin and Wuhan. Another 5 cities are currently constructing its Metro systems: Chengdu, Harbin, Qingdao, Shenyang and Xi’an. (12)

Traffic Jam in Xiamen, Fujian Province, China. (2)

Land Scarcity:
Most parts of China are covered by steep mountains, stony deserts or dry grasslands hence, they are unsuitable for agriculture. The lands that are suitable for cultivation are only in the south, east, northwest, northeast, and in some small areas of the extreme part of China. Furthermore, accelerated industrialization and urbanization result in the continual reduction of China’s arable land.

Environmental Problems:
Chinese central government has been trying to control China’s environment problems. China’s environmental laws are among the strictest in the world. However, enforcing these laws has been difficult on the local level. The current leadership assessment policy in the government and the emphasis on just seeking for economic growth have sacrificed the environment. Today, China has become one of least environmental friendly countries in the world.

Water Pollution and Scarcity:
About 90% of China’s urban water bodies are severely polluted and underground water in most cities are affected by pollution too (6). Hence, water scarcity is an issue. Its per capita availability of natural fresh water is only a quarter of the world average. Northern China is already a water scarce region and it will soon join the group of water stressed countries. It is estimated that the underground water in north China plain will drain within 30 years.

Air Pollution:
Two-thirds of the 338 Chinese cities for which air-quality data are available are considered polluted. Acid rain falls on 30% of the country. The World Health Organization has found that about 750,000 people die prematurely each year from respiratory problems in China. (6)

According to the World Bank, the cities with

Traffic Jam in Xiamen, Fujian Province, China. (2)

High urban density in one of the cities in China. (11)
the highest levels of particulate matter in China in 2004 were Tianjin, Chongqing, and Shenyang. These were among the ten most polluted cities in the world. (6)

Other Issues:
Along with the shortage of housing, other problems include education, health care, crime and safety control, shortage of electricity, sanitation and water.

Government Effort:
China’s leadership is well aware of the population growth, urbanization and environmental problems. They are determined to transform China into a more green society through policies and institutional reforms. They are also constantly in search of solutions for these challenges. Among many countries, Singapore is a country frequently studied by Chinese government for urban solutions.
Overview Of Singapore

Since 1980’s, many Chinese delegates started to visit Singapore, a Southeast Asia nation that has achieved great economic miracle within 30 years of independence. In recent years, Singapore’s urban planning expertise has also been recognized by China and internationally. Singapore’s planning has been able to control sprawl, and even expand parks and protected areas, by limiting highway construction, building public transportation networks, and enacting zoning laws that help people to live and work in the same areas. Therefore, this success story makes Singapore’s new towns viewed as viable sustainable built models for many. This extensive planning culture in Singapore is a necessity rather than an option. With only 707.1 km² and having to maintain a growing population of more than 4 million people, the land and resource scarce country, has to maximize land use and make public transportation easily available to achieve sustainable urban development for the future.

Background:

- Total Area: Total 707.1 km²
- Estimated population of 2008: 4.84 million
- Population Density: 6,489/km²
- Ethnic groups: Chinese 75.2%, Malays 13.6%, Indians 8.8%, Eurasians and other groups formed 2.4%
- Official languages: English, Mandarin, Malay and Tamil
- Declaration of independence: 31 August 1963
- Merger with Malaysia: 16 September 1963
- Separation from Malaysia: 9 August 1965 (7)

Economy:

Singapore has a highly developed market-based economy, which historically revolves around extended entrepot trade. Along with Hong Kong, South Korea and Taiwan, Singapore is one of the Four Asian Tigers. Its economy depends heavily on exports refining imported goods, especially in manufacturing. Manufacturing constituted 26% of Singapore’s GDP in 2005. The manufacturing industry is well-diversified into electronics, petroleum refining, chemicals, mechanical engineering and biomedical sciences manufacturing. In 2006, Singapore produced about 10% of the world’s foundry wafer output. Singapore has one of the busiest ports in the world. Singapore is the world’s fourth largest foreign exchange trading centre after London, New York City and Tokyo. (7)

Singapore has been rated as the most business-friendly economy in the world, with thousands of foreign expatriates working in multi-national corporations. (7)
Housing:
86% of all Singaporeans live in apartments (flats) built by the Ministry of National Development. Over 90% of Singapore residents own their own homes, a rate unmatched anywhere else. With such extensive home ownership comes more involvement in the city’s civic affairs and attention to the quality-of-life issues. (18)

Green Space:
Currently, the city has 23.5km² of parks and green areas and about 29.9km² of nature reserves. There is a long-term commitment to set aside and maintain nearly 0.01km² of green space for every 1,000 people. (18)

Singapore has recently embarked on a campaign to provide 2.4km² of “park connectors” by 2010—green corridors that will eventually connect every park and reserve on the island. The corridors will contain bike paths and hiking trails, giving residents more options for getting around the city. (18)

Air Pollution Control:
Air pollution is not a problem in Singapore. One reason for clean air is the widespread use of public transportation. Another reason is the city’s large amount of greenery. Only 1 Singaporean in every 10 owns a private vehicle. (18)

Waste Disposal:
The Ministry of Environment operates six large sewage treatment plants, enough to serve the entire population. An experimental sewage treatment plant at Bedok, with three stages of treatment, produces effluents so clean that the water is used by the semiconductor industry to manufacture silicon wafers. In addition, there are four large incinerators which reduce 85% of the city’s solid wastes into fly ashes that are then deposited into a monitored landfill located on an offshore island. (18)

Protected Waters:
Singapore has 21.6km² of protected watershed in the middle of the island. The watershed provides half of the city’s freshwater needs. The island’s four large water reservoirs have been protected completely from development since 1860. This central watershed contains perhaps the world’s only urban old-growth tropical rainforest. Singapore gets the rest of its water from Malaysia through a long-term agreement with the state of Johor. (18)

Planning for Sustainability:

1. The Concept Plan:
Singapore’s main planning tool is the Concept Plan which is a strategic development framework that is updated every decade. The current plan, drawn up in 2001, sets broad-based development plans for the next half century. It allows for an eventual population of 5.5 million within 50 years. The Concept Plan specifies 55 detailed “development guide plans” that addresses land use needs such as housing, commercial and industrial development, transportation, and recreational facilities. The planning process includes not only all government ministries but also citizens and communities and allows for local development planning by neighborhoods. (18)
2. The New Town Planning Concept:

The new town planning concept was introduced in Singapore with the building of the first New Town, Queenstown, from July 1952 to 1973 by the country’s housing authority, the Housing and Development Board (HDB). Today, there are a total of 22 new towns in the country.

All of them have three similar features which are having mixed land use, accessibility to public transportation and lots of greenery within the town. Each new town is designed in such a way that they are further sub-divided into precincts – smaller components that group four to eight blocks around an open space. The aim of precincts is to bring some of the facilities of both neighborhood park and neighborhood center closer to homes. These facilities also provide a central focal point for the residents and help foster a sense of belonging in the community. Surrounding these precincts are roads served by buses and taxis and pedestrian pathways that connect the whole town together.

Furthermore, each town is helmed by a hierarchy of commercial developments, ranging from a town center to precinct-level outlets hence, they is no need to even venture out of town to meet the most common needs of the residences. Industrial estates are located within several towns which provided employment opportunities which are close proximity to their homes. Educational, health care, and recreational needs are also taken care of with the provision of schools, hospitals, parks, sports complexes, and so on. Hence, all the new towns are designed to be self-sufficient.
Tampines New Town started its development in the 1970s. Since then, Tampines New Town has blossomed into an institutional, social, recreational and commercial hub of the eastern part of Singapore. By 1992, it has been recognized as one of the best town model when it won the World Habitat Award for Excellence in Housing Design from the Building and Social Housing Foundation of the United Nations for its outstanding design and contribution to human settlement development. Now, with a size of only 4.25 km$^2$, about one third bigger than NYC Central Park, it is home to over 200,000 people with a population density of 47,000 people/km$^2$.

### 3 main features of the New Town:

1. **Mixed Land Use:**

   (a) Mixed of different kinds of residential housing estates

   Public and private (condominiums) high-rise compact apartment blocks are located all around the New Town. There are also private low rise single-housing properties resided by the rich. Everyone has a place to live in.

   (b) Recreational landuse

   Tampines Sports Complex, parks, gardens, Tampines Mountain Biking Trail and two golf courses. These facilities provide the residents with a better quality of living, keeping them relax and happy.
Tampines Sports Complex located in town

(c) Commercial areas

Tampines Mall, Century Square, banks, private and government offices are present. The main idea of developing a regional centre is to serve to relieve strain on traffic drawn into the city centre. Hence, residents living in this region of the island will be able to find jobs that are near to their home. Therefore, these extensive arrays of facilities and offices are provided primarily for the residents in the towns. This makes the town always bustling with activities.

Tampines Mall (13)

(d) Public buildings

There are Tampines Regional library, 11 primary schools, 7 secondary schools, 2 junior colleges and polytechnics (9). This allows children to study within close proximity in their schools.

A typical bus on the street (4)

A typical bus station next to a street (4)

2. Accessibility to public transportation:

Public transport in Singapore covers a variety of modes such as bus, rail and taxi. This is a result of great emphasis by the government to promote its use over private transportation. About 5.308 million trips are made on a daily basis on the public transport system and at least half of its population utilizes it daily.

About 52.4% of the Singapore residents commute by public transport.

(a) Buses

Buses are the most comprehensive and affordable means of public transportation for the most Singaporeans (4). There are more than 300 bus services covering all parts of Singapore (4). Tampines has frequent and wide-spread bus services to serve within the town and linking to rest of Singapore too.

A typical bus on the street (4)

(b) Mass Rapid Transit (MRT)

This railway system forms the backbone of Singapore, spanning the entire city state. With daily frequencies of 3 to 8 minutes from 5.30am to 1am at night. It can get you to all parts of Singapore! MRT has a total road network length of 109.4km and 64 stations. The three main lines running at present are the North South line, East West line and the North East line. A new Circle line will be completed in 2010. Tampines is located on the East West line and hence it is conveniently connected to most parts of the island.
Taxis is the alternative for a more comfortable and direct service to your destination. It can be flagged down at any time of the day along any public roads. There are a total of 8 taxis companies with a total fleet of 24,022 taxis (10). There are taxis stands at major offices and shopping malls too where they can be hired easily.

(c) Taxis

This year, there is a new introduction of cycling tracks next to pedestrian path to promote cycling as a new mode of transportation within town. This complements the effort to improve public health by increasing the residents’ level of physical activity. The whole project costs S$1 million and will be sited next to the pedestrian footpath.

(d) Cycling

In future, cyclists will have their own lane next to the pedestrian pathway.

3. Lots of open spaces and greenery

The Green movement in Singapore started off from the vision of its first Prime Minister Mr. Lee Kuan Yew who believes that a blighted urban landscape, a concrete jungle destroys the human spirit and that the greenery of nature will help lift the residents’ spirits. Since then, with careful planning, Singapore is now 51% filled with forest reserves, water catchment areas, marshes and other non-built-up areas while 49% is used for residential, commercial and industrial purposes. Therefore, although the World Bank classifies Singapore has 100% urbanized, it is still a green island with even more biodiversity here than in all of the United States. Now, Singapore is well-recognized as a ‘garden city’ with its lush green environment where massive trees lined the streets and flowering climbers drape over flyovers and footbridges. Despite the highly densely populated town, there are always spaces to have gardens, parks and plantings.
5 Proposal For The Transfer of New Town Model To China

China is one of the most polluting, rapidly urbanizing and developing country. It contributes a large part to global warming and global climate change. Hence, China must play a crucial part in creating a more sustainable green Asia. Therefore, it needs solutions to all the problems mentioned earlier on in this report. Hence, Singapore’s new town model may be a good model to learn from since both countries share many similarities and have always been on very good terms with each other.

Similarities between the two countries:

1. Singapore in her early days used to face the same urban and environmental problems as China too.
2. Both have high population density and face the challenge of accommodating everyone comfortably.
3. Both are rapidly urbanizing countries.
4. The governments of both countries have most of the say in governance and hence are not totally democratic. The constitution of the Republic of Singapore established the nation’s political system as a representative democracy, while the country is recognized as a parliamentary republic. The People’s Action Party dominates the political scene and has won control of the parlamentary in every election since self-government in 1959.
5. Chinese is the majority in both Singapore (75.2%) and China and hence, both share very similar culture and lifestyle. Most of the population prefers to live in the city where there are always full of activities and entertainment. They do not mind living in high-rise buildings. Most lower to middle income groups stay in high-rise apartment blocks while the rich prefers to stay in single-housing low rise bungalows and terrace housing. The new town model will suit the preferences of the Chinese in China.

Other supporting factors for co-operation:

Other than the above similarities that allow the ideas in the models to be transferred, there are also other supporting factors that allow the easy co-operation between these two countries. The supporting factors are:

1. No language barrier
   • Chinese language is one of the four official languages in Singapore and the Chinese residents in Singapore are all taught to speak Chinese since young. In addition, many Chinese in Singapore are also able to speak one other China's dialect. Therefore, co-operation between these two countries are easy since they understand and can easily communicate with each other.

2. Good relationship between the two countries
   • Long history of good political relationship. China and Singapore established diplomatic relations on October 3, 1990. Before the establishment of their diplomatic relations they had already enjoyed close contacts. Prime Minister of Singapore Lee Kuan Yew visited China three times in 1975, 1980 and 1985 respectively. Vice-Premier Deng Xiaoping and Premier Zhao Ziyang visited Singapore respectively in 1978 and 1981. Premier Li Peng visited Singapore in August 1990. Ever since then, the leaders from two countries frequently visited each other. On Nov 24, 2008, Singaporean government officials have signed an agreement with China to strengthen cooperation on aviation security between the countries. (1)

   • Good business relationshp and cooperation. Economic and trade cooperation between China and Singapore has developed rapidly. By 2008, China is Singapore’s 3rd largest trading partner, and Singapore is China’s 8th largest trading partner. (1)

   • Exchanges and co-operation in other areas. The two countries have developed extensive cooperation in civil aviation, science, technology, education, culture, health and exchange of talents. (1)

   • The Chinese are eager to learn from Singapore’s expertise while Singapore’s economic policy aims to expand based on economic regionalization which focuses on overseas investment. With these two goals complementing each other, 1994 marks the
first joint development between them in the development of China-Singapore Suzhou Industrial Park.

Recently, in November 2007, the two countries signed the Framework Agreement for the Development of the Sino-Singapore Tianjin Eco-City Project in Singapore, which is based on the New Town model in Singapore. We will also be looking at the case study of this proposed project to study the transferability of Singapore’s New Town model to China.

Main aspects of learning from Singapore’s New Town model:

1. Provision of high-quality living environment through mix land use:

   China can learn to provide a high-quality living environment focusing on a strategy that provides convenient access to amenities and facilities. High density apartment blocks can be built to accommodate its population while reducing the area of land being cleared hence, it contributes to the promotion of environmental protection and conservation of natural land. In addition, mix land use must be incorporated within a town to ensure that the town is self-sufficient. Another strategy is to have industrial areas close to residential areas to bring employment closer to home to reduce the need for workers to travel. This should be done with care taken to allow for adequate buffers between industrial areas and residences.

2. Planning for transport infrastructure:

   In many China’s mega cities, the immense levels of road traffic heavily impacted on businesses and increase pollution. Hence, good planning must also focus on a transit-oriented development with transport infrastructure closely integrating within the town. Extensive railways must be located at close proximity to popular destinations and bus services must be provided at regular and fast frequency to serve areas not accessible by the major train system. With greater convenience with traveling around by public transportation, more passengers will be attracted and in turn providing the ridership to sustain the systems. Reducing the usage of car will improve congestion and reduce wastage of energy implied by excessive commuting.

3. Providing open spaces and planting greenery:

   The aesthetics of the town is very important as well and greenery will aid to improve this aspect. More trees, landscaped streets, roofs, and parks not only improve the appearance and the environmental quality of an area but, they can also have an impact on critical social issues such as health care, education, crime and safety, economic development, and social disenfranchisement (16). There are also many physiological values of parks that human can benefit from. Some examples include the availability of free public land that people can jog in, engaging in a game of football or cricket and also the utilization of fitness structures that some parks have provided. Moreover, providing open spaces and having parks around can encourage a healthy lifestyle and this will ensure that they are physically fit and emotionally well to cope with the highly competitive society the residents live in.
Criticism of Singapore’s Model and Its Transferability to China

Criticism of Singapore’s model:

1. Lack of emphasis on public participation in the development process:

Unlike America where public participation is very much valued and wanted, Singapore town's planning has very much been a traditional process where it focuses on a top-down process with the government creating the plans and implementing them. However, as the population becomes more educated and more citizens calling for democratic planning process, the government may need to allow the citizens to play a bigger role in it.

However, societies and model should be judged ultimately on their ability to deliver their citizens with most of their needs such as food, shelter, health, education, a clean environment, a sense of community and a good governance will be the one that can serve to deliver them. (20)

2. Strict regulations and fees for car ownership:

In order to reduce the number of cars on the roads, car ownership and use of cars are severely taxed. To buy a car, one has to auction for a Certificate of Entitlement (COE) that are limited in number every month. Today's average COE costs S$30,000. In addition, there is an introduction of the Electronic Road Pricing (ERP) in 1998 to restrict car traffic in certain roads of Singapore during some hours of the week to manage traffic congestion and divert car flow. (20) Moreover, the train and bus rides are not subsidized by the government. This strong implementation will face much more opposition in an auto-centric and liberal country.

3. Too expensive town model to implement especially with the need to build high rise apartments and extensive transportation network:

Many will wonder if Singapore’s model will work in a poor country or in an already badly overcrowded country since Singapore has the capital and is a very clean country so things will be easier to implement. However, little do people know that Singapore actually started out very poor, dirty, ugly and overcrowded too.

It started in 1819 when Sir Thomas Stamford Raffles founded Singapore as a British Colony which transformed the peaceful Malay fishing village into a transformed trading port. Since then, rapid clearing of forests took place to set aside land for houses, factories, warehouses, roads and other developments. There was not much town planning and the island turn overcrowded with lots of immigrants. There were no proper sanitation, lack of basic infrastructure, no proper housing for the people and the streets were full of litter. When Singapore gained independence in 1965, its leaders cried rather than cheered and the idea that a small island city-state of two million people with no hinterland could survive in what was then a difficult and troubled region seemed manifestly absurd. The odds were always against Singapore succeeding. (20)

However, with the perseverance of the govern-

*Singapore in the past was dirty, overcrowded and the living standards were very low.*
ment to transform Singapore into a clean and green city, it finally rose to achieve one of the world’s highest living standards. It has climbed from third world to the first. Recently in October 2008, UN Habitat released its findings that Singapore is the only city without slums out of the 245 around the world surveyed (8). Since a small, vulnerable, developing country can make such great leap within 43 years, China and many other developing countries can too take small steps at a time to create a better living environment for their people. The new town model in Singapore is not one for the rich country but for a committed government that wants the best for their people and for a more sustainable future. Any country can lay out a well–planned model and slowly add features of sustainability to it as the nation progress. It does not have to be of the highest standard right from the start but it must at least have the correct focus.

**Criticism of the Transferability of Singapore’s model to China:**

Simply copying Singapore’s new town model will not be successful in China because of several reasons:

1. Singapore is very small as compared to China. Its scale is like a moderate big city in China. Everything is much more complicated in China given the large population size. Different provinces have their own history, culture and dialogue. The economic and educational level among the provinces varies too. Moreover, the Central government’s decisions are often not strictly and properly enforced by the local governments because they have the power to make amendments to the laws and regulation. Slight variation in the implementation process can result in big differences to the workability of the model. Hence, Singapore’s model is only suitable for those relatively big cities in the more developed regions.

2. Singapore has a much stricter management and law system. Corruption is rare. However, the massive building of public housing in China may not serve its purpose of homing those in need as intended in the case of Singapore’s model. This is because in China, some people will take advantage of the government housing system by bribing and cheating even if they do not qualify for them. Such project will not only do the poor bad but also create more social problems in some regions of China.

3. Providing workable transportation system is a big issue in China. The government is building new highways and roads every day but yet it still cannot keep up with the daily increase in the number of cars on the road. In addition, it is very expensive to build and maintain light rail and subway systems. Most cities cannot afford to have subway or are just unsuitable to have subway due to reasons such as sites being preserved for archaeological reasons. Singapore’s new town model will require a huge investment in mass transportation system if it is implemented in China because China’s cities are too widely spaced apart. Without good, cheap and convenient mass transportation system, Singapore’s satellite town style model will just create more traffic problems, and greatly increase the number of private cars in China.
Case Study: Sino-Singapore Tianjin Eco-City

(Source from (3))

Sino-Singapore Tianjin Eco-City Project is a strategic cooperation project between China and Singapore to improve the living environment and to build an eco-culture.

In April 2007, Premier Wen Jiabao of China and Mr. Goh Chok Tong, Senior Minister of Singapore raised the idea of building a resource efficient, environmentally friendly and socially harmonious city in China together. In July, Vice Premier Wu Yi visited Singapore and further discussed about the site selection and construction principles of eco-city project. Thereafter, relevant Chinese ministries conducted a multi-round site comparison and demonstration among Tianjin and other cities. The project was finally placed in Tianjin Binhai New Area.

Why Tianjin Binhai New Area?

Strategic location

The site is 45km to Tianjin Proper and 150km to Beijing. Backed by neighboring big cities, the site is connected by a good transportation network. The low infrastructure cost is also good for the ecological restoration. Furthermore, the strategic location will help to attract more people to move in.

Resource Scarcity

To save land and water, to practice resource recycling and enhance independent innovation, the project is placed at an area of resource scarcity. The chosen site in Tianjin Binhai New Area is a fresh water-lacking area with salty land, scarce vegetation, unfavorable conditions.
natural conditions and a fragile ecology.

**Vision of Tianjin Eco-City**

- Area: 31.23km²
- Planned Population: 350,000
- Expected Completion year: 2020
- To serve as a model for the many cities in China as it needs to accommodate the massive rural-to-urban migrants

**The Goals**

- An eco-city of international co-operation
- A showcase of sustainable development
- A dynamic city with great vitality
- A comfortable city featuring healthy lifestyle
- A harmonious city of beneficial coexistence
- A future city of ecological culture

**Strategies**

**Landuse**

To be a paragon of sustainable development in China, the eco-city will adopt the intensive and compact model of urban development.

- A clustered arrangement is adopted based on the trip distance of pedestrians and non-motorized vehicle;
- Mass public traffic system will guide the development of land with an improved development intensity around bus stops;
- Mixed land use to achieve efficient land usage and create a luxuriant landscape;
- Ensure the publicity and openness of highly-valued areas such as the CBD of the eco-city and the coastal areas.

**Transportation**

The transport development will be guided by a green transportation system. Both motor road system and non-motorized road system are planned. About 90% of traffic within the city will be public transport.

**Ecology Restoration**

Outside the city: A big ecology restoration project will be carried out to retain the large ecological wetland at the estuary of the southwestern water system to

- Form an aquatic ecosystem striped by seawater and freshwater;
- Set aside the habitat for birds’ migration;
- Reserve the former watercourse of the Ji Canal and to form a regional ecological network with rivers as its arteries and veins.

Inside the eco-city:

- Wedge-shaped green areas will be built along the watercourse and wetland to form an ecological corridor connecting the region;
- Greenbelts will be set up along both banks of the Ji Canal, Tianjin-Hangu Highway and other external-access roads to provide an ecological barrier for the eco-city;
- A green corridor system covering a vast area will be constructed together with the bicycle land and walking lane and to build a multi-tiered ecosystem pattern with “reservoir-river-wetland-green land”. The local vegetation index will be no less than 0.7.

**Rehabilitation of Water Ecosystem:**

- Improve discharge control to the Jin Canal.
- Ecological water front will be adopted along the former watercourse and the artificial chan-
nel of the Ji Canal
- Decrease human disturbance to the environment.

Soil Improvement:
- Improve the saline-alkaline soil with filling, dredging and alkaline drainage as well as biological improvement etc.

Water
- Recycling of water resource
- Extensive system of rainfall collection and sewage reuse, centralized treatment of sewage and wastewater recycling
- Develop and utilize non-conventional water resources such as recycled water and de-salinated seawater etc. and to improve the proportion of use of non-conventional water resources.
- The index of per capita water consumption is controlled within 120 L/day. The utilization rate of non-conventional water resource is no less than 50%.

Energy
- The quantitative goal is that the carbon emissions per unit of GDP will be no higher than 150tons-C/million US dollars.
- The utilization rate of renewable energy sources is no less than 15%.
- The use of clean energy sources is promoted.
- All buildings inside the eco-city will be built according to the Chinese green building standard.
- Other technologies will be used such as using heat pump to reclaim waste heat, heat and chilled water co-generating system as well as pavement solar energy collection etc.
- It sets up a system for sorted collection, comprehensive treatment and recycling of solid waste and boosts the industrialization of overall utilization of recycled resources.

Major Targeted Industries
- Eco-environmental protection industry supported by universities and colleges as well as research institutions
- Green building industry: green construction industry and green real estate industry
- Modern service industry: financial industry, ecological restoration industry, service outsourcing industry, distinctive tourism and recreation industry etc.

Criticism

For the project to be successful, one cannot just analyze the model but there is also a need to analyze the society’s problems and the context as well. For a model to work, it must support a population of people and they must be able to carry out the objectives behind the working of an eco-city. Singaporeans may be brought up and be educated in a way that living in such model works for them but for China, it may not be the case. Therefore, the following criticisms on Tianjin Eco-city will encompass the hidden problems that might affect the workability and transferability of the model to China.

1. The success of this project may be influenced by the proportion of share inputs from each party. However, it is unclear how much percentage of share China and Singapore will have in this project. During their first joint project, Shuzhou Industrial Park, it started off with Singapore having 70% and China having 30% of the share. Having Singapore in control of a bigger proportion of share deters the local Chinese to put in their best efforts to make the project works. This contributed to one of the reason why the project suffered great losses in the beginning. Secondly, Singapore does not understand the local market well and offered rental spaces at high prices that deter local companies from renting the place. Finally, in order to survive this ordeal, Singapore decided to decrease its share to 30% and China to increase its share to 70%. After this change, the Chinese lowered the rent and this caused more companies to move in because of the cheaper rent. The project then began to make profit as occupancy increases. Therefore, if Singapore has a higher proportion of share again in this Eco-City project, there might be a possibility that the Chinese’s side will not put in great effort to make it work and the city will become an empty city instead.

2. For the project to be successful, the city must be developed with a target group of buyers in mind.
Are they going to attract the low-income group families or the rich, or the middle-income group families? Otherwise, the project may fail because of its lack of appropriate buyers. Furthermore, the Eco-city is located far from Tianjin and Beijing and other major employment areas hence, if there are no employment opportunities in Tianjin, no one will be attracted to live there.

3. There may be a lack of incentives for industries to locate in Tianjin because of its remote location which is very far from the main business core area. Without employment opportunities there, no people will be attracted to live there again.

4. Aiming to have 90% of the mode of transportation use by public transportation may be difficult to realize. Cars are cheap in China, the government is impossible to effectively control the use of private car. Without a nationwide control of private cars, a single city strict policy will never work because people can always purchase cars in other cities. In China, cars are not only a tool of transportation but also a symbol of one’s social and financial status. It will be hard to change people’s lifestyle habits.

5. It is not clear when the light rail will be built and when it will be finished. Without easy mass transportation to major cities, the project will be hard to succeed.

6. Restoring the local wetlands is a very important part of this project. However, there are no clear plans showing when and how the project will start. Such a big scale project needs thoughtful research and design. It is also very expensive to implement, maintain and monitor. Therefore, simply planting trees or making the city look green is not restoration ecology. More information is needed to show it is a real ecology restoration project instead of a fake selling point.

7. In both Singapore and China, leaders make decisions. Hence, the process is not transparent enough. Citizens from both countries really do not know what is going on except for the news release by the officials. A public project like this should be clearer and should encourage more public involvement to monitor the whole process. With greater public participation, the leaders will make fewer mistakes, less corruption will occur, and the project may be more successful. Moreover, the essential part of this project is learning and experimenting and hence, should be a learning opportunity for more.

![The Master Plan of the Eco-city](image-url)
Singapore’s New Town model is on the whole very transferable to China and it will be workable on solving the small scale problems in China. Singapore’s urban town planning may be worth studying for those striving to bridge the growing divide in an increasingly troubled planet. China, with its vast wealth and resources will too be able to create something even much better as long as there are committed efforts from the government. However, to solve all the problems of the whole of China, it is impossible to just copy the ideas wholesale because implementation of some of the projects can cost huge amount of money and the returns may not be sustainable. Moreover, China is such a big country, it is harder to govern and implement things as compared to Singapore. Model can be transferred but, how successful it will meet its objective will be harder to tell. In addition, to succeed on a long term basis, what needs to be learnt are the three key planning principles for greater sustainability and not just mere copying of model (17). They are planning with a long term perspective, integrated planning and planning for implementation. Planning for a long term perspective is done through the Concept Plan that ensures that the city will anticipate the projected population growth and allows for continued economic growth in a sustainable environment. Secondly, an integrated approach is important as it takes into considerations all the major land use demands such as housing, industry and commerce, recreation and nature areas, transport and utility infrastructure. This ensures that all future needs are considered and met. Lastly, planning for implementation is to plan with implementation in mind. Making sure that all plans are feasible and mechanisms are in place to realize the plans. The benefits of planning can only be realized when plans are implemented and not left in the drawer. (17)

Lastly, Singapore’s model is not the most perfect model to date although it will serve as a good model for China’s initial step towards a greater sustainability. There are lots of other things that Singapore’s model lacks as well. In an ideal case, the model will have to incorporate things such as the efficient use of resources, less waste and pollution, restoration of natural systems, a healthy social ecology, sustainable economics, community participation and involvement and preservation of local culture.
References:


