International Workshop - Session 1

The construction of Eco-city in China
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The ecological civilization is considered a high-level achievement of human civilization. And the ecological city is a new type of city, constructed on the theories of eco-progress and principles of ecology, in which nature, economy, society and human being can develop harmoniously. It will be an inevitable course in Chinese urbanization. The construction of an eco-city will have a strategic significance in the transformation of the city civilization model and in the development of urban life.

We analyzed features and trend of urban development since the founding of the People’s Republic of China in 1949 (Fig. 1). China has experienced an intensive and rapid urbanization process since Reform and Opening. With the rapid expansion of city amount and size, China has gradually formed 10 big city groups, they had great denseness in population and highly intensive in economy. At present China’s urbanization and industrialization are in the high-speed development stage. The growing problems of resources and energy depletion, environmental pollution and ecological destruction are particularly acute. Therefore the construction of ecological cities is a necessary and urgent choice.

Fig. 1 Urbanization process in China

Based on this background, we reviewed practice and exploration on eco-city construction over the past 30 years in China (Fig. 2), including basic theory, planning guidelines, design method, and management mechanism. The Chinese eco-city development model and policy with a Chinese characteristic have promoted a sustained economic growth and also effectively improved eco-environmental quality. However, the problems existed in Chinese eco-city construction included think more of economic development, management system to be improved and lack of strong scientific and technological support, etc. In the next study, the theoretical research need to improve, the indicator system of eco-city need to perfect, and the supervision to strengthen in order to make eco-city construction to be more perfect and more vitality.

Fig. 2 The course of Eco-city construction in China

The Eighteenth National Congress of the Communist Party of China has put forward to make great efforts to promote ecological civilization, raise our ecological awareness of the need to respect, accommodate to and protect nature, give high priority to making ecological civilization and work hard to build a beautiful country, and achieve lasting and sustainable development of the Chinese nation.

References:
The Construction of Eco-City in China

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Outline

1. Urbanization in China
2. Environmental Challenges
3. Construction of Eco-City
Urbanization in China

China has experienced an intensive and rapid urbanization process. The urbanization rate increased from 10.64% to 53.73% from 1949 to 2013.

In 1949, Chinese urban population was 58 million. It was 7.2 hundred million in 2013.

For the first time urban population grew more than rural population (51.27%) in 2011.

Since Reform and Opening, China’s urbanization speeds up, the urbanization rate of China is 3 times as much as that of the world in the same period.
With rapid growth of urban population, China’s city number and area size also expanded. There gradually formed 10 Metropolitan regions with high population density and intensified economic activity.

- Number of city increased from 193 in 1978 to 658 in 2013.

The 3 biggest city groups had contributed to 14% population and 42% GDP with less than 3% of the land area in China.

The total population of 4 biggest cities is about 54.64 million. It was 1.6 times of Canadian population. The population was close to Italian population. It was the equal of the 3/4 population of England and France.
In the past 60 years, China’s economy maintained a relatively high-speed growth. China has already reached USD 1000, USD 3000 and USD 6000 of GDP per capita and USD 900 million of GDP and has now become one of rich developed Countries.
China's industrialization is still at the mid-stage. Industrialization is still the process that most Chinese cities must go through.

- Proportion of primary industry decreased steadily from 22% to 10%, the tertiary industry increased from 33% to 46% in recent 50 years.
- The gap of industrialization process between developed countries and China remains huge.

Distribution and size of urbanization were determined based on land, water resource, atmospheric circulation characteristics and the ecological environment carrying capacity.
Outline

1. Urbanization in China
2. Environmental Challenges
3. Construction of Eco-City
The global and regional environmental problems mostly come from cities. Resource consumption and pollutant emissions account for 70% of those of the whole world.
Large-scale regional atmospheric haze occurs frequently because of interaction of coal-combustion pollution and vehicle exhaust pollution. Regional air pollution haze aggravate in the region of Pearl River Delta, Yangtze River Delta and Beijing-Tianjin-Tangshan. Air quality report from WHO in 2012 shows that Beijing ranked 1035th among 1082 cities around the world, and Haikou with the best air quality in China ranked after 800th.
Rapid urbanization also transformed massive ecological land into urban area, resulted in habitat fragmentation and loss of biodiversity.

Dramatic land transformation does happen, from not only arable land but also forest, grassland, wetland and water surface into urban land.
Urban river pollution becomes a common phenomenon. More than 400 cities are faced with problems about water shortage and deterioration of water quality. More than 80% of urban rivers are polluted.

**Environmental Challenges**

- **Urban river pollution becomes a common phenomenon.** More than 400 cities are faced with problems about water shortage and deterioration of water quality. More than 80% of urban rivers are polluted.

**Water Shortage**

- **Who Has Water and Who Doesn’t?**

**Deterioration of Water Quality**

- **China’s River Water Quality**

**The distribution of main national water-shortage cities**
In the future, rapid urbanization will exert much press on ecological conservation. So many local governments are facing the intractable issue to balance ecological conservation with urban development.

Urbanization and More
Cities and More Mega Cities in China

China in 2025:
- 400 million people will move into cities
- 75% of the population will be urban population
- 5 billion square meters of road will be paved
- 40 billion square meters of buildings will be constructed
Outline

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2. Environmental Challenges
3. Construction of Eco-City
The concept of Eco-City was put forward by “Man and Biosphere” project of UNESCO in 1971.

Eco-city is a platform and carrier of the Chinese government to deal with environmental challenges and the practice of the concept of sustainable development.
At the beginning of 1990s, some Chinese cities were beginning to build eco-city. Especially after the policy of ecological civilization construction of new Chinese government, China set off eco-city construction boom in the 21st century.

Making great efforts to promote ecological civilization of the 18th CPC National Congress in 2012 and the Third Plenary Session of the 18th CPC Central Committee in 2013.
The concept of "eco-city" was put forward by the UNESCO in the implementation of "man and biosphere (MAB)" research project.

The first national city ecology seminar held in Shanghai. This was a milestone in the field of Chinese urban ecology research, urban planning and construction.

Yi chun city in Jiangxi province proposed the development goals of eco-city construction, and start the pilot work at the beginning of 1988. This is the first concrete practice of eco-city construction in China.

Ministry of environmental protection published the "National ecological demonstration area construction plan outline (1996-2050)" and carried out pilot work of ecological demonstration area construction in China.

Ministry of environmental protection decided to create model city of national environmental protection.

Ministry of environmental protection published the "indexes of ecological county, city, province construction (trial)".

Ministry of environmental protection set "appraisal program of national ecological county and city construction (trial)" and "The inspection acceptance procedures of national ecological county and eco-city."

The related indexes was revised.

Ministry of environmental protection issued the "Notice of pilot work of ecological progress construction" (Issued by MEP[2008] No.36), and carried out pilot work.

Ministry of environmental protection issued the "guidance advices on promoting ecological progress construction" (Issued by MEP[2008] No. 126). This proposed directive requirements to promote ecological progress construction, and build a harmonious socialist society.

The state council published "Opinions about strengthening key work of environmental protection" (Issued by the state council[2011] No. 35) and the "twelfth five-year" plan for national environmental protection."

MEP formulated the "index of pilot demonstration zone of national ecological progress construction (trial)" (Issued by MEP[2013] No. 58).
China has begun to make great efforts to promote the overall ecological civilization demonstration-building activities.

- A total of 71 pilot areas of ecological civilization construction has been set up 5 groups.
- At present, there are more than 20 cities (districts or counties) compiled the ecological civilization construction planning.

The first group
- 6 regions in 2008
  - Miyun county
  - Anji county
  - Zhangjiagang city
  - Zhuhai city
  - Shaoguan city
  - Shenzhen city

The second group
- 12 regions in 2009
  - Yanqing county
  - Chengde city
  - Minhang District of Changshu city
  - Kunshan city
  - Jiangyin city
  - Taicang city
  - Wuxi city
  - Hangzhou city
  - Zhongshan city
  - Eryuan county
  - Guiyang city

The third group
- 34 regions in 2011
  - Xiqing District
  - Shenyang new District
  - Yixing city
  - Rongcheng city
  - Yiwu county, et al.
  - Relate to 10 Province; areas around Tai Lake; 1 industrial zone; 1 National hi-tech industrial development zone

The fourth group
- one region in 2012
  - Liaohe Protection area

The fifth group
- 18 regions in 2013
  - Wendeng city
  - Rushan city
  - Suijiaotun district of Shenyang city
  - Yuhong district
  - Hengpanshan development zone
  - Jinzhou district of Dalian city
  - Changzhou city
  - Suzhou city
  - Liyang city
  - Pukou district of Nanjing city, et al.

**Evaluation content**

- **Economy**
  - Evaluation indexes:
    - Gross Domestic Product per Capita Net Income
    - The tertiary industry accounted for the proportion of GDP
    - Energy consumption of GDP
    - Freshwater consumption of industrial added value
    - Agricultural irrigation water use efficiency
    - Mandatory implementation of cleaner production enterprises
  - Evaluation parameters:
    - $>8000$ yuan/person
    - $>40\%$
    - $<0.9$ tons standard coal/ten thousand yuan
    - $<20$ m$^3$/ten thousand yuan
    - $>0.55$ m$^3$/ten thousand yuan
    - $100\%$

- **Environment**
  - Evaluation indexes:
    - Protected area occupies land
    - Air environmental quality
    - Water environmental quality
    - Coastal water environmental quality
    - COD/SO2
    - Centralized drinking water source water quality standard rate
    - Urban sewage centralized treatment rate
    - Industrial water reuse rate
    - Noise environmental quality
    - Urban living garbage harmless treatment rate
    - Industrial solid waste disposal utilization rate
    - Urban public green area per capita
    - Environmental protection investment accounted for the proportion of GDP
  - Evaluation parameters:
    - $>85\%;70\%;40\%;15\%$
    - $>17$
    - the required standard
    - the required standard
    - $<4.0$ kg $<5.0$ kg/thousand yuan (GDP)
    - $100\%$
    - $>85\%$
    - $>80\%$
    - the required standard
    - $>90\%$
    - $>90\%$
    - $>11$ m$^2$/person
    - $>3.5\%$

- **Society**
  - Evaluation indexes:
    - Proportion of investment in environmental protection account for GDP
  - Evaluation parameters:
    - $>55\%$
    - $>65\%$
    - $>90\%$
 MEP published eco-city indicators and standard which encouraged a wave of Eco-City construction all over the country.

14 provinces were approved by MEP as National Eco-Province Construction Pilot.

38 Cities (district and county) have been awarded the title of National Eco-City.

More than 600 cities are making their efforts to get the title of National eco-city.
Different types and modes of eco-city construction were kept together all over the country.

**Different builders**

- **International cooperation**
  - Sino-Singapore Tianjin Eco-City (Singapore-China cooperation)
  - Caofeidian International Eco-City (Sweden-China cooperation)
  - Chongqing Yue Lai Eco-city (U.S.-China cooperation)
  - And so on…

- **Ministry, province and city cooperation**
  - Wuxi city
  - Guangming new district of Shenzhen city
  - And so on…

- **Local city**
  - Anji county of Zhejiang province
  - Huainan city of Anhui province
  - Yanqing county of Beijing city
  - Miyun county of Beijing city
  - And so on…

**Scope**

- **A single project**
  - Huainan city of Anhui province: its focus is the use of high concentrations of methane gas and ecological restoration of the coal mining subsidence area
  - And so on…

- **Full-scale operation**
  - Anji county of Zhejiang province
  - And so on…

Sino-Singapore Tianjin Eco-City is the first eco-city in China, it being jointly by China and Singapore.
Using analytic hierarchy process (AHP) and an integrating index evaluation method, eco-city health in China was quantitatively assessed.
The overall rank list of health status on eco-city shows a obvious fluctuation during 5 years from 2008 to 2012. Some cities have a great change in rank in different years. CEC is still at an early stage in China.
Some new problems should be concerned in the construction of eco-city in China.

New concerns
- The fast development of cars
- Infrastructure construction problems
- Air quality monitoring standard issues
- Environmental impact assessment issues

How to develop eco-city in China?
- Green Development
  - To solve urban economic growth and carbon emission reduction
- Development of Circular Economy
  - To solve cleaner production
- Advocate low carbon life
  - To improve urban living conditions
- Promote humanistic and livable spirit
  - To improve urban human settlements environment
Conclusion

- There is no any other country like China, which has so many cities are making their efforts to construct Eco-City. They are mainly concentrated in the eastern and central parts of China. They all proposed to build eco-city in 3-10 years.

- China has formed an integrated eco-city development model, which could provide useful experiences to other country.

- Eco-City construction will greatly contribute to China environment improvement in future.

Caofeidian International Eco-City

Sino-Singapore Tianjin Eco-City
Thanks for your attention!