

The Construction and Research of the Compact City “Green Valley” Based on the Ecological City Theory

Xin Bian

Shandong Women's University, Jinan, China

Qiang Sun & Shufang Sun

China Hanjia Design Group, Jinan, China

ABSTRACT: From the introduction of balanced development mechanism of environmental elements, city planning to guide the city to develop efficiently and healthfully and other methods, the paper is to achieve the goal of continuous improvement of human settlement and harmonious coexistence between human and environment in the process of city renewal and transformation. Based on Ecological City Theory, it is found that various environmental problems when city develops fast can be improved effectively via the construction and research on the compact city “green valley”. It is to increase land use rate, meet the requirements for environmental carrying capacity in the mean time and achieve the ecological balance between artificial and natural environment via self-adjusting.

KEYWORD: Ecological City Theory; Compact City; “Green Valley”

1 INTRODUCTION

Since the reform and opening up, the developing standard of China's urbanization has been raised greatly; this, in turn, leads to the complete changes of the city on which our lives and producing activities depend. The scale of the city develops from that of the big and medium to today's extra-big and big; the types of building has developed from the original ones with low-and-multiple levels to nowadays' high buildings' cluster. The extra-big and the big cities are competing each other for the construction of the skyscrapers with the highest levels; the bicycles and public buses are the original main transporting means, so the road is quite smooth; in contrast, in recent years, people witness the soar of private cars, as a result, the road is congested; originally, the rivers in the city were very clear with fishes in them, many trees surrounded by them, and the natural banks, but they are now no longer clear any more, surrounded by mosquito and various insects with fewer and fewer trees around them, the banks of them being artificial. Originally there were various kinds of natural species in the city parks with a sound ecological botanic coverage, but now they are lessened and destroyed. Previously, the harden area in the city relatively accounted for a little proportion, the soil's capacity for water penetration was good, and the climate was relatively stable; today, the harden area of the city is increasing with the soil's water penetration capacity

lessening, frequent natural disasters, and sudden climate changes. Can our city bear so heavy a burden and develop healthily and harmoniously? Can our city shake off these problems and recover to its normal state as soon as possible?

The city “green valley” construction can take its effects and is urgent and necessary in the process of the fast development of the compact cities for a given period at present and in the future.

2 A SURVEY OF THE ECOLOGICAL CITY THEORY

The urbanization in China is the inevitable result of the historical development of a given period in the past, present, and future. Along with the ever increasing speed of urbanization, the friction created among the city, environment, resource, and population is being serious. The ideology of ecological city was initiated in the 1970s, which “made use of the integrated ecological method to study the city's ecosystem and other habitats for the human being” [1]. Various theories and ideologies relevant to the ecological city had been raised by the end of the 1980s. The ecological theory has been applied to the problems, especially the environmental problems, in the city development process, exerting a deep and profound influence on the construction and development of the city in the future.



Picture 1.Green Valley

2.1 Ecological City Construction Theory

2.1.1 The Sustainable Development Theory

The sustainable development theory aims to gratify the needs of the contemporary people and at the same time preserve the resources for the later generations' use. The city environment must be developed with the premises that people coexist with the nature in a harmonious way; the natural resources should be made use of and protected in a reasonable way; the recycling economy and industrial structure should be encouraged greatly; new resources and technologies should be promoted and advocated; city economy, social development, ecological and environmental benefits should be united in a green, low-carbon dioxide, and environmental friendly way.

2.1.2 Theories of Food Chain and Food Net

The food chain mainly refers to the process by which the energy is passed in ladder levels among the living things. Many food chains are intertwined to form the food net. And the ecosystem makes the passing of energy and recycling of materials possible by the food chain and net to maintain its stable development. Several eco-industrial chains have been established in the construction of the compact cities: the material recycling one according to the theories of the food chain and net is established by making use of materials to pass, supply, and exchange energy; the one established according to various kinds of energy and their different qualities to make use of energy from the lower level to the top level; and the one established to recycle the use of water according to different levels, qualities, and requirements of water.

2.1.3 The Environmental Bearing Capacity Theory

The natural ecosystem with rich material basis plays a determining role in people's lives and production activities, is the wealth people inherited from nature, and is the indispensable resource. It should be noted that the environment can bear a limited scale of

development of the human economy and society and this bearing capacity changes intrinsically and externally along with people's transformation, creation, re-transformation, and re-creation activities, influencing human being's conducts and the healthy development of the economy and society potentially.

2.2 Basic Principles for the Construction of the Ecological City

First, the principle of putting people first should be observed. People's fundamental interests should be set as the starting point and the final goal to fully gratify people's producing and living needs, to create an ultra city environment which is suitable for living and working, to closely combine the economic and social development with the natural law, and to unite the economic and social construction with the ecological and cultural construction.

Second, observe the principle that the environment is producing force. The environment and the producing force are a united one which should not be disseminated nor be made opposed to each other by the development of cities. It should be clearly realized that the environment is the basis and prerequisite for the development of producing forces which are the deriving and definite condition for the environment. Only when each kind of resource in the environment is fully cultivated and protected, can it make more contributions to the economic and social development of human beings and turn the environment into practical producing forces.

Third, stick to the principle of adopting different measures according to local conditions. China with a vast territory witnesses a variance between its southern and northern parts in environment, resource, and culture, etc, even different cities having their unique natural resources. The local unique cultural and environmental resources should be thoroughly made use of in the city's development. Partial admiration for the foreign should be avoided. The essence left from the ancient times should also be utilized in modern times. The future development and effort-making orientation should be made clear in combination with the practical condition of the given city.

Fourth, stick to the sustainable development principle. The sustainable development aims to most fully make use of the energy or material that has entered into natural and artificial ecosystem to enable a mode of the economy running mechanism with low exhaustion, pollution, input but high production. It sticks to the developing law of the ecology theories, resolving fundamentally the friction between environment and economic development.



Picture 2.Green Valley

3 THE SYSTEMIC PLAN FOR THE COMPACT CITY “GREEN VALLEY”

The essence of the ecological city theory is to highlight the construction of the ecological civilization, coordinating the construction of economic, social, and cultural civilizations. Through the thorough analysis of today’s city developing condition, it is concluded that in order to develop ecological economy, construct a community in which environmental resources are coordinated with the economic and social development, and avoid the city’s blind expansion in a disorder way, we must consider building a compact city, emphasize the composite use and rational intensive exploitation of land resources, advocate that people live near their working places and public service facilities which are necessary for daily lives so as to realize sustainable development and the China dream for people’s livelihood. With China’s national condition that it has the largest population in the world, with more people but less land, fast development of urbanization, and a serious shortage of construction land quota, some problems influencing ecological environment which urgently need new approaches to solve them in the process of constructing compact cities.

Green Cover Book of City Environment put forward the city developing ideal, that is, “to promote the density, variety, and efficiency, and the perfect combination of social function with economic one, and to save time and energy; to restore the rich architectural styles the history has left”[2]. It is not difficult to see that the development of compact cities has brought much benefit to our lives and production activities but with the current situations it also faces the difficult and hotspot issues to be solved urgently in the developing process of the society.

3.1 Analysis of the Current Situation of the Compact Cities

3.1.1 The Development and Construction of the City with High Density

The high density construction and development of the city causes the five-quota to rise steadily, including the density of population, the height of architecture, the total number of the buildings, air pollution quota of per unit area, and the number of the private cars in per unit area, except for which, there are still many potential factors undergoing obvious changes and influencing people’s lives and production activities. The compact city theory holds that the high density development of the city helps to alleviate pressure the land bears, protect land resources, and inhibit the extension of cities. The compact city also brings much convenience to people’s lives and transportation, but a series of issues are revealed along with the development of the city, such as the exhaust emission from the industrial enterprises in the city construction districts, deterioration of air quality and the increasing haze weather caused by the large amount of pollutant from burning coal for power generating and heating and the exhaust from the motor cars, traffic congestion, low transportation efficiency, the heat island effect caused by the aggregation and expansion of the city population, poor ventilation caused by clusters of tall buildings, and pollutant diffusion problems. The city is now facing the increasingly expanding mode of development, along with this the environmental issues will be deteriorating and become the chronic disease of the city.

3.1.2 Intensive Use of Land

With the modernized economic and social development, the designing principle of the city functional zones has been extended to the plan and construction of the city. The nature, scale, and developing intensity of the land should further be made clear and endowed with legal force through the overall plan for the land utilization or the detailed controlling plan; the city core area and CBD have become the growth pole for regional economy and bellwether for the city’s development. A series of negative issues have also emerged along with this, such as the reorganization of land, the ever growing development density of the city land, in order to meet higher land utilization quota for city construction, maximizing the land revenue, the quota for city green land and square land rising far slower than the quota for construction land, in the construction of the large shopping mall, business offices, and transportation hub station, the buildings and transportation systems being more emphasized than the construction of the supporting greening

landscape, which in the long run severely damages the city's natural ecological system, the increasing light, noise, and air pollutions, and the increasing dependence on the private cars as the transportation means which causes traffic congestion in cities and affects the citizens' happiness index [3]. So, in city planning and constructing process, the organic combination of area development with the bearing capacity of the ecological environment, and the mixed land use should be realized optimally to create an outer environment of the city which is habitable and integrate function with ecology.

3.2 Meaning of the City "Green Valley"

The city "green valley" refers to the green ecological valley including the road, river, green land, and square, etc, located between the city buildings. The green ecological valley is the multifunctional combination of ecology, which includes the artificial "green valley" provided for the pedestrians and bicycles to pass safely and comfortably, the natural "green valley" for wild lives to reproduce and shelter themselves, and the ecological "green valley" for people to go trip and keep fit.

3.3 Strategies for the Construction of the Compact City "Green Valley"

3.3.1 Divide the City into Basic Units and Create the Environment of Harmonious Coexistence

By dividing the city into several basic units and studying the number of people in a unit or the supply and consumption condition for the unit resources, and the condition of material absorption and production, the level for the environment bearing capacity can be determined by comparing these conditions with the artificial environment. The goal to realize the harmonious coexistence can be reached by making use of the "green valley" to adjust the relationship between people and environment in the upgrading and transformation of the city. For example, in a given area of land in the city, the every cubic content of carbon dioxide and hydrocarbons by an analysis of a research is for A, and currently, the every cubic content of carbon dioxide and hydrocarbons which the natural and artificial environment can absorb and decompose is for B, only when A is lower than B to some extent, is the environment bearing capacity not at full and can this area be called the one which nature and people harmoniously coexist; if A is higher than B to some extent, the area should be adjusted and re-planned in the city's upgrading and transforming to make it normal.

3.3.2 Advocate Green Transportation through the Construction of the "Green Valley" Based on the Transportation System.

Based on the rules of city road transportation system, the low-carbon and environmental friendly supporting service facilities on the original city roads can be constructed according the practical condition of each districts to ensure it advantageous in the distribution of public resources. For example, in the city with the natural capacity to develop the bicycle transportation system, the exclusive lanes for bicycles of the closed multi-direction lanes should be set up and advanced technologies should be adopted to reduce the waiting time at the crossings, the influence on the riding of bicycles by the passengers getting on or off the bus can be reduced by the people-oriented design of the bus platform, and the comfort level of riding bicycles in the hot summer and cold winter can be raised by the green environment design.

3.3.3 The Combination of "Green Valley" with City's Development to Realize the Diversified and Multi-centre Developing Mode.

The combination of the "Green Valley" with the city's developing mode is an effective approach to dynamic adjustment [4]. The series of issues brought about by the high density of population in the central district of a city are caused by the single centre developing mode of the city. By the gradual construction of the "green valley", that is, increasing the green width on both sides of the road, increasing the green area of the limited land at the centre of the city, and gradually reducing the construction area of the limited land at central city, the goals to reduce the population density at the central urban area, alleviate the damage of the city diseases, increase green area, raise the level of inhabitants' comfort, turn the construction land quota to the construction of the suburban cities near the central urban area, transfer the population, and to realize multi-centre and sound urbanization can be achieved finally [5].

4 CONCLUSION

The study and construction of the compact city "green valley" based on the ecological city theory can not only provide theory and wisdom support for the fast developing economy and society, but also give a new insight and approach to the obvious difficult and hotspot issues occurring in the process of development, so as to perfectly combine the economic, social and ecological benefits. It is completely new and significant to use the ecological theories to construct the green ecological valley in the development and construction of the compact cities, and it is worth our emphasis and attention.

5 ACKNOWLEDGEMENT

After exploration, research and plain self-summary over just one year, the youth research project of Shandong Women's University (No. YB201301) titled *The Construction and Research of the Compact City "Green Valley" Based on the Ecological City Theory* comes to conclusion. Looking back to this short one year, I experience every step necessary for subject research: to find out problems, put forward subject, make out a plan, investigate and collect evidence, analyze the cause, attempt reformation, summarize experience and others driven by the subject research interest, I was also puzzled and confused ever in the process. However, what's more important is that I achieve many successes and achievements. This is one important exercise for me. The leading experts of all levels gave me guidance with utmost care and great support in this period. Here, I express my deep

respect and heartfelt gratefulness to you as a representative of our research group!

REFERENCES

- [1] Zhan An.Zong Yueguang. Analysis of Ecological City Theory: Guangxi Farming Science. 2012, 12.
- [2] Wu,Zhenghong. Feng,Changchun, Yang,Zijiang. The Land Utilization Principles in the Development of Compact Cities. City Issues. 2012, 4.
- [3] Han Xili. From the Green Belt to the Green Passage: Greenbelt in Beijing as an Example. City Issues. 2004(2): 27-31.
- [4] Jia Jun, Gao Jing. The Origin, Development, and Challenges for British Greenbelt Policy. China Gardening. 2005: 69-71.
- [5] Liu Binyi, Wang Peng. The Network Planning Development of the Green Land and the Current Research in China. China Gardening. 2010:1-5.