# People to People Exchange Serving Urban Development - keynote speech on 2013 Beijing International Forum on People to People Friendship

BPAFFC Executive Vice President Li Xiaoqiang

Ladies and gentlemen, friends:

Good morning.

The theme of 2013 Beijing International Forum on People to People Friendship is" Highlighting Urban Construction by People-to-People Cooperation and Promoting Social Prosperity by Cultural Exchanges." Around this theme, we get together with international friends from five continents, 23 countries, and 76 agencies to join hands, to exchange experiences, to share results, to discuss cooperation, and to seek common development. I would like to take this opportunity to talk about my views about that local friendship association serving the city construction and development.

As a mark of mankind's civilization mileage, the city has already 5,000 years of history in the world. World Urbanization and urban modernization have made a tremendous and far-reaching impact on the economy, society and culture, and have promoted human civilization and progress. However, during the process of urbanization, there have been different kinds of "urban disease", such as environmental pollution, traffic congestion, population growth, energy shortages, and difficulties in finding jobs. China that is the biggest developing country with the rapid development of urbanization, in the process of urbanization , has also undergone some problems that a number of countries ever had, while at the same time, some new problems of development, like unscientification of urban planning , irrationality of industrial structure, the uneven distribution of educational resources , etc. appeared in China. For this reason, China and the world have been searching constantly for ways and means of solving, researching new problems that may appear in the process of urbanization, and learning experiences and lessons from each other, in order to jointly strive to solve the difficulties and problems during urban construction and development.

The Beijing International Forum on People to People Friendship does exactly create a platform for non-governmental organizations and research institutions in the world, in order to exchange experience in urban construction and management for everyone through this platform, to explore results of educational and cultural exchanges with international countries, to conduct constructive dialogue on folk culture ,to concerns commonly modern urban development, through international non-governmental friendly exchanges and cooperation.

The Beijing People's Association for Friendship with Foreign Countries is a people's organization engaged in the work of non-governmental friendly exchanges with foreign countries in Beijing. Based in Beijing, minding the country, looking at the world, we actively commit to enhancing understanding and friendship between Beijing people and peoples from every city around the world and promoting mutual exchanges and cooperation. After strategic goals of constructing World Cities with Chinese characteristics was proposed in Beijing , the Beijing People's Association for Friendship with Foreign Countries pay more attention to develop characteristics and advantages of mass , breadth and flexibility for non-governmental foreign exchanges , and strive to contribute to the development of Beijing city .

First, learn from experience of other countries. Stones from other hills may serve to polish jade. Many countries have accumulated wealthy experience and results in the construction and management of modern city. We use the

advantage of non-governmental contacts with foreign countries, to " go out" to send environmental group delegation, to visit Japan, Singapore advanced environmental experience and waste treatment technology, to propose comments and suggestions for achieving waste resources , reduction and harmless of waste treatment. Besides, economic and trade delegation and other professional groups visit to introduce the Beijing economic and social development, so as to promote capital business into the world and attract foreign companies to enter Beijing. Through participating in the United Nations Climate Change Conference, Conference on Sustainable Development, Social Development, and other international conferences, we draw on national development experiences, exchange the problems and solutions that need to focus on during building the world's cities. In addition, we keep positively the principle of "Please come in", and repeatedly serve official head from famous enterprises in the world, to play the role of bridge and link for promoting the development of the capital. Moreover, various international exchange activities are organized, attracting international civilian organizations and agencies to come in China to share experiences and results. Today this forum is that platform we strive to create to provide suggestions and ideas for urban development. I, as the first one of the main forum speakers, hope to set the ball rolling, and so national experts can provide suggestions for urban development of China and Beijing.

The second is to show our own characteristics. Throughout the history of the evolution of the cities in the world, it can be seen that the form of cities in the world is the result of co- promoting and interacting of politics, economy and culture. Beijing, a 3000 years of famous historical and cultural city, has a history of 800 years as capital, whose unique character is underlined by distinct capital culture. We should put the Chinese culture and Beijing sign into the construction of city in the world, to let the city own its own soul. In recent years, we have organized several folk artists to visit the United States , France, Germany , Indonesia, Thailand and other countries, organizing paper cutting , kites, figurines , painting pots inside snuff and other activities, introducing history and artistic features of Beijing traditional handicrafts , and demonstrating production process, so that we can give foreign friends close understanding of Chinese outstanding folk art. Today, outside the main conference there are also six on-site production projects, such as snuff bottles, figurines, painted faces, egg carving, straw, paper cutting and so on, and everybody can take some time to go and see the wonderful performances of folk art masters. We send group delegations major in pictures to USA, UK, Germany, Australia, New Zealand, Denmark, Greece, Austria and other countries, to conduct traditional Chinese painting and calligraphy exhibition to carry out painting exchanges with foreign friends. International Softball Exchange Conference, International Taijiquan Exchange Conference are held in Beijing, and opera, Kunqu exchange activities , etc. are organized, which, through cultural exchanges , show cultural flavor and humanistic ideas of Beijing, and explore cultural quality image of Beijing in construction into World City.

Third is to provide different perspectives. in order to build Beijing to the city of gathering international events, the city of the centre for high-end enterprise headquarters, the city of attracting high-end talent aggregation, the city carrying the advanced socialist culture with Chinese characteristics, a harmonious livable capital city, it not only needs to be open and inclusive, good at learning, but also play our own advantage, highlight Chinese characteristics. Non-governmental international exchanges should be able to accept cultural traditions, ways of thinking and diverse perspectives of different communication objects, focus on personalization of communication, emphasize "harmony in diversity." We aim to let civil society organizations and international agencies from the world, from different perspectives, exchange experience in urban development, explain the direction of development of urban construction in the world, integrating wisdom of world, look for meeting point between Chinese historical and cultural heritage and modern urban development. In recent years, during series of activities, Chinese Classics • Beijing culture and world culture Lecture, we have organized, we have invited Chinese and foreign experts in various industries to show research

results and carry out interaction from different perspectives, different directions, so that exchange of ideas can collide sparks of wisdom. We organize foreign friends into the factory, into the community, into the rural areas, and organize frontline staff of district to visit and exchange in foreign countries. Every year we conduct exchanges of American and Chinese students, student exchanges in Japan, South Korea and China, anime exchanges in Japan and China and other activities, which provides multi-level, multi-angle development experience for the construction of world city of Beijing, through a wide range of non-governmental exchanges.

Beijing International Forum of non-governmental friendship is a future-oriented forum, which should be regarded as a new platform for practical cooperation and a new bright spot of non-governmental international exchanges by National civil society organizations and international agencies, highlighting the exchanges and cooperation, and sharing successful experience. To this end, I want to make the following recommendations about international non-governmental exchanges concerning Urban Development of the world:

First, to strengthen cultural exchanges. We all know that, just like Manhattan of New York, Eiffel Tower of Paris, Tiananmen Square of Beijing, Terracotta Warriors in Xi'an, etc. each city in every country has its own unique culture. It is very important in urban development to improve the protection of historical and cultural heritage, and to strengthen cultural exchanges. We just held "Photo Exhibition of The Kingdom of Cambodia Angkor World Heritage" in the Summer Palace, but also would hold in Cambodia in December, "Photo Exhibition of Summer Palace World Heritage ", and such kind of exchanges will continue. We hope that civil organizations in every country can further strengthen inter-cultural exchanges, so that unique heritage of all mankind civilization can be promoted and enjoyed. The nation being the world, the humanities Beijing allow people around the world to share the splendid culture of the Chinese nation.

Second, to deepen cooperation of projects. China is in the period of rapid urban construction and development. Some developed countries have accumulated a wealth of practical experience in the strategies of urbanization, urban planning and urban public services, but there have been some problems in some developing countries about urban construction and transformation. The forum, the various countries and international agencies have prepared a lot of papers and results about urban construction and management. Beijing People's Association for Friendship with Foreign Countries would like to be a good "Matchmaker ", to contact the parties to strengthen urban planning, urban construction , intelligent transportation, environmental protection , construction of road pipe network , treatment of waste and other aspects of cooperation , to jointly research intelligent city management, network potential in urban development , so as to improve the level of urban development , so that scientific and technological Beijing bears rich fruits .

Third, jointly promote green development. This is the new initiatives for national urban to face challenges and win the future. Beijing, as an area with relatively abundant green technology resources, and relatively strong industrial base in China, proposes innovation-driven development strategy, and make sure the green industry will be included in the focus on fostering the development of the industry as well. We hope that, civil society organizations and institutions in the world, join hands to give full play to the supporting role of science and technology, and strengthen cooperation in new energy and renewable energy, environmental protection industry, circular economy, and waste utilization and other aspects of cooperation, and promote green development, circular development, low-carbon development, and block the building of green Beijing.

My friends, with the rapid development of China and Beijing Urban Construction of the world full of opportunities, Let us take the Beijing International Forum on People to People Friendship as a platform to make friends, then push cooperation , and promote development , to strive to build beautiful homes.

Thank you.

# Korn Dabbaransi's speech

Dear Friends,

First of all, please allow me to deliver best greetings from the 65 million people of Thailand to all of you gathering here today. Regardless of our differences in religion, culture, and languages, the country borders will never be able to stop one thing. That is FRIENDSHIP.

We are all today witnessing another historical meetings of all nationalities from around the world, coming here to exchange FRIENDSHIP.

This magic word FRIENDSHIP, is the most efffective platform that springs up to so many other relationships in human's life. All of us here today are from many countries. All of us have never seen each other before. And yet, once we are here for FRIENDSHIP, from now onward we all can move forward to getting closer between us, and call each other a "FRIEND".

Nowadays, once we have been acqainted, the next thing, for sure, is to ask for each other's email, line, facebook and other channels for further dialogues.

I truly admire Beijing Friendship Association for hosting this spectacular event. I am sure that on the day of our departure, we are beginning to miss each other, and will say goodbye to each other with the words "See you again".

To meet again is a proof that any event that happens after their first time, will be a bonus of FRIENDSHIP that will stay in our hearts forever.

Korn Dabbaransi
President
Thai Chinese Friendship Association.

# Speech by Spyros Mercouris
# President of the NGO "Horizons-Actions" Beijing forum

Dear friends,

It gives me great pleasure to be here again in Beijing, a city which has offered much to me personally- both in warm friendship and in the positive response to exciting programs and possibilities between our two countries now and in the future.

China and Greece are two countries with histories that go back far in time and have created civilizations which have influenced the worlds of east and west.

In the last decades the world lives in turmoil. Hostility and excessive competitiveness have bred conflict and aggravation. Religious fanaticism, nationalism and racism are spreading. The pursuit of money corrupts and changes the characters of people creating economic hardship. Unemployment is on the rise, the problems of the minorities and the immigrants are growing, nuclear threats, wars and local upheavals are on the increase and without an end in sight.

Thus, the lifestyle been created flattens every cultural creation and by so doing is doomed to wither and decline.

In 2011 I had the honour of being invited by the "Chinese Association for Friendship with foreign countries" to take part in the forum "Friendship of Peoples" here in Beijing. I was much impressed by this meeting and filled with enthusiasm and hope. I, of course, know that without kindness, trust and good faith it is difficult to have a proper communication between people. Without communication there can be no understanding and without understanding there can be no true dialogue, agreement and results. I understood that based on these concepts, China and Greece could and should organize a constructive dialogue between cultures. I made this proposal and it was accepted by the Chinese side.

Since 2011 we have exchanged ideas, suggestions and proposals and together we have combined cultural, scientific, social, art and cultural- touristic events. It has been really important because we have gained valuable experience and the know-how in the way we approach and deal with each other and work together. We have succeeded in reaching a mutual and mature understanding of our abilities and strengths. We now know that a constructive dialogue between cultures is a necessity in our time. A constructive dialogue should apply to contemporary conditions and based on humanitarian values. Have a cosmopolitan character and outlook and remind us of the moral ideas which flourished thousands of years ago. We must never forget that culture absorbs from the past, moulds the present and shapes the future.

More than 2500 thousand years ago two great moral philosophers, one in Lu in China and in the city state of Athens, created two philosophical systems. Confucius (551-479) and Socrates (469-399) they both lived in times of war and turmoil, when military and political power influenced the lives and values of the individual. However, these two thinkers based their philosophical systems on concepts inspired by basic human qualities, namely Ren for Confucius and Areti for Socrates.

Ren signifies kindness and the feeling for moral virtue in human experience and tradition. While Areti can be translated as virtues conduct and moral values. There was a difference between the two systems: Confucius stressed the social dimension of human existence while Socrates focused on the individual effort of each human to reach Areti. The philosophical systems created by these wise men were aimed at Man, his betterment and his happiness.

Confucius taught through Discourse with his students and Socrates conveyed his moral ideas by using questions and a dialogue, thus inventing Dialectics.

The philosophies of Confucius and Socrates examined the spirit and the human soul and suggested ways of living which would contribute to the harmonious existence within societies. Preserved in the writings of their followers (the Analects for Confucius and the Dialogues by Plato for Socrates) and elaborated upon in later centuries, the thinking of the Chinese and Greek philosophers formed the basis of the eastern and the western ways for thousands of years.

Philosophical concepts have proved the inspiration of politicians who apply philosophy into society. Cultural achievement emerges as the true foundation of nations and the center of their identity. The dialogue between cultures becomes the dialogue between peoples.

An effort to implement such a dialogue between cultures was made in the 1990's by Unesco. Intellectuals and scientists from all countries tried to establish a set of values shared by all peoples. They wished to identify and justify common values from all of the civilizations. However, the project had not the hoped for results. Perhaps the approach was too theoretical and therefore fell on deaf political ears. The problems and conditions that many people had to cope with in different parts of the world at that time were very hard, but after twenty years conditions are harder than ever, there has been no easing up or real improvement, in fact, on the contrary, this unhappy situation is dangerous and can produce perilous reverberations to us all.

Therefore, we have selected certain suggested projects (of course there can be many others) which we believe could be implemented in our programme so that a constructive dialogue can commence. Practical actions are a necessary precondition for moving into a new way of thinking, into a new way of acting – where education, moral values and culture will have a central role in the economy, politics and society. When the level of culture, education and intellectual life rises, governments and citizens will understand their problems more easily. They will evaluate their problems better and will face life with greater understanding and self-confidence and show greater tolerance for the thinking and acting of others.

This initiative is coordinated across five important programmes of action shared between our two countries:

- A digital Living Library of philosophy with protagonists Confucius and Socrates.
- Mathematical thought from Pythagoras to Space.
- Art and Museums: the contribution of Art in social life as well as for Museums, education and the care and preservation of our cultural heritage.
- The Olympic Idea and Truce: the idea of the Olympics is to establish the individual values and the respect for the human being and his achievements. Also, to cultivate respect and the admiration for the mind, for the body and for their balance and harmony. In ancient times the Olympic Truce was Sacred. Today we need more than ever to reestablish the Truce and its value.
- Culture and Tourism which is a modern form of cultural travel and which promotes international collaboration, understanding and the development of regional economies. In archaeology: monuments, historical events, when and why. In history: the passage of history, what happened and happens and why. In culture: what it has offered, and what it is now offering and what influence it has on us. In politics: utilization, promotion to advertise and make known our aims and achievements. The Silk Road is a main cultural project and a shining example on how we must proceed in cultural – touristic programs.

These projects have been elaborated upon by institutions and organizations working together quickly and efficiently towards achievable and easily reached goals. Once these goals are reached we shall move forward to a dialogue on a broader level.

Throughout the ages, mankind has consistently sought progress and renewal. In the long history of human civilization there has been a whole series of renaissances, each one making its contribution to moral and intellectual regeneration.

Man and nature, never set problems that they cannot solve. Humanity always goes forward whatever happens.

Now we are taking huge strides in the development of technology and medicine. As an example, in medicine – DNA – and all that this entails. In technology, the well named pioneer space rocket, the "curiosity".

As the scientists are opening up new horizons, so, surely, the philosophers, thinkers and political statesmen will help us to find new standards and values for a more just evolution of society and to the betterment of the quality of life.

It is the cultural gifts of music, art, literature and science, which have made us what we are, and the beings which we shall become. To know our true and worthy place on earth and our eventual way to the stars that await us – this is our destiny!

The new way of thinking seems to guides us to wisdom with Ren and Areti and action with knowledge.

November 2013

# Promote the Non-government Exchange and Enhance the People's Happy Life -Speech On 2013 Beijing International Non-governmental Friendship Forum

Wang Shaofeng, District Mayor of Xicheng District People's Government, Beijing
November 14, 2013

Respected leaders, distinguished guests, ladies and gentlemen,

Good morning!

We highly appreciate Beijing People's Association for Friendship with Foreign Countries for giving us this precious opportunity to hold 2013 Beijing International Non-governmental Friendship Forum. Now, on behalf of the joint sponsors of this forum, I would like to extend my warm welcome to the guests from afar and very happy to jointly explore the issues concerned. Today, the theme of my report is Promote the Non-government Exchange and Enhance the People's Happiness.

## I. International non-government exchange is the important bridge for deepening and promoting the friendship for the people of all countries.

China's nongovernmental foreign exchange boasts a long history. As early as Tang Dynasty, Jianzhen, the famous eminent monk, was fearless of dangers and difficulties, sailed eastwardly to Japan. Under the extreme bad conditions of blindness, he preached Buddhism theory and propagated the extensive and profound Chinese culture, promoted Japanese Buddhism, medical science, architecture and sculpture. He was respected by Chinese and Japanese people and the Buddhism circle.

International non-governmental exchange makes Chinese people learn about the world. An Italian, Matteo Ricci, came to China to preach Catholicism during Wanli period of the Ming Dynasty. He was the first western scholar to read Chinese culture and research the Chinese Classics. Apart from spreading the Catholicism doctrines, he also made acquaintance with Chinese officials and social celebrities and spread the western science and technology knowledge like astronomy, mathematics and geography. His experience made the westerners start to learn about China truly and opened a window for China to confront the world. In 1610, Matteo Ricci died. According to the then Chinese convention, foreigners should be buried in Macao after their death. However, the Chinese religious disciples presented a memorial to the emperor in honor of him for granting a piece of land to bury him in Beijing. Currently, the graveyard of Matteo Ricci is still located in the Beijing Municipal Party Committee Party School, Fuchengmen Gate, Xicheng District, with a long history of over 400 years.

The present nongovernmental exchange takes on new features. Currently, nongovernmental exchanges have overwhelmed all over the districts and social fields in the world, even with their own brands. In 2011, the first batch of "Beijing Family" folk customs reception was hung with the brand at Shichahai area, Xicheng District. During the Beijing Olympic Games, there were about 50 "Olympic Games Families" of folk-custom reception households. They treated a large number of Chinese and foreign visitors with the "Folk House features" like Hutong and Siheyuan. After that, Beijing Municipal Tourism Bureau started to construct "Beijing Family", gearing to common tourists to develop

the Hutong feature family lodge industry at Wenbao Area by referring to the mode of "Olympic Games Families". This action was favored by the people from the world.

Foreign nongovernment exchanges boost the friendship. During the process of nongovernment exchange, many people become good friends. We still have a lot memories. Today, taking the opportunity of this forum, I would like to express my appreciation as a citizen in Xicheng District to Mr. Cui Changzhi, the District Mayor of Central District, Seoul South Korea. In August 2013, Beijing Xicheng District Folk-Customs Exchange Team visited the Central District, Seoul. Although this was a routine student visiting team, Mr. Cui Changzhi, as District Mayor, still granted an interview to them cordially and had photos with students one by one, which made the students feel quite honored. During their visit in South Korea, a student named Zheng Tianyang suddenly felt uncomfortably. The staff of our South Korean counterparts accompanied him to go to a hospital for close physical check-up and looked after him carefully. Moreover, they paid the whole medical treatment fees. This kind of friendship like relatives moved Zheng Tianyang and the people of Beijing Xicheng District. There have been a great number of stories like this along the process of foreign exchange of Xicheng District.

**II. Supporting and encouraging the international nongovernmental exchange is the important work of local government departments.**

Considering Xicheng District as the capital core functional area, we have always been supportive and encouraging to foreign exchange, actively promoting foreign cooperation of all fields, creating conditions and convenience for nongovernmental exchange, thus effectively promoting the considerable development of international nongovernmental exchange.

Exchange of sister cities achieved abundant fruits. In recent years, Xicheng District has established sister city relationship with 13 cities and towns like Central District, Seoul, South Korea, Pasadena of America and Monte of Switzerland. Taking an example of Pasadena City, Ms. Lu Xiwen, former District Mayor, led the visiting group to visit Pasadena, signed the sister-city agreement formally and planted a Chinese scholar tree. In 2004, with a view to celebrating the five-year anniversary of sister-city establishment between Xicheng District and Pasadena, Xicheng District named the Street Center Park at Madian Street as Rose Garden. Mr. Bill Bogarde, the mayor of Pasadena, led the visiting group to visit China and unveiled the Rose Sculpture. An official of Pasadena specially brought roses from America to Plant in Beijing and jointly cultivated the roses with Xicheng People.

Actively organize and participate in exchange activities in variant fields. In recent years, Xicheng District organized and participated in over a dozen of activities, such as "City Sustainable Development Beijing Forum", "Beijing-Cologne Economic Trading Forum" successively, so as to intensify the exchange in the city and economy aspects. In 2012, taking the 20-year anniversary opportunity of Finance Street construction, we held series of financial street introducing activities centering on "Strengthening the District" Strategy, had talks with London financial city, signed agreement with Hesse-Darmstadt of Germany and invited many exchange delegation of sister cities to visit financial street, which expanded the development space for the financial street. We made great efforts to create international activity platform, hold Xidan Fashion Annual Meeting, hosted Beijing Maliandao International Tea Culture Festival and implemented trading negotiation and cooperation with the world well-known enterprises like Goldman Sachs and Galeries Lafayette Department Store Group. Moreover, we also actively renew our working route map, serve the cause of "Going Global" strategy, improve our service for enterprises for international business contact and guide the enterprises within the district to actively expand the international market.

Support the international cultural exchange in different ways. Launch the series activities of "Xicheng Cultural

show in Sister City". These events have been hold in different cities in the U.S., Switzerland, South Korea and Australia and received unanimous compliments from the local government and the people and these people increased their learning and understanding to Xicheng District. There are outstanding students of literature and art talents in schools of Xicheng District. The students often go on tours to foreign countries to give shows and performances for the purposes of conducting exchanges. The Experimental Second Primary School Students once visited Edinburgh, Britain to put on a show of dancing drama Swan Lake, very original and creative campus fairy tale and won good praise and fame. We also hold Shichahai Cultural Tourism Festival and invited foreign folk literature and art performing teams to perform in Xicheng District. For example, Seoul Central District, South Korea has always been keeping close exchange with Xicheng district and dispatched several performing team to visit and exchange in Xicheng District including Juvenile Culture Exchange Team, which enable Xicheng District people closely to learn folk customs of South Korea and traditional music. In 2012, the America Philadelphia Orchestra was invited to China and performed at the National Performing Art Theater with the wind band of the Experimental Second Primary School at the stage. Their close interaction with the world-class orchestra impressed the primary students with unforgettable memory in their growing process undoubtedly.

Expand the talent-cultivating channels by relying on internationalization. Currently, over 50 middle schools and primary schools in Xicheng District have established sister schools relationship with over 300 schools in foreign countries. Thirty-three schools have the qualification of recruiting foreign teachers and sixteen schools have the qualification of enrolling foreign students. There are 9 schools as bases for international promotion of Chinese language in Xicheng District. Three Confucian Classes were founded abroad by Xicheng District. There are over 800 foreign students studying at Xicheng District Schools and over 50 foreign teachers teaching at Xicheng District Schools. The international exchange activities in Beijing Fourth Middle School, Yuetan High School, the 35th Middle School, Experimental Second Primary School, Beijing Primary School and Huangchenggen Primary School present the features of individuation, branding and high-end orientation.

**III. Make great efforts to promote the international nongovernment exchange to bring benefit to the extensive masses.**

The masses are not only the important participants of international nongovernment exchange, but also the largest beneficiaries of international nongovernment exchange. Within a period in the future, we will provide better service guarantee, create more channels and offer more convenience so as to further promote the nongovernment exchange in Xicheng District and make the people live happier.

Continue to intensify the exchange with the international sister cities. We will consider the features of Xicheng District, solicit the opinions of citizens, actively expand variant ways and establish sister cities. On the basis of 13 sister cities, we will expand the exchange in trade and tourism fields with the cities in North America, South America, Europe and southeastern Asian districts, perfect the pattern of sister cities and broaden the exchange channels and cooperation initiatives.

Actively develop multi-layered external connections. We will intensify the connections with the related national and Beijing authorities and organizations to expand the exchange and cooperation with international nongovernment organizations. We will intensify the daily communications with the foreign experts, consultants and diplomats in Beijing and make good use of the channels like consulates, sister cities and international friends to promote the regional nongovernment exchange.

Support nongovernment organization and cultural agents of Xicheng District for "going global". We will support

the financial enterprises and international financial agencies stationed in Xicheng District to conduct exchanges and cooperation, expand the financial service businesses, and absorb the international financial agencies to station in the financial street, so as to construct an internationally influential financial center. Taking the platform of series activities of "Culture of Xicheng District, Travel in Sister City", we will organize the professionals from cultural enterprises and folk cultural teams to go global for performance and exhibition, so as to make the citizens to participate in the international exchange. We will support all kinds of social organizations to learn from the good practices and experience in service management of foreign cities and provide more excellent and professional daily service for the residents.

It can be described that the international nongovernment exchange is not only the booster of pushing forward the regional development, but also the important platform bring benefit to the extensive citizens. We will provide service guarantee for the nongovernment exchange as before, expand the exchange and cooperation with sister cities and contribute to make the citizens live happier and better.

Finally, I would like to wish the complete success of this forum.

Thank you.

# Modern Methods for Large Transport Sectors Construction and Commissioning in Megalopolises

By Alexander Vasilyevich KABANOV, a Candidate of Sciences, a Docent of the Petersburg State Transport University (Federal State Educational Institution for Higher Professional Education, 190031, the Russian Federation, Saint-Petersburg, Moskovsky Prospekt 9),
e-mail: avkabanov07@inbox.ru

The models of organization of transport objects construction are considered, taking into account the requirements of megalopolis environment. The stage by stage commissioning of major transport systems allows adjusting the profitability of construction, organization of construction under the life cycle's contracts.

Key words: objects of transport infrastructure; the life cycle's contract, the public-private partnership; the discounting of cash flows for construction; the discounting of cash flows for the operations; the calculated planning horizon; the landmark nodes; the technology nodes.

The models of organization of construction of transport objects are considered, taking into account the requirements of the life cycle's contracts. The commissioning stage by stage of the major highways allows adjusting the profitability of construction, organization of construction under the life cycle's contract.

Key words: objects of transport infrastructure; the life cycle's contract, the public-private partnership; the discounting of cash flows for construction; the discounting of cash flows for the operations.

When constructing a major transport system, one shall join several integrated flows necessary for the successful commissioning of the obligatory structures, such as the terminal building. When determining such material flows, one shall take into consideration such factors as: the social significance of the structures to be constructed, the priority of the definite structure construction inside the system; one shall also prioritize the resource allocation for the definite structures construction, as well as synchronize the contractors' activities. One may join such material flows as: the terminal building construction flow; the one aimed for the main pedestrian path reconstruction to connect the connecting station with the terminal building; the one for the relevant railway station reorganization etc.

When using the $S_{opt}$ method (where the Construction Industrial Project [CIP], the Process Project [PP] and the Process Implementation Project [PIP] shall be employed) to prepare major transport systems construction, one may prioritize the most effective or profitable way to develop the material flows (1). Such handling (regulation) for different management options is necessary in different modern production situations.

$$S = (M \bullet R_T), \quad (1)$$

Where S is the system of the construction management models matching the general purpose of the structure construction (the structure shall meet the project requirements, as well as be able to perform its function when having been commissioned);

$M$ is the set of different system models corresponding to the PIP, PP and CIP levels;

$R_T$ is the relations between the target model elements (shown as the tree of targets) including some complex

multidimensional indicators of the construction effectiveness.

$\{M\ ;\ RT\} \rightarrow \{P_i^{MITI}\ ;\ P_j^{TEL}\}$ is the complex of the PIP, PP and CIP $\{M\}$ models and the complex of the relations between the $\{\ R_T\ \}$ models shall be evaluated via the $\{P_i^{MITI}\ ;\ P_j^{TEL}\}$ complex of both management $\{P_i^{MITI}\ \}$ and technical $P_j^{TEL}$indicators.

Taking into consideration the factors influencing the construction process we can see that S shall form the $S_{opt}$ :

$S \Rightarrow S_{opt}$

If the PP system is elaborated according to the construction process stages then the Formula (1) shall result in the optimal value. The PP elaboration methodology is the basis for the technical regulation of the different process stages acceptance. It means that the evaluation of any structure operational availability during different stages of the construction process shall be based upon the clear regulatory framework, as well as on the system of both managerial and technological measures to prepare the construction itself, and on constantly improved building inspection methods.

The construction shall be considered as a system of complex material flows aimed to create both the areal and linear structures. Every of these structures shall be considered as an independent object (i.e. every such structure may be commissioned independently according to the relevant construction stage). It means that every abovementioned material flows shall have its own construction purpose (i.e. the term when the relevant structure shall be commissioned having reached its design capacity). Such material flows shall be named as 'target' ones. They shall be combined in the relevant target model, which allows prioritizing their development.

Let us consider the factors influencing the complex material flows development prioritizing. These factors are the following ones:

1. Changes in the project financing dynamics;

2. Changes in the original phased Plan of the construction process;

3. Changes in the original construction purpose (e.g. the increase in the volumes of the projected cargo turnover for a port);

4. Emergence of any social or territorial priorities;

5. Changes in the construction deadlines;

6. The determination of the railway station main component to be commissioned first, or any changes in the relevant choice (such changes/determination may cause any changes mentioned above or even all of them).

The construction shall be performed by the General Contractor (Developer), their specialization shall meet the requirements of the definite structure function (rapid transit system, highway, road interchange etc.). One shall remember that there is no complex criteria allowing both objective evaluation of the work level (2) and prioritizing the tasks. This lack of complex criteria makes the work more continuous and more expensive, as well as decreases the quality of both the work and its end result, making the relevant investment less effective. Such criterion shall meet the requirements of the General Contractor and the subcontractors work coordination.

It means that the main purpose of the construction work shall be defined, i.e. the target criterion is needed. The conclusion is the following: special methods to prepare both the management and technology sides of such construction works are necessary. The CIP-PP-PIP:- $S_{opt}$ methodology offered by the author allows defining the procedural requirements to the construction of transport systems in the environment of a megalopolis.

The author has elaborated the V target criterion. This criterion is the work rate for the complex material flow of the transport system construction.

The work rate is the indicator of the construction general purpose.

This indicator includes the following numerical values for the structure under construction:

– the operation and target indicators;

– the management and technological ones;

– the technology-related and economic ones.

The (CIP-PP-PIP):-$S_{opt}$ method shall be elaborated to reach the abovementioned indicators when preparing the construction of a transport object.

A project title list shall be prepared for different elements of a major transportation complex. Such list is a complex one grouping diverse objects.

Here we offer the principle of grouping objects according to their role in achieving the general construction purpose, as well as according to their function in reaching the interim targets of the project (3).

A major transport system includes a group of smaller structures corresponding to different branches of economy or to different local entities. The following documents shall be prepared:

$S_{opt}$ is the reasonable schedule of the investment schemes for every branch or entity. This system shall coordinate the possible resource investment with the work schedule, with the relevant PIP, PP and CIP, with the technological maps.

$S_{opt}$ is the planning framework for the future work of construction. $S_{opt}$ includes all decisions on the construction management. The specialized material flows shall be joined into the complex ones and, respectively, into the single target complex material flow. It means that the structure of any complex material flow shall be more complex, according to the existing targets. Such structure allows solving the following problems:

- equalize both the contractors activities and the work rates for different system elements (such as railway, inhabited locality or port etc.);

– ensure that the objects under construction will be ready to use by the deadline;

– ensure more effective work planning for every type or stage of work, synchronize the construction operations, and use all resources;

– coordinate all construction processes from a single centre;

– model the transport system construction management if the relevant resources are dedicated to definite purposes.

When modeling the telic complex material flow, one shall use the Project Financing Schedule as the basis for the model required; it allows changing the targets if necessary.

Such handling (regulation) for different management options is necessary in different modern production situations.

For example:

1) The project financing strategy may change;

2) The strategy of work distribution between different contractors may change;

3) The target setting changes with respect to the original one (i.e. to the one actual when the design or construction work started). In such case the changes in the original investment strategy or in the customer-developer strategy at the stage of design or preparatory work cannot be predicted with existing methods.

Using $S_{opt}$ one may determine the management options useful if the investment target has changed (and the items 1), 2) and 3) have changed respectively).

The construction of a terminal building may be considered as an example where some management changes during the construction process are possible. Such management changes could be predicted with the $S_{opt}$ method before the construction had begun.

Now both the laws and standards applicable to the construction industry are developing; the building code changes

to meet modern requirements, the construction paradigm have been renewed. The requirements by state construction supervision are now more elaborate, every structure is required to be reliable at all stages of its life cycle.

The existing construction control method means that one shall evaluate not only how the applicable laws and standards are obeyed at both the design and construction stages of the project, but first of all the operational characteristics of every structure shall be evaluated when it is ready to use. The current acceptance procedure requires the Certificate of Compliance to be issued; every such certificate shows if the finished object meets the requirements of the laws and standards applicable, as well as if it meets the requirements of the relevant project documentation.

It has been discovered that when constructing a transport system the commissioning is always a step-by-step process; every element to be commissioned (such as: land lots, nodes, stages, turns, starting complexes, commissioning-requiring structures etc.) shall be finished separately. A transport system may be accepted and commissioned piece by piece (in this case, the pieces may be land lots, plots or nodes) if both the size and the readiness of the element show that it may be used according to the project. When designing the project, as well as in the course of both the organizational and technological design for the work process, it is necessary to justify the scope of work, as well as the necessary equipment; secondly, it is necessary to show the possible profit from the technological use of such elements during the relevant period. One shall consider these factors when preparing the management models for a transport node construction work; it shall reduce the likelihood of the capital investments in the construction work freezing; moreover, it shall make the investment return (for the construction stage) increase.

Modern Building Code applicable to construction commissioning in the Russian Federation, regulates the connection between the technological infrastructure (availability to use) of the construction elements and their intermediate acceptance. There are no modern acceptance rules for nodes, stages or commissioning phases; it increases the accident hazards: up to 40% of the failures during any structure exploitation are determined by the technical condition of separate nodes, as well as by the results of the work commissioned as separate stages of the construction process.

The lack of modern standards causes the following: the nodes of a structure under construction, as well as the stages of its commissioning can not be duly considered, whereupon funding disruptions, less effective intermediate quality control and lagging behind schedule are possible. Sometimes the construction work may even become less socially acceptable.

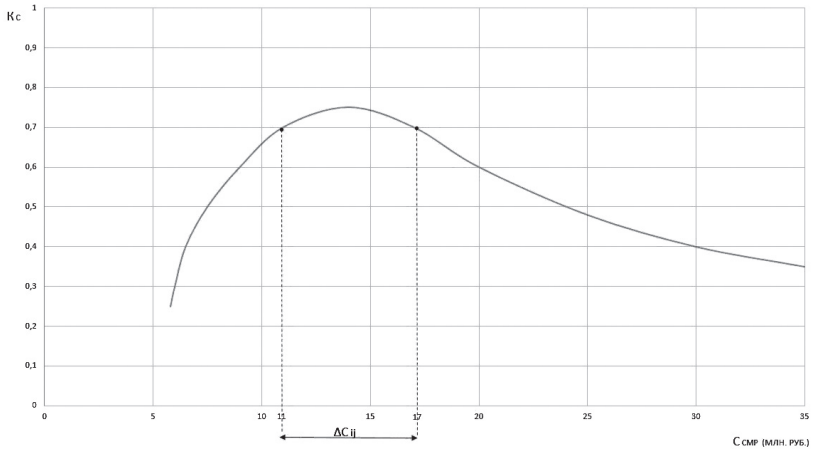
For example, if a construction stage between two road interchanges has not been duly considered, then there may be no transport infrastructure designed for a substantial district of a megalopolis and later such infrastructure may not be designed (because of lack of funding) even if all necessary administrative problems are solved.

The stage-node management method offered here is a way to coordinate the activities of all construction work participants more effectively. This method means that every construction stage or node to be commissioned shall be divided into structurally isolated and technologically separate parts. These parts may undergo their intermediate acceptance, as well as be commissioned and then used separately, just after having been finished. The boundaries of the nodes, as well as the scope of work necessary for each node shall be determined on the basis of the complex data on the node functional and operational performance, its expected cost, the labor costs and the terms and deadline. In this case the scope of work necessary for the node construction shall include the data on the specialist who shall perform the work; it is easier to coordinate the activity of different contractors. It means that inter-node material flows are used for the work process management; the aggregate schedule created with Microsoft Project software shall be used to model the abovementioned material flows.

To organize the workflow in a rational way one shall use the minimum rate of the processes superimposition (min

RSi) for every node limited by the cost difference for the construction works (ΔC) for (i;j) variants of the workflow management (see Figure 1).

Figure 1: The construction cost change influence on the processes superimposition rate RSi, rate of the superimposition (for different workflow management variants).




The node-stage method of workflow management modeling is the basis for the work acceptance according to the aggregate cycles finished; this way of acceptance is applicable to long term construction works (if the term is above 3 years). The cycles shall be defined according to the technological sequence as it is shown in the relevant aggregate schedule. The rational value of the superimposition rate for megalopolis transport system construction schedules is about 0.6÷0.8; the construction cost decrease for a single contractor is about 10,000,000 – 12,000,000 Russian rubles. For assessment calculations the operational readiness of a definite node or stage shall be expressed as the Pij integral criterion; this criterion shows the connection between the relevant stage indicators, performance indicators and construction ones:

$$Pij = \{\Gamma ij; Tij; Cij(\tau); Tpij\} \quad (1)$$

Where Γij is the complex of the performance indicators for the structure (stage) under construction, showing the readiness of the major structure ith part;

Tij is the planned duration of the construction process.

The participants of the construction process shall cooperate under the rules of public-private partnership (PPP). Life Cycle Contracts (LCCs) are the best matches for the PPP principles.

Taking into account some foreign experience, one may characterize such contracts with the following features:

- At the design stage not only the costs of building materials shall be considered, but the costs of the whole structure life cycle too.
- The design, construction and maintenance of the highway shall meet the requirements of the ISO 9000 standards applicable to the quality control for every life cycle stage;
- Under such contract the contractor shall construct the infrastructure facility at their own expense and using their own materials and then maintain the structure throughout its design life (life cycle);
- The contractor's costs are to be fully covered by the state paying for the services available through the structure constructed;
- Under a Life Cycle Contract the results of any contractor's activity shall be evaluated in the terms of the construction durability, safety, repairability, stability and other quality indicators. It means that both the quality and

reliability of such constructions shall improve.

When planning a life cycle contract for any transport system or structure, one shall use improved scientific methods. Both a finished transport system and its further maintenance for a period of 20-30 years shall be considered as the final product. It means that one shall take into consideration the long-term goals for both the construction and maintenance of the system when elaborating the relevant sector plans. Every life cycle contract (LCC) is a single management object. It includes such integral parts as: Research and Development (R&D), environmental justification, pre-design and design of the construction, the structure commissioning and maintenance, including repair and infrastructure renewal.

When comparing construction work schedules one shall take into account that the construction and maintenance costs will change over time because of both inflation and other changes in the value of money (the cash flows invested shall be discounted). Choosing the discount rate for every planning horizon, one shall take into account the following factors:

- The investment objectives and the project implementation conditions;
- The inflation rate in the national economy;
- The possible investment risk;
- The investment alternatives;
- The investor's financial conditions.

When choosing the effective work management variant under a life cycle contract, it is advisable to use the following integral effect:

$$Э_{int}^{lcc} = \sum_{t=1}^{T_{Expl}} (R_{t_{Expl}} - C_{1t_{Expl}} - K_{1t_{Expl}}) * \alpha_{1t_{Expl}} * \eta_{expl.} - \sum_{t=1}^{T_{Expl}} (C_{2t_c} + K_{2t_c}) * \alpha_{2t_{con}} * \eta_{con}$$

Where

$T_{Expl}$ is the estimated operation period (the period of exploitation)

$R_t$ is the financial result of the system use for the tth year

$C_{1t_{Expl}}$ is the costs of the system maintenance for the tth year

$K_{1t_{Expl}}$ is the investment costs of the system maintenance

$\alpha_{2t_{Expl}} = \left( \frac{1}{1 + E_N^{Expl}} \right)^{t_{Expl}}$ is the discount rate, where $E_N^{Expl}$ is the discount rate acceptable for the investor for the period of the system maintenance under the Life Cycle contract

$\eta_{Expl.}$ is the expected inflation rate for the system maintenance period

$T_c$ is the expected construction period (the 1st planning horizon)

$C_{2t_c}$ is the construction costs for the tth year

$K_{2t_c}$ is the investment costs of the construction

$\alpha_{2t_{const}} = \left( \frac{1}{1 + E_N^c} \right)^{t_c}$ is the discount rate, where $E_N^c$ is the discount rate acceptable for the investor for the

period of the construction work under the Life Cycle contract

$\eta_{const.}$ is the expected inflation rate for the construction period under the Life Cycle Contract

The effective variant chosen for both the construction process management and the transport system development makes it possible to take the following advantages of public-private partnership:

- To minimize the risk of poor quality;
- To have all work under the contract (i.e. the design, construction and maintenance of the system) performed by a single contractor;
- The sum paid for the work performed depends on the result of the work;
- No demand risk;
- Both the construction and maintenance costs may be decreased.

REFERENCES

1. G.N. Talashkin, A.A. Kabanov, A.V. Kabanov

The Management and Technological Basis for the Priority Investment Schemes Selection in the Case of Large-Scale Construction

"Industrial and Civil Engineering" (Russian: "Promyshlennoe I grazhdanskoye stroitelstvo"), #6, 2011, pages 60-63.

2. RD-11-04-2006. The construction supervision procedure to be performed by the competent authorities: auditing and certification of capital construction projects having been constructed, reconstructed and/or renovated; the methods to check if the project meets the requirements of the applicable technical regulations (standards and norms) and other applicable rules, as well as of the relevant project documentation. The Order by the Federal Service for Ecological, Technological and Nuclear Supervision of the Russian Federation, #1129 of December 26, 2006.

3. A.V. Kabanov, The Improved Management and Technical Design Methods for Major Transport Systems to be Constructed.

The Civil Engineering Bulletin (Russian: "Vestnik grazhdanskykh inzhenerov"), #4, 2007, the Saint-Petersburg State University of Architecture and Civil Engineering (SPSUACE)

# Busan Waste Treatment Policy and the Operation of Resource Circulation Complex

Busan Environmental Corporation
Director Lee Cheol-hyeong

## Environmental Policy of Busan

### 1. About Busan

a. Natural Conditions

○ Busan is on the southeastern tip of the Korean Peninsula, located along the Nakdong River and surrounded by the sea on its south. The metropolitan city has an area of 767.35km$^2$, the average temperature for the year is 14.7℃ (3.2~25.9℃), and the annual average precipitation is 1,519mm, most of which are during the summer.



<Figure> Location of Busan <Figure> Administrative Districts of Busan - 16 Wards (Counties)

b. Social Condition

○ Busan has a population of 3.57 million as of 2012 and the service business occupies 71% of the industry giving

it with an urban industry structure. Marking 1.10 million cars, the city is managing the urban environment by securing urban railroad circulation networks, activating the use of public transportation, active participation of voluntary car-free day, and securing the infrastructure for bike use.

○ Sewage conduit distribution is at 76% and sewerage is distributed by 99%, both of which are mostly the combined sewage systems. The city has organized a sewage conduit management body for management and maintenance.

**2. Direction of Environmental Policy in Busan**

○ The urban development and maintenance is directed not only to minimize environmental damage but also to improve the quality of citizens' lives, expanding the opportunity to citizens to voluntarily take part in environmental preservation.

○ The city has established and promoted the environmental administration goals for sustainable development in 10 sectors including environmental management, creation of eco-friendly urban environment, and clean and stable water quality management, in line with the intensification of collaborating with the international community.

**3. Environment-related Administrative Organization**

a. Environmental Organization in Busan

○ The Busan Metropolitan City Government has the Environment and Greenland Department that generally manages the environmental policies in Busan, under which there are 9 divisions, while the city's 16 autonomous wards (counties) have 2 departments, respectively.

b. A state-run corporation specialized in operating environmental facilities - Busan Environmental Corporation

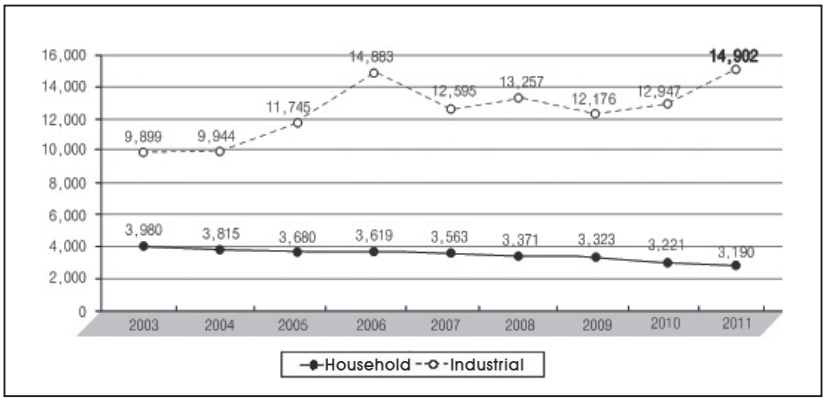
○ This specialized state-run corporation in the basic environment sector was established in 2000 to manage and operate sewage treatment plants, excreta treatment plant, incineration facility, and landfills.

## Wastes Management Policy Flow in Busan

**1. Generation of Wastes in Busan and Its Treatments**

a. Generation of Wastes

○ Households wastes have slowly decreased partially due to the recent resource recycling and energy recovery policies while industrial wastes other than designated wastes steadily increase every year.

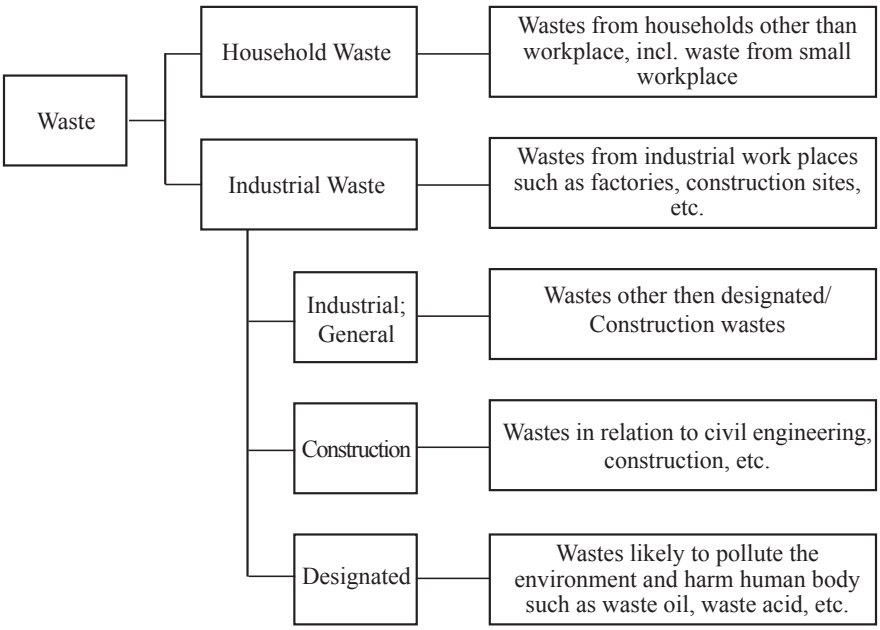



<Figure> Wastes Generation in Busan (Unit: ton/day)

b. Wastes Treatment

○ In Busan, household wastes are subject to treatment by the primary local governments and industrial wastes are subject to treatment by each business operator. Considering the urban characteristics, since each primary local government lacks the are, technology, and funds to install waste treatment facilities, the municipal government installs and operates municipal-level treatment facilities.

○ Recyling of household wastes increased to 68.7% thanks to policies to reduce wastes such as volume-rate garbage disposal system and the promotion of recycling the landfill rate had decreased, while industrial wastes have seen a rapid increase in recycling rate reaching 88.5%.




<Figure> Waste Classification System

**2. How to Treat Wastes**

a. Household Wastes

○ In order to enhance citizens' convenience during garbage discharge, separate discharge of recyclables and food wastes, and wastes reduction, the city has been collecting wastes door to door since 1996, in which the wastes other than recyclable wastes, used coal briquette, and large wastes, are to be packed in a standard plastic garbage bag and discharged at a designated time in a designated place.

○ Large wastes difficult to pack in a garbage bag such as home appliances and furniture are to be visited for collection and recycling at a specific fee in accordance with the bylaws of the respective ward or county.

| | | | | |
|---|---|---|---|---|
| Household | Landfill 9.6% | Recycle (Incl. Resource Recovery) 68.7% | Incineration 21.7% | |
| Industrial | Landfill 10.5% | Recycle 88.5% | Incineration 1.0% | |
| Designated | Landfill 28.2% | Recycle 61.2% | Incineration 9.0% | Others 0.6% |

<Table> Waste Treatments in Busan (as of 2011)

b. Operation of Landfills

○ Constructed in 1994, the Saenggok Landfill adopted the cell-type landfill method to phase in the foundation and landfill project; and the landfill facility is expected to run until 2031.

○ The landfill facility conducts environmental impact assessments for its surroundings and makes public the results; and the places finished its used as landfills convert the use to tree nursery or sport parks.

c. Operation of Incineration

○ Incineration facilities recover waste heat during incineration to generate renewable energy such as electricity and steam which are used in the facility itself and also provided as heating energy to the residents' convenience facilities or surrounding apartments complexes.

<Table> Incineration Operations in Busan (as of 2011) (Unit: KRW1,000)

| Division | | 2009 | 2010 | 2011 |
|---|---|---|---|---|
| Total | | 13,656,111 | 13,289,604 | 16,010,346 |
| Electricity | Subtotal | 1,355,431 | 1,222,042 | 1,297,067 |
| | Myeongji | 150,355(2,275MWh) | 148,753(2,238MWh) | 85,713(1,305MWh) |
| | Haeundae | 1,205,076(17,644MWh) | 1,073,289(15,455MWh) | 1,211,354(16,491MWh) |
| Local Heating | Subtotal | 9,259,996 | 8,843,164 | 10,740,686 |
| | Haeundae | 9,259,996(108,899Gcal) | 8,843,164(103,997Gcal) | 10,740,686(110,128Gcal) |
| Sales to Industries | Subtotal | 3,040,684 | 3,224,398 | 3,972,593 |
| | Myeongji | 3,040,684(130,980Gcal) | 3,224,398(132,444Gcal) | 3,972,593(148,384Gcal) |

d. Industrial Wastes

○ Industrial wastes shall be, in principle, subject to the treatment or arrangement of treatment by those who discharged the relevant wastes such as self treatment and commissioned treatment. However, considering the urban area's characteristics, since it is difficult to install waste treatment facilities and there is a lack of private treatment companies, the Ministry of Environment, the municipal government, and the ward/county governments are jointly responsible to treat wastes including designated wastes.

e. Food Wastes

○ Previously, the treatment fee had been evenly imposed on each household based on the total volume of collection box installed in apartments. Recently, however, it was converted to fees differently imposed in accordance with the discharged amount of wastes. As for detached houses, when discharging wastes, it is obligated to attach the pre-paid chip on the collection box.

| Method | RFID | Paid Chip/Sticker | Dedicated Plastic Bag |
|---|---|---|---|
| Photo |  |  |  |
| Description | Automatically measure waste weight to charge fees | Buy pre-paid chip/sticker; attach it on collection box when discharging wastes | Pack food wastes in pre-paid dedicated plastic garbage bag for discharge |
| Pros & Cons | Initial cost burden to introduce equipments; exact discharge by household; differently impose fees | Pay discharge fees when buying chips or stickers | The simplest but concerns of environmental pollution |

<Table> Comparison of the Operation Methods of Volume-rate Garbage Disposal System

○ Attention has been paid to the method using microorganisms such as EM (Effective Micro-Organism) instead of harmful insecticides for the purpose of composition of food wastes at home, insect control, and odor removal.

## Resource Recovery Policy of Wastes

### 1. Wastes Recycling

○ The recyclable wastes has attracted citizens to participate through education and promotion. The wards (counties) used 55 waste collection dedicated vehicles to quickly collect wastes to relieve citizens' inconvenience and the local governments have implemented the recyclables collection subsidy system to return part of recyclables sales to citizens to promote the restricted use of disposables and the reduction of packingaging of goods.

| Division | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|
| Paper | 840 | 836 | 804 | 769 | 749 | 725 | 706 | 704 |
| Bottles | 245 | 245 | 239 | 202 | 199 | 193 | 188 | 185 |
| Cans | 70 | 70 | 71 | 53 | 46 | 77 | 67 | 67 |
| Plastics | 151 | 148 | 147 | 178 | 177 | 177 | 184 | 180 |

<Table> Collection and Treatment of Recyclables in Busan (Unit: ton/day)

### 2. Wastes Recycling Policy

○ Since 1995 when the volume-rate garbage disposal system was first implemented, tcollecting items by wards and counties was unified in 2008, in which the items are classified into 15 articles such as paper and milk cartons, contributing to establishing the separate collection of recyclables. This is how to collect recyclables: in apartments, separate collection boxes are installed in the complex, for which the residents' community designates the collection day to discharge recyclables in a specific place while those living in detached houses discharge recyclables in front of the door on a designated day.

### 3. Resource Recovery of Food Wastes

a. Generation of Food Wastes

○ As of 2011, food wastes account for 24.3% of the total household wastes generations; since the wastes contain water of 80 to 85% it is likely to rot causing odor and wastewater during collection and transport. Furthermore, the excessive content of salt makes them difficult to be recycled as compost.

b. Treatments

○ Burying food wastes in a landfill causes second environmental pollution such as underground water contamination due to leachate and such leachate are expensive to treat. As of present, the food wastes facilities have been separately installed, from which the residues are injected into digestion tanks in the sewage treatment facilities.

| Division | | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|---|
| Resource Recovery | Total | 700 | 880 | 789 | 781 | 823 | 814 | 774 | 774 |
| | Compost | 65 | 227 | 178 | 175 | 433 | 241 | 237 | 275 |
| | Feed | 550 | 556 | 467 | 448 | 243 | 385 | 288 | 253 |
| | Fuel | 85 | 97 | 144 | 158 | 141 | 188 | 249 | 246 |
| Landfill /Incineration | | 195 | 51 | 67 | 39 | 6 | 0 | 0 | 0 |

<Table> Resource Recovery Status of Food Wastes in Busan (as of 2011) (Unit: ton/day)

## Saenggok Resource Circulation Complex

### 1. Saenggok Landfill

○ Saenggok Landfill buries household wastes generated within the Busan Metropolitan City and adopts the cell-type method by which the landfill is sanitarily managed with layers of wastes, daily covering soil, intermediate covering soil, and final covering soil.

○ Treating the leachate is to use the SETL-BIO and dense precipitation processing method in Treatment Plant 1 and to use the electrolytic flotation and MLE processing method in Treatment Plant 2.

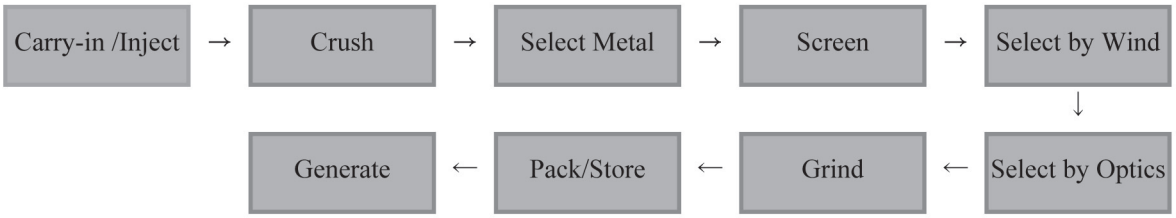
<Figure> Front View of Saenggok Landfill and Resource Circulation Complex

### 2. Refuse Derived Fuel (RDF) and the Generation Facilities of Household Wastes

○ The combustible wastes buried or incinerated in Saenggok Landfill or Dadae Incineration are expected to be treated as Refuse Derived Fuel (RDF) for electricity generation.

○ The capacity of the facility scheduled for completion in October, 2013 is 900 tons a day at 25 MW an hour, and is expected to result in annual revenues of KRW25 billion won based on the sales of electricity and metals.

○ RDF Treatment Process




<Figure> RDF Processing Chart

### 3. Sewage Sludge Land Treatment Facility

○ Since the London Convention bans ocean disposal of sewage sludge, the land treatment facility of sewage sludge was installed to treat the sludge on land and reduce its amount, of which the capacity is 550 tons a day. It is treated as follows: to dry sewage sludge up to 10% of water content during which the by-products are sold as fuel for

electricity generation and cement production and processing, expected to earn annual revenues of KRW 0.5 billion won.

**4. Resource Recovery Facility of Food Wastes**

○ The facility is to generate electricity by using the biogas from the decomposition of food wastes of which the capacity is 200 tons a day by means of anaerobic digestion and aerobic composting method. The facility generates and sells 2MW an hour and is expected to earn KRW 0.77 billion won as of 2012. It treats as much as 426 of food wastes leachate a day by itself and buries inert matters and dehydrated cake.

**5. Landfill Gas (LFG) Power Plant**

○ This facility generates electricity by collecting methane gas from Saenggok Landfill of which the capacity is 6 MW an hour operated by Seohee Constructions Co., Ltd. The generation mechanism is as follows: collection, transport, pre-treatment, generation, KEPCO transmission (electricity sales). This power plant generates and sells 5MW electricity an hour and created profits of KRW 2 billion won in 2012.

| Year | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|---|---|
| Electricity Generation (MW) | 16,249 | 21,895 | 30,262 | 31,360 | 33,895 | 25,340 | 21,310 | 20,178 | 20,647 | 14,814 |
| Electricity Sales (KRW 1m) | 1,094 | 1,428 | 1,973 | 2,108 | 2,698 | 2,136 | 2,849 | 2,311 | 2,574 | 1,967 |
| Municipal Revenues (KRW 1m) | 27 | 50 | 89 | 95 | 121 | 104 | 128 | 104 | 116 | 89 |

<Table> Electricity Generation of Busan (as of 2011)

**6. Resource Recovery Facility of Recyclables**

○ The facility was installed to reduce wastes and perform resource recovery as well as to support incomes of households in its surroundings, which has been operated by the Saenggok Residents' Operation Committee. Its capacity is 200 tons a day and created profits of KRW 15 billion won every year by separating and treating 340 tons of recyclables a day as of 2012.

**7. Emulsification Facility of Plastic Vinyl Wastes**

○ The facility was installed to reduce waste synthetic resin and conduct the resource recovery as well as to support incomes of households in its surroundings, also by the Residents' Operation Committee. Its designed capacity is 60 tons a day and it can produce recycled oil as much as 28kl a day, manufacturing refined oil and solid fuel by the pyrolysis of waste synthetic resin.

○ It treats 30 tons of plastic vinyl wastes a day as of 2012 and annually creates profits of KRW 4 billion won by selling 15 tons of light oil and 3 tons of solid fuel for factory heating.

References

1. Busan Metropolitan City, 2012 Environment White Paper.

2. Ministry of Environment, 2012 Environment White Paper

# Talk by Rick Bell, FAIA
# Executive Director, American Institute of Architects New York Chapter

My oral speech will answer the following questions:

1.PLANNING THE CITY OF THE FUTURE: How do the policies made by U.S. national, state and local governments instruct and influence city planning?

2. REGULATIONS: How do standards of the construction trades in U.S. effectively guarantee the functions of city?

3. COOPERATION: What methods does the American Institute of Architects use to cooperate with government in participating in creating livable and sustainable communities?

## INTRODUCTION

Thank you for the opportunity of being here with you today. I would particularly like to express my appreciation to the conference organizers from the Beijing People's Association for Friendship with Foreign Countries, which, since 1981, has been committed to enhancing mutual understanding and friendship between the people of Beijing and other parts of the world, promoting exchanges such as the one we enjoy today, and helping to build a harmonious world of common prosperity.

## PLANNING THE CITY OF THE FUTURE

Policies made by the three levels of government in the United States of America significantly instruct and influence city planning and the determination of what can and should be built. In New York City, far-reaching documents such as PlaNYC – the City's environmental plan – and Vision2020 – which reimagines our waterfront have had concrete results, including the new park across from the United Nations on Roosevelt Island along with the coming campus for applied technology there. Government action can influence not only buildings, but the planning of open spaces such as Brooklyn Bridge Park across from the Lower Manhattan skyline and the major crossroads plaza at Times Square at the center of New York City.

Regulations and procedures set by the National, State (Regional) and Local (Municipal) jurisdictions inform city planners, urban designers, architects, civil engineers and landscape architects, as well as the clients, both public and private, with whom we work to maintain and enhance the built environment.Such policies can result in private investment for office space such as the IAC building by Frank Gehryor the new towers rising at the World Trade Center.

The planning of large cities and major facilities including office towers, housing and educational facilities such as the New School structure on 14th Street combines a variety of incentives, appropriations and provision of infrastructure. How people move through the city is critical, from mass transit to shared bicycle system. In New York during the last twelve years, the Administration of Mayor Michael R. Bloomberg has benefited from a significantly enhanced degree of cooperation with both National and State levels of government, partly as an outgrowth of changed attitudes after September 11th of 2001. Federal funds for reimagining New York's future focused not only on reconstruction but on new types of infrastructure, including the public-private partnership CitiBike program and major augmentation of dedicated bicycle lanes. Such investment benefits citizens of New York City and regional commuterscoming to work by the various forms of public transportation. Housing patterns in Lower Manhattan had changed before 2001 as a result of

the construction of the relatively large amount of office space in the World Trade Center and the resultant conversion of secondary nearby office space into residential units, abetted by governmental economic incentives.

One feature of the Bloomberg years was an intense concern with the environmental and social aspects of planning, linked to a pro-development attitude that looked to other cities around the world for lessons. Our city has learned much from examples includingVélib' in Paris and the bike lanes of Copenhagen. We are impressed by the density, transportation connections, and future orientation of of cities such as Beijing.

**HOUSING**

Housing policy has changed significantly based on the ideology of those in office. It is connected to transportation policy and programs, including the creation and extension of mass transit lines such as the IRT #7 line now being extended to Manhattan's far west side.

The origins of our nation's public housing program date back to the reform efforts that criticized unhealthy tenement housing conditions in the slums that greeted immigrant populations from Europe and Asia at the end of the 19th century. During the 1930s and 1950s large numbers of social housing projects were built, partially triggered by the funds made available to municipalities by the Federal Government. Public housing is still very popular in New York City, with a long waiting list for projects in places such as the New York City Housing Authority's Bland Houses in Flushing, Queens. A parallel private sector market for middle-income and luxury housing has, in the United States, been continually enlivened by Federal mortgage policy.

Municipal housing policy in cities such as New York has attempted to fill the void left by Federal and State disengagement. In New York City pilot projects created by the mayoral administration of Michael R. Bloomberg during the last few years have included significant mixed-income large scale developments such as Hudson Yards and Atlantic Yards in Brooklyn.The South Bronx has sprung to life with considerable new housing. Projects include Via Verde, or "the Green Way," a 222-dwelling unit complex designed by DattnerArchitects and Grimshaw Architects and initiated by the NYC Housing Preservation and Development agency in concert with AIANew York. A design-build competition brought architects and developers together.

Environmental standards related to housing construction, and for that matter, the building of office, commercial and institutional structures as well, are set by National, State and Local statutes. The Battery Park City Authority of the State of New York has constructed exemplary housing to the highest environment standards, including the Solaire and Visionnaire projects by Pelli Clarke Pelli. Guidelines set standards for a project site built out over twenty years. Other new buildings have been generated by the private sector, with government participation through reinterpretation of the Zoining Resolution and Historic District Regulations, for example at Silver Towers, Perry Street and West 14th Street in Greenwich Village.

Architects and engineers are required to follow the most stringent of the overlapping applicable codes. In New York, for example, traditionally the New York State Energy Code was operative. But recently, with the efforts of the Bloomberg Administration's Office of Long Term Planning and Sustainability, "Local Laws" passed by the New York City Council require that the retrofit of existing buildings follow the same stricter standards required of new buildings.

**INFRASTRUCTURE**

Linked to housing policy and zoning regulations, are the overlapping and conflicting systems of design, construction and maintenance of infrastructure, including that of transportation, public hygiene, power generation, potable water supply and public safety. The earliest European settlements on the East Coast were seemingly self-

sufficient communities, with streams and wells supplying ground water, windmills delivering power for mills, and a city size that would fit within one block of modern-day Beijing or New York. Yet the beginnings of reliance on regional and international infrastructure were apparent. Global supply lines kept newcomers equipped with the essentials of the lives left behind. Defensive systems kept others outside the city limits. The parapets located on Wall Street served a similar purpose on a much smaller scale to that of the Great Wall.Despite such boundaries regional and national expansion grew through a culture of commerce and trade. New York became the nation's principal port and terminus of an extensive canal system. It was the 1825 completion of the Erie Canal, stretching 425 miles from Albany to Buffalo that led to New York's primacy.Today's Gowanus Canal is a remembrance of our waterfront's reliance on transport by barge. New York harbor is still vibrant as it prepares for the advent of deeper draught container ships made possible by the Panama Canal improvements.

Many transportation planners currently feel that our infrastructure development is not adequate, despite significant public investment in projects such as our third water tunnel. Compared with high-speed rail construction in China and Western Europe, the inter-urban connections in the United States are inadequate. More positively, "Select Bus" dedicated bus lanes compliment expansion of subway and regional rail, as at the new Fulton Center subway station and the World Trade Center PATH Hub.

The impact of the recent economic downturn has led to a renewed focus in Washington, DC, on the importance of infrastructure. New "shovel-ready" projects, such as the Fulton Center subway station by Grimshaw Architects, benefited from Federal funding through the American Recovery Act initiative of the Obama Administration.A free-standing train section linking twelve subway lines a few blocks from the World Trade Center site and the offices of Wall Street and the Civic Center, this new station was long overdue. The subway system itself is directly administered and funded through a New York State agency, the Metropolitan Transit Authority, headed by an appointee of the Governor. The regional transportation hub designed by Santiago Calatrava for the Port Authority of New York & New Jersey is situated at the State-owned World Trade Center. And the High Line's development continues into its third phase with a mix of public and private incentives, including increase in buildable floor area for adjacent structures.

**REGULATIONS**

We need to take a long view about changes building regulations coming from multiple governmental sources. Overlapping jurisdictions complicated the reinsertion of infrastructure in the rebuilding of the World Trade Center site and the insertion of an appropriate memorial there designed by Michael Arad. The New York City Building Code was able to be revised in response to the World Trade Center's destruction. The old code had been an obsolete document that was not adequately mutable in comparison with the much more flexible International Building Code, used in many other cities throughout the United States. With increased inclusion of up-to-date building materials and processes, the new code allows for greater reciprocal exchange between design professionals and construction firms nationwide. This makes it easier to build innovative structures such as HL23, located on the High Line and designed by Los Angeles architect Neil Denari. Local variation is possible and continues the tradition of seeing the code as a balancing act between the pressures of development costs and labor work rules. Safety is first and foremost. Issues of fire safety led to the creation of New York City's first building code a century ago, when workers at the Triangle Shirtwaist factory jumped from windows in attempts to escape from a burning building inadequately served by firestairs or fire escapes. Codes were quickly modified after the WTC disaster to allow for wider stairwells that would permit egress of workers while first responders climbed upstairs in the same hardened enclosures.

Codes relating to earthquakes and the prevention of building collapse were also recently changed in New York

in recognition of greater geologic risk. More attention was focused on not only the structure of the building itself, particularly in areas at risk of liquefaction, but of hanging building elements. Lighting fixtures, air distribution ductwork and other mechanical equipment and appurtenances needed to be tied back by augmented black iron support.

After Hurricane Sandy devastated parts of the New York metropolitan region, the standards for resiliency changed. The most important of the current revisions is to the Federal flood maps that determine building form and significantly influence insurance rates and thus the economics of what can be built or repaired. Also recently changed are the regulations about location of mechanical and electrical equipment and how space is counted in a building's allowable floor area, when basement and ground floor spaces may not be occupied as before.

And lastly, codes have also recently changed in regard to energy use, with the retrofit of mechanical systems of older buildings now meeting the same standards as those required for new structures. This is seen most dramatically in the new triple-glazed windows and LED illumination of the Empire State Building.

**COOPERATION**

The American Institute of Architects New York Chapter influences city construction and management in three significant ways: advice, joint ventures and exhortation through exhibitions, writings and programs. On occasion our elected leaders or those running for office meet with the AIANY Board of Directors as did candidates for city-wide office in our recent municipal elections.

Our members and Institute senior staff serve as invited participants on government bodies, including various Commissions, advisory boards and task groups. Such volunteer commitments of time and expertise allows for the voice of the architectural profession to enter into the everyday deliberations over policy change and initiative generation. AIANY members currently serve on such bodies as the City Planning Commission, the Landmarks Preservation Commission and the Public Design Commission, all of the City of New York. One of our Chapter's Vice Presidents is employed as the Commissioner of the New York City Department of Design & Construction, where I previously served as Assistant Commissioner for Architecture & Engineering. We bring Commissioners of the different city agencies together and also assist with the workshops on programs that they generate, either off premises or at our Center for Architecture.

Secondly we often co-sponsor competitions with municipal agencies. The Via Verde project was the direct result of such a competition, growing from the antecedent New Housing New York competition of ideas for sustainable affordable housing to one with full City participation. Various municipal officials including agency Commissioners and elected leaders joined AIA practitioners on the jury. Mayor Bloomberg similarly announced the adAPTmicrounit housing competition, flanked by the Planning Commissioner and Housing Commissioner , in our space at the Center for Architecture in July of 2012. More recently we have joined with the City's housing agency, HPD, to co-sponsor a competition for 1,500 units of resilient housing along an 80-acre oceanfront site in Rockaways. The results of this "FAR ROC" competition will serve as a nationwide model for safe new housing built with fuller understanding of the vulnerabilities of a post-Sandy environment.

Lastly, we use exhibitions, journal articles and programs at the Center for Architecture to exert pressure for policy change. Exhibitions such as the Edgeless School talk about the relation of school design to pedagogic theory; Context\ Contrast talk about the insertion of new buildings in historic districts; FitNation addresses the connection between public health and the decisions made by architects, landscape architects and urban planners. And, the concluding show of 2013, Practical Utopias, indicate the lessons that cities have to learn from each other around the world. The most topical of these exhibitions, "The Future of the City" proposes a specific platform of thirty ideas for those filling the

places of Mayor Bloomberg and his agency heads.

**CONCLUSION**

Friendship between people starts with communication and understanding. Conferences such as this allow not only for a presentation of initiatives but thoughts on how, working together, we can help improve our communities, our cities, our nations and our world. I thank the conference organizers for the opportunity to be here, and look forward to trying to answer your questions. For those planning to visit New York, please come to the Center for Architecture.

Thank you. xièxiè.

rev. 9/16/13

# Urban Construction and Management: Balancing Community and Megalopolis

Yasushi Aoyama

## Tokyo's Rise as a Global Knowledge Center

Today, in response to the rise of an advanced information society, office buildings are being transformed from places for the performance of routine administrative tasks to bases for the transmission and reception of information and centers for the kind of knowledge-intensive activity that generates wealth.

While it might have been supposed that the Internet would inhibit the movement of people, since we can send and receive information to or from anywhere without leaving the room, the opposite has happened. In the information age, people are moving about more than ever.

In Tokyo, the New Marunouchi Building was completed in 2002. In 2003 Roppongi Hills opened, and that year the number of passengers traveling from the suburbs into central Tokyo on privately operated commuter lines rose for the first time in about a decade. The surge came not from commuters but from people visiting the exciting new buildings in the heart of the city.

That was more than ten years ago. Since then office buildings have continued to spring up in central Tokyo and the adjoining areas, most of which go far beyond traditional office-building functions with the inclusion of hotels, restaurants, stores, personal services, educational facilities, and more. This is because, in the advanced information age, the core function of the office building has evolved from mass-processing of paperwork and clerical tasks to the creation and exchange of knowledge. Today machines take care of the routine clerical work, leaving human beings to devote themselves to activities involving higher-order thinking. Today, this is the way wealth is generated.

Cultures and civilizations flourish and advance through interchange.  People are stimulated and inspired to further intellectual growth through contact with experts in other disciplines. That is why people keep moving as they strive to improve their own knowledge and understanding.

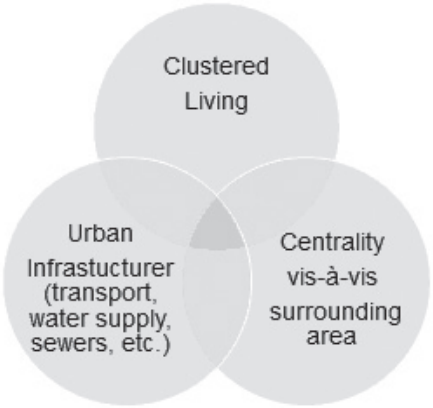



Fig.1 Three Attributes of a City = Center for Interaction

The job of urban policy makers is to respond to this evolution with the appropriate public policies. Yet in an era in which the market holds sway, urban policy must not unnecessarily restrict or distort the behavior of the private sector. Urban policy, which pertains not only to city planning but to such diverse fields as economics, social welfare, labor, and education, is an important component of any effective response to the evolution of the city.

With this understanding, the Tokyo Metropolitan Government, in an effort to keep pace with the times, outlined a major change of course in its 1995 Tokyo Plan, defying conventional wisdom with a program focused on the upgrading of city-center functions, the construction of ring roads, and the transformation of Haneda Airport into an international hub.

The plan faced opposition from those who favored the earlier focus on the development of "subcenters," such as Shinjuku and the waterfront, to foster a "multiple-center urban design." But while the subcenter development policy had offered advantages in the age of industrialization, the TMG was acutely aware of the need to upgrade functions in the city center and adjacent areas and improve transportation in and around Tokyo to meet the needs of the advanced information age. An acute awareness of the imperatives of the new era impelled the metropolitan government to declare a major policy shift.

The new policy hailed an end to the assumption of progressive outward expansion that had driven urban planning for 50 years in the aftermath of World War II. The multiple-center urban design policy was abandoned, leaving behind two notable achievements: the relocation of the Tokyo Metropolitan Government offices to Shinjuku and the waterfront subcenter development plan.

In many ways the new policy signified a shift from quantity to quality in urban planning, an awareness of the need to focus less on creating new urban centers and more on upgrading the functions of existing centers while improving the quality of amenities and urban space for those living and working in the city. This policy shares a fundamental orientation with the concept of the compact (high-density) city, which has been gaining momentum worldwide in recent years.

**Urban Planning for an Up-to-Date World City**

The new policy of upgrading city-center functions drew some criticism from the private sector, particularly a portion of the business community. Some issued dire predictions that Tokyo would find itself with a surplus of office space by 2003, causing the economy to melt down as it had after the real estate bubble of the 1980s, and urged adjustments in the supply of office space to avert such a disaster. After that came a similar argument, this time placing the predicted meltdown in 2010 and calling for "long-term planning in anticipation of an unprecedented drop in office demand" resulting from the retirement of large numbers of baby-boomers (NLI Research Institute Report, June 6, 2002).

Our position in the TMG was that, with the core functions of office buildings in the city center shifting from clerical work to information exchange, the issue was not the absolute quantity but the nature of the available floor space, and that the first need was to upgrade city-center functions. Subsequent developments have proven us right.

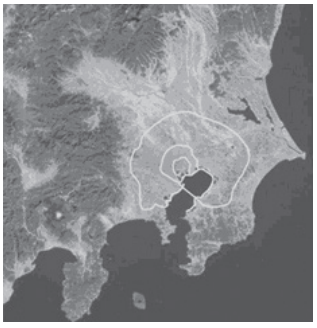


Fig.2 Tokyo Metropolitan Area and 3 Ring Roads

Tokyo Metropolis stretches out some 100 km from east to west, but from north to south it is barely 20 km at its narrowest point. Tokyo's urban functions cannot be contained within the boundaries of this unnaturally long and narrow administrative unit. The range of Tokyo's big-city functions and activities roughly corresponds to an area 100 km in diameter circumscribed by the planned Ken-O (or Metropolitan Inter-City) Expressway. This basically defines the range of daily economic and social activity in the Tokyo metropolitan area.

Tokyo's strength and appeal as a city lie in the way the entire megalopolis has come to function as one vast center of intellectual activity. Knowledge, culture, technology, industry, manpower, services, and businesses of all kinds are concentrated here.

Of the three widely acknowledged "world cities"—Tokyo, New York, and London—Tokyo reigns supreme in size (with a metropolitan area population of 30 million), if not in diversity. Whether we like it or not, we cannot make sense of Tokyo without keeping sight of this megalopolis as a whole.

The London Plan (2004) cites New York, London, and Tokyo as three "successful world cities" and keeps their development in mind when mapping out a strategy for London's long-term growth. Such comparisons among the world's great cities are inevitable, and we can hardly ignore them when discussing urban planning in relation to Tokyo.

**The Wisdom of Non-specialists-- From Land-Use Zoning to Building-Height Regulation**

When Shimpei Goto was mayor of Tokyo, he sought input on his so-called 800 million yen plan from American historian and political scientist Charles A. Beard. After the Great Kanto Earthquake of 1923, Beard returned to Tokyo to provide helpful counsel on urban planning in the aftermath of the disaster. That was back in the 1920s, but Beard's vision of Tokyo's evolution turned out to be largely correct.

For example, in a lecture Beard delivered in Tokyo in 1922, he described his view of urban planning as the construction of a city suited to a society dependent on a global network of intellectual discipline, leadership, and activity. It is clear that he is thinking not of Japanese "town planning" in general but of the proper direction for Tokyo's urban design.

Beard did not have a degree in urban planning. His original field of expertise was the history of US foreign policy. Looking at the world from this historical perspective, he offered Tokyo his advice on urban planning in the belief that the United States should treat the countries of East Asia as friends, not as the objects of imperialist expansion. We have an obligation to preserve the memory of someone who showed such a clear understanding of Tokyo and contributed so much to its development.

The fact is that the reconstruction projects headed by Shimpei Goto in the aftermath of the Great Kanto Earthquake of 1923 constituted the first sustained effort to develop modern Tokyo's urban infrastructure on the basis of a clear vision of how the city should look and function. Many of Tokyo's major thoroughfares, including Showa-dori (44 meters wide), Yasukuni-dori (36 meters wide), Hibiya-dori, and Harumi-dori, were built under this plan, which aimed to turn Tokyo into a modern city on a par with the major capitals of the West. The basic urban design that characterizes Tokyo today was a product of earthquake reconstruction.

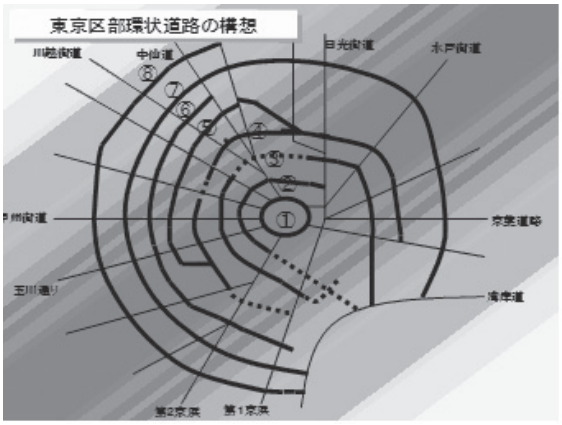



Fig. 3 Eight ring roads plan in Tokyo

In 1927, Tokyo adopted a plan to connect the radial arteries it had built after the earthquake with eight ring roads running concentrically around the nucleus of the Imperial Palace. The ring roads serve to minimize congestion in the heart of the city by allowing drivers to travel between outer neighborhoods without going through the city center.

In Japan city planning policy today is predicated on land-use zones, and when an area is zoned for land use, such regulations as floor-area ratio, building-to-land ratio, and maximum building height proceed almost automatically. Instead of arguing the merits of dividing land-use zones among the 23 wards, we should be debating an even more fundamental problem, namely, whether we should continue operating under a City Planning Law predicated on separation of uses.

The creation of separate residential, commercial, and industrial zones in urban planning was necessary in the period of rapid industrialization, but in a complex, multi-functional city like today's Tokyo, the entire system has become obsolete. After all, the concentration of multiple functions is a basic assumption of the compact-city concept that the government itself has sanctioned.

In Japan disputes over new construction projects are not uncommon, but they rarely if ever center on floor area ratio. Most frequently the issue is height. The frequency of these disputes points to a gap between the means by which city planners control development and the values of ordinary people.

For years I have advocated a shift to urban development regulations focused on the criteria of building height, form, color, facing material, and harmony with the surroundings. Generally speaking, zoning regulations should permit construction of super-high-rise buildings in the city center and nearby business districts, but forbid high-rise buildings in the outer neighborhoods.

## Incorporating Today's Values in Urban Planning

Beginning in the 1970s, construction of apartment and condominium complexes proceeded on a massive scale in Japan's urban areas. This made it possible for workers to secure housing and in many cases fulfill their dream of home ownership. For many years after World War II, housing was in short supply in Japan, but in recent years the balance has shifted to the point where homes substantially outnumber households. In 2006, recognizing that the time had come to shift the focus in housing from quantity to quality, the government enacted the Basic Act for Housing and revoked the Housing Construction Planning Law, instituted for the purpose of increasing the housing supply.

This government deserves high marks for this policy shift, but there is much left to be done. Housing policy in Japan

still faces serious challenges when it comes to improving the quality of homes and their surroundings, making homes resistant to earthquakes and other disasters, decreasing the distance between work and home, and providing more public housing. A particularly urgent problem, however, is the need to renovate aging apartment and condominium buildings.

The massive construction of modern apartment buildings in Japan's major metropolitan areas began around 1970. More than 1 million units were built prior to 1986, when standards for earthquake-resistant construction were put in place. And only a tiny fraction of these substandard structures have undergone structural renovations.

The costs entailed in structural renovation are usually beyond the means of the people living in these antiquated buildings. In cases where condominiums can be enlarged and sold again, owners may be able to finance the construction themselves, but in cases where the units are too small or the building too high or the location remote from the city center or from a commuter train station, renovation cannot proceed without public assistance. Legislation was enacted in 2002 to facilitate structural renovation of apartment and condominium buildings, but the law does not have adequate provisions to overcome opposition from individual tenants.

As part of the administrative reform program carried out around the beginning of this century, the two public corporations that had been responsible for housing construction in the postwar era—the Japan Housing Corp. and the Housing Loan Corp.—were dismantled or radically downsized, and the resolution of housing problems was largely consigned to the invisible hand of the market. Now, when apartment complexes built by the Japan Housing Corp. deteriorate, it is up to the market to renovate them, not the Japan Housing Corp. Unfortunately, if the decision is left to the market, the majority of these buildings will not be renovated. By what mechanism, then, can we ensure that they are made fit for habitation? A new mechanism must be devised, and this is a major challenge facing Japanese housing policy today.

Compared with New York or London, Tokyo is a remarkably safe and clean city. The subways are bright and reliable. Above all, Tokyo is free of the sprawling slums found in New York, London, and most large cities of the West. Herein lies Tokyo's unique strength, and if we want to maintain and enhance it, we must treat the renovation of the area's aging apartment and condominium buildings as an urgent priority.

After World War II, the first wholesale drive to develop Tokyo's infrastructure took place in the 1960s. When Tokyo was chosen as host city for the 1964 Summer Olympics in 1959, it marked the beginning of a rapid and massive urban development program.

The two guiding principles of highway construction in the 1960s were wider roads and grade separation to minimize stops. With buzzwords like "my car" and "motorization" on everybody's lips and the number of motor vehicles on the road growing by leaps and bounds, expanding the absolute capacity of the city's highways was a critical imperative. The burst of highway construction carried out preparation in for the Tokyo Olympics produced 22 roads covering 52 kilometers.

Fig. 4 Grade-Separated Crossing at Tokyo's Akasaka Mitsuke

In terms of ring roads, one of the flagship projects of this period was Ring Road No. 7, built with grade separation (by means of elevated or subterranean roadways or tracks) at each intersection with a major thoroughfare or a railway track. This ring-road layout is one reason Tokyo's congestion problems are not egregious, as compared with New York, Chicago, London, or other large cities, even though its present road area ratio of 16% is considerably lower than that of most of the world's major cities (about 20%).

Today, however, Tokyo's urban activity spills out well beyond the 23 special wards served by Ring Road No. 8, filling an area 100 km in diameter circumscribed by the planned Ken-O Expressway. These days the area inside the Ken-O Expressway and the Tokyo Bay Aqua-Line corresponds roughly to the daily range of movement about the city, whether one is speaking of urban functions or people's daily lives. In today's Tokyo, urban design issues must be approached on this scale.

According to the results of the Person Trip Survey conducted jointly by local governments in the capital area, between 1988 and 1998 the predominant flow of people in the area shifted from a simple back-and-forth movement between the city center and the periphery to a "complex inter-community movement." As seen in the figure (where line thickness indicates the percentage increase in person trips along a given course), human movement trends in the area have become increasingly complex and varied—a trend in all likelihood reflecting the shift from an industrial society to an information society.

**Major Upgrades in the World Cities**

In London, on the banks of the Thames near London Bridge, the 310-meter 72-story "Shard of Glass" completed. Designed to resemble a towering glass splinter, the building has generated excitement since the plan was first submitted by Renzo Piano, also known for such structures as Kansai International Airport near Osaka, Daimler City in Berlin, and the Centre Georges Pompidou in Paris. When completed, it will be the tallest building in the European Union. At the current stage of construction, it is already tall enough to be visible anywhere in London, and it seems poised to become one of the city's modern landmarks, along with Mitsubishi Estate Co.'s Central Saint Giles on Oxford Street.

Meanwhile, the outer shell of the main Olympic stadium for the 2012 London Olympics is virtually complete, and a number of new buildings are under construction in the London Docklands, a redeveloped commercial district comparable to Paris's La Défense.

This sort of development has been made possible because London abandoned rigid regulations governing floor-area ratio and replaced them with a system for reviewing building projects on the basis of multiple criteria appropriate to the twenty-first century, taking into account a building's function, design, and how well it harmonizes with its surroundings. This opened the door for the construction of two super-high-rise structures—the Lloyd's Building and Swiss Re Building—caddy-corner across a street six meters wide. London is pursuing a systematic policy of upgrading its functions as a world city.

New York, for its part, has placed new emphasis on building design in its recent zoning regulations and plans, and stunning buildings by renowned architects have been springing up one after another. Without a comparable effort, Tokyo is in danger of being left behind.

Beijing is also striving to become a world city, a goal it formally announced following the 2008 Olympics. The Olympics provided the impetus for the construction of new ring roads and parks. Having built the Central Business District in the western section of the city, Beijing is now focusing on improving and expanding its subway system. It currently has service along eight lines of varying lengths, and construction is proceeding apace.

Shanghai already has 11 subway lines totaling 320 kilometers, about 20 kilometers more than Tokyo. Still, the

system continues to expand rapidly, and a recent report boasts that it is on track to cover 970 kilometers by 2020. Shanghai's Pudong New Area is already equipped with super-high-rise buildings, such as the 492-meter Mori Building, and it is hard at work redeveloping the district in keeping with the theme of the Shanghai World Expo 2010: Better City, Better Life.

In both Beijing and Shanghai, a large-scale model of the city of the future has been put on display in the heart of the city, so that residents and visitors can clearly see the goal toward which urban planners are moving. Both are realistic 1:750 scale models that eloquently express the planners' vision.

In Tokyo's case, there are several 1:1,000 city models are on display—one by Mitsubishi Estate in Chiyoda ward, another by Mori Building in Minato ward, and third by Mitsui Fudosan in Chuo ward. When the International Evaluation Commission for the 2016 Olympics visited Tokyo recently, Mori Building provided them with a scale model of the planned Tokyo Waterfront Subcenter, where the new Olympic stadium would have been built. The Tokyo Metropolitan Government should consider building a large-scale public scale model of Tokyo (equipped with a large dome for display purposes) to provide residents, people connected with the development, visitors from abroad, and others with a platform for debating the state and future of urban development in Tokyo.

**The Evolution of the City**

Urban history goes back thousands of years, to the ancient world. All through that time, the city has continued to evolve. I was personally involved in the administration of a big city for thirty-six years, and during that time alone, Tokyo underwent major evolutionary changes as it responded to the needs of each era, the world situation, and the demands of the people. The reason I call it "evolution," instead of just "change," is that I do believe cities have gradually improved as a result of these changes.

Tokyo’s well-prepared final presentation to the IOC general assembly paid off, including the powerful speech by Mami Sato, a Paralympian who hails from Kesennuma, Miyagi Prefecture, one of the cities devastated by the tsunami triggered by the March 11, 2011, Great East Japan Earthquake.

Sato, who came down with bone cancer at age 19, said in her presentation that sports had the power to restore people’s confidence, including hers and others caught up by the disaster. Children living in the coastal region have been inspired by the thousands of athletes who have visited the region to participate in relief efforts, she said.

I think the phrase ‘I was saved by sport’ in her presentation appealed to IOC members’ emotions. The Olympics and Paralympics can contribute mentally, if not physically, to the people in the area who were hit by the 2011 disasters.

It will give big hope to the people in the disaster areas. Some preliminary soccer matches are planned there, and the torch relay is scheduled to run through the area. I hope officials make efforts to bring positive effects to the people by holding Olympics-related events

Tokyo can take advantage of hosting the Olympics and Paralympics by introducing social changes. Instead of being an industry-focused metropolis, Tokyo should aim to be a center for the arts, entertainment and sports. Tokyo should show the world a new model of a matured society, in which the quality of life is enhanced.

The capital is already advanced in facilities for elderly citizens and disabled people compared with other cities, but Tokyo still has room to improve as a barrier-free society, noting that by 2020, the status of the Paralympics will be much higher and thus greater efforts are needed to promote the barrier-free movement.

Hosting the Olympics is also expected to enhance the nation’s passion for sports, the experts said, noting funds will be raised for new facilities..

The thrust of infrastructure development in Tokyo has shifted from the 1960s emphasis on efficiency to cope with

urban sprawl to a new focus on the amenities befitting a mature society. In the second decade of the twenty-first century, the emphasis in urban infrastructure continues to shift from the construction of roads and railways—the imperative of the 1960s—to improvements in housing, environmental quality, and ambient water and greenery, aimed at enhancing the quality of urban life.

In central Tokyo, the Shuto Expressway was built atop one of the city's many waterways. A few years ago, when attending a dinner with former Tokyo Governor  and a number of other high-level city officials from that era, I asked whether anyone had objected to covering the river in that manner. None of those present could recollect any criticism on that score. Someone remarked that it seemed only natural that the channel be made useful for transportation, since it was originally a canal.

This kind of urban development, which Tokyo residents accepted without question 50 years ago, strikes us as bizarre today. In the twenty-first century, city dwellers value the quality of housing and the environmental and yearn for surroundings rich in ambient water and greenery. Tokyo needs to build an urban planning system that reflects these new values.

# Introduction to Montreux Switzerland

Gateway to the Lavaux vineyards (UNESCO's World Heritage List in 2007), Montreux stretches from an altitude of 372 (1220 ft) to over 2'000 meters (6600 ft) and covers almost 3'500 hectares (8'600 acres). Montreux is a Municipality of 26'000 inhabitants, among whom approximately 46 % of foreigners representing almost 150 different nationalities.

A tourist resort for over two centuries, the city enjoys an excellent international reputation in the areas of tourism, events, hotel management schools and private clinics.

Montreux is also known for her Festivals and her events of international impact, that mark all the cultural activities throughout the year:

- Montreux Jazz Festival: best of music since 1967, 250'000 visitors in 15 days (July), dozens of shows, most of which are free, indoor and outdoor ;
- Saison culturelle: twenty performances of all kinds in the Auditorium Stravinski from October to April ;
- Festival du Septembre musical: classical music festival during August and September in the Auditorium Stravinski;
- Montreux Comedy Festival: the meeting of the humour in French-speaking Switzerland, with young or famous artists, well-known by the web TV and the "French" TV-network, early December ;
- Montreux Choral Festival: festival dedicated to the choral art, for 49 years in Montreux early April ;
- Polymanga: Swiss festival dedicated to popculture and video games, 25'000 entries in 4 days early April in the "Montreux Music and Convention Centre" ;
- Montreux Noël: the largest Christmas market in Switzerland, five weeks and 420,000 visitors (end of November until end of December). You can visit Santa, who comes directly from faraway Lapland to his house at the Rochers de Naye (6'600 ft), discover an authentic Christmas Village in Caux, or stroll through a medieval market and attend a story festival within the walls of the legendary "Château de Chillon".

All these events attracts more than 750'000 spectators every year.

Montreux also has many cultural assets:

• The Montreux Museum hosts 14 rooms exhibiting the entire history of Montreux from paleolithic (around 10'000 B.C.) to modern times (the 1st known Montreux settler was found in a Neolithic grave dating to 5'000 B.C.).

• The Montreux Archives preserve close to 2'000 linear metres of original documents dating from 1269 to nowadays (in particularly the archives of Charlie Chaplin, of the painter Theodore Stravinsky and of the photographer Horst Tappe).

• Montreux has a public Municipal Library with 63'000 documents. The loan of documents is entirely free of charge. A 140 guided visits are organised every year for daycare children and school classes from the area.

## 1. URBAN CONSTRUCTION AND MANAGEMENT

### 1.1. Specific Open Space Development Plan

Montreux has two planning tools available to organise and manage its open space :

1. The communal master development plan (2001); the communal master plan CMP determines the major perspectives for the development of communal open space in terms of 11 objectives: regional context, urban structure, rural expanse, public space, transportation, environment etc …

2. The general land allotment plan (1972, partially reviewed in 1995, currently under total revision); The general land allotment plan GAP, in form of a map and rules and regulations, specifies the means to reach those objectives, in particular the different assignments of the land and the construction rules and regulations that govern them.

The five major challenges are :

1. Preserving the urban, architectural, and pastoral quality.
2. Maintaining the social mix and rejuvenate the population.
3. Quality public spaces.
4. Site-relevant development and transportation.
5. Sustainable development as a factor for quality of life.

These challenges will guide the blending of land allotment plan and urbanism rules, which will allow to manage the evolution of the territory and the urban development.

Montreux has also committed itself to comply with a “charter for public spaces” (2000).

Goals:

To revive an urban culture of public spaces.

To increase their qualitative value and their features without failing to take into account their modernity, and by bearing in mind the needs of today’s users.

Means:

To know and understand the public space.

To have a comprehensive vision of all public spaces in the city and of their connections in order to create a coherent entity.

To work in synergy with all the communal services and the external partners. Not to functionalise but to qualify the spaces.

**1.2. Tree plan**

Montreux has a modelling plan for its green spaces. This tool allows the efficient management of all the communal green spaces, including cemeteries and children’s playgrounds.

## 2. HERITAGE MANAGEMENT

Since 2004, Montreux has a protection plan for her Belle-Époque hotels permitting the conservation of this particular architecture.

As mentioned before, the CMP and the GAP narrow down the protection of built and non-built areas specifically identified by a preservation plan (village areas, remains of the heritage, open spaces not dedicated to development, etc…).

Montreux has recently set up a comprehensive project for the renovation of the 15 communal mountain pastures in order to support the said pasture land economy and to renovate and revalue the architectural heritage as wells as the natural wealth riches (CHF. 3’000’000).

Montreux has adopted a large concept for the protection of the narcissus, grow on approximately 570 hectares of our territory. In order to preserve this natural heritage, Montreux supports the owners of 150 cadastral plots on which the flowers grow with financial aid so that mowing and pasturing can be delayed until after the blooming and the use of

fertilisers is restricted.

Montreux participates and supports the Regional Natural Park Gruyères – Pays d'Enhaut since 2006. Montreux is indeed situated at one of the park's entries, a truly historic link between Lake Geneva and the surrounding Pre-alps.

Forests cover about 1,700 hectares (48 %). 170 hectares of this surface are classified as natural reservation and 30 hectares are intended for recreational purposes. Since 2004, our forests are certified FSC (Forest Stewardship Council, exemplary forest management).

## 3. ENVIRONMENTALLY SENSITIVE PRATICE

Montreux was awarded the label «Energy City» in 1999 and the label was confirmed by the renewal audits in 2003 and 2007. This accreditation rewards Montreux's commitment to rational energy consumption for the purpose of a sustainable development. In 20 years, energy consumption has decreased by 40 % for fossil fuels and by 41 % for electricity.

All the plants growing on the communal territory come from our greenhouses that produce 313'000 plants yearly belonging to 250 different species. In order to heat the seven greenhouses (1'600 m2), the olympic size swimming pool, and a care home, Montreux started investing 1.7 million CHF in 2008 to replace the old heating system by an installation that functions with wood pellets from the communal forests.

Montreux also participates in the European «Display» campaign consisting of publicly posting the energetic performances of every communal building. The posters are exhibited on major thoroughfares and are updated every year. In this way the population can become aware of the efforts deployed by the commune of Montreux during the last twenty years with respect to its energy policy.

The control of air quality is the Canton of Vaud's responsibility. Montreux has the chance to host the only monitoring station on the Riviera (20'000 hectares). Obviously, all the means for environmental protection described previously permit a sensible improvement of air quality :

Nitrogen dioxide ($NO_2$) : the threshold value of 30microgr/m3 has never been passed.

Ozone ($O_3$) : Montreux is close to the best results of the Canton being above the threshold of 120 microgr/m3 for only 180 hours over the whole year.

Water supply and distribution fall within the purview of the SIGE, the Intercommunal Management Service. The SIGE operates 56 sources, covering 88 % of the water supply, and a pumping station in the lake providing 10 % of the water; the rest (2 %) is bought from third parties. The distribution network contains 345 km of pipes. Water quality is controlled in detail twenty times a year.

The commune is responsible for the separative wastewater evacuation system, its regular control and its maintenance. The PGEE (waste water evacuation master plan) sets the reference legal frame for actions taken and projected. At present, 90% of the inhabited zones are connected to the separative system clean waters – sanitary sewage. The treatment of sanitary sewage is taken over by the SIGE who operates the wastewater treatment plants.

## 4. EDUCATIONAL CULTURE AND COMMUNICATION

Activities:

Awareness programme on HIV under the responsibility of the school nurse in 9th year classes.

Primary prevention of addiction problems related to tobacco and alcohol, from 5th year classes on, in collaboration with the responsible institutions.

Installing fruit and vegetable booths in the primary schools of Montreux. This concept is unique in the area and it complements the choice of food during the morning break by proposing a healthy alternative to the usual products offered by the bakery.

Renovation project : the pupils are involved in the maintenance of buildings they stay in during class outings. Some pupils had, for example, the opportunity to totally renovate a room in a chalet that hosts youth camps. Besides the practical application of knowledge acquired during class this project aims at developing teamwork, the sense of quality and the respect of a given timeframe.

Security marketing : a commission has been set up to manage general misbehaviour of young people of school- and postschool-age inside as well as outside of schools.

In 2000, Montreux also introduced the «Animation Jeunesse» project. Its goals are to promote an optimal development and social integration of young residents through activities such as camps, community centres, and active participation in regional events.

Since 2010, the City has a delegated to the sport, for the promotion of physical activity as essential to the harmonious development of society, both for health and for the integration and social cohesion.

Additional examples of health promotion :

School doctor and dentist.

Subsidies to sports clubs active in the training of juniors and young athletes.

Grants for children from financially challenged families to enter art or music schools, serving to take over part of the school fees according to the parents' income.

Promote the physical exercise in an urban environment by developing the concept " urban trainnig ".

Financial support for big sportive events, for example Montreux Volley Masters (every year), The 4th International Children's Games (2009) or the European Fencing Championships in 2015.

Montreux has created a position specifically dedicated to MSST (Initiatives for health and security at the workplace) : the person in charge regularly visits the administration's workplaces and raises awareness among the employees for implementing measures to optimise working conditions with respect to legal obligations.

Initiatives designed to encourage citizens in community volunteer work :

Integrating volunteer organisations in projects of public interest : social issues, day care, sports training, optional sports activities for the young, sports associations, cultural promotion, cultural activities, management of different festive activities particularly in villages and neighbourhoods.

Annual meetings with all the volunteers ("États généraux" on tourism and culture, meeting with the "village chiefs").

Financial support to the community development corporations of the villages by the commune, for example to organise the National day celebration, for maintenance of skiing tracks or sports infrastructures.

Financial support to the 12 community development corporations of the villages for the organisation of over fifty yearly events through redistribution of part of the vistors' tax (total amount approximately CHF 60'000 yearly).

Regular contacts with and operational help to existing non-profit associations.

Subsidising agreement with the institutions benefiting from financial help.

# Flyovers and Urban Landscape

Suresh, Edirisooriya A.T.

## What is Urban Landscape?

"Urban landscapes are storehouses for these social memories, because natural features such as hills or harbours, as well as the streets, buildings and patterns of settlement, frame the lives of many people and often outlast many lifetimes." (Hayden1995, p.9)

Hayden refers "these social memories", to the memories of the histories of families, neighbourhood, fellow workers, and ethnic communities. Further author mentions the urban renewal and the redevelopment are also creating the memories with urban landscape in its evolution. The generated architecture must be enhancing the lives of the people than over govern it. So the urban landscape is the overall architecture of the context and the links of the urban communities.

"There will always be landscapes which are intended as settings for architecture, where Formal, Virginian, Picturesque, Deconstructed or whatever.." (Jellicoe1992, p.24)

The urban landscape makes the picture of the particular urban spatial flow and it includes each and every element which is static in the context like buildings, bridges, flyovers, trees and the elements like people vehicles and even pets which are moving. The classification can be done on different ways. For example live elements and the non living elements. But these classifications should be done focusing the final objective. Present landscape was not emerged suddenly, but it is with a continuous evolution of time. This evolution is about the people and everything there is about the perception of them. Different concepts, trends related to their lives change the built environment and the urban landscape.

## Factors affecting the emergence of the cities and its structure.

### Physical factors

From the beginning of the civilization people were bound to the natural environment and its physical structure. Earlier nature was for their survival. They were depending on resources like rivers and water bodies and forests as a response to the nature. Later with the improvements in tools and the weapons to defend the growing boundaries against enemies, emperors thought of the more secure places for their civilization to live in. Again they used the natural barriers and they followed the patterns of the nature. Further developments were according to these patterns. Later people tried to conquer the nature for example to overcome constrains of the connectivity the tunnel and the bridges erected.

### Social factors

To understand the urban areas and its landscape, the vision of the society and the social links are really important to study.

"The more we know about the cultures, about the structure of society in various periods of history in different parts of the world, the better we are able to read their built environment."(Kostof 1991, p.10)

The society and their perception never stagnated within the history even there were more disastrous events. There are also examples, though the context was totally destroyed and people have reconstructed the same as they don't want

to lose the social links and their moral links due to such disastrous events. The same architecture was repeated again as they wanted to see that their societies were not affected.

**Economic factors**

This is the reality and the main factor when consider the capabilities of development of a city or a certain precise area. The constructive ability and the needs of adding or removing elements from the landscape depended on the economic conditions. This is evident throughout the history as well as today. Since citizens are considered, while building up the city it is important to identify the potentials for urban development and how it can be interpreted in a spatial manner than giving prior to the economics.

But according to Kostof 1991, p11, the subject of the legal and the economic factors are a huge and it is having a greater impact on formation of the cities and its environments.

The quality of the environment and the care of citizens are merely a matter of the economic factors of a city. As an example the urban left over spaces are common in most of the developing countries but in the developed countries it is well managed and treated as user friendly.

**Philosophical factors**

In ancient cities people believed that the cardinal directions and the water bodies seems important while locating the settlements. Some river banks were considered auspicious and it was selected as the city while letting the opposite bank to be the dead city.Sometimes the directions in relation to the sun considered important when laying out the cities and the entrances to them.

E.g.:- Anuradhapuara, Sri Lanka

Ancient capital of Egypt

Kostof 1991, p.11 reveals that the cities are shaped by different categories of people. For example ship gunner's (early port cities of India), military engineers, etc. So it is clear that the urban context is formed with the philosophies followed by the creator.

**Elements of the Urban Landscape**

Several scholars have looked at the urban context; cities in different perspectives. Looking deeper in to it, as Kostof, 1992 mentions there is the urban process. This is the contribution of the man and his activities responding to the environment surrounded and the factors described above. The process also contributed to the vivacity of the urban landscape.

Krier, 1975 argues that the urban space is twofold; the Squares and the Streets. It is more conceptual because the built masses are identifies as the periphery of the square which generate the ambience in the urban square and the open space are such which are enclosed by the peripheral buildings.

"I shall attempt to discern this quality whatever we are dealing with physical features and of the spatial nature two basic elements are the streets and squares" (Krier 1984, p.16)

But Kostof describes it in a different way going in to further detail of a city in City Assembled, reveals that the city Edge, Divisions, Public spaces, Streets and Urban process is vital. The importance of this classification is that it describes about the live nature of the city as the urban process.

Besides both Lynch, 1979 was thinking of an image of a city by handling five elements; Paths, Edges, Districts, Nodes and the Landmarks. This is more detailed and almost covers the whole fabric. As Lynch reveals that this is about imaging a city and the imaging is the real time experience of the city landscape; the urban landscape. Further Bentley strengthens this idea of these elements as it very relevant to a responsive environment and these are used to discuss the responsiveness of an environment by him.

**Evolution of Urban Landscape**

"The specific organization of the city, and the behaviour in it, are the result of interaction of environmental characteristics, the choice processes of individuals and groups, and various constrains." (Rapoport 1977, p.81)

The performances of the spaces and the capability of tolerating the new functions are significant throughout the evolution. Therefore each function may change or may not, but it has to accommodate new functions as well as the traditional at the same time.

That the society, urban form, urban spaces, activities and their expressions are creating a base to explore how the evolution took place in urban landscape than going for an elementary evolusion.

**Society**

The change of the people in different eras reveals the facts about the socio-spatial connections they had. So the evolution of urban landscape had a direct impact of communities. Generally the attitudes of people influenced the urban landscape and it was similar to human connections. Earlier man was more community oriented and their landscape was depicting the sense of community. It was evident as they settle in a particular place as well as they grow in the context.

"The land prices are high and going up as they raise higher the buildings get taller. The poor people, of course, get pushed out either in to the far-off suburbs or to live in the crevices here and there- in illegal shanty towns, on the pavements, whatever. - Charles Correa" (Editor 1986, p.11)

While cities are becoming more complex in its conditions people got lost in urban landscapes because the cities are not much responsive enough to guide them. Then people tried to find different methods of improve the sensitivity of it. So they defined and tried to arrange the paths, demarcations, segments, nodes and landmarks to make the cities more human oriented. But even with more population there were more and more activities gathered, and for the functionality of it different layers emerged.

Sometimes there are evidences that these structures are defining the spaces for different user categories. Such common example can be found in New Delhi where the flyover easily forgets the community under it. Sometimes it is the social attitude.

**Urban Built Mass**

Urban form must be expressive to have a better communication with the people who live there. It creates the image of the city as people experience it with the several elements according to Kevin Lynch. Also they are the elements which bring up the features of urban landscape in more details.

The urban form can be divided in to two, for better understanding; the urban built mass and non-built spaces. So generally the built masses may affect on segmentation of the cities, its edges and landmarks. Paths and nodes deal with the non-built urban spaces as they are open free spaces. But these are parts of a single entity as each of them having strong connections and even they are influenced by each

As Relph, 1987 reveals the modern form of urban contexts had undergone many criticisms and arguments as the architecture changed the landscape. As the first step after the modernism with the post-modern concepts the landscape was much expressive than the modern urban landscape generated by the built masses. Christopher 1981 sees it is not human oriented even today.

"By comparison, the developments of today are not human in their origin. They are too often created by cooperation that manipulate stock for profit at long distance or decided by comities concerned with abstract social welfare. They are too often grey and colourless." (Christopher 1981, p.55)

The viaducts in that sense are important to consider as its built mass comprised with different interpretations in the urban landscape since they are emerging and flowing through the city making problems even with its scale. This is

proved as the research done for Seattle in United States, where it reveals that the public life and the surrounded cultural masses were affected by the new viaduct.

**Urban non Built Spaces**

There are mainly two types of urban spaces, interior and the exterior. The exterior influenced by the forms or the built masses surrounded by it. As the Krier 1984, classifies the urban space is streets and squares. So it said that squares are both the built mass and the space trapped. The interior spaces are defined by the buildings itself most of the times, and it is secured by the weather and the threats from outside. But as a part of the whole it may not merely defined by a single building but other buildings around as they are connected to it.

"Urban space... This space is geometrically bounded by a variety of elevations. It is only the clear legibility of its geometrical characteristics and aesthetic qualities which allows us consciously to perceive external space as urban space" (Krier 1984, p.15)

The evolution of the urban spaces, both the interior and the exterior are depends on the time and the changing need of the dwellers as they are guided by their psyche.

The viaducts created another layer to the urban landscape while creating different types of urban spaces in the contemporary world. Different elements with different definitions were making the essence of the space which is positive and negative. The viaducts gave such definitions on demarcations, channels, segments, nodes and landmarks. So they seem challenging to the functionality as well as to the existing urban no built spaces. These structures most of the time making lost spaces, especially considering the third world cities. Theses are affected to the urban form as well to the urban non built spaces and the activities of their contexts.

**Functions / Activities**

"In addition to the geographical factor the individual character of the towns will also have been shaped by their activities and buildings related to them." (Tugnett 1987, p.25)

The activities can be public and private. The public functions hold the importance in the urban context than the private functions. The transportation, recreation and commercial activities are such which evolve rapidly in the broader sense. These different functions have affected the organization of the urban landscape. So the evolution of the urban landscape can also evaluate with the functions of the context from time to time.

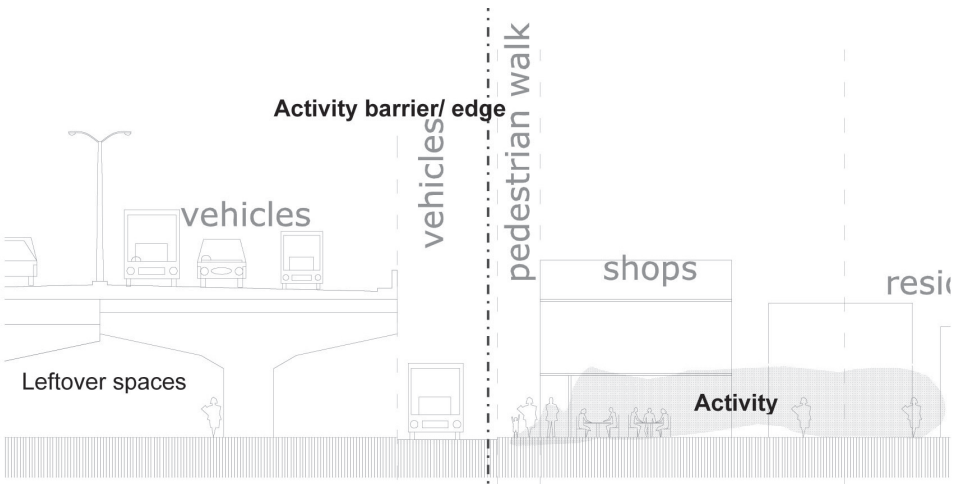
"It commonly thought that before the industrial revolution on people had a sense of equilibrium, which the pace of modern life has destroyed through dislocation, industrialization and specialization. Disequilibrium is a powerful motivatin control the conditions

**Exp**

The rmance. It is hard to vel. But in micro leve

"The stylishness, and post m

The cities. The monorails structures are rigid b by its own expressio



## Responsiveness of the Urban Landscape

### Responsiveness

"The relationship in the physical environment is spatial. Basically objects and people are related through representation in and by space."

"Space is experienced as three dimensional extension of the world which is around us. - the intervals, relationships and distance between people and people, people and thing, things and things and space is at the heart of the built environment." (Rapoport 1977, p.9)

As Rapoport 1970 reveals in "Human Aspects of Urban Form" it is important to consider about the social values, other such attributes; human aspects, and the quality of the physical erection of the environment in urban contexts; the urban form. This is quite compatible with the urban landscape also, as it is a facilitator for human performances in public and private life.

**Social and Cultural Responsiveness.**

"In any ideal situation each group of people would more to match their preferences and the city would consist of a set of areas expressing the social identity, status and preferences of various groups." (Rapoport 1977, p.12)

Financial and the political responsiveness is always depends on society, cultures and different ideologies of them. Therefore than the political and financial responsiveness of the urban landscape, social/cultural responsiveness and environmental responsiveness is much important because it breeds the others.

**Environmental Responsiveness.**

The environmental responsiveness refers how and to what extend it communicates and allows people to perform their activities as they prefer in a particular defined environment. This is more important to consider in the urban contexts because the complexity of issues and it is suppose to minimize the diverse effect on citizens. Since the urban landscape is the platform where people celebrate the urbanity, it is important that the physical context being responsive.

"The spatial characteristics of built environment also greatly influence and reflect the organization of communication. Thus who communicates with whom, under what condition, how, then, where and which context in one important way in which the built environment and social organization are linked and related." (Rapoport 1977, p.12)

The landscape is derived by the physical elements. The responsiveness is important to the urban landscape as people affected by their surrounding than in the other environments. Further responsiveness means creating dialogues between people and their surroundings. So positive responsiveness creates more connection with the landscape and stresses and joys will be a part of the environment as they share them.

"This means, of course, that physical elements in the environment take on varying meaning and their influence and importance, and their effect on behaviour, changes accordingly." (Rapoport 1977, p.12)

### Environmental Responsiveness

The responsiveness is vital considering the living environment; the urban landscapes, on which the people live, experience and enjoy their day to day life. The responsiveness of the urban landscape will enhance the communication with the citizens. Lack of environmental responsiveness is a threat that leads towards deserting of the public spaces and public life, which is vital in the urban contexts. Here the environmental responsiveness is evaluated with different physical factors found in the urban landscape.

Bentley 1975 describes seven factors of environmental responsiveness as permeability, variety, legibility, robustness, visual appropriateness, richness, and personalization concerning about the communication of man with the surrounding environment in relation to its physical attribute. These factors are also described with the Lynch's categorization of the urban elements.

**Permeability**

Permeability is the quality which enhances the choice of fenestration or accessibility in the urban landscape. When the permeability is more it means that the context is more porous and less cohesive. The permeability is to be promoted with control to generate private and public activities separately in the same landscape. So there should be an interface since those are contrary and the permeability level must keep appropriate.

**Variety**

Different uses, forms, meaning and the expressions which creates a variety in the urban landscape is considered here. Different variety levels of above mentioned forms, meanings and expressions is automatically enhanced by the variety of uses prior to the functions. The different approaches of accommodating uses will create different forms, meanings and expressions in the urban landscape automatically.

**Legibility**

Legibility is the ability of understanding or reading a structure or perceiving it in mind. In general terms, this is reading a layout of the landscape elements in mind, as the memories gained through experience directly and indirectly. If the landscape is legible, people may tend to flow freely enjoying without any conflict because they know where are leading to as they have references from the context. When the elements are supporting to evoke memories through experience the landscape is more legible.

**Robustness**

Robustness provides the association of more functions at a single space at the same time. In simple terms it supports multifunctional requirements in a single space for a larger user category. Robustness will promote and enhance the mix of uses in the urban landscape. Participation of different social categories there will animate the urban landscape and it is always gained the attention of the people.

**Visual Appropriateness**

Visual appropriateness is the determinant factor of the responsiveness in more detailed version. This strongly affects the interpretations of a particular place through the visual media; on the urban landscape obviously. The meanings of the places and the elements are by these visual interpretations, so meanings helps people to make the choices.

Visual appropriateness is vital in the places with a great public participation, where many people are from many different backgrounds. As people are the living part of the urban landscape, this quality is important in terms of animating the urban landscape by looking in to the eyes of the people.

**Richness**

Richness will contribute to the sense-experience that user can enjoy.

"For most people, sight is the dominant sense. Most of the information we handle is channelled through our eyes…… visual richness."(Bentley 1975, p.89)

But the visual experience is not the mere experience, but there are other experiences as well; sense of motion, smell, hearing and touch as Bentley describes.

Visual experiences created by the environments are twofold; firstly by focussing the attention on different sources, and secondly by moving away from a source towards another. Bentley, 1975 mention two factors as the basis of the richness. The orientation of the surfaces concerned and the likely position from it will be viewed.

**Personalization**

In the urban landscape, personalization considered vital because people are having the intension of keeping a stamp on places where they behaves. Therefore this is having a direct impact on the responsiveness of the urban

landscape. So in each place it is necessary to let personalization to some extent regarding making the places functional. Sometimes it is automatically personalized by selecting the most suitable place for the each one, but this is not a passive personalization on urban landscape.

Case Study: Analysis of the Responsiveness of Flyover, Demetagoda, Sri Lanka

Role Plays by the Flyover in the Urban Context

Urban Location

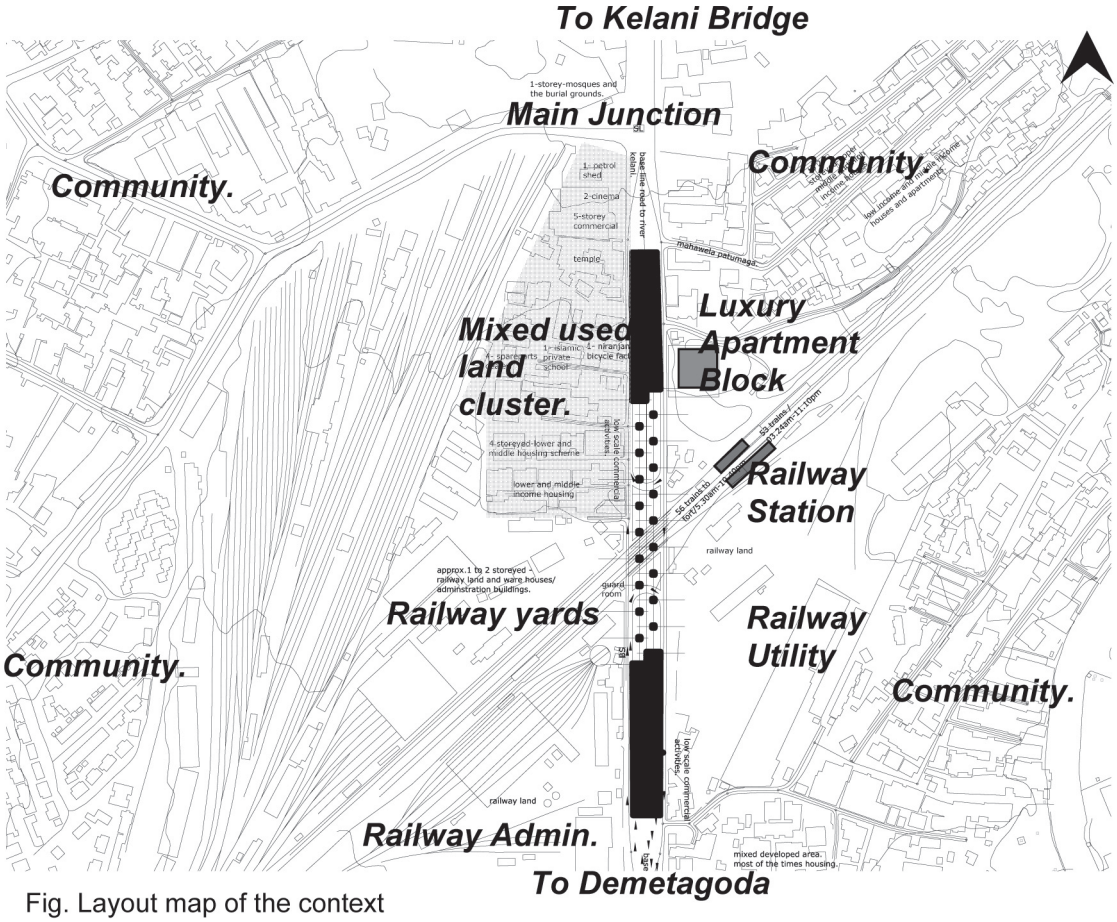



Fig. Layout map of the context

Flyover, which is approx. 82 feet wide and 1635 feet long, locates with the Base Line road at the crossing of Demetagoda railway lines which is by the side of the railway yards. Demetagoda can be identified as an area which is most of the times residential. But there the other activities such as commercial and industrial can also be seen. Major land use is by the railway as a sole authority and the residences most of the times are low income.

The commercial activities are having their prominence along the Base Line road while the residential and industries are further detached from the Base Line.

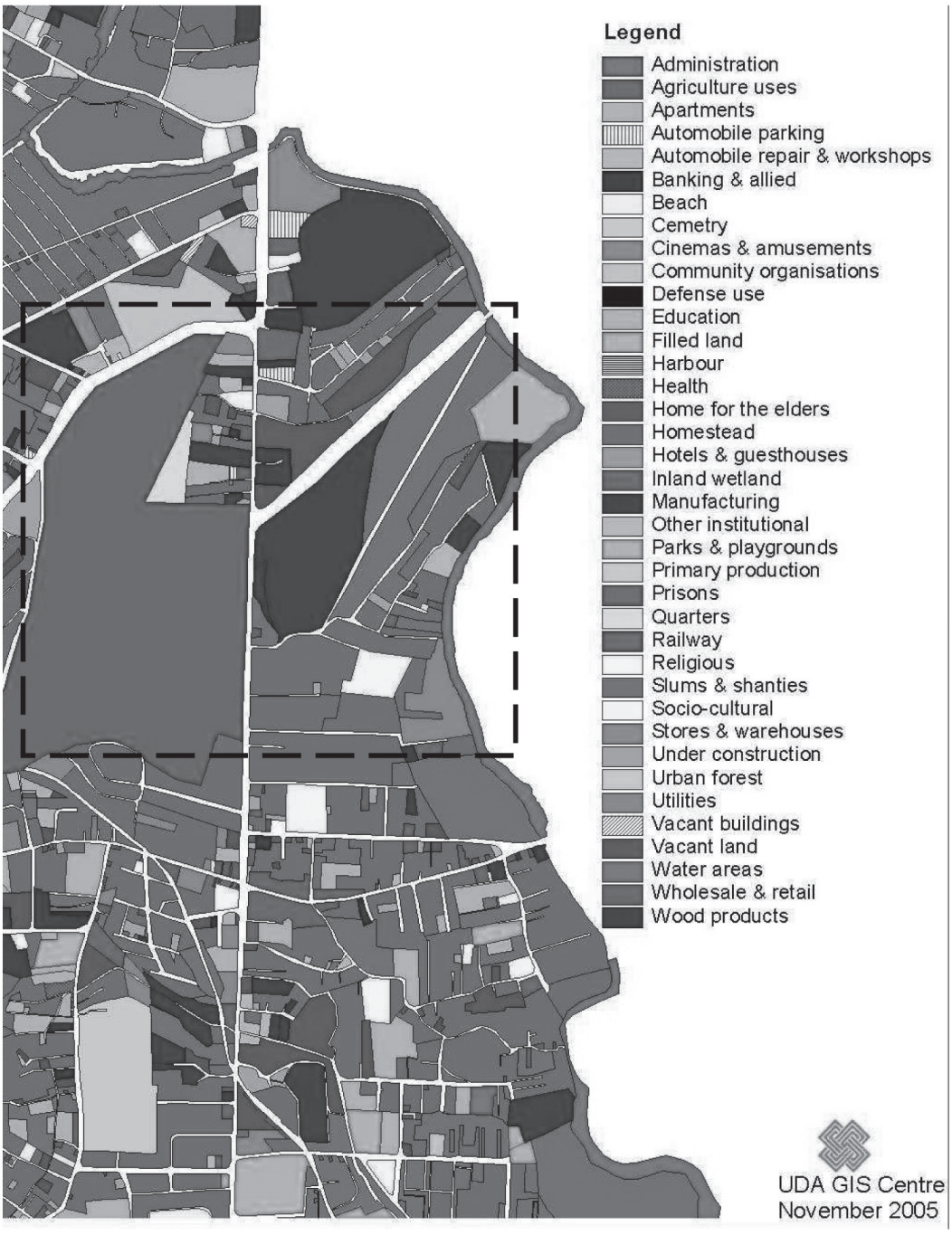



Fig: Land use map; Demetagoda flyover and surrounding.

The starting and the end of the flyover connect different characters of the landscape and even different functions. One end of it is a junction which connects one of the main transport lines from Fort, towards the suburbs and major towns like Kandy, Kurunegala and Gampaha. The other end is the town centre of Demetagoda but few hundred metres away.

The flyover is not letting any road to cross, but a railway line as its intension to minimize the traffic at the railway intersection. So besides all activities this vehicular circulation and the traffic is being the most dynamic and dominating in the landscape. So this dynamism segregates the landscape in to two as it holds them in both side of the Baseline road.

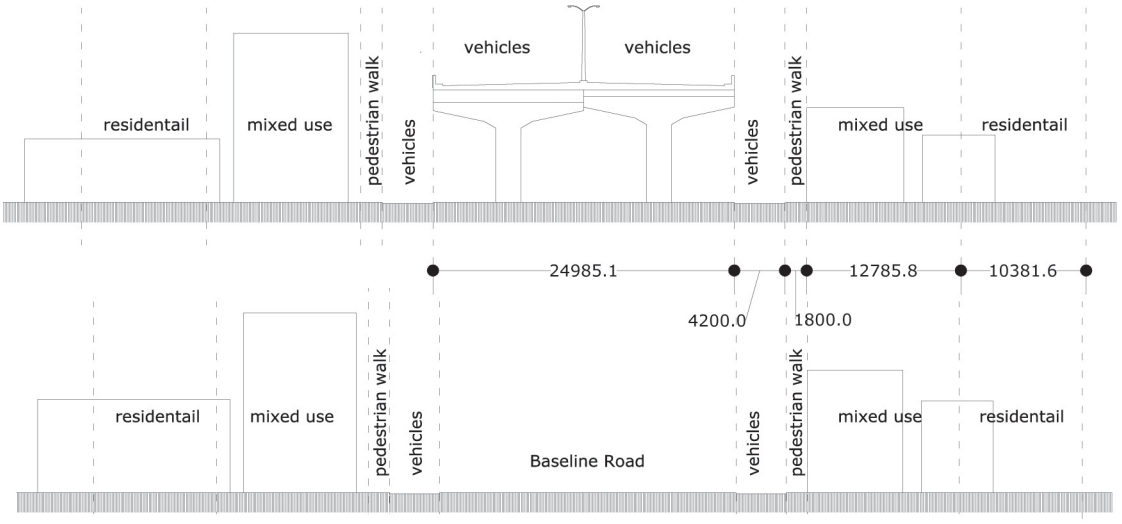



Fig. Typical section across the flyover and a section across the baseline; zoning of the activities

Considering about Demetagoda it is sort of under developed poorly utilized landscape. This can be observed by the land use and the quality of the built and non built environments. The density is much higher in the area because it holds many no of shanties, squatters and sheds, in the residential districts. There the commercial activities focusing on the land price.

The next important feature is the dominance of the railway with its character in the context. As it accommodates the highest portion of land as the sole owner which is private; the railway sheds, administration, factory and tracks. The station has not get any significance there since it is not well treated and defined in the existing landscape though it is an important transport terminal.

The luxury residential apartment is the tallest built structure in the neighbouring landscape but Jaic Hilton tower and the HNB Tower can be seen from a distance of few kilometres. So the residential apartment behaves as the landmark of the context. Being a residential building it is not getting any favour of the context because the paths are not promoting the pedestrian movement but the vehicular primarily.

The next biggest sole ownership of open land extent in the landscape is for the manufacturing. Every other land is also protected individually and there is no connection with the overall landscape but there are paths even for the human use than the vehicles. Such uses are access ways by foot for public and for the individual use.

There locates cluster of land which is identical with its mixed use locates in between the Base Line and the railway sheds. It cannot be identified as a district but it contains almost all the functions there; the residential apartments for low, middle and high income people, religious, small industrial activities, commercial activities, utilities and even the administration.

Since it is hard to identify where what happens, the land utilization and the legibility of the landscape are not appropriate. The division of the lands and the layout of the buildings are haphazardly built and arranged.

The flyover creates an opportunity overcome the traffic delays and it can be identified as an element which is used

for the efficiency of traffic. Than the path created above, there are two paths laid in both side of the flyover at the ground level. The widths of these paths are 15' feet each and used by the public transportation buses and also by pedestrians, especially who are accessing the railway station at the ground level by crossing those roads.

The flyover is allowing people to cross it, by crossing the side roads, through its lifted and supported column structure which creates physical and visual links to certain extend.

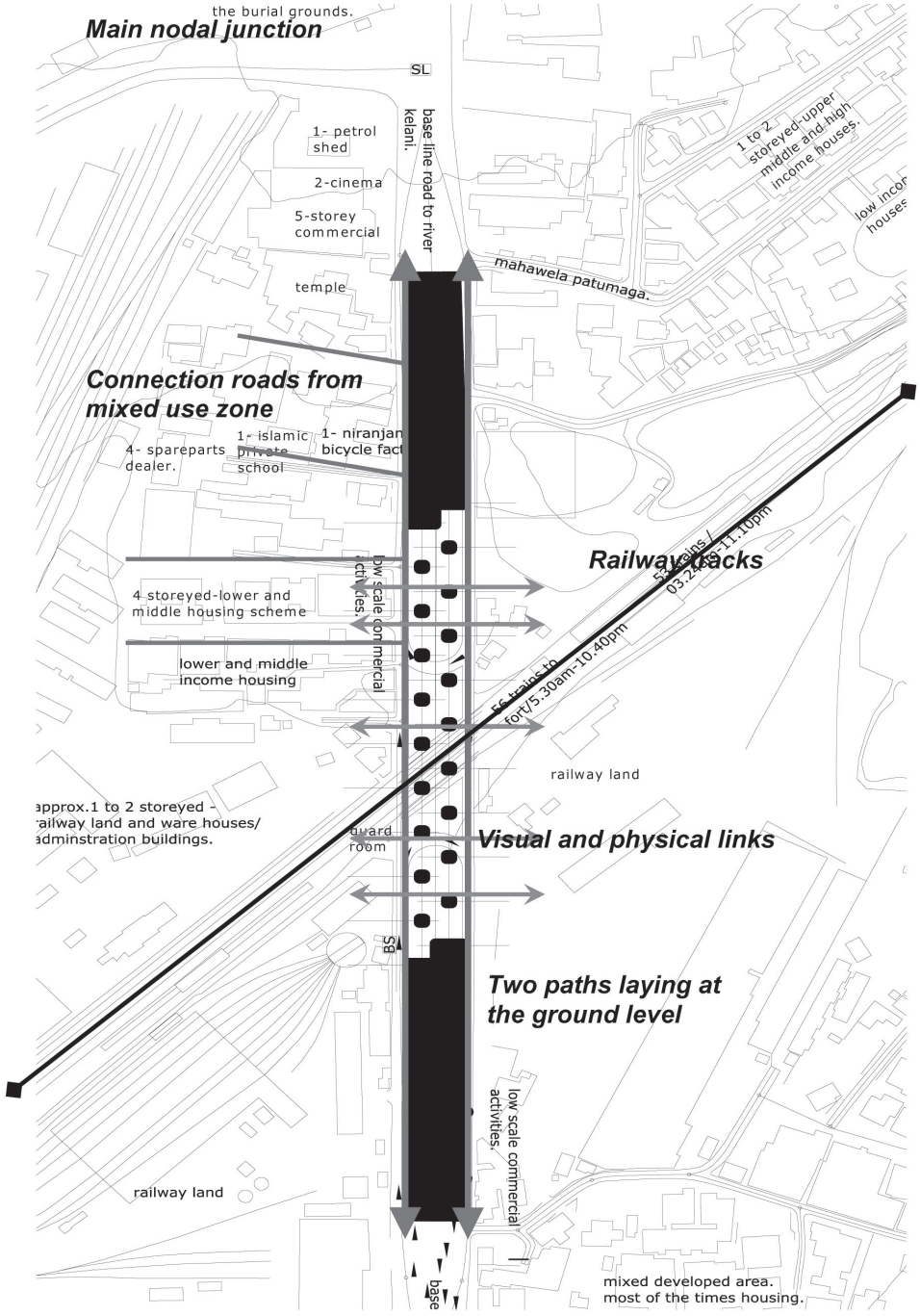
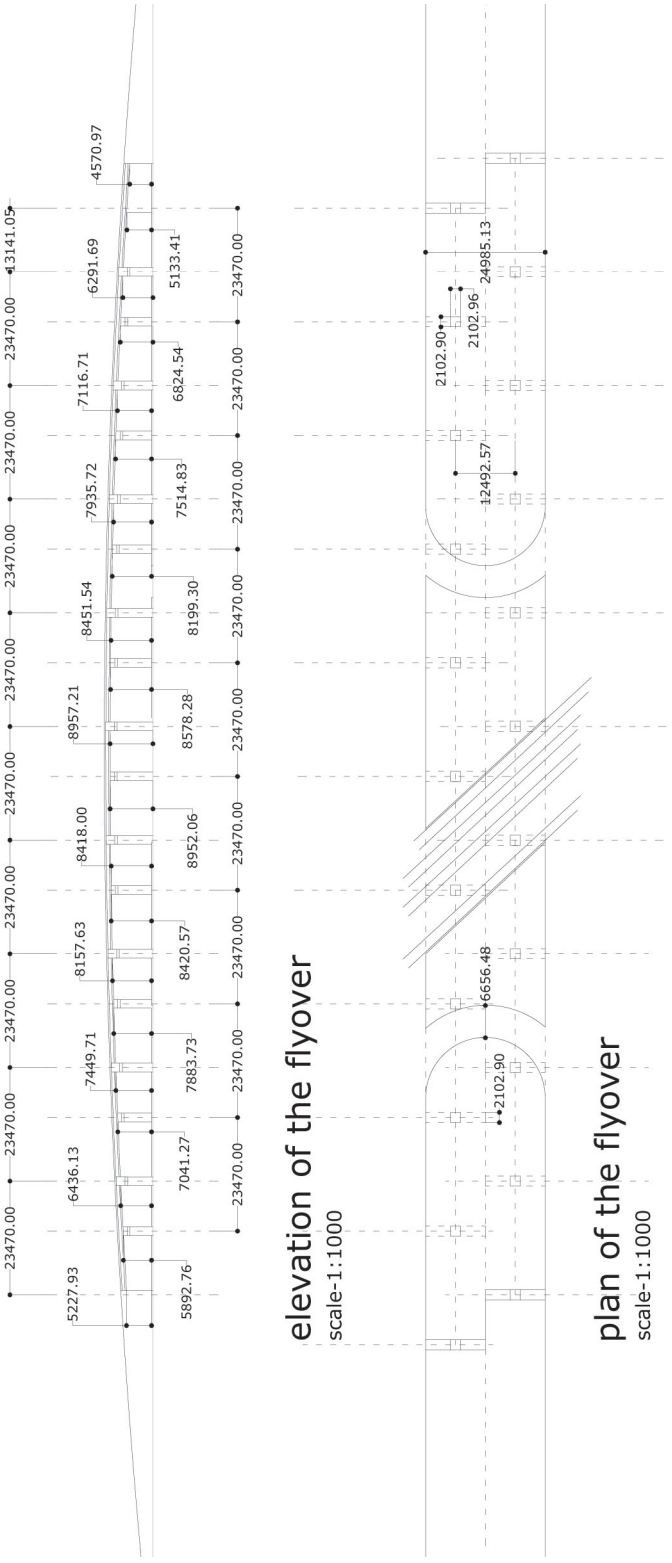



Fig. Layout and the connectivity of the neighborhood context oft the flyover

Figure of the Flyover

Fig. Section



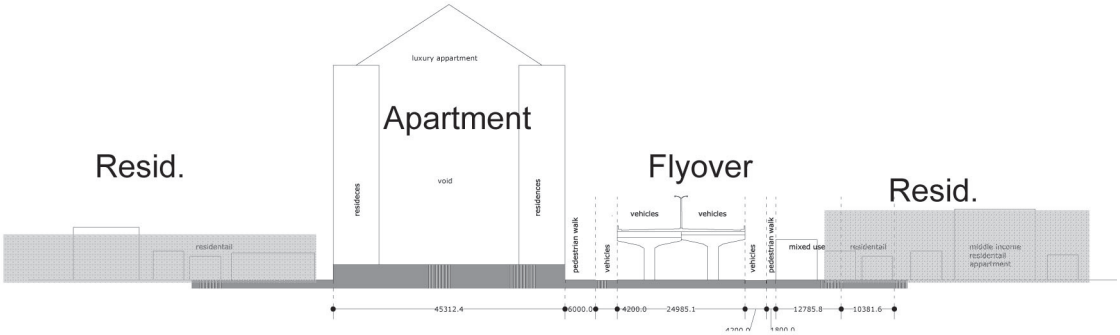



Fig. Section a cross the luxury apartment looking Demetagoda.

Considering about the section of the landscape it is evident that the flyover is more prominent than the luxury residential building. In the dominance of the height (vertical direction) is by the luxury apartment and the horizontal dominance by the scale of the flyover. Therefore the pedestrian activities are not getting any prominence.

**Expressions**

Instead of the railway, the functions that neighboured the flyover are the pedestrian activities, residential access and the small scale commercial activities as discussed earlier. They are not sophisticated but more expressive by its nature than the flyover. But the flyover is more dominant and a clear definite edge with concrete which makes the directional quality. But the access and the other activities are happening in a perpendicular direction. Even it has created lost spaces in the context used by those who live in street.

Considering the role play by the flyover in the Demetagoda landscape, it is evident that it is created and acts as a path. It has a clearly defined edge in two different dimensions; at the below level, on the ground and the above head which is inclining. It has an identity as a landmark though it is not dominant by the height but because of its function, scale and the structure.

Even though the functions like railway and the other means of transportation got together, there is no significant experience like gathering or breathing created by the landscape for people. Such spaces and the nodal character are not encouraged.

## Responsiveness of the Demetagoda Flyover to its Landscape.

**Permeability**

The Baseline road distinguishes the landscape in to two as mentioned above by its layout and function. Considering layout it has a clear definition of the edges created along as a demarcation for vehicular movements. The flyover also behaves in the same way. But it is having a three dimensional edge which inclines and declines along the base line road. This edge defines the path of the flyover.

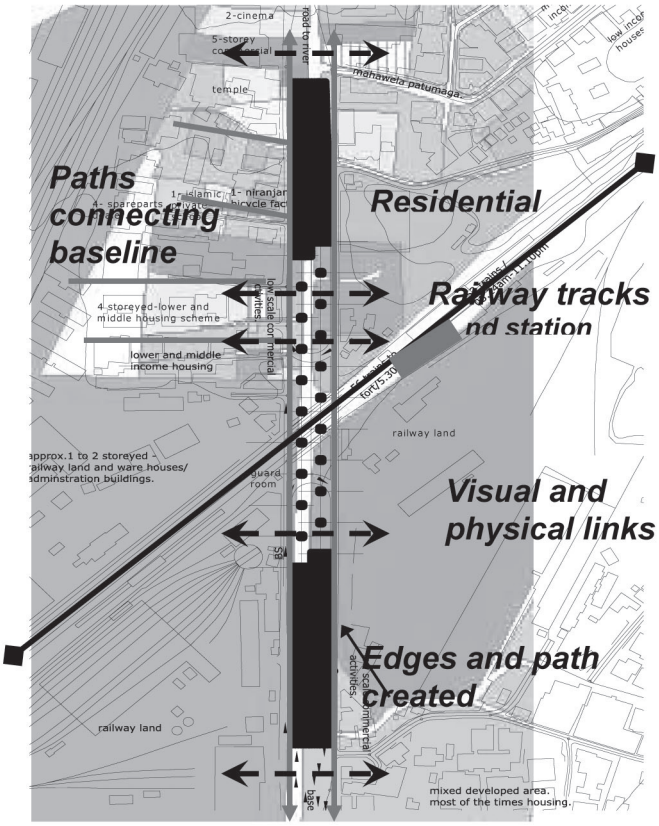



Fig.Merged Land Use map, Layout and the connectivity of the neighborhood context oft the flyover

This edge or the path created is not promoting the connectivity physically in both sides. The station is just hiding in the landscape without nay significance and it is more encouraged by the less permeability of the flyover and the activities around it. The paths which connect to the Baseline road are disturbed by the mass of the flyover as a barrier. Therefore the permeability has been discouraged in the landscape as they are not functionally, visually and physically connected.

"The second common cause of misalignment to the rest of the city was the sharp separation of a path from surrounding elements."(Lynch, p.56)

Flyover also encourages the directional movement and there is no response to the other directions. But it is necessary for the responsiveness of the landscape where there are many other streets. So the other directions will not get any clue or an influence to enhance the experience through the landscape.

The flyover structure lies along the road for many hundred feet and because of its three dimensional character; the edge which is elevated gradually from the ground disturbs the physical links with the surrounding, but to some extend the visual links are promoted with the voids underneath.

This visual barrier has already affected the residential buildings in the surrounding as the flyover get focus on their windows. So this visual barrier obstructs the view of the urban landscape as well as created arid view of the vehicles speeding and sound.

Because of the intensity of the dynamism of the activity; transportation, also enhances this separation and reduces

the permeability on landscape. Even the space created below it is not allowing people to be associated as it is a naked structural supports. That space can be an intermediate space for better connection with the both sides of the landscape.

**Variety**

Unlike the buildings, flyover is a special kind of a contrasting element. Within the whole landscape and enhances the variety by its form being contrasting. But it is hard to identify a functional variety which welcomes people to get involved. The form is derived considering the engineering of construction it is just a concrete mass with no variety in its form.

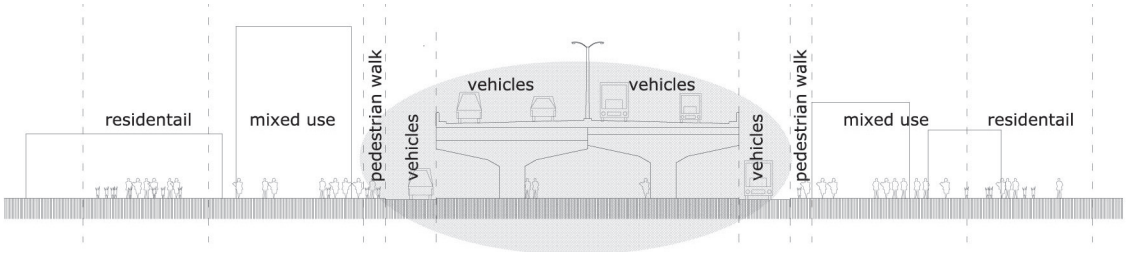



Fig. Typical activity flow of the landscape cross the flyover, section looking towards Demetagoda.

The using of the flyover by vehicles will make a different experience through the landscape because it facilitates the vehicles to pass above the railway and the neighbouring context at a higher elevation. The flyover can contribute to variety than the mere Baseline road laid along, because it keeps a structure in-between the two separated landscapes by the road at the ground level.

But it is not giving a glance to promote variety of activities connecting the both landscapes, though it is having the potential. It is possible to cross the ground laying roads as there is no much vehicular traffic and get involved with the activities happening there. The design of the flyover is not sensitive enough to do so. But such spaces are left for nothing. Therefore the spaces are not used by the people as it belongs to them. So it has created more leftover spaces in the context which is not acceptable in the urban context.

There is no contribution to the public activities because the dynamism of the context it over governing the people, all the priorities are set for traffic concerns and it is not penetrating though the spaces created under it.

Because of the heavy structure and the separation of the paths at the both sides of the flyover the space has been isolated. So people are not moving in to it gradually and therefore the activities are not taking place. But there is a potential promote in terms of railway activities. Even because of the length of the flyover (1635 feet), which is having the same character dissolved the variety of form and even the function.

Because of the directional quality of the flyover, and the traffic it is hard to see people are waiting and participating way side activities. But in front of the luxury apartment there is a 20 feet setback which creates a breathing space of the landscape. But it hardly contributes to the landscape because there are no other activities nearby to get the benefit of it.

Mobility of the pedestrian is lacking in the neighbouring context though there is a major railway station locates there as the flyover has diluted the variety of activities and the permeability of the urban landscape. The flyover seems to have no mutual compatibility with the context itself as it doesn't promote people to be close and to promote activities around it. There is no potential created for the neighbouring small scale commercial activities by the flyover. So they are isolated and they are struggling to survive and even the separations to the both sides of the road have adverse effects on these mutual interrelated functions.

**Legibility**

"The desire to separate the vehicles and the pedestrian routes makes both central and the suburban areas far less legible." (Bentley 1975, p.43)

The legibility of the landscape is having the negative and the positive effects from the flyover. According to Bentley as mentioned above with the separation of the different uses and the users the legibility has been damaged even considering the width of the Baseline road. The whole Demetagoda context, flyover as a landmark, is making landscape is more legible. But it is different considering the neighbourhood context since it disturbs, cut off the visual links and the physical access to the neighbouring landscape with the edge that it creates.

While travelling with a vehicle whichever the route takes; on the flyover or on the ground routes, when the flyover passes it evoke images about the different links and the places associates with the place. So it makes a legible image to some extend with the distance landmarks and the view of the connecting routes which can be perceived.

But the people who are on the ground are disturbed visually for having neighbouring links by the built masses.

The landscape seems like it is squeezed by the issues of the traffic and the human congestion. So the public relevance is not considered in the landscape. Even there is no legibility of the activities as it is not visually and physically well connected through the space under the flyover. The railway station seems a hide out which is not legible at all as it is neglected by the flyover. So it is evident that it even didn't give clues about the activities surrounded or about the experience of the landscape.

**Robustness**

There are activities around the flyover with different scales; residential, commercial and religious which are more relate with pedestrian. This diversity of the activity can be even seen from the land use map of the context. The flyover as it creates a visual and a functional barrier for those activities and because they are separated without any physical access. Therefore the basics of robustness are ignored. But there is a potential for improving robustness by connecting all the activities around through the leftover space with the column structure and it was not considered. But now the space under the flyover is a vacuum which is not promoting any positive activity in terms or responsiveness of the environment.

The definite edge of it is not creating a potential for the activities to link with each other or to make relationships with the structure itself. The structure is having texture created purposely to drop the weight in visual means but the expressionless nature of the front is avoiding people as barrier. The streets which connect the baseline are not connected through the space under even with visual links which enhance the functional nature of the space. So the flyover is over governing and the robustness is lacking there.

Fig. The edge of the payment is creating an activity barrier which reduces the flow of the activities.

Along the foot walk by the sides of the flyover at the ground level, the activities are having a communal nature. They are small scale commercial activities and the residential spaces. The activities are not limited to the interiors but they are happening in the outside of the built environment too. This is positive in terms of robustness. But the flyover is a separate element by its expression and it is not supporting such activities.

Even because there is no much space between the pedestrian path and the edge of the flyover there promotes only the movement in one direction and this is negative in terms of robustness.

The layout of the flyover seems that it can be developed to gain the large scale robustness as Bentley reveals. The space under the flyover can be detailed with different links to it and make the public activities happening there. But the designing of the flyover have no options for such which enhance the responsiveness of its structure. Therefore it is clear that the flyover merely thinks of the functionality of the traffic flow because there is no potential that it created on the urban landscape to be meaningful or responsive in terms of people.

**Visual Appropriateness**

At the first sight the flyover takes a much important position in Demetagoda landscape being a landmark as well as a contrasting structure because of its scale and the function. Visually it is a single object, a dynamic structure which runs through the landscape.

The visual appropriateness can be analysed in different ways as Bentley mentions; by its form in terms of legibility, supporting variety, and robustness.

The form of the flyover is not complex and it is easily graspable. But it is monotonous along the full length of the structure as it repeats the same elements again and again.

The colour of the structure is grey, which is fare faced, and there is no special variation in its colour. The textures and colours make the structure more solid, heavy and less contrasting. But because it depicts its functionality or the use, with its form it is quite legible. The appearance of the flyover seems like an elevated road and even the colour of it is matching with the function of it but in his context it relates with a community living under it. The use of the spaces below is also to be considered. Therefore the visual appropriateness is a vital concern.

Considering about the neighbouring context it is low scale built structures and more community oriented and some are religious. The flyover is being the focus from such spaces. But the structure hasn't paid any concern on it. The rigid, formal dull, impression of the elevation of flyover is conflicting the context by contrast and in its scale even.

As analysed earlier it is evident that the flyover is not promoting variety by its form. It is just a concrete structure which stands on the pillars which are repeating at 24.7m. But with the form the activity is not conflicting which is positive in terms of visual appropriateness.

Though there is a potential to develop robustness in the context the flyover and the spaces it created haven't looked in to it. So the robustness of the landscape is discouraged and the activities are happening individually though they are supportive to each other.

Considering about the public sight, the façade of the flyover is not identical, as it runs along the direction of the movement. But for the pedestrians it is much important as the flyover starts people have to walk along a narrow path which is demarcated by the façade of the flyover and the boundary of the lands of the context.

The façade of the flyover transforms to void which is with columns in-between, from the solid wall of the ramp. Repeating column structure as the flyover flies at a higher elevation creates a leftover space with no function identified. This space is presently used by the beggars and for informal activities and it would be negative in terms of visual

appropriateness.

The columns can be identified with different heights but the similar in all the other measures. So it creates a façade with different relationships even here the elements are same. Even as it disturbs the view of the bedroom in flats as discussed earlier, the visual appropriateness of the total landscape has an impact.

**Richness**

The richness has two main factors; the orientation of the surface and the position of viewing.

Flyover at Demetagoda has its surface oriented along the moving direction, and has no much contribution to the landscape because there are no prominent (obviously seeing) visual angles towards, because the viewing distance is the width of the side roads and the pavement which is almost 20 feet. Even the pavement, where the people are behaving and seeing, is nearly 6 feet. So there is no much space to stay an experience the façade of the flyover.

But the treatment of the surface of the bare skeleton in the middle of the road is not considered. The repetition of the same column with different heights is the only objects which catches the eye.

The detailing of the columns expresses the huge strength that it has but the masculine appearance of it is by pure geometric forms and they have no expression of the location where it stands, activities happening around and the people who live there. To reduce the weight of the columns, strips are carved on it in the vertical direction. This can also be seen on the ramp ending wall.

Rhythms of changing height of the columns are not much significant. The whole structure seems one thing altogether and there is no much to be experienced by the people who bound with the landscape because they experience the whole one instead of each element.

The material of it is expressed by exposure in fare face. Fare faced concrete and the rough, rustic look of it is not contributing to the richness of the environment as it is not detailed well but expresses it as a stubborn concrete giant.

Even the flyover is not creating any positive sensory experience so the spaces are dull and abandoned. But in the side walls on ramp are treated with different patterns to dilute the visual impact. The concrete panels are used on wall to create a vertical pattern with two different textures. One panel is pain with no texture and the other is with trips carved on it in the vertical direction. But  the expression of the ramp will b experienced as a single solid where the texture of the panels are not making such an contrast on surface.

Considering about the distant experience it is much interesting in its form. But when it is closer the flyover is dumb. There is no play with the visual elements which makes visual complexities, visual riddles, and interpretations which enhances the rich ness.

**Personalization**

The analysis is based on the contribution of the flyover on landscape regarding the personalising of the spaces in it. The structure of the flyover has two main figures; the solid ramp and the see through column array. Therefore the more potential is in the space with the columns as it can contain people and activity. The width of the space under is 82 feet, and the height varies between 12 feet to 29 feet approximately and columns are at 27.4m c/c in a single row.

It is not possible to consider about the personalization of the flyover by the community as it is separated with the edge, which is not penetrating and discourage people from accessing, created by the paths at the ground level. The space is not used by the people effectively in a meaningful way the space has became a lost space in the landscape.

Considering about the elements that are under the flyover it is too rigid and solid with no variation. The less public access is vital but even the similar elements with no variation and visually not aesthetical has also deserted the space with no personalization. It seems nobody’s space and socially not related.

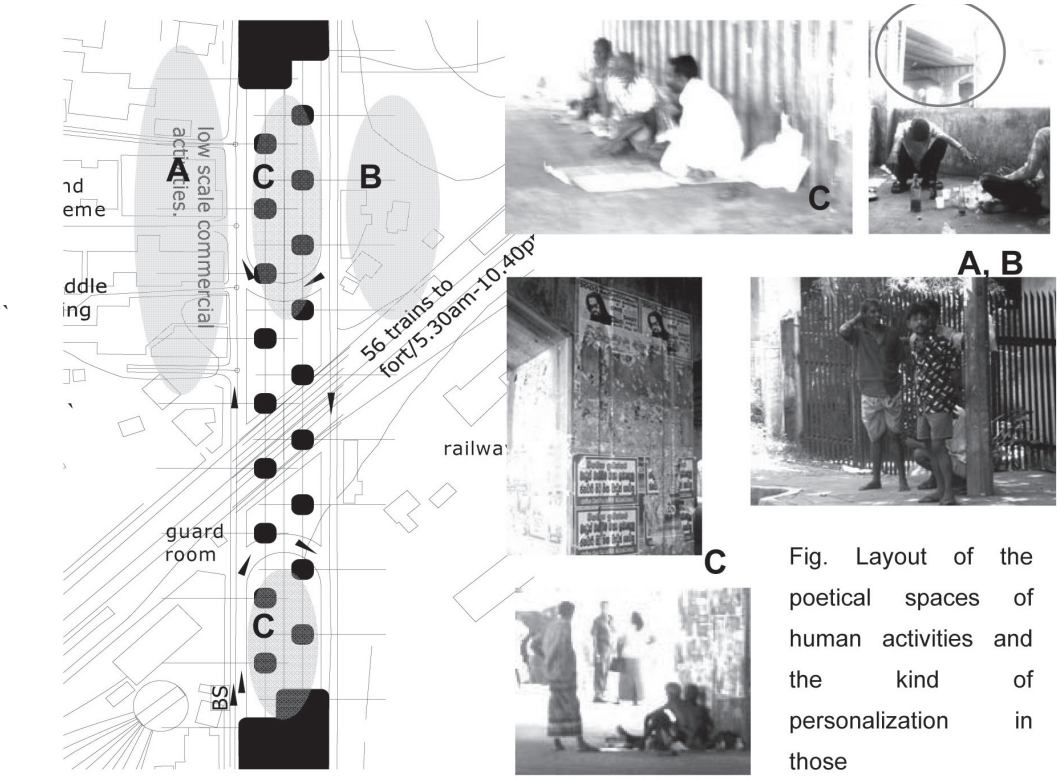
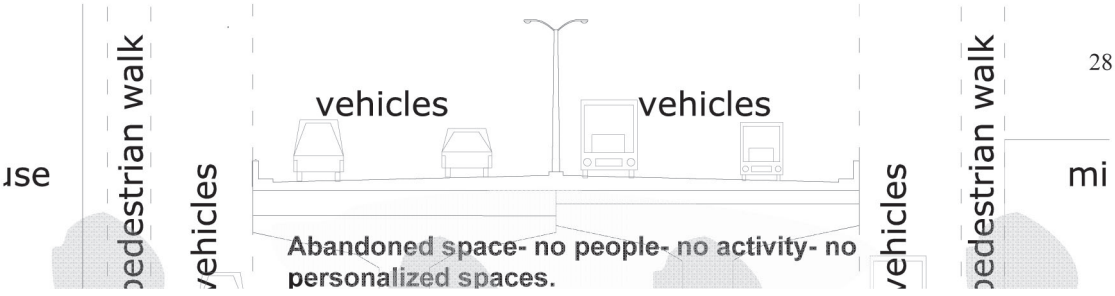



Fig. Layout of the poetical spaces of human activities and the kind of personalization in those

Considering about personalization it is vital to cater a considerable variation where different people from different backgrounds will feel to be involved. But the regular location of the elements with the same character will dilute this special quality. Because it is equal everywhere but the people are not. This sort of issues are evident in the in the history where the modern landscape was deserted because it was inhuman and so contribution to be personalized with its clear edges and dominating quality.




Even considering about the immediate context it is contrasting being regular and definite in its form so people will not feel belongingness, therefore they avoid such spaces. Even considering about the immediate context it is developed with human activities but no pre-consideration or a plan. So it is more informal and the materials also not very hard. Therefore such spaces encourage people to keep their stamp on such.

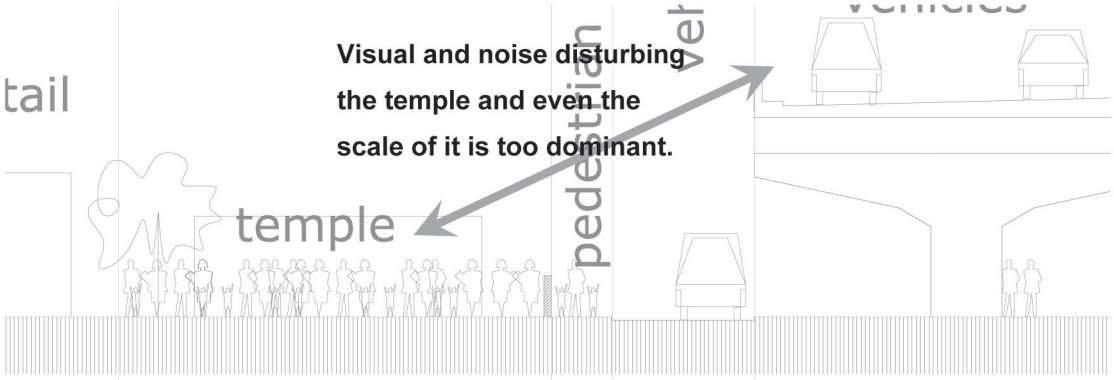



Fig. Personalization is disturbed; Socially important spaces of the urban landscape and the flyover are conflicting with activities and even with scale and form.

The spaces in the urban landscape around the flyover are become hard to personalise since the flyover is overlooking to those. The temples are the most damaged since the flyover damaged its spatial properties with religious consideration. It also disturbed the views through bedroom windows of residential apartments.

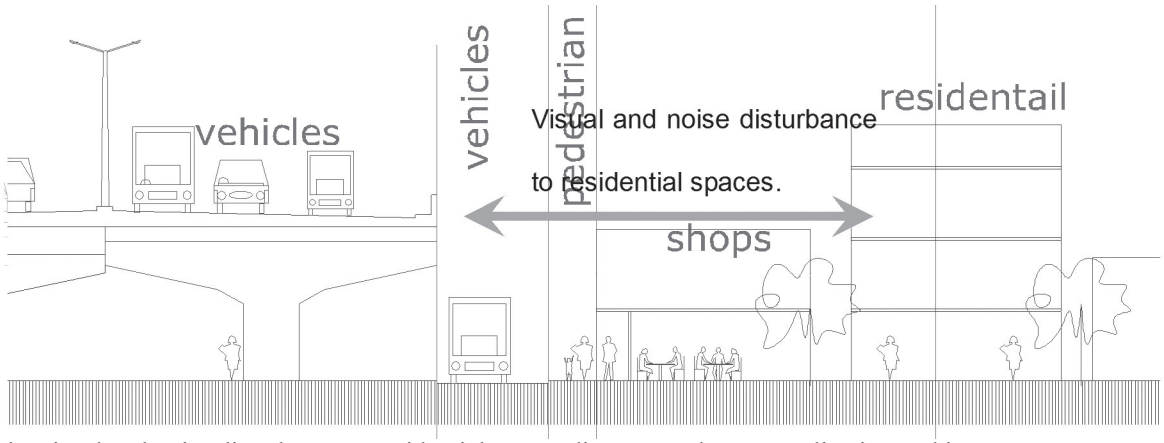



Fig.Visual and noise disturbance to residential spaces discourage the personalization and improve more stress.

**Conclusion**

The flyovers are vital in the contemporary urban contexts as another stage of the evolution. With the growing population and the activities the mobility considered important. Flyovers as a solution to the less efficiency of functions prove that it enhance mobility and reduce congestion.

It is true that it enhances the accessibility of two points and it has neglected the environments of the urban landscape in-between. Though it is the responsibility of the engineers, it is crucial when it is erected on the landscape, since conflicting with the responsiveness. According to the analysis the flyover is enhancing the legibility of the context as it is contrasting in the urban landscape as a landmark which will be experienced at the ground level as well when it is using. It is positive to some extent but the adverse effects are more because it the lack of the sensitivity in it.

The urban landscape is a social responsibility where people celebrate the urbanity. So the flyovers must be responsible and sensitive enough to be responsive towards them being meaningful. Though legibility is improved by

its form, physical and visual permeability, and the nodal activities are discouraged. Therefore the considered legibility is very less and inappropriate. Considering about the elements of it and the space that it creates, there is much more potential for those being deserted if the flyovers are not thought in terms of environment responsiveness. The lessons of such urban issues can be identified form the history where people abandoned spaces in such landscapes.

Though the structure is primarily derived based on the Imagineering of the engineers, the spaces created and the form must be with a sensitive architectural thought and the positioning of should be evaluated by the planners as well as the urban designers. Even the form of the flyover as well as the elements of it is to be detailed and designed in a way to achieve environment responsiveness.

But in the present context considering the responsiveness is more critical having many diverse effects on the responsiveness. People are discouraged to perform their public life and it has added more tension to the landscape because there is less responsiveness. At the same time the activities around also was disturbed and the created barriers to the potential of robustness and the legibility.

As the urban context is getting more tensed day by day it is important to have more responsive spaces and the structures which are coming to the urban landscape must be well thought and designed according to enhance the quality of the landscape.

Bibliography

Alexander, Christopher -A New Theory of Urban Design, Oxford University Press, London, 1987.
Bentley, I -Responsive Environments, The Architectural Press Limited, 1985
Carver, Norman F. -Iberian Villages, Portugal and Spain, Documan Press Ltd, Michigan, 49005.
Editor -Design for High Intensity Development, Cambridge Press, Massachusetts, 1986.
Evensen, T.T -Archetypes of Urbanism, Scandinavian University Press, Norway, 1999.
Grove, A.B. -City Landscape, University Press, Cambridge, UK, 1987.
Hayden, Dolores. -The Power of the Place, MIT Press, Cambridge, Massachusettes, London, England, 1994.
Hayward, Richard. -Making Better Places, Urban Design Now, Butterworth-Heinemann Ltd, Oxford, 1993.
Jellicoe, Geoffrey -Designing the New Landscape, Thames and Hudson Ltd, London, 1992.
Kostof, Spiro -The City Assembled, Thames and Hudson Ltd, London, 1992.
Kostof, Spiro -The City Shaped, Thames and Hudson Ltd, London, 1991.
Krier, Rob -Urban Space, Academy Editions, London, 1984.
Lynch, Kevin -Image of the City, MIT Press, 1979
Peel, Lucy -20th Century Architecture, Grange Books, London, 1996.
Relph, Edward -Modern Urban Landscape, John Hopkins University Press, Baltimore, Maryland, UK, 1987.
Shultz, Norberg Christian. -The Concept of Dwelling, Rizzoli International Publications, Inc, New York 1985.
Tugnett, Anthony -Making Townscapes, Bath Press, Bath, 1987.

# URBAN RESETTLEMENT FOR PUBLIC INFRASTRUCTURE A KITCHEN APPROACH

Urban infrastructure in over the world have almost same problem, which is land and people resettlement. Jakarta as urban city also have same problem, but with new approach leadership from our Governor Joko Widodo, those problem solve partially. To resettlement people Governor use “kitchen approach”, which source from Indonesian Culture. This approach now globally well known and became famous.

Megacity of Jakarta located in an island name Java, positioned almost in the center of Indonesia. Jakarta consist of :

1. Area 662.33 sq.km (land) dan 6.977.5 sq.km (sea)
2. 12 million people in day and 9.61 million people in night.
3. 13.157,63 people per sq.km
4. Urban growth 1.42 % per year
5. IPM 2011 = 77.85
6. Economic Growth in 2011 : 6,5 – 6,7 %
7. Road Ratio 6.25 %
8. Water infrastructure ratio 3.2 %
9. Pipe Water coverage 63.5 %
10. Waste Water Coverage 3.37 %
11. Solid Waste production per day 27.906 cu.m and lifted only 23.698 cu.m per day (85 %) in 2010.
12. Open Green area 9.9 %

Those fact made Jakarta very complicated since became Indonesia most favorite address to live in. Main issue for Jakarta can be divided with :

1. People, since Jakarta have 9.6 million people in night and if added with the satellite city will be 28 million people will result massive mobility 29.1 million trip per day, traffic, pollution, crimes, etc.

2. Transportation, city infrastructure and public transportation cannot build faster than urban growth, and also Jakarta was not design for 12 million people, this result people travelling by personal vehicle.

3. Flood and water resource.

4. Houses.

5. Enviromental
6. Disaster and global weather change.

Build an infrastructure in Urban City always have problem with land acquisition since almost every land in the city already build and own by private. Jakarta has many function for a city beside as a city him self, the function are :

1. Jakarta has function as National Capitol City
2. Center of Trade
3. Center of Economy
4. Home of Foreign Embassy

Those function made Jakarta have many stake holder to maintain, with different requirement. The requirement from each stake holder sometimes opposites, for example to maintain economic growth investors request to build more building like mall, office tower dan others, but with build more building can result more problem like traffic conjection, pollution, flood, etc those mean city must build more infrastructure.

**JAKARTA INFRASTRUCTURE PLAN**

Indonesia as most growing

1. Mass Rapid Transit (MRT)
2. Airport Commuter Line.
3. Jakarta Monorail
4. JEDI (Jakarta Emergecy Dredging Initiative)
5. Pond revitalitation.
6. Pesanggarahan, Angke and Sunter River Revitalitation
7. Ciliwung River Revitalitation
8. Jakarta Multi Purpose Deep Tunnel

9. Jakarta Coastal Defence
10. Reclamation
11. 6 Inner City Toll Road
12. Jakarta Outer Ring Road 2
13. Port Access Toll Road
14. DKI Jakarta Sewerage Development Project.

## JAKARTA MAIN PROBLEM FOR INFRASTUCTURE DEVELOPMENT

**1. Land.**

More than 85 percent land in Jakarta already build and owned by private sector, its mean if government want to build infrastructure must buy these land. Land acquisition if no people live above it will not be a problem, but in urban city like Jakarta almost every inch live people above it, than its mean very big problem. Even government have budget to pay the land and also everything above it, its not guarantee. This will cause social problem even can become national problem.

**2. Infrastructure asset**

Infrastructure in Jakarta own and manage by Indonesian Government and Jakarta City Government which also have a separate budget. Regulation and law stated forbidden to expense maintenance for any asset not owned. Since Indonesian Government must build and maintenance all Indonesia, and also other province need more infrastructure than Jakarta, this make Jakarta less priority than other province. Problems are not build new infrastructure, but to maintain the existing infrastructure this mean Jakarta City Government not allowed to maintain infrastructure owned by Indonesian Government. For example 13 main river passed Jakarta according regulation their asset owned by Indonesian Government, flood in Jakarta 85 percent sourced from 13 river.

**3. Procurement.**

Even Jakarta have budget in 2013 about 50 zillion rupiah or about 50 billon USD, but regulation for spending money specially for infrastructure is very complex, for smooth purchasing process it will take 21 days to complete. Every purchasing from Jakarta City Government must be in the budget in year of purchasing, this mean if we planned this year than only can purchase next year. So people need to wait their problem can be solve next year.

## SOLUTION FOR THE PROBLEM

**1. Regulation on Land Purchasing.**

Land purchasing is became complex problem for Infrastructure development, since almost all infrastructure development need land, and specially in Jakarta always create problem. Indonesian legislative create regulation number 2 year 2013 about land purchasing for public infrastructure, which make land purchasing a clearer regulation.

**2. Kitchen Approach for land resettlement**

Governor Joko Widodo almost every day meet Jakarta Citizen to persuade and need almost 10 time lunch/dinner with citizen who need to relocate. Jakarta City Government build low class apartment for every citizen relocated. In result in almost all over Jakarta has been Revitalization with almost no problem. Now this methods creates very positive energy to infrastructure development, and almost all giant infrastructure development starting even development which impossible to start in past. Now Jokowi way became famous in the world, try to search Joko Widodo in Internet and can

be found almost million pages, from what Governor did and will doing in future. Governor approach for infrastructure development has studied by other city, specially urban city to develop their city.


In conclusions infrastructure development in urban city Jakarta, not only need money or budget there is a lot thing cannot buy by money, and people can be very persisting to give their right. A human approach need to resolve it, and Jakarta City has new method “kitchen approach”, this approach only cost hundred dollars to resolve multi billion dollars project and for millions of people.

# Rescate de Espacios Públicos en Azcapotzalco

Sergio Palacios Trejo

La Ciudad de México es primer lugar en Desarrollo Humano, transparencia, promedio de escolaridad, acción climática, perspectiva de género, derechos humanos, inversión pública, inversión extranjera, inversión privada, en expansión de infraestructura, en calidad del espacio público, como destino turístico, investigación científica y en competitividad.

Avanzar en la construcción de una ciudad progresista, de derechos y libertades, de desarrollo humano, de espacios y tendencias comunitarias, de inversión e innovación. En pocas palabras una ciudad de vanguardia en México y en el mundo.

El más grande y denotado esfuerzo estos años ha sido el de equidad, a combatir y reducir la barbarie que es la desigualdad en México.Buscamos la equidad como una filosofía política, es una visión de la sociedad y es la política pública principal que nos anima.

La izquierda ha construido en estos, ya 16 años, la ciudad más avanzada del país y así lo han evaluado los ciudadanos de esta que es la sociedad más crítica y exigente del México: este gobierno 2012-2015 es, también, progresista. Hace 10 años que la izquierda gobierna Azcapotzalco y ha dado resultados extraordinarios con nuevas formas de hacer política para la equidad y el desarrollo económico.

Azcapotzalco, es considerada territorialmente como la delegación más pequeña de las 16 que conforman el Distrito Federal cuenta con una población de 414,711 habitantes, lo que representa el 4.69% de la población total de la Ciudad de México.

Desde que entré al gobierno el 1ro de octubre de 2012 incluí en el Programa de Gobierno Delegacional 2012-2015, varios esfuerzos encaminados hacia la recuperación de la calidad de vida de los habitantes de la demarcacióncon "Ejes" de acción en las diversas Direcciones que conforman mi administración.

En cuanto a la "Calidad de los Servicios Urbanos y la Infraestructura Pública"de esta Delegación, la Dirección General de Servicios Urbanos, a través de sus diversas direcciones ha emprendido las siguientes acciones:

- Programa de reforestación de áreas verdes, efectuando así la plantación de 150 árboles, 10,200 arbustos y 4,336 plantas ornamentales.
- Se ha dado continuidad al mantenimiento integral de cerca de 1,500.000 m2 de áreas verdes que integran los parques, jardines, Alameda Norte, Parque Tezozomoc, avenidas, camellones y remanentes. Proporcionándolo en 5´954,726 m2 (se realiza en varias ocasiones).
- Mantenimiento de 54 fuentes ornamentales de la demarcación.
- Creación del Parque de Bolsillo con una superficie aproximadamente de 300 m2 en la colonia Nueva Santa María, Eje 2 Norte esquina Membrillo. Acción que es relevante y propicia la calidad del aire de nuestra ciudad en conjunto con las acciones emprendidas durante la actual administración del Gobierno del Distrito Federal
- Remodelación del Jardín Hidalgo con una superficie aproximadamente de 10,000 m2.

El objetivo de este "Eje de Gobierno" es mejorar la calidad de los servicios urbanos que ofrece la delegación; implementando procesos de atención eficaces, que permitan la mejora en los servicios, a su vez que estos impacten en

la calidad de vida de sus habitantes. Asimismo se ha establecido como meta durante los dos primeros años rehabilitar el 70 % de luminarias y durante el tercer año cubrir el 30 % restante.

Se han atendido las solicitudes ciudadanas, rehabilitando el alumbrado público de zonas residenciales, unidades habitacionales, estaciones de transporte colectivo metro, avenidas principales, parques, jardines y paraderos de autobuses con el objetivo de trabajar conjuntamente con los órganos encargados de la seguridad pública y así ofrecer tranquilidad a los ciudadanos de la demarcación, al mismo tiempo que se refuerza la seguridad para zonas comerciales y negocios locales, lo cual impulsa el desarrollo económico del territorio delegacional.

En materia del manejo y recolección de basura, Azcapotzalco ha instalado "Contenedores Soterrados", esta es otra acción que se ha implementado en 26 colonias de la delegación, entre las que destacan: UH. Tlatilco, UH. El Rosario, Hospital La Raza, UH. Francisco I. Madero, UH. Miguel Hidalgo, Colonia Ampliación del Gas, Col. Ampliación San Pedro Xalpa, Col. Pueblo San Martin Xochináhuac, entre otros.

Se promovió la instalación de 100 contenedores a la mano donde los transeúntes depositarán sus residuos separados en orgánicos e inorgánicos, actualmente estos contenedores están colocados en Parque de la China, Parque Revolución, Parque Cultural Recreativo Tezozómoc.

Se implantaron programas para la recolección de árboles de navidad, con la finalidad de operar un proceso de trituración para la generación de composta, misma que se utilizó para la reforestación de zonas verdes de la demarcación.

De esta forma todas las áreas dependientes de la Dirección General de Servicios Urbanos trabajan integralmente para alcanzar el bienestar social y calidad de vida de los habitantes de la Delegación Azcapotzalco.

La política de desarrollo económico determiné bajo la convicción de que para lograr un desarrollo económico local es importante que los actores productivos, académicos, civiles y gubernamentales, propongan e impulsen programas y proyectos económicos de vinculación y cooperación.

El Programa Delegacional de Desarrollo Económico, Cooperativo y Sustentable cuenta con 3 ejes estratégicos:

- Eje 1: Fortalecimiento del capital humano para el uso intensivo del conocimiento.
- Eje 2: Impulsar el conocimiento, la innovación y la cooperación para la creación de valor.
- Eje 3: Impulsar el desarrollo económico con criterios de sustentabilidad.
- Eje Especial: Participar en la atractividad regional para la inversión de capital.

Para participar en la atractividad regional para la inversión de capital. La delegación Azcapotzalco se propuso coadyuvar con el Gobierno del Distrito Federal en la transformación de la demarcación en un polo de inversión y reactivación económica que permita la implantación de complejos planificados de inversiones (distritos, parques, corredores, zonas industriales de empresas) y propicie la generación de empleos.

Con información del Censo de Población y Vivienda 2010 del Instituto Nacional de Estadística, Geografía e Información (INEGI), el 45.19% de los habitantes de Azcapotzalco, es Población Económicamente Activa.

De acuerdo al Censo Económico 2009 del INEGI, Azcapotzalco cuenta con 17,166 Unidades Económicas, de las cuales, el 45.23% son unidades económicas dedicadas al comercio al por menor, 12.69% a los servicios de alojamiento temporal y de preparación de alimentos y bebidas, y sólo 9.92% a la industria manufacturera.

A su vez, los sectores que mayor inversión representan para la demarcación son: Corporativos con una inversión total por 2 mil 683 millones 531 mil pesos, la industria manufacturera por 2 mil 245 millones 369 mil pesos, y el comercio al por mayor por una inversión total de 1 mil 4 millones 586 mil pesos, es decir, estas inversiones representan el 36.71%, 32.09% y 13.74% respectivamente del total de las inversiones hechas en la delegación.

Azcapotzalco se caracteriza por contar con una de las zona industriales más importantes del país: “Zona industrial

de Vallejo", la cual ha sido factor en la economía nacional, impulsando empleos y siendo la puerta de acceso a economíasde países hermanos y grandes empresas trasnacionales que ven en Azcapotzalco un lugar predilecto para la inversión, ya que además de contar con dicha zona industrial, existen grandes centros de logística como "Pical Pantaco" ubicado en la zona central de Azcapotzalco y "Ferrovalle" el cual, es una terminal de trenes de carga, lo que representa un beneficio en costos de traslado, teniendo una conexión territorial envidiable, optimizando la distribución y logística de las empresas.

Los pasado 6 y 7 de mayo de este año, recibimos a una delegación de funcionarios y políticos Chinos del Distrito Popular de Xicheng, Beijing. En un sólido iintercambio de experiencias en planeación, desarrollo urbano, deporte, cultura y turismo. En conjunto con el fideicomiso del Centro Histórico el Jefe Delegacional recibió con la Autoridad del Centro Histórico a la misma delegación de Xichengpara el intercambio de experiencias de preservación y protección de centros históricos.

Como resultado del interés mostrado en la políticas públicas que desarrolla la Delegación Azcapotzalco, hay una invitación expresa del distrito de Xicheng, Beijing para realizar un hermanamiento ya que ambos lugares pertenecen a las capitales de ambos países.

Celebramos este hecho ya que encontramos vasos comunicantes entre ambos lugares, coincidimos en que el intercambio cultural, de negocios y de políticas públicas de frutos para nuestras comunidades, ciudades y países. Ya que México y China son países con vocación cultural y de amistad que ya los hace hermanos.

Sergio Palacios Trejo
Jefe Delegacional en Azcapotzalco

Azcapotzalco, Ciudad de México 30 de septiembre 2013.

# The Construction of City Underground Pipe Network is One Important Part of Beijing Development

Zhenzhen Chen
(Beijing University of Chemical Technology,
Beijing association for productivity society)

[Abstract] The construction of city underground pipe network is the lifeblood of city economic activity and lives of people. With the rapid development of Chinese economy, the progress of urbanization has become fast. Urban and rural integration has become an important part of city development, which makes the construction of city underground pipe network face with a severe test. This paper mainly aims at the main existing problems of pipe network construction in the progress of Beijing urbanization. The city pipe network construction and management are analyzed, and the development trend of city pipe network construction is expounded.

[Keyword] underground pipe network; common channel; integrated management

Underground pipe network is the important infrastructure in the city, which is the lifeline for the survival and development of the city. It is responsible for a variety of energy transport, information transmission, all kinds of waste discharge function, including water supply, drainage, electricity, communications, gas, heating, industrial and other multi class and multi ownership management. The complex layout of pipeline network is the basis for the survival and development of the city and it is an important guarantee for people's normal production and life. Establishing scientific, complete, accurate underground pipe network construction is the basis of city planning, construction and development. Moreover, it is the objective requirement of full utilization and reasonable development of city underground space. With the rapid development of economy, the bearing capacity of public infrastructure of the city is to adapt the city construction has become the focus of people's attention, which is a exploit of 'power in the contemporary, but benefit for the future generations'. However, underground pipe network construction, information management and repair and other issues still exist in the construction of city development. What's more, the impact on the city life is not to be ignored. For example, on the afternoon of June 23, 2011, Beijing suffered rare torrential rain in recent ten years, leading to multiple sections of water seriously. On the night, the Beijing traffic is completely paralyzed. The city drainage system was facing a hitherto unknown challenge, various problems have surfaced. The various problems of pipe network construction have begun to exposure, and the contradiction is more prominent, which has become a barrier of city public service facilities. Therefore, to resolve a series of problems of the underground pipe network is imminent.

## 1. The existing problems in the construction of underground pipe network in Beijing at present

### 1.1 The underground pipe network layout is disordered and lack of planning, and the phenomenon of 'mind the business respectively' is seriously

With the development of economy, city size and population density in Beijing city are increasing, which gives more and more pressure to the public facilities in the city. As the center of the city life, the underground pipe network is bound to face greater challenges. In order to better adapt to and meet the continuous development of people's life demand, the government increases the burden of city infrastructure virtually. In the research process of negative

aspects about underground pipe network the nozzle set is too much and the setting rules are confused. The basis of administrative departments are all into one system respectively, for the reasons of being lack of coordination, cooperation between each other, which is one of the important problems of underground pipe network construction in Beijing city. At every crossroads intersection, this problem is particularly serious. In some sections, even in three steps or five steps, you can see a well lid. In a word, ten meters are well lids. It can affect the car driving. What makes it worse, it will cause road loosening, sinking and bumpy after a long time. When it becomes serious, unexpectedly the base is broken and the well wall is collapsed, which is often causing damage to the vehicle, and causing traffic accidents. Moreover, vile character stealing manhole cover still exists despite of repeated prohibitions, which brings great harm to the citizens' personal safety. For example, at the crossroads of the Olympic Park, all kinds of underground pipeline exports are amounted to 17, like sewage, rainwater, telecom, Unicom, electric power, transportation, which arranged in a crisscross pattern. When you stand on the road, it is almost covered with a variety of composite manhole covers of underground pipe network under your foot. The density of underground pipe network of Beijing City is more and more large. Although the city planning in some individual places, it is comprehensive from urban system, land scale, garden green space, landscape and environmental protection to the municipal engineering, but the network planning especially the detailed planning pipe network is not very good, result in disorder and low efficiency of pipe network construction. First of all, because there is no municipal unified design and construction, pipeline owners often dig ground and bury lines respectively. A road is often digged and buried repeatedly. Repeated construction affects traffic, and it is inconvenient to repair and reconstruct pipeline. The construction of the pipeline brings the huge economic loss, caused by water, power, gas and communication block. For considering the traffic, if any one of the 17 nozzles in the underground pipe network has a problem, a traffic warning will be set, resulting in circuit repair and traffic flow, which brings greater pressure to traffic jams of Beijing City. Secondly, the underground pipe networks are all into one system respectively and the pipeline networks has not built effective quarantine measures. Due to their different bearing capacity and service life and so on, this buries pipeline accident. It is worth to think that water pipe network has a relationship with electricity pipe network. Obviously, if a leak of sewage of the city like groundwater net happens, it will bring great challenges to electricity network security. For example, in the summer of 2011, because of storm water overflowed the road, causing electric leakage phenomenon, lead one of the citizens to electrocution. Therefore, solving the city safety problems has become a prioritized problem among too many problems.

**1.2 Lacking of unified, standard and reasonable legal rules**

At present, aiming at the construction of the underground pipe network, although the various relevant departments combine with their own management authority established underground pipeline management rules and regulations, each one of them is all into one system respectively and lacks of co-ordination. What's more, the relevant local regulations have been seriously lagging behind, seriously affecting the construction and management of underground pipe network. The lack of legal regulations of the underground pipe network has two aspects. On one hand, from the administrative level, laws and regulations of the underground pipe network have no specific planning direction and detailed criteria for specific construction etc. Underground pipeline construction and completion is not fully integrated into the planned, constructive and necessary administrative procedure, caused by the administrative subject vacancy and the administrative object isolated. On the other hand, from the aspect of construction and pipeline management authority units, the relevant laws and regulations do not specify the unified guidelines for the management. With too many short-term behaviors, the management lacks of macro strategic considerations and long-term planning and annual plans for building repair. The phenomena of redundant investment, construction and excavation are too many. As the pipeline management is not standardized, it affects the construction of the underground pipe network. So it is

needed for technical legislation, and the standard facilities road with underground pipe network construction should be stipulated. Meanwhile, other pipelines should not be excavated separately. Pipes and lines should be unified into the ground together. To repair and maintain the pipeline should also be paid in accordance with the provisions of use and management. Roads and underground pipe networks should be unified planning design and synchronous construction, which avoids underground resources loss or monopoly, while increasing the private capital attraction.

**1.3 The urban population Beijing city is overloaded, resulting in large pressure of underground pipe network**

The phenomenon of water in Beijing as mentioned, it is due to several reasons. the first reason is that the system of the city underground pipe network is a subsystem of the whole big city construction system, so the drainage volume overload and local spillovers, in fact, is not only the subsystem out of the question, but also the whole system. A problem has been talked a lot, but we cannot cope with the scale of the problem, which is that the Beijing city population is seriously excessive load at present. The population density is too large, increasing the bearing pressure of underground pipe network. A lot of cities of China, the city drainage system and underground pipe network construction cannot catch up with the level of developed countries. The underground pipe network is a subsystem of city construction, the drainage volume overload and local spillovers show that this system has a problem. The development model of focusing on a single center gives more pressure to urban baring functions. The roads with water are the right places, of which the population number does not match with city construction comprehensive level well. The construction index may be relied on the population load in 10 years, 20 years or even 30 years ago. Now, it is clearly not enough for use. On one hand, more than 80% of the road surface is covered by concrete, asphalt and other impermeable materials. Then rainwater cannot penetrate, resulting in serious waterlogging in recent years in Beijing. On the other hand, Beijing city government has realized the severity of drainage problems and increases the investment, but as the large urban population number, drainage facilities are still unable to meet the population load. Taking Beijing as an example, from 2007 to 2012, the city drainage pipeline length is increased by 1700 km, which increased 23.39% over the past 6 years. However, the population has increased by 30.89%. For per possession of drainage pipeline length, it is only 0.51 meters in 2012. There is still a big gap, compared to the developed countries, of which per possession of drainage pipeline length is more than 4 meters.

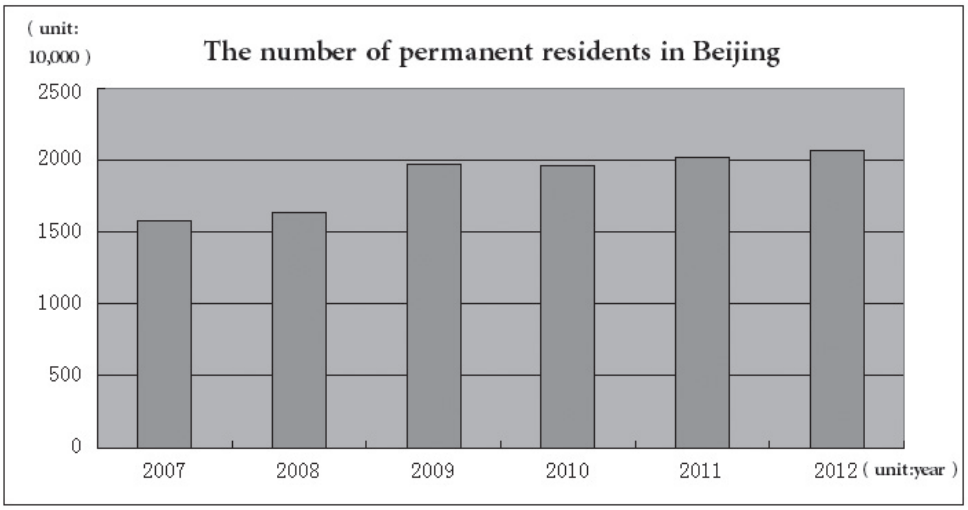



Figure 1. The number of permanent residents in Beijing (From 2007 to 2012)

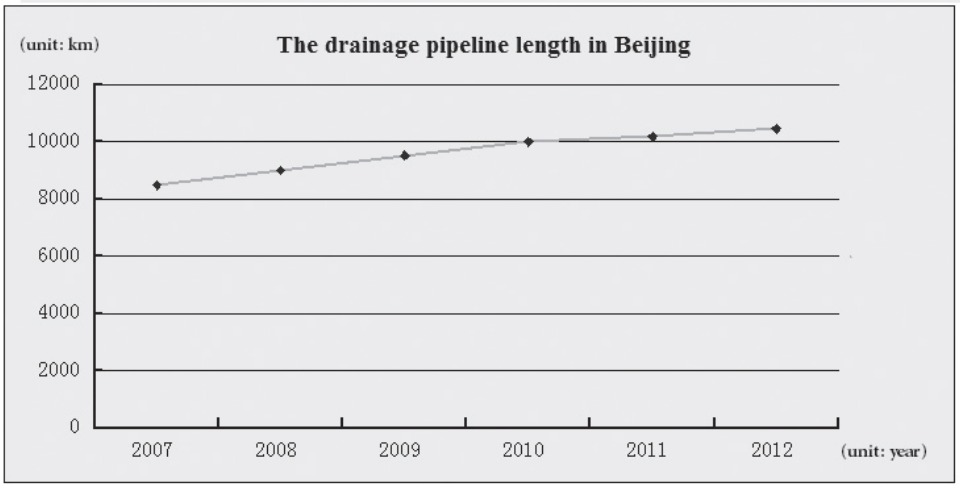



Figure 2. The drainage pipeline length in Beijing (From 2007 to 2012)

**1.4 There are some problems in the information management system of underground pipe network.**

In many cities of China, the management model of the underground pipe network is minding their own business. Beijing is no exception. Under this system, each department only pays attention to their own pipeline laying and pipeline management. The pipeline diagram drawing is often not standardized, and some units have established a professional data management system, while the others have not. If established, the established time, technology platform and standards are not the same. Meanwhile, no exchange of data between the different data management systems makes it difficult to share and query information. In case of emergency, such as broken water pipes, gas leakage, it is difficult to have timely treatment. In the construction process, due to less understanding of the underground pipe network, it is often to see the broken pipeline because of digging, resulting in water and electricity, communications interruption and even casualty. The underground pipeline is different from buildings on the ground, which can be seen clearly. What's more, a site can have only one building, a building construction and renovation, basically does not affect other buildings. But the underground pipe network is different, as it is buried in deep underground, you cannot see it with your eyes. A variety of underground pipelines may be layered paving below one block. Burying a new pipe or changing any pipeline will affect all the other pipelines' safety. Only the underground pipelines archives information aggregated together, and only the management centralized and unified, can we understand the laying of underground pipelines correctly, which provides the necessary information for city planning and construction.

## 2. The reasonable reform measures of the underground pipe network

**2.1 In the process of urban-rural integration, the 'utilitytunnel' construction is introduced for the pipe network layout, planning chaos.**

It is necessary to popularize the utilitytunnel construction to the present situation of underground pipe network in Beijing City. At the same time, it should increase the utilitytunnel model. The integrated management of city underground pipe channel, Japanese called 'common channel', but its English name is 'utilitytunnel', which refers to the all kinds of public pipelines where set on the ground, underground or overhead concentrated into one system, and leaving walking tunnel channel for maintenance personnel. That is to say that a tunnel is constructed in the city underground space, which concentrates electric power, communications, gas, water supply and drainage pipeline

in one part, where sets a manhole, hoisting orifice and monitoring system. The implementation of unified planning, design, construction and management changes the respective various pipeline constructions and the messy management situation thoroughly. When one line needs to be opened, it is only need to notify the relevant responsible departments, switch on the interface, which is convenient to repair, and save the national resources.

The utilitytunnel will set all kinds of pipelines in a tunnel, eliminating the phenomenon that the lines used in communication, electric power system in the city covered over the web and wire rod, high voltage tower erected on the ground. The pipeline does not contact the groundwater and soil, so as to avoid the corrosion of acid substances, which extends service life. It is about every kilometer where opens a repair channel, using ladder directly into the inside to repair lines, which is convenient for repair and management of pipelines. What's more, the pipelines can be well out of the main road, which effectively reduces the number of tube wells. Also, it avoids repeating excavation surface due to bury or repair pipelines, reducing the road maintenance costs, which ensures the full function of the road traffic. But the Great Hanshin earthquake in Japan's disaster prevention experience shows that even by the strong typhoon, earthquake or other disasters, as the various pipeline facilities are set in the utilitytunnel, so it can avoid the second disaster caused by broken wire rod or broken wires. In case of fire, because there are no overhead wires, it is conducive to outfire rapidly and the disaster control in the smallest range. Thus it can be effective to strengthen the city's ability of preventing and mitigating disasters. The construction of utilitytunnel is a more scientific and reasonable pattern, and also an effective way to create a harmonious ecological environmental city for Beijing City.

Therefore, the utilitytunnel has the characteristics of intensive, comprehensive, avoiding many problems caused by the underground pipeline laying or repair. It will be the better choice of city development in the future. Last year the underground municipal comprehensive pipe channel in Beijing Zhongguancun West concentrated laid tap water, rainwater, sewage, reclaimed water, electricity supply, communications and natural gas and other municipal pipelines in an utilitytunnel. Follow the principles of unified planning, in the construction process to achieve the integration of urban and rural, we should accept the way that the Old District transforms step by step, the New District steps ahead, and finally networking approach. Eventually, the city underground pipelines unifies to the utilitytunnel.

**2.2 Set unified, effective laws and regulations system, unified the standards of underground pipe network construction and management implementation**

The city should improve laws and regulations and the supporting measures. The underground pipeline construction and management of market-oriented operation is still in the exploratory stage in our country city, and its effectiveness has been emerging trends. But it's healthy and sustainable development is inseparable from the corresponding system of rules, especially construction specifications , operating specifications, safety management specifications, which ensure the new model develop of urban underground pipeline construction healthy and steady. Therefore, it is necessary to strengthen the relevant legislation research. Beijing city should determine the corresponding management policy as soon as possible. According to the advanced city's experience, unifying construction of underground pipelines facilitates the government to carry out macro-control of road and construction of facilities. Clear property rights and responsibilities can avoid disputes between stakeholders, which facilitates communication and coordination, so as to effectively save cost. Therefore, we should set up a specialized agency of unified management of underground pipelines. Only establish authoritative unified management agencies, can we coordinate the relationship between the parties. If Beijing City establishes an effective administration, improves the management of underground pipelines and underground pipeline project file. In return, it can promote the underground pipeline management, forming a virtuous cycle to ensure the underground pipeline profile information systematicness, accuracy and reality, as urban planning, construction and management services. According to the principle of 'who invests, who owns, who benefits, who maintains' and the

model of utilitytunnel management, the development of underground project should be built, transferred and leased in accordance with laws, preventing the waste of resources caused by disorderly competition. To construct urban underground network system, standards and specifications must be in advance. Meanwhile, it must start with a high starting point and high standard construction, such as setting specific stands of location, direction, depth, width, material, anti-seepage , anti-fire, anti-water and the use and maintenance methods etc. of the utilitytunnel. The planning, construction, expansion, maintenance, use, external services and other things of urban underground pipe network system should also develop ways to avoid digging or excavating at any time.

**2.3 Reduce the population pressure and improve the bearing capacity of the underground pipe network at the same time**

As it is known to us that Beijing is a big city where population density is too dense, which will bring great pressure to the city's infrastructure construction, so that the load is far more than the capacity of its own. This is contrary to the strategy of continuable development in the integration of urban and rural. Therefore, reducing the population pressure is badly needed. In this process, the government should play the role of macro regulation and control, adhere to rely on the infrastructure, and promote the integration of urban and rural economic, community building. Urban and rural integration strategy will be applied to narrow the gap between outskirts and downtown and coordinate the layout of population pressure. Thus it can greatly reduce the forces on the urban infrastructure.

**2.4 Determine the important role of pipe network planning in city planning**

In order to improve the bearing capacity of the underground pipe network problems, first of all, the city should establish the important position of pipe network planning in city planning. Pipe network is an important part of city system, which is not only the large artery in city operation, but also an important symbol of modernization level of the city. Therefore, whether in academic or in practice, it should further clarify the important status of network planning and strengthen theoretical research and work deployment of pipe network planning, which is the basic premise of doing well in network planning. Firstly, the pipe network planning should be included into transportation planning. What's more, the city development and city traffic planning should be combined, including road carrying capacity and so on, greatly reducing the number of road excavation. The utilitytunnel management process will also reduce the stress of the city traffic. Secondly, in the planning of city development, the factors of important infrastructure construction in the underground pipe network should also be considered, combined with the process of integration of urban and rural. Meanwhile, the development of small cities and towns and the transformation of the Old Districts should have a far view. For example, the pipe network planning and construction should combine with city development planning in the next 20 years with overall consideration and comprehensive management.

Based on the construction of utilitytunnel, the equipment management of underground pipe network should be strengthened and combined it with the infrastructure construction of city. The utilitytunnel management should be in coordinate with city equipment maintenance. Implementing overall management and unified maintenance can greatly reduce the repetitive infrastructure maintenance problems and maintenance cost and energy, improving the working efficiency of related departments.

In addition, the city should pay attention to the development of international pipe network construction and related training of personnel and from the actual situation, make a specific pipe network planning for its development upon the reality, improving the bearing capacity of pipe network fundamentally.

**2.5 Use modern means of science and technology to establish the information management system of underground pipe network database files**

The city government should do comprehensive survey of underground pipe network and grasp the detailed

distribution of underground pipe network and related facilities. Besides, it should establish the pipe network data files and information database, guaranteeing that the network information is complete. The pipe network data files matches with the distribution reality. While strengthening the dynamic tracking files of underground pipe network management, the city government is taking full use of modern science and technology, which improves the processing, sorting, storage and utilization of scientific management level of the underground pipe network archival information. Especially the relative perfection and maturity of urban geographic information system (GIS) creates conditions for digitizing the underground pipe network files. The establishment of underground pipe network information management system will provide great convenience for the effective application of underground pipe network archives. GIS is a collection, storage, analysis and management information platform based on urban space information in support of geospatial information and attribute information associated with it. Since any one city planning and urban construction projects are attached to a fixed geographical coordinates or geographical location, by using GIS the developing city construction archives information system has broad prospects. But due to the construction of GIS platform in hardware and software, the configuration requires a lot of money. Meanwhile, a difficulty of large number topographic maps needed to collect, enter and digitize within the city and other practical difficulties makes GIS mainly use for underground pipe network archives management. Using the GIS technology can draw a comprehensive map and using of computer can store and manage information, which provides the basis for practical information management of city underground pipe network.

In addition, country and city planning related departments should develop detailed macro planning for the construction of underground pipe network, which is harmoniously in coordinate with overall planning and specific measures. They should carry out on-the-spot investigation, avoiding blind reconstruction and expansion. Regardless of the size, the project shall be carried out strictly in accordance with engineering drawings, so that the construction of city underground pipe network is in an orderly manner so as to better serve the rapid development of modern urban services.

Underground pipe network construction is one of urgent problems in Beijing. The underground pipe network construction is also facing serious challenges. The development direction and tendency of underground pipe network construction are closely linked with people's life. Therefore, the city should strengthen utilitytunnel construction, of which construction, maintenance, repair, information management and other aspects should combined with its infrastructure construction and urban development trends. Only recognize the problem, and base on the actual situation, can the city fundamentally solve problems of pipe network construction in the urban infrastructure construction to create sustainable development environment with a more benign cycle.

The authors' introduction:
Chen Zhenzhen: Master of management science and engineering,
Beijing University of Chemical Technology;
Beijing association for productivity society

Guider:
Yuesheng Zhu: Vice director of Beijing Association of productivity society;
Special recommended propounder of Beijing Municipal Government

# Problems and Suggestions on Beijing Underground Space Development and Utilization

Chen Jun

Abstract: In the 21st Century, the underground space development and utilization has become one of the important tasks in Beijing urban development and construction. Beijing has conducted positive practices and promotion works on underground space development and utilization in the recent decade. However, compared to the domestic and international cities and regions with more mature experiences in this regard, Beijing still has lots of deficiencies. Such main problems as the lack of protection of the laws and regulations, unclear systems and mechanisms and the lack of implementation level planning hinder the process and efficiency of Beijing underground space development and utilization. This paper, on the basis of summarizing the problems, explores and proposes the ideas and suggestions on solving problems, hoping to guide the scientific, reasonable and orderly development and utilization of Beijing underground space and find out a wider space for the sustainable development of Beijing.

Key Words: Beijing; Underground Space; Problems; Suggestions

## 1. Planning and Practices in the Recent Decade

In the recent decade, Beijing urban construction enters a period of rapid development and the underground space has been developed and used on a large scale. The underground space, as the important space resource of Beijing urban development and construction, has attracted more and more attentions.

In 2001, Beijing begun to formulate the "Underground Space Overall Planning", which was the first time that the domestic super-large city formulated a underground space planning with a wide range on the overall planning level. This planning was finished in 2004 and it was approved by the Beijing Municipal Government in 2005. This planning has been included in the Beijing urban overall planning and new city planning, affecting and guiding the relevant planning in Beijing urban construction and laying a certain foundation for the ordered development and utilization of Beijing underground space.

Simultaneously, multiple important functional areas of the city actively carry out underground space planning. Such regions as Beijing's Central Business District (CBD), Zhongguancun West, the central area of the Olympic Park and the Financial Street have formulated underground space planning and currently, most underground space of these regions have been basically constructed and come into use. The capabilities of underground space cover many types such as business, catering, sports, culture, parking, municipal pipeline and rail transit, complementing and perfecting the requirements of floor space and creating opportunities for constructing comprehensive and high-efficiency region environment.

In the recent five years, the Beijing rail transit construction speed is very fast and the integrated construction of surrounding land for rail transit terminals and surrounding underground space planning construction of terminals have been gradually attached great importance. In 2010, the Beijing 2015 Underground Space Development and Utilization Planning Along the Rail Transit Network was finished, promoting the underground space development and utilization

along the rail transit on a certain extent. Furthermore, Beijing is also active in large infrastructures underground projects, actively builds underground traffic tunnels and underground municipal integrated pipeline corridor, actively carry out urban power stations underground and adopts the underground and overground three-dimensional mode in the comprehensive transportation junction.

It can be said that the recent decade is a period witnessing the rapid development of Beijing underground space and certain results have been achieved.

## 2. Rethink and Summarization on Main Problems

By comparing Beijing with domestic and international cities and regions with more mature experiences in underground space development and utilization, we find that the underground space development and utilization of Beijing has been attached importance to some extent, but the smooth and high-efficiency period has not been achieved and some key problems remain to be solved and broken through.

Firstly, lack of protection of the laws and regulations. The foreign experiences indicate that the perfect underground space regulation and the practicable reward and implementing rules are the most effective way to promote the underground space construction. Currently, China's present national laws, constructional laws and Beijing local laws and regulations have not clearly defined the property relations of underground buildings and structures and the relevant real estate certificates are not obtained. Therefore, the rights and interests of developers, investors and builders of underground space cannot be protected by basic civil laws and then, the enthusiasm of investors is affected, which is not conducive to the further development of underground space construction.

Secondly, lack of the promotion by clear and effective administrative management system and implementation mechanism. From the aspect of administrative management system of the government, the development and utilization of underground space involves multiple departments, including subway corporations, municipal administration, traffic and civil defense. The unclear responsibility chain of various departments results in such phenomena as multiple management, cross operation and responsibility overlap, which greatly restrict the development and utilization of underground space. Currently, Beijing lacks of mature underground space development mode and implementation mechanism. The independent project approval of underground space is very hard and the land rights, investment modes and operation management all lack of clear systems, however, the management mode of "One Project One Discussion" is commonly adopted.

Besides, lack of some important underground space special planning and normative underground space control detailed planning to guide the urban underground space construction.

## 3. Main Ideas and Suggestions

The underground space development and utilization shall coordinate with urban development strategy targets and layout structure. An underground space system with perfect functions, safety and convenience and beautiful environment shall be constructed actively.

(1) Establish and Perfect Systems and Mechanisms

Coordinate various government departments on the municipal government level and improve the management system, through which, make them perform its own functions and cooperate with each other and form a scientific and efficient management system. Define the rights and responsibilities of relevant departments from multiple links such as project approval, planning, investment, construction and rights and define the implementation mechanism of underground space projects. Actively summarize the successful experiences in underground space development and

utilization from areas along existing rails and important functional areas and launch the implementation mechanism in line with national conditions and Beijing's economic and social development requirements.

(2) Establish and Perfect Relevant Laws and Regulations

Firstly, establishing and perfecting the underground space laws and regulations at Beijing local level are badly in need, where the core is to solve the rights issues of underground space, including underground space ownership, use right, development neighboring relations and development priorities, underground construction (structures) ownership, acquisition, registration, transfer and mortgage. Secondly, perfect the laws and regulation and relevant technical standards and specifications formulated for underground space planning. On the conditions that the local regulations are difficult to put in place at a short time, guide the underground space planning and construction works to be ordered by industry specifications and technical standards.

(3) Perfect Planning Formulation System

The underground space overall planning formulation on the city's overall level is need to be further perfected. Further strengthen the formulation works of underground space control detailed planning in the city's important functional areas and regions along the rail transit. Pay attention to specify relevant planning, design requirements and control and guide underground space scale, layout, functions and other contents; guarantee the planning formulation level and lay a foundation for improving the approval and management efficiency of the planning. Furthermore, actively carry out important underground space special planning, learn from domestic and international advanced experiences and technologies and deepen and strengthen the control and guidance on various underground space development and utilization.

(4) Actively Promote the Construction and Management of Information Systems

It is suggested that the construction and management of underground space basic information system shall be strengthened as soon as possible, especially the general investigation of the basic information in underground municipal pipeline and the system establishment shall be accelerated, which can provide important technical support for ensuring the city safety and lay a food foundation to orderly implement underground space construction. At present, such cities as Shanghai, Shenzhen, Hangzhou, Suzhou, Tianjin, Guangzhou, Nanjing and Chongqing have tried and innovated on the construction and management of underground municipal pipeline information system.

## 4. Looking Forward

In the coming decades, Beijing urban functions will continue to be optimized and strengthened. Realizing effective combination of the underground and the overground and attaching importance on comprehensive efficiency will be the scientific development direction. The prospect expected is the "people-oriented and harmonious underground space system, resource-saving and low-carbon underground space system, three-dimensional underground space system with compact layout and eco-friendly and comfortable underground space system!"1

There is still much to be done and all levels and various departments shall coordinate with each other and offer advice and suggestions!

Note: This paper is completed through modifying the paper (presented at the mentioned international conference) which was prepared by the writer for attending the 13th annual conference of International Underground Space Joint Research Center in 2012.

References:

[1] Wei Xiuling: Study on Underground Space Right in China, Xiamen University Press, 2011.

[2] Deng Shaohai, Chen Zhilong & Wang Yubei: On the Law Policies and Practices of City Underground Space, Southeast University Press, 2010.

[3] Shenzhen Urban Planning and Development Research Centre: A Study of Planning Formulation and Management of Urban Underground Space Development and Utilization, 2010.

[4] Beijing Urban Planning and Design Institute: Underground Space Development and Utilization Planning for the Core Area of the Central City of Beijing (2004-2020), 2004.

A Brief Introduction to the Writer

Chen Jun, female, a senior engineer of Beijing Urban Planning and Design Institute, a National Register Planner and the director of the Underground Space Branch of Chinese Society of Rock Mechanics and Engineering.

Address: N0. 60, South Lishi Road, Xicheng District, Beijing City  Postal Code: 100045

Phone Number: 01088073801 (office), 13651293245; Fax: 01068056024;

Email: yuchenjun2008@126.com

# Present Using Situation and Safety Evaluation of Paper and Plastic Food Packaging Materials Production in China

DONG Jin-shi, Li Hui
(Beijing Kaifa Environmental Protection Technology Consultation Center, Beijing 100097, China)

Abstract: This paper introduces several kinds of common food packaging materials and products, mainly including the paper food packaging, all kinds of plastic, in addition, materials, characteristics and the present situation of production are introduced and evaluated. The use scope and usage are different for all kinds of packaging. The relevant guidance and advice were given to consumers for the problems being paid attention to and to manufacturers for how to control the quality.

Key words: Food Packaging Materials; Paper Cups; Paper Boxes; Plastic Packaging

Food packaging is part of the food products. It is one of the main projects in the process of food industry. It protects the food from avoiding the damages caused by biological, chemical and physical external factors in the circulation process from the factory to finally reach the customers. It can also have the function of keeping the stable quality of the food and facilitate the eating of the food, besides, it also initially describes the food appearance with an image to attracts consumption, which has the value beyond the material cost.

Food packaging has many categories according to different classification types, and the most common type is categorized as per packaging materials. There is national standard of Classification of Food Packaging Containers and Articles (GB/T 23509-2009) in terms of standard, including the regulations on the descriptions and classifications of food packaging materials. Followings are the lists and evaluations on the current state of some common food packaging materials.

## 1. Food packaging with paper

It refers to the food packaging made of paper material, mainly including the food packaging such as paper cup, paper bowl, paper tableware, paper box.

China has related national standard on the paper material food packaging, for example, Hygienic Standard of Paper Used for Food Packaging (GB 11680-1989) on paper packaging materials, Paper Container Set for Food (GB/T 27589-2011), Paper Cup (GB/T 27590-2011), Paper Bowl (GB/T 27591-2011) etc. on paper packaging products; There are Paper Cup (QB 2294-2006), Food Packaging Paper (QB 1014-2010), Paper Container Set for Food (QB/T 2341-1997) etc. in the industrial standard. The three national standards of Paper Container Set for Food, Paper Cup and Paper Bowl have been formally implemented since June 1, 2012. Though they belong to voluntary standard, its index is stricter than the earlier issued industrial standard Paper Cup (QB 2294-2006), for example, GB/T 27590-2011 requires 'no printings within 15mm from the cup mouth to the cup body and 10mm from the cup bottom to the cup body. '[1]

According to the regulation of Standardization Law of China, 'National standards should be made refer to those technical requirements needed to be unified nationwide. National standard is made by the State Council's administrative department of standardization. Industrial standards can be made refer to those technical requirements without national standard but needed to be unified in a certain industry nationwide. Industrial standard is made by the related

administrative department of State Council, and records in State Council's administrative department of standardization; it will be abolished as soon as the national standard is issued.'

Though related administrative department does not abolish industrial standard of Paper Cup (QB 2294-2006). As of May, 2013, most of the disposable paper cups currently sold on the market have already followed the national standard of Paper Cup (GB/T 27590-2011), and have made a revision on the printing according to the international food packaging association's investigation.

## 2. Food packaging with plastic

Plastic food packaging means the food packaging adopts plastic as its main material for packaging. For example, beverage bottles, disposable plastic fast food containers and food packaging bags, etc. are all belong to plastic food packaging. We have relatively complete related national standards for plastic food packaging, for example, standard for raw material resin, plastic products, and plastic material inspection method, etc.

Once mentioned the sanitary safety of plastic packaging, the most important index is 'evaporities'. The evaporities mean the total none volatile components migrated into soaked fluid. The evaporities detection principle is that, acetic acid evaporities simulates acidic food, and n-hexane evaporities simulates oily food. the amount of substance that dissolved out by the plastic products Under certain temperature and time, the bigger amount of substance that dissolved out by the plastic products, the more hazardous substances are dissolved out under this condition of the plastic packaging. If 4% acetic acid evaporities of plastic products exceeds national standard requirement, maybe 'dirty' enterprises have added many toxic and harmful chemical substances such as industrial calcium carbonate, talc and heavy metals in the production process. N-hexane evaporities exceed the standard may be caused by the enterprises' randomly change of the process formula in the production process to improve the toughness of polypropylene plastic to be easy for product separation after cutting, or excessively add polyethylene in the production process and use liquid fertilizer.

In addition to sanitary safety of plastic, a common phenomenon exists currently is that most consumers keep a wrong knowing and using of the plastic food packaging. So it is important to note that different plastic materials have different performances, and also have different usage. Therefore, only clearly know the plastic materials and correctly use plastic packaging can ensure the health and safe of food packaging. There is national standard Marking of Plastic Products (GB/T 16288-2008) for the plastic material and code, including 140 plastic names and codes. While choosing food and food packaging, the consumers should check the plastic material and code. Followings are the common used plastic codes and usage scopes as well as notices:

### 2.1 Polyethylene glycol terephthalate

Polyethylene glycol terephthalate, which is abbreviated as PET, and its code is 1 [2] , is always used to make mineral water bottles, carbonated beverage bottles, juice bottles, etc.. Due to this kind of material can only be heat-resisted to 70℃, it is only suitable for keeping warm or cold drink, and will easily deformed and probably dissolve out harmful substance to human body while keeping high temperature liquid or heating. Therefore, throw away the beverage bottles as soon as they are used up, and do not used them as water cups or repeatedly use them as containers to keep other things to avoid healthy problems.

The plastic bottles made of PET materials cannot put in the car for a long time; do not keep the substances such as wine, oil and vinegar, because the harmful substances can be easily dissolved out. Also do not keep the liquid with the temperature above 70℃ because the material's decomposition will release harmful chemicals at high temperatures.

### 2.2 High density polyethylene

High density polyethylene, which is abbreviated PE-HD, and its code is 2 [2], is suitable for food and medicine

packaging, the packaging bottles of cleaning supplies and shower products, shopping bags and rubbish cans. Most of the plastic bags used in the super markets and shopping malls are made of this material, and its heat-resistant can reach 110℃. The plastic bags marked as food-purpose can be used for putting food. PE-HD is widely used on various translucent and opaque plastic containers, and its hand feeling is thick.

High density polyethylene is white particles with non-toxic, tasteless and odourless. Its melting point is about 130℃, and it has good heat resistance and cold resistance with a stable chemical performance as well as high rigidity and tenacity, fine mechanical strength, high insulation dielectric strength, fine environmental stress crack resistance, and it is not harmful to human body.

The bottles keep cleaning supplies and shower products can be repeatedly used after cleaning, however, normally these bottles cannot be cleaned clearly. The remaining substances will be a hotbed of the bacteria, and it is better not be used circularly. Particularly, it is not recommended to be circularly used as the containers for keeping food and medicines.

**2.3 Polyvinyl chloride**

Polyvinyl chloride, which is abbreviated PVC, and its code is 3 [2], is now used to make food cling film, artificial leather, sewer lines, etc.. It is widely used for manufacturing outer husks of wires and cables because of its good performance of electrical insulation and certain self flame resistance. Besides, PVC has a wide use in industrial filed, especially in the areas with a high requirement of acid and alkali corrosion resistance.

PVC is a kind of hard plastic, and a large amount of plasticizer must be added if transparent flexible plastic films are made. Since the plasticizer is soluble in the oil while it is not soluble in the water, thus when it contacts with oily food or containers, there will be exudation once contacts, but the exudation or migratory amount matters with the contacting time and temperature.

Therefore, the toxic and harmful substances of plastic products made of this material come from two aspects, one is the incompletely polymerized chloroethylene in the production process, and the other is plasticizer. These two kinds of substances can be much easily released out when meet with high temperature and oil, and will enter into human body together with the food to harm the health.

This material can not be used in higher temperature areas. PVC will generate a large amount of plasticizer and heat stabilizer contained heavy metals, and it is hard to deny the existence of free monomers in the synthesis process. Toxins can be easily dissolved out when it meets with high temperature and oil, and some can even cause cancer. Thus, PVC is basically replaced by PP and PE in applications of contacting human body, especially in the applications of medicine and food.

**2.4 Low density polyethylene**

Low density polyethylene, which is abbreviated PE-LD, and its code is 4 [2], is normally used on plastic film, plastic wrap, the hose packaging of toothpaste and facial cleanser, internal pad pasting film of milk carton, and beverage carton. Most of them are used on the apparatus such as plastic films, and it is not suitable for using as beverage containers.

PE-LD products should avoid being used in the temperature above100℃ because it will soften and even melt. The plastic wrap will hot-melting in the temperature above 110℃, therefore, the plastic wrap should be removed first before the food is put into the microwave oven [4].

**2.5 Polypropylene**

Polypropylene's code is 5, which is abbreviated PP [2]. The microwave oven food case, disposable food case, take-away food case and Locker fresh-keeping case are all made of this material. It has a heat resistance of 120℃, and is the

comparatively safety material accepted worldwide currently. The plastic cases can be put into microwave oven, and can be repeatedly used after carefully cleaning[3]. PP has a higher hardness, and glossy surface.

Part of the case bodies of microwave oven used food cases are made of PP, but the case covers are made of #6 PS. Check it carefully before using, remove the case cover before heating if such situation is met.

**2.6 Polystyrene**

Polystyrene, which is abbreviated PS, and its code is 6 [2], is divided into two categories, foaming and non-foaming. Common polystyrene packaging products include transparent cake box, fast food case cover, disposable foam plastic tableware, etc..

Polystyrene is synthesized from styrene monomers through free radical polymerization reaction. It has excellent thermal insulation, insulation and transparency, thermal deformation temperature is 70℃, brittle, easy to crack at low temperature. Polystyrene itself is easy to burn, and not resistant to organic solvents, soluble in the erosions of aromatic hydrocarbons, chlorinated hydrocarbons, senior fatty esters and hydrocarbons. After foaming, polystyrene has bigger volume and lower density, and it is mostly used to make foaming tableware. However, its surface is easy to absorb grease, and it is hard to recycle for treatment, apt to cause secondary pollution.

Harmful substances will be produced if PS meets with strong acid and alkali substances. Do not hold acid or alkali food with PS instruments. Neither put hot food in the foamed fast food case, nor heating it with microwave oven. With the continuous development and innovation of science and technology, there are glass material, ceramic material, wood packaging and composite packaging material, etc. and food packaging materials are becoming more diversified. Refer to this, professor Dong Jinshi, vice president and secretary general of international food packaging association, stressed that production enterprises, dealers and monitoring departments should all noticed that food packaging must ensure its safety and sanitation to let consumers buy felt relieved, with peace of mind. Therefore, it is important to have related standards and regulations on food packaging, and it is critical on monitoring of law enforcement departments. It also requires necessary propaganda from the media and supervisions from the side. Producers and dealers should consider the safety and health as the first point, strictly implement national standards and produce quality-secured food packaging.

References:

[1] Gao Fengjuan, Gao Jun, Qiu Wenlun, .GB/T 27590-2011 Paper Cup [S], Beijing: China Zhijian Publishing House, 2012.

[2] Wen Yunxuan, Liao Zhengpin, Chen Jiaqi, Shi Yazhen, Chen Qian, Li Lixin, GB/T 16288-2008, Marking of Plastic Products [S]. Beijing: China Zhijian Publishing House. 2008

[3] Wu Guorong, etc. Know the Small Signs of Plastic Container [J] China Packaging. 2008, 4:84

Author: Dong Jinshi, male, environmental chemistry master of Chinese Academy of Sciences, director of Beijing Kaifa Environmental Protection Technology Consulting Center, mainly deals with the researches on the aspects of food packaging; Li Hui, female, bachelor of Beijing Forestry University Packaging Engineering Department, junior registered inspector of the nation, works in the quality monitoring department of Beijing Kaifa Environmental Protection Technology Consulting Center.

Add: 18E, Plot B, Zhiye Yuan, Shuguang Garden, Banjing Road, Haidian District, Beijing. (100097)

Tel: 010-88465537/39-12, 88466551

Fax: 010-88465537/39-15

# Beijing Planning & Construction: 1949-2012

Du Liqun

As the capital of the People's Republic of China, Beijing is the national political center as well as the cultural center, and also the world famous ancient capital and modern international city.

Beijing is located at the North China Plain, its southeast is connected to Tianjin and the rest is encircled by Hebei Province, the administrative region area covers 16410 square kilometers. The terrain of Beijing is high in west part and low in southeast. In which, Beijing bay covers 6289 square kilometers and occupies 39% of the total area of the administrative region; the mountainous area covers 10121 square kilometers, and occupies 61% of the total area of the administrative region.

Beijing is the city with traditional and modern charm. Owning more than 3000 years history of city and more than 800 years history of capital, Beijing is the one of the "major four ancient cities" in China, and possessed of 6 world heritages. Therefore, Beijing is the city with the largest number of the cultural heritage items. The old city of Beijing has grade-strict and level-clear outline, rigorous and order central axis of urban planning, organic and vivid urban water system, straight and flat urban road network, and unique quadrangle dwelling type urban living form. Some new functional regions and urban landmarks, such as CBD, Zhongguancun Science and Technology Park, national stadium (bird's nest) and swimming pool (the Water Cube), are developed and formed at the periphery of the old city.

## 1. Review of Beijing urban master planning

The overall planning is the general program of the urban construction development. For more than 60 years from the establishment of Beijing Metropolis Planning Committee in 1950 to today, there are 7 versions of the urban master planning officially organized to compile by the Beijing municipal government, wherein three editions are officially approved by the State Council. The urban master planning in 7 editions reflects the exploration of constructing the capital Beijing at different periods, shows the periodic awareness of the capital planning constructer on the urban development rules, and also reflects back the transformation of ideological trend in the urban planning idea field at home and abroad. The 7 editions of master planning are approximately divided into two stages; the master plans in 1953, 1957, 1958, and 1973 are introduced and carried out on the basis of the guiding thought of developing industrial city under the overall background of the national industry construction. The master plans in 1982, 1992 and 2004 are introduced on the basis of the guiding ideology that how Beijing can serve for the national construction better as a capital under the big background of the reform and opening-up policy. The urban master planning in 1982 reflects the characteristics of putting wrongs to rights and restarting at the early period of the reform. The urban master planning in 1992 shows the characteristics of economic and urban transformation development after making clear the market economic direction. The master planning in 2004 is an exploration of the urban development road under the comprehensive, coordinated, and sustainable Scientific Outlook on Development. The compilation of 7 master plans is a successful and circuitous exploring process while also an organic and continuous, amending, and gradually clear process coming down in one continuous line.

### 1.1 General Policy of Urban Development: from "three services" to "four services"

The Outline of Draft on Transforming and Expanding Beijing Urban Planning in 1953 puts forwards a general policy of "three services" urban construction, namely, service for the Central, service for production, and in the final analysis, service for working people. The urban master planning in 2004 presents the requirement of "service for the work of the center party, government, army leading organizations, service for the international communication of country, service for scientific and educational development, and service for improving the mass's life". From "three provides" to "four services", the service for the center and the people is unchanged, and reflects that the basic foothold of the urban development is consistent; meanwhile, it also reflects the era characteristics and stage task of the capital urban construction. The big industrial development period is served for production; under the current knowledge economy and global background, it is mainly served for the international communication of the country and the scientific and educational education; therefore, the demand of an opened China's international communication and the internal demand of deepening the reform of the scientific, educational, and the cultural development in China.

**1.2 Designated function of city: from "political, economical, cultural center" to "political and cultural center"**

The transition of the designated function of city reflects the change of the urban development direction and is a result of determining the combined action of a long-term variable and a short-term variable in the urban development direction. In the discussion of the Beijing's designated function in the several editions of the master plans, "political center and cultural center" are unchanged, and reflect the most irreplaceable function in Beijing. As the capital, Beijing is the least disputable political center throughout the country. From ancient times, Beijing is the cultural center as the historical ancient capital and has deep foundation in terms of cultural and educational business, therefore, it is deserved to be the cultural center throughout the country. Therefore, politics and culture are the long-term variables influencing on Beijing's development. The location of "economic center" is mainly appeared in the several editions of plans before the reform and opening-up policy; the core content is to build up "the modern industrial base and the scientific technological center", and the main reason is that the new regime is unstable at the early years of the new nation, the national economic society is going to chaos, thus it is urgent to develop production; the display of the other function cannot be mentioned without the rudimentary economic foundation; therefore, the development of industry at that time is the first task of new regime. After the reform and opening-up, the national material production capacity is basically structured; the overcharge industrial structure of Beijing brings environmental pollution and resource shortage, the function conflict thereof with the political center and the cultural center is increasingly severe, the long-term variable starts to display roles; the master planning in 1982 takes out the statement of "economic center" in the designated function of city.

**1.3 Population size: from "adjustment" to "control" and "controllable and guidable"**

View from the thinking of all previous overall planning on population development, several changes from "adjustment" to "control" and "controllable and guidable" have been experienced; the key turning point is Conclusion of 13 Years in 1962; before this, the urban development takes the industrialization as the main line, and the population is mainly served for this goal. The Conclusion of 13 Years in 1963 has comprehensively rethink the urban construction, and realize that many problems are caused for the manufacturers are excessively gathered at the downtown, the occupation of land is too large, and the layout is disorder, and present "the downtown scale in the future will not enlarge any more but will be mainly engaged in adjusting the supporting, leveling and filling, and certain room shall be reserved for perfecting the further development in the future. Hereto, the urban population scale policy will be transformed from the adaption of population development to control of population development, and this change of thinking is a marked improvement. The urban master planning in 1992 clearly presents the population control thinking of "strictly controlling

the downtown population scale, and actively developing the outer suburbs; the Beijing Urban Master Planning in 2004 presents a policy of "gross control, actively guide, reasonably distribution, and quality improvement" on the basis of "controllable and guidable".

**1.4 Space strategy: from "downtown development" to "two strategic shifts" and "two-axle, two-zone, and multi-center"**

The urban scale at strategic shift is limited in the downtown; the strategic problem at that time is to select old city or suburbs as the administrative center. The most of experts proposed to set the administrative center in the old city. The first reason is economy, the original various municipal communal facilities can be fully used by building the administrative center in the old city, it is relatively cost-effective in terms of economy; the second reason is beautiful appearance, the experts thought that the old city of Beijing is possessed of grand and beautiful scale, and modern facilities; as the capital constructed and decorated for several hundreds of years, it is unnecessary to abandon it. Experts represented by Liang Sicheng and Chen Zhanxiang thought that the administrative center shall be placed at the outside of the old city, the main reason includes: firstly, the layout system of the old city is perfect, and it is a perfect art entity reserved with Chinese ancient layout and possessed of the tradition of the urban plan, this characteristic is very unique in the world, and this integrity will be damaged by placing a huge working center area in the old city; the street type of the whole Beijing will be changed and the appearance is damaged since a lot of new buildings are built in the cultural relic center zone. Secondly, the removal difficulty is big, and the arrangement of placing the administrative center in the old city must implement a lot of removals, the implementing difficulty is relatively big. Thirdly, the land is limited, the density of old city is very high, and the density of overtop building at present will be closer if the new administrative zone is built in the old city zone; besides, after further building the administrative center, workers only have to live in the suburbs, the remote distance between working place and living place will add the complexity of traffic. Although the later actual construction is arranged according to the thinking of placing the administrative center in the old city, the scheme of new administrative center at suburbs by Liang Sicheng and Chen Zhanxiang is the beginning of adjusting the thinking of urban space structure, as well as the earliest idea of dispersing development.

Along with the adjustment of the administrative division, the suburb of Beijing becomes larger, and the relationship between the suburb and the downtown goes up to a new strategic issue. In 1957, the overall planning proposes a concept of "child-mother city" for the first time, and also the idea of carrying out the dispersing construction within the administrative region. The Conclusion of 13 Years in 1962 affirms the thinking of "control downtown and develop suburb". In 1992, the suburb supporting construction in the overall planning is gradually perfected, but the center city is more and more intensive; a "two-shifts" strategy is proposed, namely, :the focus of the urban construction will be gradually transferred from the downtown to the outer suburban district, and the downtown construction will be transferred from the extension to the adjustment reconstruction". In 2004, specific to the problems of heavier pressure of old city, non-released gathering trend of the center city, and lagging construction of satellite town, the overall planning proposes the assumption of "dual-axle, dual-zone, and multi-center", and its core is to structure a multi-center system in the administrative region; the assumption includes two parts as follows: firstly, promote the anti-magnetic center of taking the new suburb city as the center city to the status of municipal-level center so as to realize the gathering effect that the satellite town cannot reach, disperse the pressure of the center city, wherein the development focus is that the eastern development drives the new focus city; secondly, build multiple municipal centers in the center city so as to disperse the pressure of old city and CBD, and improve the function housing relationship of the center city. Compared with the planned space strategy in the past, the assumption of "dual-axle, dual-zone, and multi-center" pointed out the direction and way of the space adjustment definitely.

## 2. Construction and development situation of Beijing

### 2.1 General situation of development for 60 years

The comprehensive economic strength is leaped. Firstly, the economic aggregate is rapidly increased, the GDP is 0.79 billion Yuan in 1952, and reaches up to 1625.19 billion Yuan in 2011, the GDP is increased by 425 times according to the comparable worth; the economic growth rate is stable, the GDP annual average growth is 10.8% from 1952 to 2011 according to the comparable worth; the improvement level per capita is considerable, the average per capita income is 165 Yuan in 1952 and reaches up to 81658 Yuan (12780 Dollars/person) in 2011, and increased by 100 times according to the comparable worth. The proportion of three industries in 2008 reaches up to 72.3%, and Beijing is the city which the only one exceeding 70% in the big cities throughout the country and approaches the level of developed city in the word. Thereby the transition from the consumption type city to the production type city and then to the service type city is realized.

The urban construction achieves great breakthrough. Under the pushing of economic development and continuously improvement of the consumption type of residents, the urban scale is greatly changed; the building gross in the whole city is increased from about 20.50 million square meters (the administrative scope at that time) in 1949 to about 11.8 billion square meters (the administrative scope today) in 2011, and increased by about 60 times; the building area of the center city is increased from 62 square kilometers in 1949 to 840 square kilometers in 2011, and increased by 13 times; the permanent resident population in the whole city is increased from 2.092 million people (the administrative scope at that time) in 1949 to 20.186 million people (the administrative scope today) in 2011, and increased by 9 times. At the same time, construction of the urban infrastructure and the public service facility gets a considerable progress.

### 2.2 Implement achievement of Beijing urban master planning

Since the State Council replies the Beijing Urban Master Planning (2004-2020) officially in 2005, Beijing aims to construct “national capital, international city, famous cultural city, livable city”, the capital function is continuously enhanced under the driving of preparing and holding Olympic Games, and other important events, the capital’s performance in economic and social development is remarkable, the stage development goal of structuring the basic framework of the modern international city is basically realized.

Firstly, the strategic adjustment of the urban space is orderly carried out. Since the master planning in 2005 is implemented, population and a part of function of the center city are actively resolved through carrying out 6 adjustments and 6 optimizations. The construction of focus function zone of CBD, financial street, and Olympics center zone is enhanced, the major item such as removal of Shougang Group speeds up to carry out, the environment renovation and the construction intensity of green space system are increased. Meanwhile, the development strategy of new city is positively carried out, and the strategy of taking the development of new city by the rail transit is greatly pushed; the development of the new city is pushed by taking the land banking, framework type infrastructure construction, introduction of major high-end industry item, and environmental construction and renovation as the key points.

Secondly, the capital economy achieves sound and fast development. The industrial layout is continuously optimized; a preliminary pattern of two-axle optimization, two-zone gathering, and multi-center interactive development is basically formed. The comprehensive competitive power of six major high-end industrial function zones is further promoted, 7% of plain area realizes 463.85 billion Yuan of comprehensive competitive power; the ratio of industrial value added in the whole city GDP is improved from 28.9% in 2004 to 38.2% in 2009. The average growth rate per annum is 21.6%, the rate of contribution to the whole city economic growth reaches up to 47.3%. The ratio of three industrial structures in 2009 reaches 1: 23.2: 75.8 and the employment proportion of three industries reaches up to 75%

above. The gross regional domestic product per capita exceeds 10, 000 dollars, thus the development goal determined in the master planning is realized in ahead of 11 years.

Thirdly, the resource environmental bearing capacity is stably promoted. From 2005 to 2009, the energy consumption of Beijing gross 10, 000 Yuan-regional domestic product is reduced from 0.79 ton to 0.54 tons of standard coal, the water consumption is reduced from 49.5 cubic meters to 29.92 cubic meters, and thereby the goal of energy-saving and consumption-reducing in the 11th Five-Year Plan is reached in ahead of 1 year.

Fourthly, the construction effect of the livable is remarkable. The indemnificatory houses with 5.92 million, 8.03 million, and 9.38 million square meters are respectively started newly within 3 years from 2007 to 2009. During the period of the 11th Five-Year Plan, the investment of indemnificatory housing development is 10.35 billions Yuan and 2.7 times of that during the 11th Five-Year Plan. There are 17 rail transit lines covering 456 kilometers in operation in 2013, the average passenger capacity daily reaches about 10 million people per time. The bus trip proportion of the central city is improved from 28% in 2003 to 44% in 2012, and basically closes to the development goal that "the proportion of transit trip of central city in passenger transport gross is improved to 50% above" in the overall plan; the proportion of the rail transit in the transit trip is improved from 18% to 38%.

## 3. Beijing in the future

### 3.1 Challenge of Beijing development

In the future 5-10 years, the economic environment at home and abroad are complex under the background of globalization, urbanization, marketization, and benefit diversification, the uncertain and unstable factors are increased, the challenge for the capital development is bigger, the problem is more protruded, and task is more arduous.

Firstly, the contradiction between the rapid growth of the population scale and the bearing ability of the resource environment is daily highlighted, the status of excessively gathering of single population center is not changed radically; the shortage of the resource, in particular to the water resource, becomes a major bottleneck for Beijing's development for a long time.

Secondly, the task of optimizing and upgrading the industrial structure is very heavy, the capability of independent innovation, the comprehensive competitive power, and the endogenous power of the industrial development are not strong enough.

Thirdly, the development distance between urban and rural areas caused by the urban and rural dual structure is still existed; the contradiction of the urban and rural combining section is extruded and shows the trend of spreading to new cities and small towns.

Fourthly, the cultural soft strength and influence are desired to be improved; the construction of famous cultural city taking the old city protection as the core is required to explore more powerful implementing mechanism.

Fifthly, the construction of a livable city shoulders heavy responsibilities. The contradictions of traffic, housing, public service, social stability, and other aspects are still existed, and the accordingly cost rise, and efficiency drop become the outstanding link influencing on the harmonized and sustainable development of the capital and the urban competitiveness.

Sixthly, the regional coordinating development mechanism is incomplete, the radiation driving action of Beijing on the regional development has not display completely; the coordinating development in Beijing, Tianjin and Hebei areas is expected to further promote.

### 3.2 Development strategy in the future

The development construction of Beijing must rely on the capital function and the reality of Beijing, further

implement the location of designated function of city in Beijing Urban Master Planning (20004-2020), effectively integrate and fully display the resource advantages, promote the comprehensive transition of economy, society, ecology, urban and rural, and regional development, and push the coordinating development of every business, thereby laying a solid foundation for the sustainable development of the capital on a higher level within a longer term.

(1) Economic development strategy: lead transition from the traditional element to innovation, fully display the capital resource advantages, push the scientific and technological progress and innovation, and realize the substantial progress by transforming the economic development method.

(2) Social development strategy: transform from the relative unbalanced development to more consideration about people's livelihood and benefit of every side, push the equalization of public service, meticulous urban management, and realize the social harmony and livable city.

(3) Cultural development strategy: transform the domestic cultural center to the mutual reflection of the traditional culture and the modern civilization, the world famous cultural city with high containment, diversified and unique eastern charming, and improve the international influence of culture.

(4) Ecological environmental development strategy: transform from the relatively extensive resource using mode and the ecological environmental management mode to the mode focusing more on resource saving and ecological friendly-development, protect and perfect the regional ecological security pattern, enhance the science and technology support, and promote the resource environmental carrying capacity.

(5) Urban-rural integration development strategy: transform from the urban and rural dual structure to city and countryside integration, further explore an urbanized road according with the development rules of the capital characteristics and the city and countryside integration, and positively and stably carry out the process of urbanization.

(6) Space harmonious development strategy: transform from the gathering of excessive center of population, function and industry to the coordinating development of administrative region and region; enhance the comprehensive radiation and service driving ability, structure a multi-center, networked new pattern with balanced development of town cluster in a larger regional scale.

Vice-president of Beijing Urban Planning Design and Research Institute
Du Liqun

# On Importance of Promoting Scientific Literacy of Citizens in Beijing

Han Shuyun

From July 21 to 22, 2012, the single-day strongest extraordinary rainstorm occurred in Beijing since the complete meteorological records were available from 1951, which caused severe disasters of mountain torrent, mudslide, urban waterlogging, etc., and resulted in the significant loss of life and property as well as the serious inconvenience of transportation.

Throughout the Beijing "7.21" incident, in the face of the emergencies, with the vision of Beijing ascending into in the world cities, people can find it no longer a livable city, but a city with its safe loading rate reaching the limit, the dangers emerging, the urbanization quality being not high, and the safety faced with threats.

## I. Promoting civic scientific literacy is an important fundamental social project in building the innovation-oriented nation.

In the five years since the State Council printed and issued the Outline of National Action Scheme of Scientific Literacy for All Chinese Citizens, the science popularization developed in a fastest and best way. The ratio of citizens with the basic scientific literacy in the whole country is doubled, and the work pattern of science popularization, namely, domination by the government, participation by the whole nation participate, and full combination and cooperation is basically formed. Beijing as the national capital is always at the leading position in the whole-national scientific literacy building program, the ratio of citizens with the basic scientific literacy is more than three times higher than the average ratio in the whole country, and the gap with the developed country is narrowed rapidly.

To promote the scientific literacy of the whole nation, a long-term and unswerving effort is required. As is stated in the Outline of National Action Scheme of Scientific Literacy for All Chinese Citizens, that citizens with the basic scientific literacy generally refer to those who know the necessary knowledge of science and technology, master the basic scientific methods, build up the scientific thought, advocate scientific spirit and have the ability of using the above-mentioned items to handle actual problems and participate in public affairs.

In 2010, Beijing conducted a whole-nation scientific literacy investigation synchronously with the whole country. Through this investigation, not only the basic scientific literacy status of the Beijing citizens is found out, but also the factors influencing the scientific literacy of the different populations are analyzed scientifically, which has an important guiding and reference significance in enhancing the pertinence of the scientific literacy building and also the efficiency of the investment in the science popularization.

## II. Scientific Literacy Status of Different Populations and the Existing Problems

The investigation shows that in 2010, the ratio of Beijing citizens with basic scientific literacy was 10.0% which is higher than the national level (3.27%) of the same period by 6.37 percentage points. From the perspectives of constituting the citizens' scientific literacy, the ratio of citizens knowing the necessary scientific knowledge was 26.4%,

the ratio of citizens mastering the basic scientific methods was 33.9%, and the ratio of citizens advocating the scientific spirit was 72.2%.

**(I) Current Status**

1. Scientific Literacy Status of Citizens in Different Populations

From perspective of the relationship between the urban-rural variables and the civic scientific literacy, the ratio of the urban residents with the scientific literacy is 10.9%, the ratio of the rural residents is 5.5%, the latter is nearly half of the former, and there is an obvious difference in the scientific literacy of the both populations. From the perspective of the gender, the ratio of the male citizens with the basic scientific literacy is 12.2%, the ratio of the female citizens is 7.8%, and the obvious difference also exists between the both. There is also an obvious difference in the ratio of the citizens with the scientific literacy of different ages, and the ratio decreases with the increase of the age. Specifically, the ratio of citizens with basic scientific literacy between 18 and 39 is the highest, 14.3%; followed by those between 40 and 54 years, 7.5%; and the ratio between 55 and 69 is the lowest, 3.6%. From the perspective of the relationship between the scientific literacy and education level, a significant positive correlation is presented, that is, the higher the education level is, the higher the ratio of the citizens with the basic scientific literacy will be. Specifically, the ratio of the citizens with college education or above is the highest, 16.7%; the ratio of citizens with senior high school education (secondary technical school education or vocational school education) ranks in the middle, 6.4%; and the ratio of citizens with junior middle school education is the lowest, only 1.6%.

2. Channels for Citizens to Obtain Scientific and Technical Information

The investigation revealed that the first and the second channels for Beijing citizens to obtain the scientific and technical information are television and newspapers, which are 87.4% and 73.1% respectively; for other channels, the ratio of the two channels – communication with others and broadcast are both above 20%; and the ratio of the channels to obtain information from books, magazines and scientific journals are 11.3%, 9.7% and 8.1% respectively. Compared with the previous situation, the application of the Internet for the public to obtain the scientific and technical information is significantly improved. For example, in 2007, the ratio is 20.5%, and through the development less than three years, the ratio increases to 48.4% which is 2.36 times of that in 2007.

3. Status of Citizens Participating in Science Popularization Activities

Besides the channels of media, etc. to obtain the scientific and technical information, directly participating in the science popularization activities is also an effective method for the citizens to improve their scientific literacy. According to the investigation on the citizens in participating in the science popularization activities in the past year, in all kinds of science popularization activities, the ratio of citizens visiting various science and technology exhibitions in 2009 is the highest, 49.9%; followed by that of the citizens attending the science popularization lectures, 42.4%; the ratio of the citizens participating in the Beijing Science and Technology Week (Science Festival, Science Popularization Day) also reaches 36.5%; and in the aspects of other science popularization activities, the ratios of citizens participating in the science and technology training and the application science and technology consultation are 25.4% and 23.3% respectively. Compared with that in 2007, the ratios of citizens participating in the science and technology exhibitions, the Beijing Science and Technology Week (Science Festival, Science Popularization Day), the science popularization lectures, etc. are greatly increased by 22.9%, 17.4% and 10.5% respectively.

4. Application Status of Science Popularization Facilities

The investigation showed that in all kinds of public places, 67.3% of the citizens are interested in the zoos (aquariums, botanical gardens) which present the greatest attraction; 51.8% are interested in the natural museums, 49.6% are interested in the science museums. 37.0% and 31.6% are interested in the public libraries and the exhibition

halls respectively; the ratios of the citizens interested in relevant science popularization facilities around are respectively 28.5% for science popularization galleries or publicity columns, and 35.5% for book reading rooms. The ratio of citizens interested in the science and technology demonstration centers or stations of science popularization activities is 25.4%. The ratios of citizens utilizing the science popularization facilities around are: 46.8% for science galleries or publicity columns, and 43.7% for books reading rooms.

5. Frequency of Participating in Public Affairs of Science and Technology

To actively participate in the public affairs of science and technology is not only the direct embodiment of civic scientific literacy, but also the inevitably demand for the citizens to perform their rights after the scientific literacy rises to a certain level. In general, Beijing citizens show higher level of concern and participation in the public affairs of science and technology. For example, the ratios of citizens reading newspapers, periodicals or scientific articles on the Internet "usually" or "occasionally" are 49.3% and 30.9% respectively, the ratios of citizens "rarely participating in the activities" and "never participating in the activities" are 9.6% and 9.0% respectively. The ratios of citizens "usually" or "occasionally" talking about the public affairs of science and technology with their relatives and friends are 23.8% and 47.6% respectively; and the ratios of citizens "usually" or "occasionally" participating in the discussion or hearing of the public issues relevant to the science and technology are 3.8% and 10.3% respectively.

Take the investigation of the public's performance in the large-scale activities for an example. The statistical data of the Ministry of Public Security reveals that from 2006 to 2008, 35,000 to 41,000 large-scale activities were held during the national festivals and holidays in total and the participating population is more than 500 million. Additionally, according to the safety spot check for the main large activities during the festivals and holidays by the public security department, various potential safety hazards exist in nearly 70% of the activities. The characteristics of the large-scale activities during the festivals and holidays are: makeshift venues—some structures are always temporarily established and lack of complete and thorough security check; crowds of people, a large number of people are gathered in a short time, and meanwhile, because the participants are not familiar with the site conditions and safety precautions, serious accidents can be easily caused by some small unexpected disturbances; and multiple participation sides, which makes the management complicated, resulting in the emergency facilities lacking of pertinence and coordinability, and consequently, "Blind Areas" of safety management is easily incurred. The evolution mechanism research for the public emergencies in our country shows that, among the 94 incidents from 2005 to 2008, the incidents under the main conditions of "public places + trample calamity" are the majority, which always involve the entertainment places, underground supermarkets, and present the cluster phenomena, such as panic buying, the student leaving after school, movement towards the same direction in public places, the audiences leaving after show in the cinemas and theatres, etc. The results of the specific analysis on the other 84 incidents are that: 7 incidents are incurred because the public are frightened due to the sudden natural meteorological disasters; 26 casualty incidents are caused by fire, explosion, objects falling from the above and structure collapse; 6 casualty incidents are resulted from chaos due to terrors and rumors; and 45 trample calamities are caused by minor disturbance, which occupies the largest proportion. The behaviors of the crowded people show that: from the initial gathering till the trample occurring, the incidents are formed by stages of crowd gathering, crowding, chaos, evacuation, etc.. Generally, when the crowd density reaches 3.8 persons/□, serious jamming can be caused, and such a case may be suddenly worsened in summer. At this moment, the self-discipline and moral restraint abilities are weakened, especially for the diseased persons. In this case, the crowd panic is the precondition of the trample calamity: the crowd gathered at the exit causes the arch jamming; the physical interaction is strengthened, and the crowd density in a unit area reaches an intolerable limit; when the main exit is not available and the crowd is not informed, the crowd from different directions is congested at the crossing of the passage or the exit/

entrance, and the suddenly-increased reverse flow is formed; the travel speed of the people in normal conditions is 1.2 m/s, while the evacuation speed in emergencies is 1.5 m/s, when the crowd density reaches 3.3-5 persons/□, the evacuation movement is hard; and with the increase of the crowd in panic, the interaction among the crowd at the jamming spots is strengthened, and the factors of danger are enhanced, and at this time, the reinforced bars can be broken off and the concrete walls can be pushed down with the strength.

The result of another questionnaire survey on the disaster mitigation issue shows that, 37% of people have never received the disaster prevention and mitigation education, and only 4% often adopt such an education, when the surveyed people were asked whether the emergency medicines, such as survival kit, etc. are prepared at home, 74% give the negative answer.

**(II) Existing Problems**

The insufficient development in the civic scientific literacy indicators is manifested in the three aspects:

1. The degree of advocating the scientific spirit is to be improved

Although the degree of the citizens advocating the scientific spirit and involving in the science popularization activities is relatively high, the performance in the dimensions of scientific knowledge, and scientific methods and processes is relatively poor.

2. The initiative of the citizens to participate in the science popularization activities is to be improved

For various science popularization facilities and activities, the ratio of citizens "not participating in but hearing of" is significantly higher than that of the "participating in".

3. The citizens' interest in the science and technology is relatively limited

Beijing citizens are very interested in the science and technology, but the objective of the public's interest in the scientific and technical information shows obvious "practicability". The scientific literacy level of Beijing citizens ranks in the leading position within the whole country. According to the eighth national civic scientific literacy survey in 2010, the scientific literacy level of Beijing citizens was only secondary to that of Shanghai citizens, ranked second in the provincial administrative units of the whole country, and was 3.06 times of the national average level. Since the civic scientific literacy investigation was conducted in Beijing in 1997 for the first time , the civic scientific literacy level of the whole citizens in Beijing has kept a stable and rapid growth, the ratio of the public with the basic scientific literacy has been increased from 4.0% in 1997 to 6.6% in 2002, 9.2% in 2007, and then to 10.0% in this investigation, 1.5 times and 6.0 percentage points are increased in 13 years, the average annual growth rate is up to 7.3%, which shows a stable and sound growth trend, and fully embodies the effect of the civic scientific literacy building and science popularization work in Beijing.

**III. Experience of the Disaster Mitigation Association in Conducting the Activities to Promote the Scientific Literacy of Beijing Citizens**

**(I) Emphasis on the Publicity and Education of Disaster Prevention and Mitigation Science Popularization**

Organize various types of science popularization knowledge lectures, report meetings, academic forums, exhibitions, street promotion, consultation and public advertising, makes science popularization display boards and wall charts, distribute publicity materials, provide more than 500 publicity articles for the television, broadcast, publications, newspapers, etc., and compile 18 kinds of the published series of disaster mitigation management and science popularization books which are 147,000 volumes in total.

After the "721" Beijing massive natural disaster, the disaster mitigation association set up the science popularization publicity team composed of the experts in comprehensive disaster prevention and mitigation,

earthquakes, meteorology, water, health, etc. according to the characteristics of the affected populations, the team has hold 10 science popularization lectures for the school of children of migrant workers in the mountain areas, health units, Party schools, civil servants, colleges & universities, middle and primary schools, business groups, the world top 500 companies, military and other units, to introduce the knowledge and prevention measures of the common mountain torrents, mudslides, rainstorm, thunder and lightning and other natural disasters in Beijing in the flood season, as well as the evacuation methods in the emergencies of automotive drowning, suddenly-encountered fires, earthquakes, etc. Especially, the dangerous village – Qiupo Village in Beijing Mentougou District was successfully moved integrally before July 20, 2012, which fully demonstrated the importance of the popularization of disaster prevention and mitigation knowledge, the preventability of disasters as well as the effect of the precautions. The benefited people reach more than 10,000.

**(II) Publicity Through Large National Science Popularization Platform**

During "Beijing Science and Technology Week", "National Science Popularization Day Carnival", "512" National Day for Disaster Mitigation and other large-scale science popularization publicity activities, the Disaster Mitigation Association focuses on the publicity and popularization of the disaster prevention and mitigation knowledge, and presents the earthquake experience vehicles, China earthquake emergency rescue vehicles and Beijing meteorological emergency command vehicles at the main venue, so that the public can learn more about and master the scientific knowledge of earthquake prevention and disaster mitigation.

The on-site publicity of 2010 Beijing Science and Technology Week is still vivid in our memory, the middle schools in Qinhuangdao, Qingdao, Shijiazhuang, Tangshan and other places took Beijing Science and Technology Week as an important festival of science and technology, the teachers organized the students for visit and interaction, and they said to us: it is happy for you to live in Beijing and have so many opportunities to study a variety of science popularization knowledge every year for free. How we envy you.

Compared with many other cities across the country, Beijing citizens' scientific literacy ranks in the top. The Disaster Mitigation Association takes the "721" massive natural disaster for an example, to demonstrate the self-rescue and mutual-rescue measures as well as the precautions under the rainstorm and automotive wading circumstances in the daily science popularization publicity activities and the published books, but when the disaster comes, there are still 79 people died in the incident.

**(III) Holding Various Science Popularization Activities in Communities**

Authorized by the Beijing meteorological bureau, the Beijing Meteorological Disaster Warning Signals and Precaution Guidelines completed by the disaster mitigation association has entered 16 districts and counties in the whole city on the arrival of the fifth national "512" "Disaster Prevention and Mitigation Day", covering more than 6700 communities. In the enlightenment of "721" extraordinary rainstorm in the last year, on the basis of the original content, the part of response measures in the meteorological disaster prevention guidelines is strengthened in the newly revised "Early Warning Guidelines", such as the response to the rainstorm, the dangerous level, the time to reduce travels, the levels for stopping the classes and work and notes for the driving. And all the people from government to the whole society know well how to carry out the self rescue and mutual rescue, and also how to take precautions. The public can master the scientific prevention and evacuation measures through the learning, to minimize the losses caused by the natural disasters.

## IV. Suggestions and Considerations

In the publicity of "512 National Disaster Mitigation Day" deployed by the national disaster mitigation committee

in 2012, it was emphasized to find the potential risks, eliminate the hidden dangers, establish risk screening linkage mechanism, etc. Starting from the safety culture construction to understand and cognize the disasters is the specific demand for the emergency preparedness of safety culture. In the education of safety culture, the misunderstanding shall be eliminated and the understanding on the functions of the emergency plan shall be strengthened.

1. In order to overcome the formalization problems, the lessons learned after the disaster shall be firstly conducted to overcome the impracticability problems, the existing public safety education rests on the exhibition, the emergency training only stays on the performance level, and the learned can't be used in the practice;

2. The Planning of National Security Culture Education shall be formulated from the aspect of sustainable development, and the Planning is also a part of the "living culture" content advocated by the government for the great cultural development. On the basis of the practice that the public awareness can't be enhanced rapidly, the Planning emphasizes the system design, in particular, from perspective of the national and urban comprehensive disaster mitigation, makes the disaster risk concept be deeply rooted in the people's hearts, and enable more people to understand that the "disasters" are also the national conditions, "ignorance will lead to the most serious disasters", and in the face of the disasters, science shall be believed first against the blind intrepidity;

3. The planning with the center of establishing the safety communities for comprehensive disaster mitigation and "family security plan" shall be promoted vigorously. Based on the successful experience at home and abroad of the safety community construction, from the perspective of safety-sociology, the functions of the safety communities in adjusting the social structures causing the unsafe factors, improving the disaster-resisting ability beneficial to ensure the safety of the social basic units, and strengthening the social control function of the government are obvious. Therefore, the construction of safety community shall be strengthened practically on a high standard from the perspective of the innovation of social management, focusing on the integration of the safety community, fire-fighting community, seismic community, civil prevention community, etc. into the "comprehensive disaster mitigation community", this is not only a change of name, but the cultural demand of the comprehensive disaster mitigation construction in the communities;

4. The systematic "campus safety culture" activities shall be comprehensively promoted. On April 10, 2012, the State Council promulgated the Regulation on School Bus Safety Management, but it only draws a clear "safety line" for the driving of the school bus, while the campus safety is a systematic project, "campus safety culture" is a large system for the comprehensive disaster mitigation. The campus safety not only requires the school buses obeying the regulations, but also requires strict institutional construction and supervision.

In the era of rapid development of science and technology, the comprehensive national strength embodies in the national scientific literacy which directly affects the level of technological application in the country, is related to the economic development and social progress, and fundamentally determines the developmental level of the productivity and culture, as well as the innovation capacity of the nation. The developed countries regard the improvement of national scientific literacy as the main strategic direction in the 21st century, and issue the strategies and plans to improve the national scientific literacy. The Party Central Committee and the State Council always attach great importance to the national scientific literacy work, and place the civic scientific literacy building on the overall strategic position to promote vigorously.

On the people-oriented basis, the two-way interactive platform shall be established with the objectives and outcomes of the citizens' demand as the center, focusing on the quality. The citizens are the subject and benefitted party of the scientific literacy building, the demands of the citizens from different fields, different levels and different groups shall be satisfied with different means of communication and ways, to release the greatest desire and potential of the citizens, demonstrate the force of science popularization and stimulate the enthusiasm and initiative of the citizens,

so as to make the citizens become the active groups to form a good participation atmosphere. The civic scientific literacy building shall be integrated into the overall society development. The science popularization is the common responsibility of the whole society, only if the civic scientific literacy is developed simultaneously with the society, the great vitality can be showed.

September 2, 2013

About the author: Han Shuyun, female, senior engineer, Deputy Secretary-General of Beijing Disaster Mitigation Association, engaged in the comprehensive disaster mitigation research. Address: No. 44 Zizhuyuan Road, Haidian District,

Tele: 100089 010-68400821

E-mail: bjjzxh@vip.sina.com

# Research on Relieving China City Comprehensive Disasters

Jin Lei  Han Shuyun

Abstract: A city is a life entity which is growing all the time. This article argues that during the urbanization process, the megacities' development has been enslaved to disaster risk factor. Through the accidents disaster chain, besides catastrophe factors such as earthquake, the disaster developed by extreme weather conditions affects directly the healthy development of urbanization, in the meantime, it'll also derive and induce serial disaster closely related to urbanization development. As per the urban hazard control, it's hard to define pure meteorological disasters. Therefore, with integrated strategy of disaster reduction, this article researches weather disaster problem in the urban comprehensive disaster prevention, while discussing the method of urbanization safety.

Key words: Urbanization, Weather disaster, Comprehensive disaster  Urban safety design

In April 2013, UNISDR issued Global Disaster-Reducing Estimation Report in 2013 and pointed out the frequent disasters are becoming an increasingly urgent issue in the economy and commercial society. The report stressed that the risks arising from the natural disasters have further risen with the increase of the global population and the acceleration of the urbanization process and the factors of climatic change. In fact, due to the unscientific urban planning, on the one hand, there is something wrong with the urban management scale and the city scale expands larger and larger; on the other hand, the carrying capability of the most cities has saturated and there is shortage of supporting city safety and salvation space facilities. The typical "Competitive Disease" of city has become the source of being short of measures for safety development.

## I. "Ten-year" Disasters and enlightment of China cities

Climatic change is the largest challenge confronting by the current world. According to the related report of World Meteorological Organization in 2011, the period from 2001 to 2010 is the warmest ten years recorded. We can see that the transition of "International Day for Disaster Reduction" theme since the 21st century can show the influence and the change. As early as 1996, the "International Day for Disaster Reduction" proposed the theme of "Urbanization and Disaster". In recent years, what Beijing makes the people intolerable is the heavy rain on July 21, 2012. Although it is said that the July 21 Heavy Rain has not occurred for 61 years, in essence, it was a natural disaster. Since 1951, there were several similar extra heavy climatic conditions in Beijing history, such as 464mm rainfall at Laiguangying, Chaoyang District on August 8, 1963 and 479.2mm at Badaohe, Huairou on July 27, 1972. Comparing with the conditions today and 50 years before, the urbanization rate is greatly improved. While the modern high-speed pancake-baking urban planning construction realizes the city prosperity, it also reserves the crisis difficult to overcome for the city urban guarantee. As for the "water safety" property issue, Ban-ki moon once pointed out on "International Day for Disaster Reduction" in 2010 that it is difficult to find the natural disaster purely leading to the social disaster in the contemporary society. The whole world, especially, the big cities shall particularly be concerned about the disaster expanding issue from the natural enticing reasons. Thus in terms of the natural disaster hitting every 61 years on July 21, the vulnerable conditions in Beijing originates from the natural disaster. The weak corresponding ability and disorderly conditions in case of urgent incidents are caused by the absence of urgent disaster corresponding management.

Nowadays, China "City Disease" indicates the features of human-caused disasters. Heavy rain causes the traffic paralysis of the city traffic. The delivery inputting of unqualified equipment greatly lowers the city safety degree; inferior food and drug are full of in the market causing innocent persons death and injury. Urban artificial risks (The nature is industrialized and the tradition is theoretically systemization) have become the main sources of social disasters risks of the modern cities. For example, nuclear and radiation safety, heavy metal, dangerous chemical products, lasting organic pollutants and dangerous matters are non-ignorable city new environment risk factors. Based on the substantial increase city population, the disaster potentialities accompanying are increased constantly. The disaster caused from the human factor and disaster-causing frequency is improved linearly. Thus learning the ratio of man-made disasters and major types are the critical link to confirm the urban man-made disaster high risks. We should acknowledge that the man-made disaster concepts are lock of unified cognition, but among the four disaster incidents of natural disaster, accident disaster, and public hygiene event accidents according to the Emergent Cases provided by the Emergency Response Law of the People's Republic of China.

"The main instructions reserved by China city disaster shall be establishing the "Comprehensive disaster reduction" and "Big Safety Concept". Comprehensive disaster reduction has two aspects of significance. On the one hand, it is closely connected with the linking spreading of city public crisis. Any single crisis event may cause a series of secondary crisis event, requiring multi-disciplinary department for unified coordination and management, especially the possibility of leading to "new disaster" from this kind of crisis event. On the other hand, during the total period of crisis event emergent management, that is, the whole process of monitoring, prediction, warning, prevention, rescue, treatment and recovery, it requires government functional agents orderly emergent processing and optimized policy-making under the unified guidance of the comprehensive departments. Comprehensive disaster reduction means adoption all kinds of prediction, warning, preventing measures to reduce the threat and influence of variant disasters on city districts. The crucial parts shall fall on "comprehensive parts", that is, embodying the comprehensive views on disaster recognition, comprehensive views on disaster management, comprehensive views on disaster mechanism coordination and comprehensive views on the emergent prepared schemes and laws and regulations. The four features of comprehensive disaster reduction are as follows.

The mechanism continuity among single disasters: the "disaster links" of the modern city disasters are more and more. The most common clear disaster "disaster links" are as "Wind-Rain-Hail-Flood-Landslide-Building Destruction-Rain-waterlogging". Thus it is of great significance to research several simultaneous disasters (main disaster and secondary disaster) and concern the unknown field of disasters; (2) Integration of all disaster-reducing links of all cities: many cases of city disaster reduction and prevention demonstrate that it is very necessary to adopt effective and complete "Three Systems- One Case" management of city comprehensive disaster reduction before implementing the single disaster execution power. That is, "Comprehensive running of all-society disaster reduction factors" must be popularized in the modern metropolis. (3) Comprehensive disaster reduction is more beneficial to the city society development. If taking GDP and governmental finance revenue on the city economy as the positive increase marks, then the investment of "consumption" related to city disasters shall be regarded as negative growth. The current annual disaster loss is not calculated under the premise of cooperating with the statistics departments, excluding the affiliated economic loss of social production link caused by the disaster apartment form the direct loss of disasters (that is, the amount of derivative disaster), also short of connection with the national insurance mechanism. (4) Comprehensive integration of qualitative and quantitative features due to the variant features of city disasters and considering that city system is the integration of society, humankind and geography, thus, the combination of qualitative and quantitative methods are necessary for the comprehensive disaster reduction methodology. It is featured by upgrading from

qualitative understanding of variant aspects to quantitative understanding, the combination of natural science, social scientific theory and experience skills, the combination of micro and macro world as per the complex system of hierarchical theory and the combination of "soft" methods and "hard technology".

## II. China city "Ten-year" still witnesses the clear disaster reduction issues

Although the Chinese comprehensive ability of disaster preventing and disaster resisting is improved evidently, the comprehensive disaster reduction system of preventing, resisting and saving integration (system, mechanism and legal system) are formed preliminarily, but the power resisting the great disaster is still weak. Provided that the "May 12" Wenchuan Megaseisms Earthquake shall be rescued by the whole country, then Ya'an 7.0 Strong Shock shall not exclude the "cost" and "investment" and adopt non-plan investment. The city without "Income-output ratio" and urbanization disaster resisting are not beneficial to the national urban disaster reduction strategy. Generally speaking, the China city (including urbanization) confronts the following challenges: the uncertainty of climate change causes greater environmental risks, the disorderly massive increasing of China city and urbanization aggravates the potential risks, and the influence and widespread of the global great catastrophes shall not impossible to influence the China country in the internationalization settings. The specific ways are like follows. Apart from the natural disasters and man-made disasters, a large scale of nontraditional safety incidents like pollution incidents, food and medical drug safety, sudden public hygienic incidents, school building safety and terrorism occur one after another. For example, following Dayawan Nuclear Plant leakage and Zijin Mining pollution event in 2010, Bohai Oilfield oil spilling event and Yunnan Qujing chromium slags issue occurred in 2011.

### 1. Safety Issues of four municipalities

In May 2012, on the 4th municipality safety forum held in Shanghai, the State Administration of Work Safety stressed that presently China is during the period of industrialization and urbanization. The city takes on new features like city and countryside integration, population densification, park-form factories, elevated road bridges and complex system, etc. Accident disasters has been transferred from the traditional industry to city transportation, construction, firefighting and all running industries and school, community and industry park, especially in the personnel highly-intensified public sites and city major incidents space. The risks insurance are increased but not decreased.

Firstly, the city function determines the complexity and difficulty foreseeability of disasters. Since the hitting of SARS in Beijing in 2003, all the major accidents including CCTV new building fire disaster in 2009, "6.27" No. 7 building toppling and falling at Shanghai Lotus Riverside View in 2009, "November 15" extra fire disaster accidents in Shanghai in 2010, Escalator breakdown of No. 4 Beijing Subway in 2011, "September 27" rear-end collision and "September 14" major road traffic accidents of No.10 Shanghai Subway in 2011, illustrated that although the four municipalities have different city function orientation, the occurred accident and disasters have the same complexity and difficult foreseeability in common.

Secondly, quick urbanization process is difficult in blocking the new risks of accidents and disasters. The systemization, derivative and crossing features of city safety are increasingly evident, which are the new conditions unavoidable during the quick development of urbanization. For example, based on the fact of increasing severe the land ground settlement in Beijing, Shanghai and Tianjin, Shanghai has predicted that the sea level will rise by 10-16 cm in the future 20 years. The four municipalities are located at the crucial period of transition development. All kinds of factors flow and gathering degree are very high. Thus the city construction must keep a foothold on city safety controllable ability.

Thirdly, the recent domestic ten-year city comprehensive disaster prevention and reduction plan is not only

incorporated into Overall City Planning version. It is also more and more gathered at the following aspects, disaster monitoring warning information issuing system, disaster prevention and emergent management information system, emergent comprehensive rescue team of city emergent guarantee platform city, emergent road, refuge-avoiding evacuating site, emergent infrastructure, disaster rescue materials and emergent supply system, etc.

**2. Bearing capacity of city lifeline**

On April 1, 2013, PRC government website issued the notice of General Office of the State Council. It required the city draining and preventing waterlogging facilities construction shall be completed. The rain sewage system of draining pipeline network shall be completed within five years. It will take about 10 years to construct more perfect city draining waterlogging preventing engineering system. It is the first time for the state to issue the city waterlogging road map and timetable. Superficially, it researched the radical treating policy of inner waterlogging both of draining and impounding and increased the city water permeability performance. However, the problem is that its whole conception goes away from the actual conditions of cities fails to consider the problem from the city space limitless expansion. Endless increasing city capacity and function will lower the steps of city draining waterlogging facilities construction. The terrible growth not only threats the city waterlogging system, but also endangers the whole life line system safety.

**3. No conflict between the city disaster prevention normal management and urgent management**

Apart from the management thinking, scientific research is valuable to predict the future disaster risks. To get to know the vulnerability with the city disaster prevention, it stresses more on the resilience of the system. It also stresses the system response to the outside world and the process returning the original status after being attacked by the disaster. The research of the city comprehensive disaster reduction involves widespread scope. It not only researches the city disaster science principles, but also deals with the effective disaster prevention and reduction technology policies under the comprehensive disaster reduction. The underground space safety and the estimation of other subway running requires the risk efficiency research. It not only researches the high frequency of reasonable evacuating personnel in subways, but also deals with the reliability of subway safety running facilities. It also makes great efforts to incorporate it into the city underground space safety system, so as to look for the reasonable indicators of city safety investment.

**4. Safety design concern on the emergent shelter**

In 2002, Beijing Planning Committee and Beijing Seismological Bureau jointly formulated Planning Outline of Urgent Shelter (Outdoor) of Beijing Downtown Earthquake and other Disaster Urgent Shelter, which was the first planning outline on city disaster prevention and reduction urgent disaster avoiding. Tianjin Municipality formulated its shelter place planning in 2004 and made the per capita value research of used land at the shelter place. It researched and demonstrated, from the construction urgent sheltering place requirements and disaster population capacity, the population density influencing factors, geological conditions factors, land-using functional factors, architectural quality and lifeline system special guarantee factors. But China has not yet constructed the shelter place preventing variant disasters like comprehensively guarding shelter earthquake and extreme meteorological conditions. In terms of the conditions under the great disasters in big cities, the quality and quantity of the current shelter avoiding disasters are not sufficient enough. Shelter site is an important public service facility guaranteeing the city safety, therefore, its availability and fairness are very necessary.

**5. Ten-year anniversary of "SARS"doubting the effectiveness of the prepared scheme**

Looking back the two aspects progress of ten-year anniversary of "SARS", firstly, a series of public healthy incidents defending laws and regulations are "Updating" revised. If we say that "SARS" can suddenly attacks the whole society because it is related to its mystery and strangeness, more essentially, there are too many defects in the national public health field. Secondly, the discipline of ten-year anniversary of "SARS"leads the public health to enter the quick

lane. It also influences all systems of China disaster reduction and prevention subtly. We cannot think that we didn't obtain experience from SARS while confronting Wenchuan Earthquake, Yushu Earthquake and a series of sudden incidents. Thus, some people may think whether the situations wil be better if we prevent haze and H7N9 birds flu like preventing SARS. While confronting the progress of planning designing disaster prevention of medical buildings ten years since SARS breakout, many Beijing Comprehensive 3A Hospitals were the spreading resources among the most gathered mass, but they were also the backbones to rescue the severe illness sufferers. However, ten years later, it is still difficult to put an end to the public health incidents like SARS.

## III. Rationality and suggestions for city safe development in China.

### 1. Eight opinions on safe cities

(1) Safety cities shall be a complete and essentially safety city. The crisis incidents like the natural disaster, man-made disaster, public-health event and social event are also located under the monitor of top designing safety status.

(2) Safe cities shall be a city with comprehensive urgent management capacity. They shall be comprehensive emergent management and processing capacity with the comprehensive disaster reduction and legislation as the premise. They shall have the special "affiliated management" functions coordinating with the central government and differentiating from the general municipalities.

(3) Safe cities shall have the comprehensive "border crossing" control power, guiding power, decision-making power and quick response ability and recognition level of domestic and foreign disaster prevention and coordinating rescue to all kinds of disasters.

(4) Safe cities shall have first-rate lifeline system and high reliable guiding system. They shall not only guarantee the system safe, reliable and quick in recovery. They shall have sufficient disaster capacity preparation and quick evacuating and other extended capacity.

(5) Safe cities shall have the internationalized level of citizens. Not only the citizens shall have the safety culture to cultivate the quality and skills of education, but also 60% of the city population shall accept the disaster preventing education and the education reaches the necessary quantity of the safety community standard required by WHO. .

(6) Safe cities shall have strong damage-resisting ability to the disasters. In case of all kinds of disasters, over 60% the citizens shall have the ability to participate in rescue and mutual rescue to guarantee the smooth operation of important facilities. Especially, the citizens shall have the good stable status for the changes in case of disasters.

(7) Safe cities shall make the governmental servants as the "forerunner" of the safety urgent supervisor. They shall also require the project constructors and managers shall be the soul in the aspects of theory and practice, culture and practice, project and non-project strategies of the public safety construction.

(8) Safe cities shall be with the notion of contemporary city and buildings, the guaranteeing ability of disaster regions and "warning line" and reducing the man-made disaster to the utmost and the ability expanding disaster expansion.

### 2. The related suggestions on safe cities public policy formulating

In 2012, China embraced as a new ten-year period. A "Ten-year" is only an instant in the long history. How to realize the great-leap-forward development and how to interact with the world are confronting the unprecedented opportunities and challenges. No matter the extra large cities or urbanization, improvements must be made in the following aspects.

(1) Upgrade the national notion of cities on life and safety;

(2) Upgrade the lifeline system ability of city disaster preventing and destruction resisting;

(3) Upgrade the essential ability and level of comprehensive city disaster reduction planning;

(4) Upgrade the disaster reduction and preventing designing research and education on the city planners and architects;

(5) Upgrade the emergency management ability and quality of city managers and public servants;

(6) Upgrade the disaster preventing ability education of the mass, primary and middle school students and the disadvantageous groups. The specific aspects are as the following opinions and suggestions.

Firstly, develop the emergent city safety industry. We must admit that the emergent management consciousness of China's urban residents is very low and weak, the truly effective emergent processing materials are very weak under the disaster circumstances, the emergent prepared scheme warning and processing are not mature so that cities become disorderly in case of disasters. Therefore, the emergent city safety industry shall be related to the intensification of the comprehensive disaster reducing ability matching with the urbanization development and the overall development of the overall situations.

Secondly, develop the fundamental research on the serious disasters. Apart from the management thinking, scientific research is very valuable to predict the future disaster risks. It is related to the vulnerability of city disaster prevention. The fundamental research stressed more on the system resilience, the system response on the outside impact and the process of returning to the original status after being hit by the disasters.

Thirdly, develop the disaster preventing legislation of cities as the planning ability construction of the mark. Aiming at the unsatisfactory city emergent management regional cooperating ability, the lag behind of the city infrastructure disaster preventing and reduction ability, the low participation of mass in sudden incidents, we shall explore the formulating ways of Law of City Disaster Prevention matching with the national Corresponding Law on Sudden Incidents. The focus shall be fallen on researching the law systems and functions taking the comprehensive disaster notion, defining the basic principles and fundamental system of law, so as to innovate the basic framework of Law of City Disaster Prevention. The writer suggests that with a view to intensifying the China city comprehensive emergent management capacity ability construction, the following 6 aspects shall be implemented as well as the legislation research.

(1) Intensify the city disaster risk resources and the popularization and checking power of the potentialities; (2) intensify the comprehensive structure of key city field monitoring network and predicting system; (3) intensify the emergent information guidance and recovery reconstruction ability after disaster; strictly limit the reporting information flow of major incidents and intensify the unified planning before and after the disaster (4) intensify the emergent logistics construction of coordination guarantee and emergent scheme management of city crossing departments, crossing fields and industries; (5) Intensify the construction of the comprehensive city disaster preventing standard system; creating conditions for emergent prepared scheme management to provide system guarantee; (6) Intensify the comprehensive policy research of new conditions and new features of city adaptability disaster preventing and reduction management; correctly master and control the social mentality and emergent spreading mode construction of appeal

Jin Lei
Vice Secretary General of China Association of Disaster Prevention
Vice President of Beijing Association of Disaster Reduction
Expert consultant of Beijing Peoples' Government
Senior Engineer with professor level
Han Shuyun
Secretary General of Beijing Association of Disaster Reduction,
Senior Engineer
(Beijing Association of Disaster Reduction, 100089)

# Scientific Planning is the Premise and Foundation of Developing Low-Carbon City

Li Zhe
Chinese Academy Science and Technology for Development, Beijing 100038, China;
Beijing Association of Productive Strength, Beijing 100029, China

Abstract: To adapt the global climate change, developing low-carbon city is necessity of promoting developing mode and carrier of practicing the theory of low-carbon economy. The planning focuses on spatial distribution, industrial structure, construction facilities, traffic system, community planning and so on. Expressing the coordination and unity of the whole planning, quantifying the planning goals and establishing a comprehensive protection mechanism are the necessary ways to build scientific low-carbon city.

Key words: low-carbon city; scientific planning

## 1. The Situation of Developing Low-carbon city

### 1.1 Building low-carbon city is a significant method to adapt the global climate change

With the opening of the Copenhagen climate change conference, it attracts more focus on carbon emission issues. If the climate continues to warm up, animal extinction and extreme weather such as drought, flood will become more frequent, which is a great threaten to food security.

From the sources of greenhouse gas, urban cities are both the center of population, construction, transportation, industry, logistics and the roots of high energy consumption and high carbon emissions. As a result, building low-carbon city is a significant method to adapt the global climate change. It leads to the study and practice of low-carbon economy and low-carbon city.

### 1.2 Low-carbon city is the necessity of promoting converting developing mode

Generally speaking, China is in the middle and advanced developing period of industry. Population, economy and energy consumption are rising up continuously, while the urban energy consumption structure is inappropriate at the same time. On one hand, we are facing up great pressure of energy-saving and emission reduction. On the other hand, there is a great improvement of industrial structure and technology structure.

Practically speaking, the construction work of low-carbon cities has a series of problems such as unfair job-dividing, no specific objectives of energy-saving and emission reduction, lack of testing and evaluation system. In addition, city planning cannot form restrain of industrial restructuring, consumption model and daily operation, which means that the plan is just a principle and instructive document.

### 1.3 Building low-carbon city is carrier of practicing the theory of low-carbon economy

Multi-criterions are put forward to evaluate low-carbon city planning and construction. Take overall control towards urban structure and developing mode and reduce carbon emission. First of all, exploring suitable mode of land utilization and establishing green traffic systems can lead to industrial restructuring and promote circular economy by city planning. Secondly, changes in people's daily life and environment protection by advanced technology are important strategies that should be made to turn into a low-carbon city. Theory and method of low-carbon city planning are keys of building low-carbon city, which needs overall arrangements and comprehensive regulation of social

economic activities. Most of all, the government should look into this problem in a higher level, a broader view and a longer-term plan in order to make stable economic growth and low carbon emission.

## 2. Key points of low-carbon city planning

One way to plan, establish and practice low-carbon city is that be aware of invisible factors, such as economy, society, culture, environment, personal values, life style, consumption habit and so on, can have an influence on low-carbon city development. In addition, social wealth distribution and social equity also should be concerned. Thus, all these factors might affect the use and distribution of city energy and city resources. When the government works out city resource distribution, specific, quantitative goals ought to be made to estimate the effects of low-carbon city development, which assert a claim that government should seize key areas and recognize key points to improve feasibility of low-carbon planning.

### 2.1 Space layout

Reduce travel time and travel distance by establishing scientific urban space structure and layout so as to prevent pollution, improve the urban efficiency and lessen heat exhaustion. According to the situation of China, we should abandon chaotic urban expansion mode and optimize urban space structure. Above all, the planning should hold the function of "density guidance" to make proper proportion of form elements in urban areas. For example, job-housing balance, balance between economic activities and public institution, balance between social groups and facilities are taken into consideration. Secondly, urban space utilization pays more attention to integration above and below ground, which means that our city can become compact city more easily in terms of low-carbon life. Meanwhile, green space should be increased in different kinds of active areas on the basis of protecting and taking advantage of ecological environment, which leads to improve climate micro-cycle on local areas.

### 2.2 Industrial structure

Two sides should be taken in to account when we carry out low-carbon industrial planning and optimize industrial structure. On one hand, accelerate urban economic structure adjustment and optimization and give priority to develop local leading industrial. For example, information technology, energy-saving, new energy, biology, high-end equipment manufacturing, new material and new energy automobile are strategic emerging industries that belong to leading industries, which have low energy consumption, high driving coefficient of industrial, more job opportunities, good comprehensive benefits and lead to the direction of low-carbon industry. On the other hand, increase energy efficiency of traditional industries, improve entrance requirements of steel, non-ferrous metals, construction materials, chemical engineering, power and other high-energy industries and accelerate elimination of pollution industries, facilities and companies. In addition, city planning should strengthen the study of low-carbon developing rules and provide low-carbon industry with convenient and valid guidance on land-using planning.

### 2.3 Construction facilities

Construction energy consumption and carbon emission increase rapidly with the developing of urbanization. It is necessary to analyze the infrastructure construction and carbon emission caused by people's life style to recognize major problems of low-carbon construction, including construction materials, energy facilities and people's life style and consumption concept. Besides, predicting infrastructure demand in the future and carbon-reduction potential and working out proper objectives of energy-saving and carbon emission attracts more concern in low-carbon city.

Government should advocate and promote green construction plan and design. We need to set up design standards of green construction that meets with climates in different regions, including policies and regulations of energy-saving construction, technical standards of energy-saving construction design and evaluate, study of heat metrological control,

application and dissemination of renewable energy sources and low energy consumption, ultralow energy consumption technology in residential building, longer operation life of construction facilities.

**2.4 Traffic system**

Traffic system is the major industry of urban energy consumption and low-carbon traffic system is a significant part of promoting urban energy utilization. It is suggested traffic system planning should be in progress from both hardware facilities and traffic polities.

Hardware facilities: adjust measures to local conditions in energy-saving, high-efficient facilities such as rail transit construction and bus-only lanes, no transit of subway, express train, airport, bus, taxis in metropolis, keep and enlarge bicycle road, side pavement to advocate green travels, increase investments in information technology to promote smart traffic with high operation efficiency.

Traffic politics: encourage people to take part in public transport or bicycles, restrict expansion of personal cars and work out viable emission standards under strict managements, encourage and generalize new energy automobiles by preferential policy, improve service level of public transport.

**2.5 Community planning**

Low-carbon community reduces greenhouse gas emission from community planning construction, use and management by means of comprehensive methods of energy, resources, traffic, land-using and construction. Besides, people are able to spread low-carbon community idea via all kinds of life styles such as household, business and leisure.

In community planning, the whole planning distribution of all building and other facilities in the region can make a direct effect on the inner microenvironment and microclimate. As a result, proper planning in dwelling district can make entire use of natural lighting and nature ventilation and cut down energy emissions. Sophisticated green system in summer can lower environmental temperature effectively and increase the air humidity to get rid of artificial environment dependence. Meanwhile, tall evergreen trees and shrubs in winter can decrease the wind direction and wind speed in surrounding areas to improve building heat-retaining capacity. Proper distribution of roads also can make living condition better and low-carbon community spatial distribution should take spatial scale in adjacent community into consideration. Lower automobile usage to satisfy people to go shopping and do some exercise without vehicles. What's more, low-carbon community design focuses more on renewable energy resources and clean energy to improve energy efficiency, provide convenient and comfortable public traffic and chronic traffic conditions and advocate saving water to make full use of recycled water and rain. Making a good microclimate is also significant by land-using distribution.

## 3. Suggestions

Scientific planning is the premise and basis of low-carbon city construction. However, according to wide range of issues in low-carbon planning, it is the main challenge that how to make coordination between low-carbon planning and other planning and how to ensure the implement.

**3.1 Express the coordination and unity of the whole planning**

It is important to clarify any department's responsibility and labor division to avoid evasiveness and uncertainty when the government compiles the whole planning because low-carbon city construction involves many government departments. The government major leaders should set up supervise offices to enhance coordination, when a department cannot undertake a task alone, which reflects that the government play a leading role in the planning. At the present stage of urban development in China, low-carbon city construction idea is ought to pay more attention to the government's comprehensive leading force to improve low-carbon rule design. The planning is not only a guiding, principle action, but also the binding legal governmental document that involves any other departments. Thus, city overall planning is

meant to be put forward in view of overall scope, which plays a leading role in carbon-emission reduction including actions, schedules, responsible departments, fund sources and so on.

**3.2 Quantify the city planning goals**

The realization of low-carbon goals promoted by city overall planning is supposed to embody the measure degree of low-carbon policy and substance of action projects to improve political expression ability of planning achievements. City overall planning goals are quantified to a great extent in order to simplify goals and evaluate implementation effects in the future. There are three comprehensive indicators measuring carbon emission as follows: total carbon emission, per capita emission and carbon emission intensity. Carbon emission intensity refers to the total carbon emission produced by per unit of GDP. The former two indicators are absolute indicators and the last one is the relative indicator.

In the rapid advancing period of urbanization, it is difficult to reflect the efforts made by the government if we use total carbon emission and per capita emission as developing goals of low-carbon city. Thus, carbon emission intensity is commonly used as emission standard to most cities when we work out overall goals of low-carbon development. Decreasing the carbon emission intensity as the overall goal via analyzing base cases deeply is an alternative way. However, per capita emission in Beijing, Shanghai and Shenzhen is much more than average so that per capita emission can be used as overall goals in transition developing stage.

**3.3 Establish a comprehensive protection mechanism in low-carbon city planning**

When low-carbon city planning is formed, available protection mechanism should be set up to promote the planning practicable. Similar to other planning supervision systems, several parts are supposed to be emphasized as follows: Establish assessment and evaluation system to evaluate the working performance and assess responsible departments periodically to give rewards. Set up politics of accelerating low-carbon development to guide market actions within city respective responsibilities. Set up public opinions leading system and public involved mechanism. Primary organization and non-government agency should make efforts in leading public to an economical, low-carbon habits and life style and forming a green, low-carbon and economical consumption patterns by means of education, advertisement, training and so on. Lead public to purchase energy-saving and low-carbon products to affect corporations' production behavior. Encourage public to participate in government's relevant decisions to ensure source management and policy to carry out effectively. Encourage public to supervise corporate low-carbon production and management to help building low-carbon business faith and put low-carbon, environmental protection into business decisions.

In conclusion, China is still in the rapid advancing period of urbanization and substance planning is one of the mainstream planning. When the concept of low-carbon city was introduced to China, it becomes focus of our current study that how to integrate low-carbon city with existing planning system so as to fit national situation better. There is no widely spread idea of low-carbon city planning organizing system and method in that low-carbon city planning framework is still under construction. This part need to be discussed combining with actual situations in different regions. With regards to the implement of low-carbon city, it is relatively weak in academic research at present, which calls for further study based on low-carbon city planning.

Reference:

[1] Chen Hongbo. Low-carbon city planning: target choice and key areas[J]. Journal of huazhong university of science and technology, 2011.

[2] Song Yan, Peng Ke. Study on methods that city overall planning promotes low-carbon city development[J]. planner, 2001.

[3] Liu Shan, Yu Fei. Study on low-carbon city planning[J]. China's Foreign Trade, 2011.

[4] Hong Yue. Brief Analysis on Chinese low-carbon city planning[J]. private science and technology, 2011.

[5] Chu Chunli. Study on the Planning Principles and Framework of Low Carbon Development of Cities in China[J] ECOLOGICAL ECONOMY, 2011.

About the author:

Li Zhe, doctor, Deputy Director of Institute of science and technology system and management, Chinese Academy Science and Technology for Development. Director of Beijing Association of Productive Strength. Invited Propounder of Beijing Government.

# Make the Urban Environment of Beijing Reflect Cultural Characteristics

Liu Xinkui

## I. Cultural Characteristics of the Urban Environment of Beijing

As far as the urban environment is concerned, nature is its background, and history is its root and culture its soul. As a noted historic and cultural city, the urban environment of Beijing characterizes the integration and mutual reflection of nature, ecology, history and culture. The characteristics lie in the following eight aspects:

**(1) Delightful contrast of the beauties of four seasons and places of interest**

There is a clear distinction among the four seasons in Beijing, so the beauty of all the seasons differs from one another. There are seventy national 4A level scenic spots among which there are twenty-eight places of interest. The places of interest are often the integration of natural scenes and human creations and form a delightful contrast of the beauty of four seasons and festival events.

**(2) Mutual reflection of the style of the ancient capital and the city color**

The style of the ancient capital is the core of the urban environment. The city in the Ming and Qing Dynasties (called Old City at that time) was the masterpiece of the urban planning in Ancient China. Protection of the style and the control area takes up approximately 44% of the whole old city. The royal red walls and yellow tiles, the grey residential dwellings, the green water system of rivers and lakes and the old trees in the traditional city formed unique scenery.

**(3) Harmony of city pattern and impression**

The urban transportation pattern can be discerned: the patterns of the grid network of the urban roads and the loop and radial roads. The urban function layout is obvious: set Tian'anmen Square at the core to form the political, cultural and tourist center of the ancient capital; the traditional business districts of Dongdan, Xidan and Qianmen; the financial street and the central business district (CBD); the residential district at the marginal area, the country parks and the holiday resorts of the city.

**(4) Interpenetration of customs and cuisine and entertainment**

The customs of the city reflect the cultural patterns and lifestyles in Beijing. Currently, the inherited customs include the major festival customs: the Spring Festival, Tomb-Sweeping Day, Dragon-Boat Festival and Mid-autumn Festival. Other customs associated with the solar term are the beginning of spring, Double Ninth Festival, the summer solstice, the winter solstice and the like. Such customs forge close ties to all sorts of activities like the traditional cuisine, tasting tea and chrysanthemum appreciation and connect with the cheongsam, jade sculpture and time-honored brands to form a strong Beijing flavor.

**(5) Coexistence of water gardens and folk customs**

There are three hundred and sixteen city parks and green landscapes now in Beijing. Twenty two out of them are national forest parks and eighty one out of them are country parks. Such folk festivals as the Temple Fair during the spring festival, watching lanterns on the Lantern Festival and some major cultural activities like New Year's bell ringing in the Summer Palace connect the beautiful scenery with significant cultural activities.

**(6) Colorful cultural activities and diverse cultural facilities**

Culture and art is the style of the city. Not only Beijing boasts rich traditional arts like Peking Opera and Pingju Opera, but it has also preserved the traditional venues like Huguang Guild Hall and Lao She Teahouse. As a noted cultural center, Beijing has already built fifty four large theaters including National Grand Theater, National Pingju Theater and Peking Opera Theater. There are more than ten thousand of theatrical performances every year. Besides, Beijing has got large numbers of museums. The cultural art exhibitions yield unusually brilliant results.

**(7) Co-existence of cultural quality and inclusiveness**

All the previous census data indicate that the educational level of the population in Beijing is higher than that of the other provinces and cities. However, such phenomena as littering everywhere, eating snacks, Chinese style of crossing roads and smoking are still widespread. The urban atmosphere becomes open and inclusive with the rapid growth of the local population, but chaos and disorder in public space exist in many places.

**(8) Co-existence of solemnness and dilapidation**

The space in the city is open, the buildings solemn but not exquisite enough. The urban trunk roads are 100 meters wide. There are lots of solemn and magnificent institutional structures on both sides of the truck roads. However, the alleyways are often dirty and disorderly. It must be noted that the dilapidation of the cottage area in the Old City has left a bad impression on the tourists.

## II. Cultural deposits deficiency during capital environment construction

From the perspective of the urban cultural deposits reflected by the urban environment, we've made an analysis of the environmental problems in Beijing.

**(1) Lack of ingenious use of nature in the urban landscape**

The traditional use of nature at its best embodies the regional characteristics. However, there are few successful examples of use of nature in modern cities. For instance, the high platforms for the green landscapes in Beijing prevents rainwater and dust from entering inside, thus weakening the absorption capacity of rainwater and flood. Massive nurtured lawns and flowers arrangement depend upon the labor so that the original rugged microfeature has lost. Nowadays, the widespread application of glass curtain walls doesn't fit the typical characteristic of being cold in winter and being hot in summer.

**(2) Insufficient integration of cultural relics and public life**

There are many cultural relics in Beijing, but such perfect integration with the urban environment as Tian'anmen Square and Wangfujing Church is quite few. First, cultural relics have become tourist attractions. Sometimes there are so many people there. The citizens are inaccessible or the visibility of iconic landmarks is poor. Second, most of the historical sites are located in the courtyards or shaded by the tall buildings. Some surroundings are disorderly. The urban landscape lacks of the overall beauty. Third, some historic buildings are dilapidated and have dense population. Last, some historical sites have been recovered, but the exploration of their historical connotations is not abundant enough.

**(3) Lack of the communication environment full of cultural atmosphere**

As a city with an ancient cultural background, the public communication environment full of cultural atmosphere is necessary. However, many cultural celebrities criticize that Beijing lacks of the communication space and there are no communication places in alleyways, streets and business districts. The business districts merely satisfy the living needs. Restaurants and supermarkets can be seen everywhere but it is hard for one to find a café and a bookstore. The streets in the business districts are wide and the city squares are unsuitable for communication.

**(4) Insufficient humanistic concern for the masses in the urban facilities**

The proportion of aged population is comparatively higher in Beijing, but barrier free facilities in the city remain

at a low level. Lots of blind sidewalks have been built, but barrier free accesses quite few. Such public facilities as the city roads, overpasses and squares are majestic and grand but lacks of comfort. You may get lost above or below the huge overpasses, so it is really inconvenient for pedestrians and bikes to pass. The traffic pursues the principle of motor vehicles going first, which is also no good for pedestrians to pass.

**(5) Strong commercial atmosphere and weak cultural atmosphere in the cultural functional areas**

In the eyes of most people, Beijing is a political and commercial city and lacks cultural atmosphere. The visibility of the iconic buildings in the current historic conservation areas is poor around which there lots of low-end commercial facilities. The university district, especially Zhongguancun, has evolved into a business district and a hypermarket of electronics sales without cultural atmosphere. The commercial facilities are mainly distributed in the suburban University Town and its public service area, which leads to lack of necessary cultural facilities and atmosphere.

**(6) No sigh of advanced cultural atmosphere in the newfound function area**

The peerless indoor activity space also exists in the central business districts, Zhongguancun and financial street, but the outdoor public activity atmosphere is insufficient. The coffee culture in Zhongguancun is becoming widespread; the public activity is becoming richer and the private communication is becoming more frequent in the financial streets, but all these are limited to the indoor space. The advanced culture is difficult to spread in the outdoor space and lacks humanistic concern for the public space, which has something to do with large scale of mechanization, deficiency of public facilities like small street green lands, sheds and passive facilities.

**(7) Mismatching of the urban public facilities and regional environment**

Such public facilities as the fences, street lamps, garbage bins and benches pursue the standards rather than the features of the regional environment. The parking halls are made from shiny stainless steel. Some of them are narrow; the large billboards leave no standing room for people. Some major historic landmarks like Desheng Gate are disorderly. The traffic function is not well-organized, the signboards, roads fences and waiting rooms are out of order. The Northern Olympic parks are large in scale but are not convenient for the pedestrians.

**(8) Lacks of supports to the life experience in public environment**

The public services put a premium to political events and other important events but lack supports to the iconic life events of the people, which result in deficiency of public culture experience in some parks and squares and fail to make urban collective memory. As for important events like birth of children, initiation rite, marriage registration and golden wedding, the city administrators don't provide public services in public places to make beautiful memory.

**(9) Lacks of supports to city functions in public environment**

City functions refer to necessary environment capacity, facilities easy to maintain and manage, unimpeded traffic, accessibility, identifiability, security and comfort level. The existing public environment does not take people flow, physical distribution, the overall environment capacity into account. The public and private transportation and accessibility of venues are not well-designed, which affects pedestrians and cyclists. The venues created by space lack security and comfort level.

**(10) Lacks of interest and pleasure in public environment**

Modern public art attaches great importance to participation and experience of the masses. Solemnity and stiffness are abandoned and humor and fun should be added. The unique scene and use of nature produces pleasant feelings inside and gives the masses various experiences. The public environment in the capital focuses on solemnity, sternness and historic theme and lacks relaxation, bantering and humor in daily life as well as life experience of individuals, which is hard to produce pleasant feelings inside. Take Xidan Cultural Plaza, for instance, there are no interesting sketches people can participate in there.

## III. Countermeasures of Making Reflected the Urban Environment of Beijing Reflect Cultural Characteristics

Under new circumstances, the construction of urban environment in the capital should pay more attention to reflecting urban cultural characteristics and creating humanistic environment which can preserve beautiful collective memory.

**(1) Creating space for the urban folk festivals**

Beijing carries on the tradition of beautifying the urban public space depending on major political events. The folk festivals should be added to the urban beautification process. In national festivals and important solar term, a festive environment should be created in urban public space to show that we have inherited the national traditions. The festive space can be renovated and designed during Tomb-Sweeping Festival, Dragon-Boat Festival, Mid-Autumn Festival and Double Ninth Festival. As the festivals are approaching, we should invite experts in folk customs and art to give us some landscape design guidelines. The venues for festival and folk custom activities, roads, buses and subway stations should be beautified and decorated in a proper manner. For example, streamers, flags and slogans with ethnic characteristics should be hanged in public facilities like the city square and major roads.

**(2) Redesign the environment in key areas**

The urban cultural characteristics are particularly reflected in conservation districts of historic sites, various public (commercial) centers and all kinds of key functional zones. The two situations of "decay due to conservation" and "overdevelopment" in the conservation districts of historic sites have to be changed. The cultural function in the old city should be revitalized. We should develop the economy in the old city and redesign the environment in the conservation districts of historic sites. The comprehensive environment improvement in different business centers should be made, especially motor vehicles traffic, public traffic venues and roads. Meanwhile, we should design the environment in front of the commercial facilities and the city square and encourage people set up cafés, bookstores and theaters with cultural atmosphere. We should focus on the environment design of important public communication venues in CBD, financial street and Zhongguancun, including the front of the well-known pubs, cafés and bookstores and street roads to show modern cultural characteristics.

**(3) Renovate regional environment and shape characteristics**

Based on the principles of respecting nature and ecology, reflecting cultural characteristics and combing service functions, we should divide various areas to renovate the urban environment in a comprehensive way. We should renovate the walking routes, bus stops, parking facilities and road public facilities. Besides, we should carry out overall design of the green landscapes, commercial plaza, street space and billboards in the concentration area of business and services and around major public facilities. At the same time, we should explore resources of historical culture and regional cultural features. In particular, we need to comb the chronic traffic system and public transportation stops to realize more space for pedestrians and to give highlight to humanistic care.

**(4) Improve public service capacity of special leisure area**

We should improve services in the riverside green land, the street lamps, benches, leisure pavilions, fitness tracks, cycles' routes, movie theaters, communication space, regional museums, community bookstores and kite square. Besides, we should build more functional facilities for children's fun, sports and art displays and set up sculptures that can reflect cultural activities and historical culture. Outside art performances can be held in parks and city squares. We should advocate that parks, campuses and squares should be divided into designated areas where the initiation rite of students, wedding ceremony and other commemorative activities can be held at specific time to make collective memory.

**(5) Highlight landmark buildings and beautiful scenery**

The urban cultural characteristics come from tangible cultural relics and historic sites and landmark buildings. In order to improve their visibility, the walls of the Library and Democracy Plaza after the Red Building of Peking University should be changed to fence even if they are still being used in the magazine Seeking Truth. There are lots of opposite scenery in the city streets. We can design landmark buildings and opposite scenery by means of experiencing. The beautiful scenery in parks should be seen through fences (you can see the view of Zhongnanhai from the North Sea Bridge) and Chinese window lattice. The passengers in buses and pedestrians can see the beauty of the streets. Moreover, we should revamp the landmark buildings and public facilities like military museum in a proper way so that they can be open to the public.

**(6) Create space for community culture**

The focus of community environment treatment includes the business centers, leisure squares and vegetable markets. The traffic lines of motor vehicles in the business centers need to be renovated in order that the business streets take walking as the main way of travelling. The unnecessary shops and stall keepers on both sides of the business streets need to be straightened out. The environment of the leisure square in the community needs to be improved and leisure facilities need to be increased. Shaping cultural environment of vegetable markets is also important. We should improve facilities in the vegetable markets through public funds, increase facilities for water uses, garbage collection and electronic shopping, establish communication venues for community residents to discuss cooking and set up teahouses and cafés where applicable.

**(7) Promote the integration of culture and art activities and public space**

We should make public policies that require parks and city squares to host a certain amount of public and charitable culture and art activities every year. Notices should be issued to the citizens to give them access to art space. In addition, we should accept applications of performances of schools, associations, amateur performers and art groups to make various performances more popular. Furthermore, we should change the present condition that only the elders are doing exercises and have fun in the parks to get the elegant art close to parks. As the school time for the students in primary and secondary schools is decreasing, we can arrange them to take part in the cultural, cultural and sporting activities in the parks.

**(8) Strengthen the guidance of developing cultural characteristics of urban environment**

A special committee for cultural characteristics should be set up in the Capital Environment Construction Committee. It will consist of experts in city planning, building design, culture, art, landscape design, folk customs and gardening. All of them will guide the urban environment design plan and give lectures to improve the cognition level of Beijing culture of administrators at all levels. They will work out an album called Beautiful Beijing-Cases of the Cultural Characteristics of Urban Environment to show the urban cultural characteristics. They will explain and analyze the cultural characteristics of places of interest, park green land, ancient capital style, modern architecture, city square and communities and provide examples to have cultural relics and historic sites integrated into the city life.

**(9) Let the public participate in creating the urban cultural environment**

We can set up new columns in the public network like Beijing-China and launch a beautiful scenery collection activity of “Beautiful Beijing”. The collection content includes the four seasons’ scenery, construction view, landscape, community scene and other sites in Beijing and eight new attractions of all districts and counties.

We should solicit opinions on the reformable city landscape and solutions, appraise the collected opinions and select a certain amount of solutions to be implemented by the community groups. Besides, we should listen to the renovation suggestions of community public space from community residents, change the over-commercialized

atmosphere in the community and make policies to increase cultural and sports facilities like community library.

**(10) Conduct lasting education on the awareness of public environment and quality of civilization**

The expenditure on environmental protection, environment health of the city, environmental order management and garbage disposal should be make public so that each taxpayer can understand the public finance expenditures incurred by individual behaviors. In addition, we should focus on forming the five following habits: no smoking, no littering, no snacks, be quiet and no crowding in public places; we should form the law-abiding public habit. We can expose behaviors of violations of laws and disciplines and increase penalty by law and introduce them to personal credit records when necessary. Last, we should force the service enterprises in the community to comply with the requirements of public environment, establish community access system and have them supervised and evaluated by the community residents.

About the Author: Professor of Capital University of Economics and Business, guest researcher of the Institute of Contemporary China Studies of Hong Kong Baptist University, director of the Professional Committee of Urban Planning Management Urban Planning Society of Beijing, director of the Professional Committee of Public Environment of Urban Management Society of Beijing, member of the expert panel of Capital Environment Construction Committee.

# Thinking on Great Development and Prosperity of Garden Culture in Beijing

Liu Xiuchen

Culture is the blood of a nation, and also a spiritual home for the people. Discussions and practices regarding the garden culture in Beijing have never been suspended ever since the early years of the new nation. Achievements in the renovation and construction of the classical and modern gardens in Beijing are the result of different periods during such a process. The older generation of state leaders has attached importance to the garden culture in Beijing, fully recognizing the status and value of Beijing royal gardens in the world, with Beijing Municipal Bureau of Landscape and Forestry independently established as one of the only eleven bureaus set up by Beijing Municipal People's Committee (Beijing Municipal Government). Since then, the renovation and reorganization of such landscape gardens as the summer palace, the Temple of Heaven, the North Sea and even the Ming Tombs, the Badaling Great Wall and the Pool and Oak Temple, etc., have been conducted gradually on the basis of the national strength. Great achievements have been made based on the construction principle of protection, utilization and restoration in a scientific way. With a view to modern gardens, people have also made fruitful and beneficial exploration in both inheriting traditions and adapting to functional demands of new times. On the whole, gardens have formed a gardening style that is sublime, simple, magnificent, splendid, modest and philosophical. Garden culture has always been a miracle in view of the major pattern of the Beijing Culture. It has been a focus well-received both at home and abroad, which indicates its identity and status.

## The essential attributes of gardens are cities & towns, urbanization and human settlement.

For mankind, planning and constructing urban gardens and green lands is the greatest discovery and the most important progress during the process to know and plan cities. Cities are a gathering place for mankind. A city can survive, develop, progress and remain alive today only by means of sustainable utilization. Landscaping is an important measure for urban eco-environmental protection, relaxation, scenery, culture & relief, disaster reduction and hedging. It is a necessary means for sustainable development and also an indispensable part among various elements for cities. Urban greenland ratio has become a key scale to measure livability.

Landscape architecture is defined as a science to plan, design, protect, construct and manage outdoor circumstances. Outdoor space construction is the core. The outdoor space construction mentioned here is surely based on cities in general. Its fundamental mission is to coordinate the relationship between human and nature, with landscape gardens constituting a figure-ground relationship with buildings and cities, which supplement each other. It is one of the pillar sciences for theories on human habitats. Gardens refer to the esthetic natural living environment that is created and formed on a certain plot based on a principle of science and art (see the Chinese Ancient Garden History by Wang Juyuna).

The fundamental mission mentioned here, is to solve the problem of how to conform to and coordinate with nature during urbanization, making urban development and ecological protection in harmony. Theories such as "nature

and man in one", "nature and man in harmony" and "learning from nature", are the basic standpoint, starting point and also end result of gardens. Of course, it is also the standpoint, starting point and end result of cities. Some people say gardens are cities. That is to say, it shall coordinate the relationship between nature and man based on garden-oriented concepts and measures (methodology), which is also the fundamental philosophy for urban development. It also includes scientific and artistic means. Science and technology results in unceasing progress of gardening technologies and maximizes garden functions, for instance, improving the rational layout of green quantity, green quality and green land. Art is to shape urban cultures, cultivate spiritual sentiment, sublimate urban temperament and protect urban context. Both scientific and artistic means are the cultural expressions of cities. It is said that culture is humanization and art is artificialization. In other words, all these are done through arm of flesh. In the process of urbanization, gardens have always developed with the development of cities. There would be no gardens without cities (gardens that are independent of cities are also part of cities). It would be unimaginable if there are no gardens in a city. Cities and gardens are interdependent and this is the basic explanation of the fact that greening rate in each cities shall be over one third of urban land.

The Central Government has put forward eco-civilization construction at the 17th CPC National Congress for the first time and defined it as the resultant of positive improvement & optimization of relationship between man & nature, construction of a scientific ecological operational mechanism and sound living conditions during human transformation of the objective world. Gardens are not the whole part of urban eco-civilization (also including green agriculture, green food and green GDP, etc.), but definitely the core of urban eco-civilization construction. Gardens are the result of urban economic and social development. This is true for royal gardens, literati gardens, marketplace gardens, courtyard gardens and streetwise gardens, etc. From traditional gardens to urban greening and further to a green network integrating cities and countryside, the green axle is just an illustration of the fact that gardens follow cities. Gardens undertake the most important and direct task in terms of urban civilization construction. This is the basic explanation of the fact that urban gardens have developed prosperously while other industries decline dramatically due to the economic circumstances at present. Thus it can be seen that the essential attribute of gardens are cities & towns, urbanization and human settlement. Of course, the issue of whether it is a garden in cities or a city in gardens shall be further discussed.

## Establishing "the garden, ancient building & cultural relic system in Beijing", revitalizing new ideas of cultural relic tourism

Beijing has a city history of 3,000 years and a capital history of over 850 years, which is a world-famous ancient capital and historic city. It has taken an important position in world urban history. Moreover, with the opening to the outside world, the world is now re-recognizing Beijing.

**I. A zygosome of two Beijings:** the modern Beijing full of high-rise buildings and criss-crossing roads and the ancient building & cultural relic Beijing unceasingly accumulated and remained with the course of history. The two co-exist, incorporate and dialogue, thus forming the zygosome of modern culture and traditional relic culture, which is of typical significance in view of contemporary world cities. Ancient buildings, gardens and culture relics in some cities have been protected as a whole in the world, for instance, Rome, Paris, Florence and Prague. Quite a few cities also have been protected coincidentally, for instance, Moscow, Seoul and Beijing. However in any case, such world-class cultural symbols of landscape, gardens and ancient buildings as the Imperial Palace, the Temple of Heaven and the Badaling Great Wall, etc. are still the logo of Beijing.

**II. Three major parts of ancient buildings, gardens & cultural relics in Beijing:** the ancient buildings, gardens

& cultural relics in Beijing are mainly distributed in three parts: the cultural relic part in downtown, mainly taking the Imperial Palace as the center while supported by the West Imperial Garden and Three Lakes, taking the Temples of Heaven, Earth, Sun and Moon as the lining and the star0studded temples and dwellings as the base; the Xiaoxishan Royal Garden Scenic Spot represented by three hills and five gardens including the Summer Palace and the Yuan-Ming Yuan Imperial Garden, etc., the cultural relic cluster in northwestern outer suburbs intersecting Mt. Taihang and Yanshan Mountain flows. For instance, the third part is represented by Dabaotai, the Logou Bridge, the Pool and Oak Temple, the Jietai Temple, the Yunju Temple, the Hongluo Temple, the Badaling Great Wall, the Ming Tombs and Mutianyu, etc. The first part is a focus that is deeply interlaced and co-existed compatibly with the Modern Beijing.

**III. Establishment of the ancient building, garden & cultural relic system in downtown area of Beijing:** modernized urban construction has been changing and improving the image of Beijing in a rapid and vigorous way. It cannot avoid the fact that the modern Beijing is submerge and downplaying the role of historical relics in Beijing. When taking a birds-eye view from an airplane, Beijing roughly looks like a concrete forest and roofed ocean except for the yellow-surface formed by the glazed roofings of the Imperial Palace, the white dots formed by the North Sea and the green block formed by the Temple of Heaven. Don't be worried: the internal structure of the ancient building, garden & cultural relic system of Beijing can still be faintly visible when restoring and reorganizing the existing cultural relics, cultural buildings and gardens within the Fourth Ring Road to generalize a system and then immaterializing the substance of the modern Beijing. How exciting and cheerful to form the relic spots in both series and parallel connections by way of the historic period oriented system, the regional distribution oriented system and the water system running along the ancient road network of the city and the endless flow of the city moat. The unique and exhilarating ancient building, garden & cultural relic system of Beijing can still be exhibited vividly.

**IV. Emergence of the ancient building, garden & cultural relic system of Beijing from ground after stripping high-rise buildings off:** to make a good plan of the urban pattern of the exhibition hall and make the audience much impressive: the greatness of Beijing lies in fast changes and ongoing progress. In case of stripping off and immaterializing within the pattern and abolishing the ancient building, garden & cultural relic system pattern in downtown of the Modern Beijing (which has destroyed the unnecessary reoccurrence of non-renewable cultural relics), only the Imperial Palace, the West Imperial Garden and Three Lakes, temples, the Temples of Heaven, Earth, Sun, Moon, Agriculture and Land & Grain, former residences, dwellings, water systems, road networks, gardens and some gate towers will be emerged and connected via a green corridor. Well! Beijing with a fascinating relic culture will be not only beautiful and profound but also a complete huge system that can be formed easily. Right, it is a system. It is the historical Beijing outlined with history by our ancestors.

**V. Re-recognition of a cultural center:** with a view to the four functions as realized by planning and restoring Beijing, the manifestation of the cultural function is relatively weakest. It goes without saying that Beijing is a political center. Besides, it is also a cultural center and cultural entity that is tangible and available, instead of a virtual concept. The Beijing Culture is a key part of the Chinese Culture, and also a principal window and focus demonstrating the Chinese history and civilization. The Culture of course includes the modern cultural civilization. However, the historical cultural civilization is more important to Beijing, which is just the ancient buildings, gardens & cultural relics that are a major expression of the uniqueness of the Beijing Culture in material form, which cannot be taken away and defamed. Of course, such non-material things as the Kunqu Opera, the Beijing Opera and folk customs, etc. also play a part, with no more details given hereby. Based on the orientation of Beijing and the general concept of Humanistic understandings, by virtue of such a beautiful and unique trump card as ancient buildings, gardens & cultural relics, the image of the overwhelming great nation becomes absolutely clear and this is the charm of historic culture, It shall disclose the

cultural connotation with the orientation of a cultural center; otherwise the center will be a virtual one.

**VI. Some suggestions:**

1. Firstly, it shall study the theoretical category establishing the ancient building, garden & cultural relic system in downtown of Beijing: to define the rules and regulations on its scope and ratings. The author generally thinks that it shall be relatively feasible to take the area within the Fourth Ring Road as the border. It shall adopt a 3D system instead of a 2D one. It shall generate a 3D dynamic image of the downtown cultural relic system via a computer. People can feel the historical atmosphere and vicissitudes of life from the ancient building, garden & cultural relic system from the model. They can also understand and experience the cultural meaning and practical significance of a historical Beijing theoretically. A younger generation can get sight of a realistically existing historical Beijing in the classroom.

2. It shall plan and establish the ancient building, garden & cultural relic system in downtown of Beijing: with the deepening in the planning and restoration of Beijing as well as the functional orientation of the downtown area, a trend weakening new urban construction within the Fourth Ring Road shall be inevitable. It can strip off ancient buildings and gardens from the zygosome consisting of the modern Beijing and the relic Beijing by weakening construction while immaterializing reality, consciously make ancient buildings and gardens emerge from ground once again. Moreover, it shall also study the harmony theory fro the modern Beijing and the one with ancient buildings, gardens & cultural relics, forming a bridge link to both sides based on some thoughts such as moderation, containment and harmony in diversity, etc. As a result, a modern and cutting-edge Beijing and unique ancient Beijing will be coordinated, incorporated, unified and harmonized in the planning and construction. (Of course, sometimes a contrast may be unification and coordination at a higher level, which shall be supported theoretically.)

3. It shall restore cultural relics in phases, batches and sections and connect them with a green corridor step by step. It shall take dozens of years to construct the ancient building, garden & cultural relic system and hand it over to the younger generation. It cannot be completed all at once and an impulse does no good in this case. It shall make an overall annual construction plan in drawings, models and computers uniformly, with sections and time intervals defined.

4. It shall set up a coordinating agency for restoring ancient buildings, gardens & cultural relics in Beijing. The agency shall be led by the Municipal Government and supported by Beijing offices of the Central Government, troops and colleges and universities, etc. The annual completion of stock-taking will definitely be useful and resultful, which shall be supported throughout the country and the world.

Such a charitable deed shall become a new idea for the creative industry of Beijing Culture. It is not only the final opportunity for Beijing to search after ancient buildings, gardens & cultural relics, but also an effective measure to spur on modern tourism economy. It is even the words right from the bottom of heart for all the people in Beijing and China in view of the history and culture of Beijing.

## Ancient buildings and gardens shall become an innovation industry of culture, an important center of effort

The creative industry of Beijing Culture has made great achievement and dramatically increases in proportion of production value, even since it is concerned till up to today. However, some "creative" industries that are engaged by both us and others only flourish at the beginning, with some industries declined in the fierce competition. Only these creative ideas are unique and of most vitality. Digitals, animation, movies & television and antiques have them it hit. However, with a view to vast and profound China, all these are not unique in Beijing. Ancient buildings and gardens shall become the center of effort for the creative industry of Beijing Culture. This is because only they can be of

valuable uniqueness.

Among numerous urban cultures in Beijing, people can immediately find the resplendent bright pearl--the ancient building & garden culture in Beijing. It is right that the realistic and historical position taken by ancient buildings and gardens in Beijing is indeed prominent. They are the particular and best-representing culture in Beijing: the royal gardens in Beijing tops the world; the ancient buildings make Beijing known as one of the three most world-famous ancient capitals, namely, Beijing, Paris and Rome. Culture exists here and there in those mansions of a prince and gardens, for instance, the Prince Gong Mansion, the Prince Chun Mansion, the Mr. Na's Garden and the Backyard Garden....., not to mention the Summer Palace, the North Sea and the Qianlong Garden of the Imperial Palace. People even can a lot of subject matters worthy of debate in corners. In addition of those quiet quadrangle dwellings, cicada-chirping ancient Hutongs, dilapidated city walls & temple walls and gnarled pagoda and cypress trees, mysterious and fascinating tales exist everywhere. These tales are published in evening newspapers and magazines, thus becoming the topic of conversation for people at leisure. Even Han Suyin and Kissinger take great pains to travel across oceans and seas to seek quietness and explore ancient cultures. Beijing is rather a book that can never be finished. The immensity and profoundness of ancient buildings and gardens in Beijing make it unique in expressing an urban culture in the world.

**Absorbing traditional nutrition, enlightening innovative ideas, leveling up the urban garden culture in full**

Although the urban garden culture relates to construction & maintenance management, operation ingenuity and refined quality, it is further shown in the theoretical accomplishment of planning & design and the mastering and innovation of artistic means. Gardens shall be an ancient but young science in China. It is ancient because that the Chinese gardening history dates back to thousands of years ago. Some gardens become traditional garden models and practice theories in the cultural heritage of the world. In addition of the abundant garden and plant resources in China, it is honorably regarded as the "Mother of world gardens". It is young because that the science develops and evolves in practice while incorporating and linking to modern life in recent decades. Due to limited national strength in the fifties or sixties of last century, gardens were generally at a primary level except for several excellent works. Influenced by traditional gardens, former Soviet Union cities and theories on greening and cultural recreation in residential areas, generally speaking, axial lines, scenic spots, scenery with hills and waters, together with traditional or innovative gardening symbols have become a common mode in garden design. An ideal park in the eyes of the public is a pavilion in shades. Ever since reforms and opening to the outside world, the urban functions have been improved gradually. The garden concept has been explored, deepened and improved continuously, with the design teams expanded at the same time. The designers combine the national conditions in practice, keep on absorbing nutritive basis from the traditional context, adopt both domestic and foreign new thoughts and ideas, conform to modern demands to create some better works. Quite a few garden designers not only direct garden planning and design, but also participate in urban planning and involve in urban design. They play a role at a more extensive and wider level. The designers explore, hunt after and pick up in the dilemma of social trend of thought, academic trend and likes & dislikes by decision makers, in pursuit of survival of the fittest and the positive mainstream. However, there are only a few works that can be popular with the public, recognized by experts and classical.

Both the decision makers and the designers shall advocate a design concept and methodology to "solve the problems", with "having an idea in the mind before starting writing or painting" the most important for creation. It

shall grasp the bright and accurate conception from a macroscopic view, define the planning framework, placing the projects in the whole city or regional circumstances, and orient its attributes, functions and forms by combining the present situation, putting forward methods and means that can solve the problems. In general, it shall take a comprehensive creation path down to the ground. Once the solution is determined, details will determine its success or failure, particularly in gardens. Ingenuity is often expressed via details. As a "forced art", gardens shall be evaluated and commented by tourists at any time, thus it shall stand up to deliberation. Scenic spots shall always be "scattered" while details shall be "demonstrated in an unhurried way". All these are vital for the design and construction staff.

But the good news is that, the growth of a generation of garden designers has widened the planning and design concepts. Creative thinking exists in front of the rapidly-developed science and technology and the facts of information explosion, as well as in fission. Various opinions and criticism push a city to a highly-varnished concept, showing an equal dialogue and inclusive approach on the planning & design platform. However, no matter what happens, the body of gardens will permanently be the green space that stems from nature and exceeds nature, that is, "humanized nature". Common customs and trends will only be a passer-by. The key is that people controlling cultures shall have a peaceful mind and read more, go into the thick of life and practice, keep on accumulation and deposition, sensitively catching the subject to be expressed.

When viewing gardens at state level: ecology is the major problem confronted by a city, relaxation is the major problem confronted by the public, landscape is the major problem confronted by environmental construction, culture highlighting is the problem confronted by social progress, risk avoidance is the major problem confronted by disasters. It shall make a top-level design to solve the underlying garden problems in reform and opening to the outside world, which is also an expectation of us.

Liu Xiuchen, Consultant of the State Council
Gender: male
Date of Birth: February, 1944
Party Affiliation: Jiu San Society

Former Deputy Director of Beijing Municipal Bureau of Landscape and Forestry; Engineering Adviser for Beijing Olympic Games; member of the 9th, 10th and 11th CPPCC National Committee; Central Committee member of the 11th Jiu San Society; vice-chairman member of Beijing Municipal Committee; professor-level senior engineer; enjoying the special government allowance; long engaged in landscape & garden planning and design.

Having won the first prize in Beijing garden design, the outstanding award for new gardens, the outstanding garden design award and outstanding paper award granted by Chinese Society of Landscape Architecture, etc.; having been selected as the Model Worker of Beijing by CPPCC, the winner of National greening medal, the National Solidarity Model of Beijing, the Expert with Important Contributions by the State Council, enjoying the government allowance.

# Characteristics of specific emission of particle matter and heavy metals from diesel engine

LIU Junnv

Abstract: Specific emission of particle matter (PM) and heavy metals from road and off-road diesel engine of different emission levels from GⅡ to GⅤ were analyzed. The results showed that specific emission of PM and heavy metals from diesel engine of GⅤ was much lower than that from diesel engine of GⅢ and GⅣ, which was only 75% of specific emission of heavy metals from those. For road diesel engine of GⅣ, specific emission of PM and heavy metals under European transient cycle (ETC) test was obviously higher than those under European steady state cycle (ESC) test. Meanwhile, specific emission of heavy metals from large displacement diesel engine was above 20% much higher than that of low displacement diesel engine under ETC test. The rank order of specific emission of seven heavy metals from road and off-road diesel engine was almost As>Zn, Cu, Cr>Ni, Pb>Cd. The total specific emission of heavy metals from off-road diesel engine of GⅡ was nearly 16 times of that from road diesel engine, indicated that it had more environmental pollution risk.

Keywords: diesel engine; particle matter; heavy metals; specific emission

The emission of particle matters from diesel has always been a serious problem in the impact of the diesel engine development. The particle matter discharged by the diesel is usually a complex mixture, of which the core part is the carbon particles and what distributed around is the complex organic or metallic materials [1-3]. The carbon black component in the particle matter has a strong absorption effect towards light, which makes it contribute significantly to the greenhouse effect; the particle size is substantially under 1μm or less, which can be deposited in the deep alveoli of respiratory tract, thus posing great threat to human health; the chemical composition of particle matter, especially the harmful ingredients adsorbed on the surface of the particles determines its negative effects on human health and the environment; the larger specific surface area, the more adsorption of heavy metals and toxic substances will be, and the greater harm to human health will be posed as well [4-5]. A great number of studies were carried out in the aspects of the impacts on diesel emissions from fuel quality [6-7], load [8], emission control technology [9-10] and so on, particle matter emissions measurement methods and emission characteristics both at home and abroad [11-12]; whereas, the study on the heavy metals in particle matter emitted from the road and non-road diesel was rarely reported. Based on the collection of the particle matter samples emitted from the new diesel of different types and emission levels, the characteristics of specific emission of diesel particle matter and heavy metals is studied in this paper, so that the scientific basis is provided for the assessment of environmental risks of diesel emissions of heavy metals and environmental management.

## 1. Experimental Section

### 1.1 Sample Collection and Determination of specific emissions of particle matter

The diesel particle matter samples were all collected from a new diesel exhaust emissions testing center in May 2012, and the main technical parameters are listed in Table 1. Among which, three of the road diesels had undergone the test of steady state cycle (European steady state cycle, ESC), and the two diesels of GIV emission level had also gone through the transient cycle test (European transient cycle, ETC). Glass fiber paper was used for the filter, and 2-4 parallel samples were collected for samples of each number. The filter weight difference of sampling before and

after test was weighed, and the specific emission of diesel particle matter can be obtained from the ratio to the nominal power of the diesel engine. The collected particle samples of filter membrane were dried under 105℃ to get the constant weight and put in the desiccators for testing.

Table 1 Sample numbers and test information of diesel engine

| Type | Emission Level | Rated Power | Displacement (L) | Test Cycle | Sample Number |
|---|---|---|---|---|---|
| Road | GV | 325kw/2000rpm | 11.596 | ESC | G5S |
| | GIV | 279kw/2000rpm | 9.762 | ESC | G4S1 |
| | | | | ETC | G4T1 |
| | | 199kw/2300rpm | 7.6 | ESC | G4S2 |
| | | | | ETC | G4T2 |
| | GⅢ | 276kw/2300rpm | 9.762 | ESC | G3S |
| Non-road | GⅡ | 25kw/1800rpm | 3 | 5mode | G2 |

**1.2 Analysis of Heavy Metals in Particle Matter**

HCl-HNO3-HF-HClO4 wet digestion was used for filter membrane particle matter samples, and the reagents used were all in superior grade pure level. Firstly, filter membrane sample was placed in the beaker of PTFE, and after wetting by ultrapure water, the beaker wall was washed with HCl; then 10mLHCl was added, and the sample was heated at low temperature to get the initial decomposition; when evaporated to 3mL, it was removed for cooling, then add 5mL HNO3, 5mL HF and 3mL HClO4, and covered for heating 1h, and opened the cover to removed the silicon; the beaker lid and the inner wall were rinsed and 1mL HNO3 warmed dissolve residue was added, and the solution was moved to a 50mL volumetric flask, and dilute after cooling. Samples of digested were quantitatively analyzed by ELAN9000 type ICP-MS instrument (PE, USA ) for the content of Pb, Cr, Cd, Ni, Cu, Zn and As. The samples digested with a blank paper was determined as blank testing; in the determination process, every 10 samples were used to measure the standard solution to monitor the stability of the instrument, and the internal standard online addition method is used for the correction of matrix effects and instrument drift. The product of the content of various heavy metals in the determined membrane sample and the specific emission of particle matter is the specific emissions of heavy metals in the diesel, and the measured results were indicated in the mean and standard deviation of parallel samples.

**1.3 Data Processing**

The SPSS13.0 software and two-tailed test of the Personal correlation coefficient were used for the correlation analysis of the specific emission of heavy metals in diesels.

## 2. Results and Discussion

**2.1 Specific Emission of Diesel Particle Matter**

The specific emission of diesel particle matter for different models and emission standards is shown in Figure 1. The specific emission of non-road GⅡ diesel engine emission level is as high as 254 ± 8mg/kwh, which is far higher than the road diesel engines with various emission levels, which are 14 times and 8.7 times that of two test cycles specific emission ESC and ETC of the current GⅣ level respectively, and 17.5 times and 3.4 times of the specific emission of GV and GⅢ emission levels. All this indicate that the emissions management of urban non-road diesel particle matter is extremely urgent. For the current road diesel engine vehicles of three levels of emissions within the city, the specific emission of particle matter shows the present status of GⅢ> GⅣ> GⅤ. Under the same ESC test cycle, the specific emission of GⅢ particle matter is as high as 75 ± 7mg/kwh, which is 4.2 times and 5.2 times of the

specific emission of GⅣ and GⅤ particle matter, while the specific emission of particle matter of GⅤ is approximately 20 % lower than GⅣ. For the current mostly used diesel of GⅣ emission level in Beijing urban roads, there is not so much difference in the specific emission of particle matter of different power and displacement, yet however, the specific emission of particle matter under ETC test cycle is about 50-70% higher than ESC on the average, indicating the diesel traveling on the road and operating conditions have a greater impact on the emissions of particle matter, which is consistent with the results reported in the literatures [13].

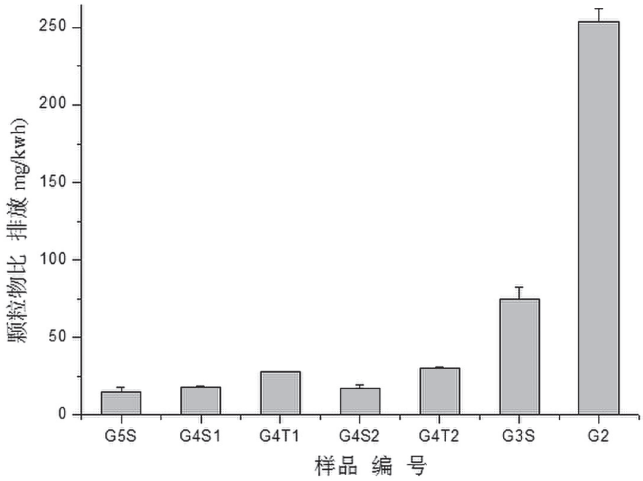



Fig. 1 Specific emission of particle matter from diesel engine

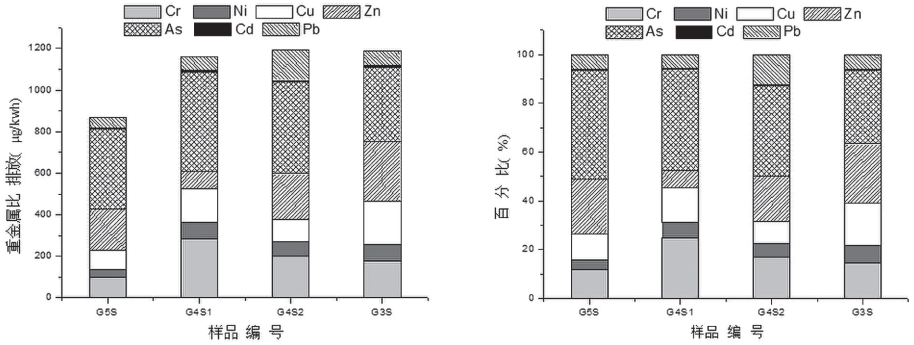
**2.2 Specific Emissions of Heavy Metals in Diesel**

2.2.1 Specific Emissions of Heavy Metals of Road Diesel Engine of Different Levels of Emission

The specific emissions and emission percentage of heavy metal for road diesel engine of different emission levels are shown in Figure 2. Under the same ESC test cycle, the specific emissions of heavy metal total amount of road diesel of GⅤ emission level is 871 μg/kwh, which is only about 75% of the specific emissions of heavy metal of road diesel of GⅢ and GⅣ emission level. There is not so much difference between the specific emission of heavy metal of road diesel engines of two displacement levels of GⅢ and GⅣ, which are 1160-1193 μg/kwh. Compared with the specific emission of road diesel particle matter, though GⅣ has greatly reduced the specific emission of particle matter than GⅢ, the specific emission of heavy metals did not significantly reduced in which the cause and mechanism still needs further research and analysis.

In the distribution characteristics of specific emission of 7 heavy metals among particle matters, As has the highest specific emission, which is as high as 358-480 μg/kwh, accounting for 30-44% of the total specific emission of heavy metals; Cd has the lowest specific emission, which is only 4-6 μg/kwh, representing less than 0.5% of heavy metals specific emission; the order of specific emission of 7 heavy metals is substantially like As> Zn, Cu, Cr> Ni, Pb> Cd. Compared with the specific emission of heavy metals of GⅢ and GⅣ, the specific emission of Ni and Cr in the road diesel particle matter of GⅤ emission levels reduced by about one times, which is only 37 μg/kwh and 102 μg/kwh; while the specific emission of Pb is 52 μg/kwh, which is also reduced by about 1/3 plus, indicating that the road diesel of Gv emission level is significantly better than the other emissions level both in terms of particle matter and specific emissions of heavy metals, which greatly reduced the harm to the environment of particulate emissions. Though the specific emission of heavy metal in GⅣ diesel engine of two different displacement doesn't vary so much, the specific

emission and percentage difference of Cr, Cu, Zn and Pb varies a great lot; the specific emission of Pb and Zn of the larger displacement and power G4S2 is 2.2 times and 2.7 times than that of the less displacement G4S1, indicating the displacement and power ratings of diesel engine have the significant effect on the specific emission of heavy metals.




（a）specific emission of heavy metals （b）relative percentage content

Fig.2 Specific emission and relative percentage content of heavy metals from road diesel engine

2.2.2 Specific Emission of Heavy Metals of Road Diesel of GⅣ Emission Levels

The specific emission and percentage content of heavy metals of diesel engines with GⅣ emission level of different displacement are shown in Figure 3. The specific emission of heavy metals of G4T1 and G4T2 diesel engines under ETC test cycle are up to 1883 μ g/kwh and 2276 μ g/kwh respectively, which are 1.6 times and 1.9 times of G4S1 and G4S2 under the corresponding ESC test cycle, indicating that the specific emission of heavy metals of transient emissions is significantly higher than the steady-state emission. In the ESC test cycle of steady state emissions of diesel engines of different displacement and power rating, the difference of specific emissions of heavy metals is less obvious, which are 1160 μ g / kwh and 1193 μ g / kwh respectively; But in ETC test cycle of transient emissions, the specific emission of heavy metals of diesel engines of large displacement and high-power is 20% higher than those smaller ones, indicating that under transient conditions, diesel engine displacement and power are the important factors influencing the specific emission of heavy metals.

In the distribution characteristics of the specific emission of 7 heavy metals in particle matters, As has the highest specific emission, which is up to 444-832 μ g/kwh, accounting for 34-41% of the total specific emission of heavy metals; Cd has the lowest specific emission, which is only 5-12 μ g/kwh, representing approximately 0.5% of the total specific emission of heavy metals; the order of the specific emission of seven heavy metals is substantially As> Zn, Cu, Cr> Ni, Pb> Cd. Compared with the ESC test cycle, the specific emission of all seven heavy metals of different displacement in GⅣ emission levels under ETC test cycle were significantly improved, in which the specific emission of Ni and Zn are up to nearly 2 times and more. In the ETC test cycle of diesel of different displacement, the specific emission of Cu, Zn, As and Pb from large displacement diesel engine are 21-62 % higher than that of the smaller ones, which contributes the most to the total specific emission of heavy metals.

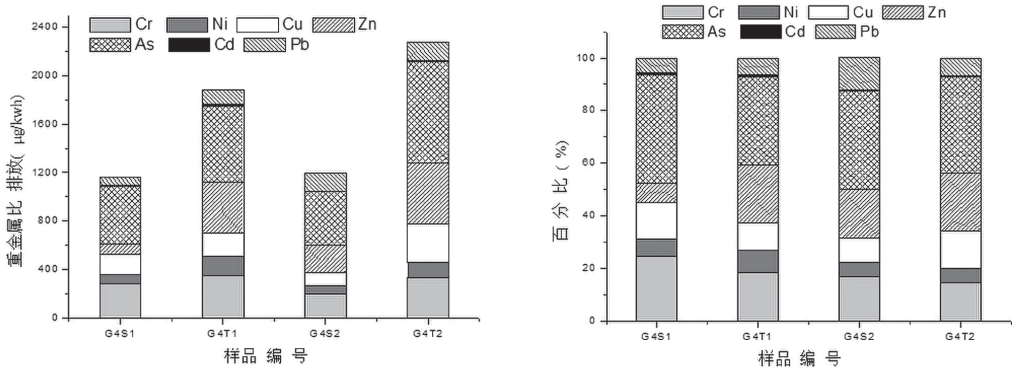



Fig.3 Specific emission and relative percentage content of heavy metals from road diesel engine for GⅣ

2.2.3 The Specific Emission of Heavy Metals of Road and Non-road Diesel Engines

The specific emission of heavy metals of non-road diesel engines of GⅡ and road diesels with different emissions levels are shown in Table 2. Although there is the difference in the test mode of specific emission of particle matter, the total specific emission of heavy metals of non-road GⅡ diesel is almost 16 times that of the road diesel engines, indicating that the environmental pollution risks of non-road diesel is significantly higher than road diesel in terms of both particle matter and heavy metal emissions; and this is closely related to the lacking of effective pollution monitoring of the current actual non-road diesel engines. In the distribution characteristics of the specific emission of 7 heavy metals of particle matter, the order of the specific emissions are all As> Zn> Cr> Cu> Pb> Ni> Cd. The specific emission of various heavy metals of non-road GⅡ diesel are all 14-19 times that of the corresponding figures from road diesel emissions, which once again shows the urgency of the strengthening of non-road diesel emissions monitoring and regulation.

Table 2 Specific emission of heavy metals from road and off-road diesel engine

| Type | specific emissions of heavy metals (μg / kwh) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Cr | Ni | Cu | Zn | As | Cd | Pb | Total |
| Non-road GⅡ | 3467 | 1239 | 2943 | 5329 | 8213 | 98 | 1434 | 22722 |
| Road Mean Value (GⅢ, GⅣ, GⅤ) | 242 | 91 | 180 | 285 | 522 | 7 | 101 | 1429 |

**2.3 Correlation Analysis of Specific Emission of Heavy Metals of Diesel Engine**

Correlation analysis is conducive to resolve the relationship between the specific emissions of various heavy metals in the diesel exhaust particle matters. The correlation analysis showed (as in Table 3) that the specific emission of Cr and Ni, As of diesel shows the significant positive correlation ($P<0.05$), and correlation coefficients are 0.88 and 0.86 respectively; the specific emission of Cd showed the significant positive correlation with all five heavy metals of Cr, Ni, Cu, Zn, As, and showed the extreme positive correlation with As (0.94, $P<0.01$), indicating that the emissions of Cd is affected a lot in the specific emission of heavy metals in diesel engine emissions, which may also be the reason why Cd has the relatively lower specific emissions. The specific emission of Pb in diesel has no correlation with the specific emission of other heavy metals, indicating that it's less affected in the aspect of emissions, and has strong independence. The source apportionment of heavy metals in diesel exhaust and its specific emissions impact mechanism remains to be further studied.

Table 3 Relative analysis of specific emission of heavy metals from diesel engine

| | Cr | Ni | Cu | Zn | As | Cd | Pb |
|---|---|---|---|---|---|---|---|
| Cr | 1 | 0.88* | 0.68 | 0.54 | 0.82* | 0.86* | 0.57 |
| Ni | | 1 | 0.70 | 0.77 | 0.75 | 0.89* | 0.57 |
| Cu | | | 1 | 0.77 | 0.80 | 0.89* | 0.45 |
| Zn | | | | 1 | 0.78 | 0.87* | 0.66 |
| As | | | | | 1 | 0.94** | 0.69 |
| Cd | | | | | | 1 | 0.63 |
| Pb | | | | | | | 1 |

* P<0.05; ** P<0.01

## 3. Conclusion

The research results of specific emission of both particle matters and heavy metals for different diesel engines with emission levels and different displacement and under different test cycles showed that:

(1) The specific emissions of both particle matters and heavy metals for diesel engines of GⅤ emission levels are far below the levels of GⅢ and GⅣ emission diesel engines; and the specific emission of heavy metals are only about 75% of the rod diesel engines of GⅢ and GⅣ, which greatly reduced the harm to the environment from the particle matter emissions. Though GⅣ road diesel greatly reduced the particle matter emissions than GⅢ, the specific emission of heavy metals doesn’t vary so much, and the reason has yet to be analyzed in depth.

(2) The specific emissions of both particle matter and heavy metals of GⅣ road diesel ETC test cycle are significantly higher than the ESC test cycle; despite the fact that the total specific emission of heavy metals of two different displacement GⅣ diesel engines under the ESC test cycle is more or less the same, yet the specific emission and percentage content in Cr , Cu, Zn and Pb varied a lot; and the specific emission of heavy metals of diesel engine with large displacement in the ETC test cycle is 20% higher than the diesel engines with small displacement and small power, indicating that diesel engine displacement and power under transient conditions are the important factors affecting the specific emission of heavy metals.

(3) In the distribution characteristics of specific emission of 7 heavy metals in the particle matters, the specific emissions of As is the highest, occupying 30-44% of the total specific emission of heavy metals; the specific emission of Cd is the lowest, generally only representing 0.5% of the total specific emission of heavy metals; the specific emission of heavy metals of road and non-road diesel engine is basically As> Zn, Cu, Cr> Ni, Pb> Cd.

(4) The total specific emission of heavy metals of non-road diesel GⅡ is 16 times more than that of road diesel, and the specific emissions of various heavy metals are all 14-19 times higher than the corresponding specific emission of the heavy metals of road diesels, indicating that non-road diesel, in both particle matters or emissions of heavy metals, its pollution risk to the environment is significantly higher than road diesel engines, which should cause the attention of environmental regulatory and supervision department.

(5) Correlation analysis showed that there is some correlation in the specific emission of heavy metals in diesel exhaust emissions, while the source apportionment of heavy metals and its specific emissions impact mechanism remains to be further studied.

References:

[1] Wang Ning, Hai Zhen, Wang Feng. Status and prospects of the external purification technology for diesel-powered vehicle [J]. ENVIRONMENTAL POLLUTION AND CONTROL, 2010, 32 ( 1 ) :73 -77, 84.

[2] Zou Jianguo, Zhong Qin. Analysis on the Composition of Diesel Particulate Emission [J]. ENVIRONMENTAL MONITORING IN CHINA, 2006,22 (3) : 23-26.

[3] Xi Zhige, Chao Fuhuan, Sun Yongmei, et al. Chemical characterization of particulate emissions from diesel engines: A review [J]. Aerosol Science, 2007, 38: 1079-1118.

[4] Hit the leather, Chao Fuhuan , Xiaoliang , et al. Analysis on diesel oil vehicle exhaust and its oxidative DNA damage [J]. CHINESE JOURNAL OF PUBLIC HEALTH, 2004, 20 (4) : 419-421.

[5] BETTS K S. Road RAGE? The role of diesel particle matter in lung inflammation [J]. Environmental Health Perspectives, 2011, 119 (3): a132.

[6] Lin Lin, SUMPUN C, Dong Ying, et al . Influence of fuel oxygen content on engine exhaust emissions [J]. ENVIRONMENTAL POLLUTION AND CONTROL, 2009, 31 (6):7- 10.

[7] KLEEMAN MJ, RIDDLE SG, ROBERT MA, et al. Lubricating oil and fuel contributions to particle matter emissions from light-duty gasoline and heavy-duty diesel vehicles [J]. Environmental Science & Technology, 2008, 42 (1): 235-242.

[8] Yao Zhiliang, Wang Qidong, Zhang Yingzhi, et al. The impact of load on emission from on-road heavy diesel vehicle [J]. ENVIRONMENTAL POLLUTION AND CONTROL, 2012, 34 (3): 63-67.

[9] LIU Z, GE Y, TAN J, et al. Impacts of continuously regenerating trap and particle oxidation catalyst on the NO2 and particle matter emissions emitted from diesel engine [J]. Journal of Environmental Sciences-China, 2012, 24 (4): 624-631.

[10] SHAH SD, COCKER DR, JOHNSON KC, et al. Reduction of particle matter emissions from diesel backup generators equipped with four different exhaust aftertreatment devices [J]. Environmental Science & Technology, 2007, 41 (14):5070-5076.

[11] LIU ZG, VASYS VN, DETTMANN ME, et al. Comparison of strategies for the measurement of mass emissions from diesel engines emitting ultra-low levels of particle matter [J]. Aerosol Science and Technology, 2009, 42 (11): 1142-1152.

[12] GANGWAR JN, GUPTA T, AGARWAL A K. Composition and comparative toxicity of particle matter emitted from a diesel and biodiesel fuelled CRDI engine [J]. Atmospheric Environment, 2012, 46: 472-481.

[13] LIU ZG, FORD DC, VASYS VN, et al. Influence of engine operating conditions on diesel particle matter emissions in relation to transient and steady-state conditions [J]. Environmental Science & Technology, 2007, 41 (13): 4593-4599.

Author: Liu Junnv, female, born in 1980, master degree graduate of Beijing University, serving in Beijing Vehicle Emission Management Center

Mailing address: No. 22, South Yongchang Road, Yizhuang Development Zone, Beijing

Zip Code: 100176 Tel: 13691328296

E-mail: masha0708@sina.com

# The Utilization of Environmental Protection Factor and Its Functions of Ecological Restoration in the Garden Park

Pan Jie
Environmental protection agency of Fengtai District 100071

From the beginning of preparation to officially opened on May 18, 2013, with the concept of low carbon and environmental protection as well as ecological restoration, the 9th China (Beijing) international garden exposition smartly used the waste land to make ecological restoration, it made an ecological restoration on the original 140 hectares of construction waste landfill site, and it can be called a model of "change the wasted to the magical". It widely adopted new materials, new technologies and new achievements on the constructions of park landscape and facilities, used the new technologies and new energies such as water permeable brick, rainwater garden, water-saving irrigating, vertical greening, ground-source heat pump system, rainfall flood utilization system and solar photovoltaic power generation system, industriously achieve the goal of "protect in the development, and develop in the protection".

Key word: environmental protection, ecological environment, energy saving and emission reduction, ecological restoration

## I. Garden park information

The 9th China (Beijing) international garden expo is located along Yongding River in Fengtai District of Beijing, it covers a total area of 267 hectares, echoing at a distance with Lugou ancient bridge, it has rich historical and cultural atmosphere, and is the core area of "green ecological development zone of Yongding River" in the action plan of South Beijing. The garden park is a major infrastructure project and model project refers to the work of environmental protection. The park area is 267 hectares, plus the garden park lake of 246 hectares, covers a total area of 513 hectares, is 1.7 times of the Summer Palace. To build an ecological environmental protection garden park on original rubbish landfill will renovate the ecological environment of Yongding River, create the new highlight of Beijing ecological restoration and new attractions of west Beijing tourism, and thus push forward the economic and social development of Fengtai and even the southwest area of Beijing. The Garden Expo builds the first classical Chinese garden museum combined with multiple sci-tech means domestically, intensively shows the new achievements of Chinese garden careers, and exhibits a full view of the garden art and the development platform. The construction of garden park will apply different ways, enhance the interactivities and participations, popularize green ecological environmental protection concepts to the whole society, display the new materials, new technologies and new processes with energy-saving and the scientific and reasonable use of low carbon and environmental protectional technologies such as recycled water, solar energy and wind energy, which will also be a highlight of this 9th China (Beijing) international garden expo.

## II. Model project of ecological restoration

### 1. Site selection's guidance to district ecological restoration

The Garden Park locates on the right bank of Yongding River, its ecological environment has been severely destroyed because of years' quarrying and sand-excavation, etc., and forms a bad environment of "dusty in sunny days with field moving in windy days". In 1980s, the old channel of Yongding River formed a large bunker because of sand mining, and it has gradually been a construction waste landfill site, and its area was 140 hectares, it still remained a big

bunker of more than 30m in depth with an area of 20 hectares until the preparation construction of Garden Park. More than 2000 scavengers once gathering and personally building more than 20,000 square meters on this land make the environment and security extremely bad. In order to completely change the ecological environment of this area, with many researches and debates done by the experts, a garden park was decided to be built on this construction rubbish landfill site. It was the first case of the nation to build ecological restoration park on such a large scaled wasted land, and currently it has the green land of 147 hectares. Rely on the slope potential, create a falling flower valley with ecological restoration method, and the large bunker has changed to be a big attraction of the garden expo. And others, such as wetland park, covers an area of 35.5 hectares with a daily processing capacity of 80,000 tons, mainly provides the water sources for the "one line for five lakes" (Yuanbo Lake, Wanping Lake, Xiaoyue Lake, Mencheng Lake and Lianshi Lake, all belonging Yongding River in Beijing). It can say that garden park is a master piece of "change the wasted to the magical" by contrasting its before and after.

**2. Functions to ecological restoration after the Garden built**

The Garden Park will play functions of the vacuum cleaner, noise reduction, thermostat and the air conditioner. In the terms of vacuuming, the green plants on green lands of 147 hectares in the Garden Park have the function of dust absorption, 1 hectare green plants can absorb smoke dust 82 kgs per day refer to the preliminary estimate, thus the dust absorption of the entire garden park will reach 12 tons per day, and reach 4400 tons every year. In the terms of noise reduction, the woods of the park can reduce the noises of 5 to 40 decibels, compare to the opening land in the same distance of the noise source, the natural attenuation of noise can lower more than 5 to 25 decibels. In terms of temperature adjustment, the summer temperature on concentrated green land is 10℃ lower than that on the opening land, and 2℃ to 3℃ higher in winter. In terms of air conditioning, the most distinctive feature of green plants' photosynthesis is to absorb the carbon dioxide and discharge oxygen. The carbon dioxide absorption of 1 hectare green land is about 1 ton per day, and its oxygen discharge is 700 kgs per day. Thus the entire park can absorb 150 tons carbon dioxide every day, and it will reach 54,000 tons each year, its daily oxygen discharge is 700kges, and there will 38,000 tons oxygen discharge every year. The entire garden park can be called as a natural oxygen bar, which will play an important role to improve the regional air quality.

The built garden park has greatly improved the environmental quality of the region, the garden park changed the original severe natural environmental construction waste yard to be a beautiful garden, and created an urban gardening scenic spot covering an area nearly 2 times larger than the Summer Palace, which has greatly improved the ecological environment and urban landscape, besides, the water source purifying constructions of Yuanbo Lake and Garden Park will make an important contribution to Yongding River channel restoration and Yongding River "one line for five lakes" water quality guarantee.

## III. The application of new technology, new material and new achievement of environmental protection

New materials, new sci-tech innovated energy-saving achievements have been widely applied in the landscapes, buildings and facilities constructions, for example, high survival rate technology of large arbor transplant was adopted, the new technologies and new energies such as water permeable brick, rainwater garden, water-saving irrigating, vertical greening, ground-source heat pump system, rainfall flood utilization system of the park area and solar photovoltaic power generation system.

**1. Abundant environmental protectional factors**

Low carbon, environmental protection and ecological restoration is the basic concept of the garden expo. Currently the garden park comprise green landscape engineering, main exhibition hall, water source purifying engineering (Wetland

Park) and garden museum, and all these projects show a concept of green and environmental protection.

This garden expo can realize two "zero emissions": including zero emission of all municipal wastewater of the park, and zero emission of all municipal rainwater. There are two newly built wastewater treatment stations in the park, the produced sewage after the treatment and purification of the 35 hectares Wetland Park will be used in the landscape water area and made greening irrigation; 60% of the areas of roads and squares are paved with water permeable materials, the areas without water permeable materials are built with rainwater collection ditches, and rainwater garden is specially built to recycle use all the rainwater. Besides, 70% of the buildings adopt ground-source heat pump, and some buildings adopt the solar photovoltaic power generation technology.

The heating, heat supply of air conditioners and domestic hot water of the exhibition hall are all from a set of ground-source heat pump system. This item can annually save the standard coal of 1518.94 tons according to the calculation, and reduce carbon dioxide discharge of 2840.42 tons. Meanwhile, there are 10 "hidden" solar photovoltaic charging stations to provide the illuminations and powers for the main roads and grass lands in the park, and provide the power source for monitoring system. These 10 hidden power stations will save standard coal of 726 tons every year, reduce the discharges of 4.3 tons sulfur dioxide, 12.4 tons nitric oxide and 1900 tons carbon dioxide.

**2. The application of Internet of Things technology**

The garden park covers a total area of 513 hectares, including 267 hectares land area, 246 hectares Yuanbo Lake, it is equivalent to 1.7 times of the size of the Summer Palace, the park plans to plant more than 13,000,000 trees and shrubs as well as flowers, which will form a green landscape of 147 hectares. However, irrigation water for such a large green land is a huge cost, and the irrigation of the park is a test to the organizers especially in a city short of water supply like Beijing.

Refer to this situation, the trees which can fit to grow in the northern climate are chosen, such as pinus tabulaeformis and pagoda tree which are belong to the drought-resistant varieties, they are able to get a normal growth after planting. Besides, this garden expo applied the technology of internet of things in the gardening to realize the precise irrigation, precise fertilization, water saving and fertilizer saving to reduce pollution.

Internet of things technology is a comprehensive application of internet technology, GPS technology and grid system, it makes real time collections of any information required to be monitored, connected or interacted of the objects or processes via various information sensing devices, and forms a huge network with internet. Its purpose is to realize the connections between object and object, object and people, as well as object and network to facilitate identification, managing and controlling. The core and base of "internet of things technology" is still "internet technology", and it is a network technology extending and development on the base of internet technology; its client end extends and develops to any objects to make information change and communication. Therefore, the internet of things technology's deification is, it is a kind of network technology that connect any objects with internet to make information change and communication to realize smart identification, positioning, tracking, monitoring and managing with the help of information sensing devices such as radio frequency identification (RFID), infrared inductor, global positioning system and laser scanner on following the agreed agreement.

The main process includes automatic data acquisition, information wireless transmission and result visible expression. It mainly distributes the smart sensor nodes on the farmland required to be monitored and makes real-time detections on the plants' physiological information, soil moisture and temperature, the density of the nodes' distribution depends on the local plants, soil and topography condition, with the help of GPRS technology (general packet radio service) and GSM technology (global system mobile-communication), the information will be uploaded to the server through GPRS system and internet, and the server will issue the collected data to the related websites, as long as you

can surf the internet in any place of the world, you can make data query and download, and the same function can be also realized with mobile internet.

The internet of things application in this garden expo shows a fast development of Chinese garden irrigation technology, and will play a demonstration role for the industries of gardening and agriculture. The management of internet of things has the features of precise, collective, automatic and controllable, etc., the "precise irrigation" of the plants have realized in Jiuxiu Valley of Garden Park, and realized water saving, fertilizer saving and reduced environmental pollutions, this technology will make the water utilization rate exceeds 85%. As soon as the technical staff input the information of each tree into the system, the system will judge the "water consumption" of each tree according to the data such as the variety and age of the trees, what is more advanced is that it can calculate how much is the rainfalls around this tree when it rains each time, and how much water the tree has "drunk", and then adjust the irrigation volume of each tree according to this data. Only this smart control system can save more than 50% irrigation water. Therefore, the application of internet of things not only improves the work precision, accuracy and efficiency, but also is a high and new technology of water saving, energy saving and environmental protection, which is worthy for us to learn and make deep exploration.

## IV. A positive role to ecological civilization construction

As expanding the ideas, getting rid of the traditional concepts and bravely applying the sci-tech new achievement to fully develop each advantage of the new technology, the most featured aspects of this garden expo is the achievement applications of modern new technology, new material and new process. Such as the advanced water-saving irrigation technology, high efficient internet of things managing system, waste changed Jinxiu Valley, and wetland project, etc. all show the feature of "new", and makes this garden expo compete out in various expos.

It shows a guiding role of demonstration in the construction of ecological civilization all over the nation and even in the world. It boasts that garden expo is also a proud major project on the frontiers of environmental protection. The garden expo is the model to practice the environmental protection strategy of "develop in protection and protect in development". It is to "drain the pond to get all the fish" if the development goes without protection, and it is "a fruitless approach" if the protection goes without development. After the expo, it will provide the public a leisure place with beautiful environment, and it is planned to build as a featured tourism area, a destination of tourism and education. Meanwhile, the garden expo has also played a leading role in regional development: it improved the surrounding ecological environment, city appearance and environment, improved the environmental quality of the region; it speeded up the infrastructure construction progress, realized the acceleration of the infrastructure construction related with people' life such as water, electricity and gas supply, in the mean time of constant improvement in the traffic system; it gathered the industries and boosted employment, achieved new wealth for the people.

References:

[1] Internet of things: An Edged Tool to Make the New Path of Environmental Protection, China Economic Herald, 2011-12-10;

[2] Environmental Impact Statement on Garden Area Greening Landscape and Related Facility Construction of the 9th China (Beijing) International Garden Expo

[3] Real time detection and irrigation forecast system based on the structure of internet of things

[4] Change the wasted to the magical, what a Jinxiu Valley! China Environment News, 2013-5-10

[5] Gardens: Landscape in Poems and Paintings, a Dreaming Paradise, Fengtai Newspaper

[6] Hi-tech Supports Garden Park, Wasteyard Changes to Be Beautiful Valley, Beijing Daily.
[7] Utilization and Sustainable Development after the 9th Garden Expo
[8] Media Service Guidance of Beijing Garden Expo.

Author's information: Pan Jie, female, born in August 1989, graduated from the environmental engineering department of chemical engineering college in Beijing University of Chemical Technology in 2011, now works in the Environmental Protection Agency of Fengtai District in Beijing,. Add: #28, Qilizhuang Road, Fengtai District, Beijing, zip code: 100071, contact number: 63815165, 15120058283, E-mail: 354166413@qq.com.

# Study on Damage of Waste Fluorescent Tube and Countermeasure of Pollution Prevention

Peng Meng
Beijing Solid Waste Management Center 100089

Abstract: With large output and wide application range in our country, fluorescent tube becomes an essential lighting appliance in people's life. In the face of such huge market, many cities have not built up a recycling system of the waste fluorescent tube yet, and consumers are lack of proper knowledge about the damage of the waste fluorescent tube, so that the broken or waste fluorescent tubes are treated along with the household refuse, thereby causing mercury pollution and threatening human health. Started from the lighting principle of the fluorescent tube, this paper provides analysis and suggestions for the countermeasure of the pollution prevention.

For luminous efficiency of the fluorescent lamp is higher than that of the incandescent light bulb, it is good for saving energy and reducing emission, and mainly applied to the indoor lighting in the hotel, restaurant, office building, business building, market, supermarket, school classroom, meeting center, exhibition hall, station, wharf, factory, residential building, and other places. The statistics show that there are 207 manufacturing enterprises of fluorescent tube with total output of about 2 billions of tubes [1] in 2004 throughout the country. Along with the continuously progress of technology and continuously extension of market demand, the output of domestic fluorescent tube is further promoted. Therefore, the recycling work of the waste fluorescent tube becomes an important issue in the face of such huge fluorescent tube market.

Key Words: waste fluorescent tube, damage, pollution prevention

## 1. Damage of waste fluorescent tube on environment and human body

### 1.1 Lighting principle of fluorescent tube

Fluorescent tube is a gas discharge lamp, and mercury is used as the gas discharge medium in the lamp tube. The fluorescent tube is required to maintain essential free mercury steam pressure (0.6-1.33 Pa) at work so as to ensure the chemical combination [2] among mercury, glass, fluorescent powder, and electrode.

### 1.2 Damage of waste fluorescent tube on environment and human body

As a toxic chemical matter, mercury is able to damage nervous centralis of human body. People can suffer acute and chronic intoxication after contacting it: the acute intoxication will make people die, and the chronic mercury intoxication will mainly damage the digestive tract, kidney, respiratory system, spleen, and nervous system, and will also cause mouth swellings and erosion, dropsical nephritis, nephritis, pneumonia, neurasthenia, etc [34].

A power saving fluorescent lamp contains 0.5 mg mercury averagely (only a few products can reach up to about 0.25 mg), the pollution [5] of about 360 ton water will be caused since 1 mg of mercury intrudes into the underground. The mercury can be evaporated under the normal temperature for its boiling point is very low, therefore, the waste fluorescent tube after breaking will spread the mercury steam to four sides immediately, and the mercury in the surrounding air will reach up to 10-20 mg/cm3 instantly; however, the highest allowed concentration specified in the national regulation of mercury in the air is only 0.01 mg. People will have a life-threatening complication after absorbing 2.5g of mercury steam once [2].

After the fluorescent lamp is broken, the mercury in the lamp tube will spread mercury steam to surroundings; if

the mercury is not treated and embedded, it will pollute soil and underground water, and accordingly threaten human body's health.

## 2. Prevention countermeasure on pollution of waste fluorescent tube

At present, people started to focus on the recycling and management works of the waste fluorescent tube; furthermore, people at home and overseas have certain advanced experience in this aspect.

### 2.1 Prevention countermeasure of foreign countries on pollution of waste fluorescent tube

Today, many developed countries adopt solid mercury alloy, metallic mercury packet, and others instead of liquid mercury during the production of the fluorescent tube, or stop the production of the fluorescent tube, transfer the "waste-making enterprise" of producing lamp tube by liquid mercury to our country or the other third world countries, meanwhile, they adopt strict recycling measures for the waste and old tubes in order to prevent the residual mercury from spreading to the air and water[6].

Internationally, many countries with developed industry adopted many measures to reduce the mercury pollution of the lighting technology, and achieved great success; after conclusion, these measures can be separated into the following several items mainly [7]:

(1) Improve the consciousness of user about the mercury pollution in the fluorescent tube, promote people to cooperate to recycle conscientiously, improve the recycling rate, and better use the resource;

(2) Urge the manufacture to improve the quality of light source, and reduce the mercury content from the pollution source;

(3) Give full play to the function of government, and make the management work smoother through legislation, administration, economics, education, and other methods.

(4) Make the legislation strict, officially list the waste fluorescent tube to the recycling product, and carry out the examination of recycling rate, accelerate every enterprise to actively develop the recycling technology and add the treatment ability.

Policy of the law: The Sweden government issued Manufacturer Liability Law of Electronic & Appliance Product, Pretreatment Rules and Guideline of Waste & Old Appliance and Electronic Refuse, and Treatment Law of Waste & Old Electronic Appliance; the main accordance for recycling waste electric appliance in German is Law of Circular Economy and Treatment Method of Waste and Old Equipment in Information Industry; Directive on Waste Electronic Appliance (2002/96/EC) and Directive on Limiting Use of Some Harmful Matters in Electronic Appliance (2002/95/EC) issued uniformly by EU in 2003 are two compulsory technical regulations. Based on Fundamental Law of Construction of Circular Society and relevant Promotion Law of Effective Use of Resource, the MITI of Japan listed the waste fluorescent tube into the recycling product officially in July 2001, and implemented the examination of the recycling rate, thereby every enterprise is actively engaged in the recycling technology and the treatment ability is increased.

Technological means: nowadays, only some developed countries are possessed of matured treatment technology of waste fluorescent lamp, and have started the business operations. The union of European Lighting Company established a base for the collection and recycling treatment of the waste light source, and the major treatment method includes: (1) pulverize tube by a wet method, solidify mercury by mercuric sulfide method, recycle metal box glass, and deliver the fluorescent powder to the pointed manufacturer to recycle; (2) pulverize tube by a dry method, distill and remove mercury, recycle the metal box glass. The American Appliance Manufacturer Association (NE2MA) introduces that the disposal method of mercury-containing waste light source in America includes: (1) Sulphurating landfill method: exceeding mercury is hard to be monitored from the lixivium of the landfill by the United States Environmental

Protection Agency. (2) Burning method: for this method can recycle the mercury completely, most mercury still enters the air, so the effect is not ideal. (3) Cutting method: it belongs to the recycling method and includes the following methods: firstly, cut off the non-glass part at the end part, recycle metal and a part of mercury; and then further separate the mercury from the fluorescent material by the combination of the wet method and the fire method; finally, recycle glass.

**2.2 Status of our country on pollution prevention of waste fluorescent tube**

2.2.1 Relevant policy

The existing laws and regulations issued by our country about the recycling treatment of hazardous wastes include: Catalogue of National Hazardous Wastes, Laws on Prevention of Environment Pollution by Solid Waste of the People's Republic of China, Pollution Prevention Technique of Hazardous Wastes, Management Method of Hazardous Waste Manifest, and Business Certificate Management Method of Hazardous Wastes.

The 29th type of "mercury waste" of the Catalogue of National Hazardous Wastes has clearly listed out the "production and use of fluorescent screen and mercury lamp", and represents that the abandonment and use of the mercury-containing fluorescent tube shall be managed according to the Laws on Prevention of Environment Pollution by Solid Waste of the People's Republic of China.

The 16$^{th}$ article of the Laws on Prevention of Environment Pollution by Solid Waste specifies that unit and individual engaged in collecting, storing, transporting, using, and disposing the solid wastes must take measures to prevent spread, loss, leakage or the other measures for preventing environmental pollution.

The Pollution Prevention Technique of Hazardous Wastes has made corresponding specifications about the collection and transportation, transfer, and storage of the hazardous waste, and specially stipulates the waste fluorescent tube that government in all levels shall formulate technological and economical policies and adjust the product structure; weed out the high-pollution fluorescent tube, encourage the establishment of the collecting system and fund system of the waste fluorescent tube; enhance the management of the generation, collection, and disposal of the waste fluorescent tube, encourage the key cities to build up the regional recycling facility of waste fluorescent tube so as to provide service for the recycling treatment of the fluorescent tube in this region.

The Management Method of Hazardous Waste Manifest stipulates that the unit who generates the hazardous wastes must submit a hazardous wastes transfer plan for approval according to the related national provisions before transferring the hazardous wastes; after approval, the generating unit shall apply to the administrative department in charge of the environmental protection in the original place for getting manifest. The generating unit shall report the administrative department in charge of the environmental protection in the original place within 3 days before moving out the hazardous wastes, and report the expected arrival time to the administrative department in charge of the environmental protection in the present place.

2.2.2 Recycling and reusing

Our country is actively engaged in planning the recycling of the waste fluorescent lamp. At present, the recycling treatment of China's waste fluorescent tube mainly includes "directly breaking and separation" and "blowing and separation of cutting end"; the prior one is characterized in compact structure, small occupied area, and few investments, but the fluorescent powder cannot be used anymore. The later one is able to effectively classify and collect the rare-earth fluorescent powder for recycling and reusing, but the investment is high.

Besides, through the redemption work of "one-yuan energy-saving lamp", more people learn about the damage of the waste fluorescent tube on the environment, and participate in the activity of recycling actively. However, for the recycling branch is incomplete, the publicity force is not enough, the implementation of laws and regulations is not

improved, a lot of waste fluorescent lamps are directly thrown into the trash can after losing efficacy or being broken.

**2.3 Countermeasure of pollution prevention**

Facing such huge fluorescent tube market, and basing on the advanced experience at overseas and keeping a foothold on the reality, we should start from the following aspects:

2.3.1 Strengthen publicity and popularize common sense of environment pollution of waste fluorescent tube

As for the recycling work of the waste fluorescent tube, firstly, enhance the environmental-protection awareness of consumers; make the consumers learn about the damage of the waste and damage fluorescent lamp on environment and human body through publicity method in school, community, and office building, so that more people can actively participate in the recycling work of the fluorescent tube, and provide more materials for the recycling materials of the fluorescent tube, thereby promoting the recycling system to carry out orderly.

2.3.2 Perfect system, and facilitate the general public to participate in recycling work

Firstly, set up a whole process management system of the waste fluorescent tube. The whole process management includes generation, identification, mark, classification, collection, exchange, transportation, storage, recycle, reuse, disposal, final disposal, and so on of the fluorescent [8]; it requires that the manufacturer must undertake the responsibility and obligations of recycling, so that the number of the manufacturer is leveled to that of the recycling enterprise. Secondly, perfect the recycling network of the waste fluorescent lamp, set up fixed recycling points at surrounding of the large residential areas and office building so that the general public can participate in recycling conveniently. For the investment of recycling waste fluorescent lamp is big, the cost high, it is afraid that the recycling work is hard to carry out for a long time only upon the market operation; therefore, it needs the support and guidance of government and widely participation of social organization, thereby forming a join force and promoting the recycling work to carry out continuously.

2.3.3 Technological innovation, actively control pollution source

Firstly, reduce the use of the mercury from the source. The mercury content of various light sources are limited in the issued regulations and rules, thus the technological, technical and device levels of the manufacture are improved, the overall level of the manufacturing industry of the lighting appliance is promoted, energy-saving and green electric light source products can be produced; secondly, actively study and develop the mercury substitute materials of fluorescent lamp. Devote great effort to studying and developing the substitute materials of the mercury, so that the mercury can retreat from the stage of the fluorescent lamp completely. Only depending on studying, developing, and using the mercury substitute materials of the fluorescent lamp, the mercury pollution of the fluorescent lamp can be solved completely. At present, the study on the low-pressure discharge fluorescent lamp and quasimolecule light source [9] has achieved great success, and it is expected to solve the mercury pollution of the fluorescent lamp completely in the future.

The widely application of fluorescent lamp is beneficial to save energy and reduce emission, duly handle the waste fluorescent tube, regulate the recycling system, continuously create new technology, develop new light source, and promote the harmonious development between the social progress and the environmental protection.

References

[1] Liang Zhen, National Fluorescent Lamp Market Investigation Report in 2004 [J]. China Lighting Appliance, 2006

[2] Wang Tao, Recycling and Disposal of Waste Fluorescent Lamp [J]. China Environmental-protection Industry, 2005

[3] Jin Taiyi, Occupational Health and Occupational Medicine (the sixth edition) [J]. People's Medical Publishing House, 2007

[4] He Suiyuan, Environmental Chemical (the fourth edition) [J]. East China University Of Science and Technology Publishing House, 2000

[5] Sun Yuelan, Green Lighting and Environmental Pollution [J]. Light Industrial Machinery, 2005(2): 133-135

[6] Zheng Jun, Recycling Status and Comprehensive Use Countermeasure of Waste Fluorescent Tube in Beijing [J]. North Environment , 2010(22): 24-27.

[7]Chen Yuming, Chen Dahua. Mercury Pollution and Prevention in Lighting Technology [J]. Light and Illumination. 1998-12,22 (4),37-39.

[8]Sun Shenglong, and others. Simple Analysis on Disposal Technology and Management of Our Hazardous Wastes [J]. China Environmental Pollution, 2003(22):72

[9] Zhang Shanrui, Zhu Shaolong. Review of Mercury-free Fluorescent Lamp Progress (II)- Quasimolecule Discharge Fluorescent Lamp[J]. China Lighting Appliance, 2002, (6): 1-7.

About the Author

Peng Meng, Female, born on November 26, 1986, graduated from chemical and environmental engineering school of Beijing Technology and Business Technology and majored in practical chemistry, and now employed in Beijing Solid Waste Management Center as the section member of the solid waste management section. The contact address: 67#, Suzhou Street, Haidian District Zip: 100089, contact number: 13810731701, e-mail: pengmeng1126@163.com.

# Simple analysis and Defense on High Temperature Weather

Ruan Shuigen Han Shuyun Zheng Dawei
(Beijing Disaster Reduction Association)

Since July this year, most of China's areas appeared a high temperature weather for a long time, showed a character of "wide range, more days, lasting and strong strength". The highest temperature and its duration time in many places of southern areas have broken the extremum in the meteorological data of the history. Therefore, China Meteorological Administration launched the first emergency response on the highest level of high temperature of the year, i.e., high temperature warning rose from yellow to orange. Though the hot weather in north China was not as "hot" as that in Yangze River and Huai River area, southwest and south China, but there were 4 continuous days appeared with a high temperature above 35℃ in the first ten days of July in Beijing, and 3 days in the last ten days, including a day with the highest temperature of 38.2℃. The series of high temperature weather made the social public complain incessantly.

The reason caused the continuous high temperature was that the rain band moved northward earlier this year, and made the southern area under the control of subtropical high in most of the time, the longer controlled by the subtropical high, the longer high temperature weather lasts, and the high temperature strength will further increase. The subtropical high further enhanced and westward extended in the late July, at the same time, the continental high pressure in the east of northwest area functioned with the subtropical high, led a northward extension of high temperature, and made the high temperature weather appear in wide scopes in north China.

High temperature in summer, especially the continuity high temperature after the starting of the hottest part of the summer has a great harm; it not only causes the earth crack, yellows the green plants, dries the farmlands, reduce the agricultural products and even corps failures; but also causes the water shortage in a wide rang, rivers and lakes cut off, hard to drink for both man and livestock, leads forest and grass fire disasters, and also causes overload of power use, increases the heatstroke, and will directly endanger people's life and health.

Refer to our country locates in the middle and low latitude, the high temperature heat of the summer is also a natural disaster which can not avoid. The society and public can fully and efficiently adopt various measurements to relief and reduce the influence of this disaster when the high temperature and heat wave is coming. How to cope with high temperature heat? We thought that it should start from multiple angles on adapting, reducing and positively responding, scientifically implement from different levels such as individuals and families, units and communities, government and departments, make a linkage development, thus we suggest:

1. The measures on the level of functional departments and government: revise and improve emergency general plans for the high temperature defense, timely start the particular emergency plan for responding high temperature, timely release high temperature warning through the Medias such as radio, television and newspaper; the public health department and media can increase the heat knowledge propaganda and education, propagandize how to defense heat-wave and avoid diseases caused by it, particularly enhance the propagandas and services to those vulnerable to heat-wave; require the hospitals and community services make sufficient preparations for coping with the high temperature heat. The power and water supplying departments ensure there is enough power and water supplying during the heat-

wave warning period; remind the public try to open the air conditioners or stay in the cool environment to avoid the heat, etc.; try best to reduce the number of people affected by heat disease to death. Practically implement Emergency Plan and Heat Prevention and Temperature-lowing Managing Method and clarify that out-door open air work should be stopped the day when the highest daily temperature reaches above 40℃; when the highest daily temperature reaches between 37℃ and 40℃, the accumulated out-door open air work arranged to the labors should not exceed 6 hours, and the continuous operation time should not exceed national regulation, no out-door open air work should be arranged within 3 hours in the highest daily temperature; when the highest daily temperature reaches between 35℃ and 37℃, the employer should take the ways such as shifts rest to shorten the continuous working time of the labors, and no overtime work should be arranged to the out-door open air working labors; and alert to the public, due to the climate characteristics of this summer and the forecast from meteorological department, each unit and social public need to prepare for a long last battle with the high temperature weather, meanwhile, pay attention to the fire and electricity prevention to avoid the fire disasters caused by high consumptions of power and the large loads of the power equipments such as wires and transformers.

2. The measures on the level of units and communities: make or revise and improve detailed emergency plans of high temperature avoidance on real time implementing once meet with the high temperature weather, take the high temperature hot weather responding and heatstroke prevention as one of the focuses and urgent affair of recent safety work. Make sun block preparation before working and activities outside, take sunshade and sunhat, try to ask the staff to wear light colored clothes with good permeability, some medicines such as Klian Intan, Shidishui and Huoxiang Zhengqi Liquid can be taken along with the staff, timely replenish the water to ease discomforts come from high temperature or slight sunstroke; a sunstroke normally accompanies with the symptoms such as dizziness, dizzy, bosom frowsty, nausea, vomiting, abdominal pains and fever, seriously people can even be fainted, once sunstroke symptoms are found, activities under the high temperature should be stopped immediately, and replenish water timely, lie for a rest in a cool and ventilating place, unfasten the collar, make hypothermia, and send to the hospital for the serious ones; refer to those who must work out-door under the high temperature, reasonable rest time should be arranged, and should avoid work in the high temperature period at noon, necessary cooling drinks and sunstroke prevention medicines should be prepared in the working places, if the staff feels uncomfortable, he or she should stop working immediately, and move to the cooling place to have a rest; it is necessary to remind everyone that due to long days and short nights in summer and the hot weather, people are lack of sleep, proper siesta can be taken for the conditional staffs to ensure more energy to put in the work in the afternoon.

3. The measures on the level of individuals and families: learn, familiar with and master the basic knowledge and skills of high temperature defense and fighting through various channels. The room should ventilated, avoid or reduce outdoor activities during the day, especially do not go out under the hot sunshine from 10 to 16 o'clock, it is not suitable to sleep on the balcony, under the tree or in the open air, properly sleep later and get up earlier, and a nap at noon is recommended; wear straw hat and light colored clothes outside of the door, and prepare the drinking water and sunstroke prevention medicines, stop working if uncomfortable dizzy is felt, and rest in the shade; do not bath with cold water when sweaty all over, dry the sweat and rest for a while first, and then bath with warm water. Indoor air conditioner and fans can not blow directly to the head or one part of the body for a long time; pay attention to the diet sanitation, do not eat unhealthy food and do not drink unboiled water; the elderly patients should make health check periodically, timely go to see a doctor in case of discomfort, decrease going out, if the elderly wants to go out, he or she must be accompanied by family members, it is suitable for quiet sitting, be more meditation and discard anger, no excessive cool enjoyment. Infants and kids should avoid too thick coat, wear loose, comfortable and short clothes, no excessive cold

drinks, have fresh and cooked food, bath every day to avoid prickly heat, timely to see a doctor if indigestion appears, do not sleep on summer sleeping mat; Pregnant women avoid big covers, have the bedroom ventilated, had better not sleep on the summer sleeping mat, frequently bath and change the clothes, dress with big and breathable clothes, no engorging of too cold food.

July 31, 2013

Ruan Shuigen: Expert and researcher of Beijing Disaster Reduction Association
Han Shuyun: Deputy Secretary General, senior engineer.
Zheng Dawei: Expert of Beijing Disaster Reduction Association, Professor of China Agricultural University

# Salvation Capability Evaluation on Coping with Disasters

Ruan Shuigen  Han Shuyun
(Beijing Disaster Reduction Association)

Abstract: China is one of the most serious countries suffering from the natural disasters in the world. According to the statistics from Ministry of Civil Affairs (MOCA) [1], in China, there are about 300 million people (times) affected by various natural disasters yearly on average, about 3 million houses collapse and about 9 million population are emergently relocated, resulting a direct economic loss of approximately RMB200 billion. Every year, Chinese government inputs great amount of manpower, material and financial resources to prevent and relief the disasters. Based on the analysis of factors on effective development of disaster relief[1], mainly including the infrastructure level of disaster salvation, material reservation level and rescue level of disaster salvation, etc, this article proposed the disaster salvation coping capacity evaluation index system and its method of estimation and calculation via researching the capability system's design principles and structure, and provides guidance and scientific basis for the evaluation of actual disaster salvation capability.

## 1. Foreword

A large number of natural disaster relief examples showed that the improvement of disaster salvation actions has an extreme important effect on maximally relieving the harms caused by the disasters. Yet the particular researches on objective estimation of disaster salvation capability have not been found domestically. However, it urgently requires the pre-disaster but not emergency salvation capability evaluation.  Refer to this problem, based on the analysis of factors on effective development of disaster relief [1], mainly including the infrastructure level of disaster relief, material reservation level and rescue level of disaster relief, etc, this article proposed the disaster salvation coping capacity evaluation index system and its method of estimation and calculation via researching the capability system's design principles and structure, and provides guidance and scientific basis for the evaluation of actual disaster salvation capability.

## 2. Design principles and structure of capability system

Disaster salvation coping capability is an important part of comprehensive coping capability of natural disaster. It is necessary to choose some important elements with characteristic meanings as indexes from the various factors that affect this capability to objectively reflect disaster salvation coping capability, which can comparative correctly master the essence of disaster salvation coping capability [2].

**1) Selecting principle**

There are many selecting principles of evaluation index, and they are normally the same in the disaster prevention and mitigation as well as public security field. This article here only emphasizes on the following four principles from the view of evaluating disaster salvation coping capability.

Scientificity: this is a principle must to be followed in any constructing index system, namely, the index should be scientific with clear definition and standard calculation.

Independence: this principle is very important to construct the index group; the indexes are required to be with high independence, weak relations between indexes and no overlaps in definition domains.

Representativeness: the representative and extreme important factor should be chosen as the index to directly reflect the capability because of the interactions and different importance of the factors among the various factors which affect the disaster salvation capability.

Operability: here mainly refer to the reliability and accessibility of the material data source which can quickly input to the daily operation, and with simple and standard operation.

**2) System structure**

According to the connotation of disaster salvation coping capability, the topic researches mainly from the salvation resources (including salvation funds, reservation supplies and disaster facilities) of disaster reduction and relief and takes it as its center, constructs disaster salvation coping capability index system; meanwhile, normal layering analysis is adopted to divide this structure's index group into four grades, i.e., target layer, system layer, state layer and variable layer.

Target layer: reflect the basic and comprehensive characteristic of the coping capability.

System layer: based on the definition of the coping capability, reflect the main effect system and its internal relations.

State layer: describe the relation structure of each effected system with comprehensive behavior (index).

Variable layer: essentially describe the results of above behaviors with quantifiable indexes.

## 3. Disaster salvation coping capability evaluation index system

Based on the principles and system structure of last section, an analysis method combined with quantitative and qualitative is adopted, we have designed 3 evaluation factors of grade I, 14 evaluation indexes of grade II and 39 detailed indexes of grade III (table 3.1). This disaster salvation coping capability index system can comparatively and objectively reflect the capability state. The weight is confirmed through score by expert in order to be direct, practical and simple. Layer A and B are scored with a full score of 10, and layer C is scored multiply step by step. The weighted value of each layer refer to table 3.1

Table 3.1 Disaster salvation coping capability evaluation index system

| Ⅰ | Ⅱ | Ⅲ |
|---|---|---|
| A1: Infrastructure level of disaster salvation (0.3) | B1: Traffic and transportation system （0.30） | C1: Smooth and fast speed of traffic and cargo transportation (1.0) |
| | | C2: Basically smooth and ordinary speed of traffic and cargo transportation (0.5) |
| | | C3: Unsmooth and slow speed of traffic and cargo transportation (0.25) |
| | B2: communication network and communication tool (0.15) | C4: Developed communication network and each information can be obtained (1.0) |
| | | C5: Developed communication network, sometimes information cannot be obtained in a few areas. (0.5) |
| | | C6: Comparatively undeveloped communication network, and there is obvious blind angle in communication. (025) |
| | B3: lifeline system (0.15) | C7: Water, electricity and gas can meet the demands, and they are in a normal operation and guarantee. (1.0) |
| | | C8: Water, electricity and gas can basically meet the demands, and have a basically normal operation. (0.5) |
| | | C9: Water, electricity and gas cannot meet the demands, and have an abnormal operation. (0.25) |

| | | |
|---|---|---|
| | B4：<br>Medical system (0.15) | C10: Sufficient hospitals and beds, fully equipped. (1.0) |
| | | C11: Limited hospitals and beds, insufficient equipments. (0.5) |
| | B5:<br>Shelter (0.20) | C12: Reasonable distributions and their capacities can meet the demands. (1.0) |
| | | C13: Comparatively reasonable distributions and their capacities are limited. (0.5) |
| | | C14: Insufficient locations and the capacities cannot meet the demands. (0.25) |
| A2:<br>Material reservation level of disaster salvation (0.3) | B6:<br>Repository construction (0.30) | C15: Reasonable layout and levels, the capacities meet the demands. (1.0) |
| | | C16: Basically reasonable layout and levels, the capacities are limited. (0.5) |
| | | C17: Insufficient repositories, small capacities. (0.25) |
| | B7:<br>Supplies sorts (0.25) | C18: Complete sorts and meet the demands (1.0) |
| | | C19: Comparatively complete sorts and can basically meet the demands. (0.5) |
| | | C20: Single sort and cannot meet the demands. (0.25) |
| | B8:<br>Supplies reserves (0.25) | C21: Sufficient reserves and replace timely (1.0) |
| | | C22: Basically sufficient reserves and replace basically in time (0.5) |
| | | C23: Insufficient reserves and do not replace timely. (0.25) |
| | B9:<br>Salvation equipment (0.20) | C24: Fully and sufficiently equipped to meet the demands. (1.0) |
| | | C25: Limited equipments, basically meet the demands. (0.5) |
| | | C26: Incompletely and insufficiently equipped, and cannot meet the demands. (0.25) |
| A3:<br>Rescue level of disaster salvation (0.4) | B10:<br>Economic development (0.35) | C27: Large sum of GDP, fast increasing speed. (1.0) |
| | | C28: Comparatively large sum of GDP, and comparatively fast increasing speed. (0.5) |
| | | C29: General sum of GDP, slow increasing speed. (0.25) |
| | B11:<br>Non-governmental salvation funds (0.15) | C30: Plenty channels of fund reserves and the amount is large. (1.0) |
| | | C31: Limited fund reserves and amount (0.5) |
| | B12:<br>Medical rescue state (0.15) | C32: Sufficient quantity of doctors (nurses) and they have a fast speed to reach the disaster areas. (1.0) |
| | | C33: Limited quantity of doctors (nurses) and they have a comparatively fast speed to reach the disaster areas. (0.5) |
| | | C34: Insufficient quantity of doctors (nurses) and they are hard to reach the disaster areas directly (0.25) |
| | B13:<br>Wounded transferring speed (0.15) | C35: The wounded can be received treatment timely with a fast transferring speed. (1.0) |
| | | C36: Basically the wounded can be received treatment timely with a comparatively fast transferring speed. (0.5) |
| | | C37: The wounded have not been received treatment timely with a slow transferring speed. (0.25) |

| | | |
|---|---|---|
| | B14: Coping preparations of communities and villages | C38: Good state in volunteer team constructions, disaster prevention and relief senses and emergency acceptances. (1.0) |
| | | C39: Normal state in volunteer team constructions, disaster prevention and relief senses and emergency acceptances. (0.5) |

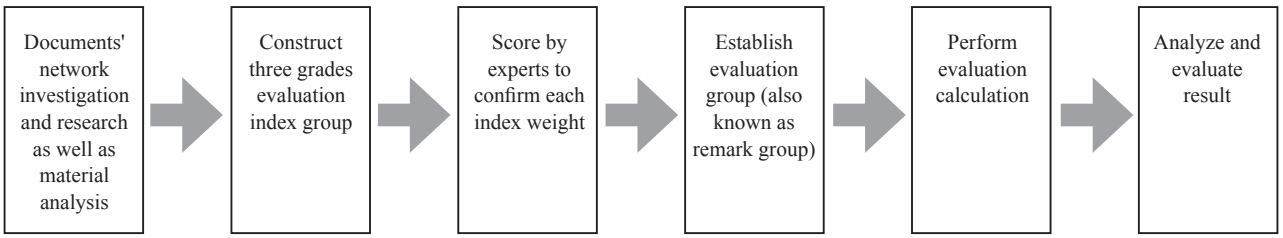
Obviously, each index listed in table 3.1 emphasizes both on scientificity and independency, considers the highlighted focuses, and does not include each factor and index which reflects disaster coping capability.

## 4. Evaluation flow and estimation of disaster salvation coping capability

**1) Evaluation flow**

Because disaster salvation coping capability is a vague qualitative concept and there is no certain boundary value on quantity, therefore, only the analysis combined with quantitative and qualitative can be adopted to finally show a quantizable value, and further comparatively and objectively reflect and evaluate the capability level. The evaluation flow shows as figure 5.1.

Figure 4.1 Evaluation flow of disaster salvation coping capability




Normally the evaluation group in figure 4.1 is also known as remark group, i.e., T= (T1, T2 …Ti). This article is divided it into four grades according to the characteristics of Beijing: i.e., T1 refers to strong coping capability which can fully meet the salvation demands; T2 refers to better coping capability which can generally meet the salvation demands; T3 refers to general coping capability which cannot finish meeting the salvation demands; T4 refers to weak coping capability which cannot meet the salvation demands.

2) Calculation of salvation evaluation

Due to the weak correlations between indexes of the index group, linear relational expression can be adopted to perform the coping capability, and its calculation formula is:

$$F = \sum_1^n \mathrm{W}i\mathrm{F}i \tag{4.1}$$

Wi and Fi in the formula respectively refer to the evaluation value and its corresponding weight of the next layer's index, n refers to the total index of the existing layer. Starting from index layer of grade III, gradually upward to calculate the index evaluation value of the former layer, thus formula (5.1) can be changed as

$$F = \sum_i^3 . \sum_1^i [\mathrm{Cij} . Bij . \mathrm{A}i] \tag{4.2}$$

F in the formula is the final coping evaluation value of disaster salvation, Cij is each factor's score valued by expert in grade III, Bij is the weight of each factor in grade II, and Ai is the weight of each factor in grade I.

Since the evaluation group in above section has divided it into four grades, and its corresponding grade value

judgment refers to table (4.1). Evaluated object value F can be calculated according to formula (4.1) or (4.2), and then evaluate the strength of disaster salvation coping capability as per table (4.1).

Table 4.1 Disaster salvation coping capability evaluation grade value judgment table

| Grade | Strong | Fine | Normal | Weak |
|---|---|---|---|---|
| Value F | F≥0.8 | 0.65≤F＜0.8 | 0.50≤F＜0.65 | F＜0.50 |

References:

[1] Ma Zongjin, etc. Natural disaster evolution, disaster degree and countermeasures (Research on China's natural disaster reduction) [M]. Beijing Science and technology press, 1990.

[2] Wu Jidong, Influence of natural disaster and evaluation method of indirect economic loss [J], Geographical science progress, 2009, 28 (6): 877-885;

[3] Ruan Shuigen, etc. Natural disaster loss evaluation and research of salvation measuring mode, technical report of Beijing Disaster Reduction Association topic research, 2010.

[4] Gao Qinghua, etc., Natural Disaster Evaluation, Beijing, China Meteorological Press, 2007,7,102-105.

[5] Feng Lihua, Quantitative Calculation of Disaster Loss [J], science of disaster, 1993,8(2):17-19.

[6] Feng Zhize, Natural disaster grading and disaster grading management research, science of disaster, 1996,11(1):34-37.

Ruan Shuigen: Expert and researcher of Beijing Disaster Reduction Association

Han Shuyun: Deputy Secretary General, senior engineer.

# Urban underground space development in China

Shi Xiaodong

China has undergone rapid development in urbanization at the rate of 2 times the average world level in the past 20 years. As a result, the total number of the cities in China increased from 216 in 1978 to 660 in 2009. The rate of urbanization in China will rise from the current 40% to 75% in the coming 50 years, and the urban population will also increase from 520 million to 1,000 million, which means 500 million people in China are to be urbanized, and 10 to 12 million people will move into cities from rural areas every year.

How to carry out scientific, rational and highly-efficient urban construction during the rapid process of urbanization is an important issue we are facing. And we have found through recent practice in urban development in China that development and utilization of underground space is an effective way to achieve sustainable urban development, and is the valuable urban space resources. Thus we have summarized the advantages of underground space into the following points:

(1) Save land resources, and effectively restrict urban expansion;
(2) Develop subway, promote public transport, improve transportation efficiency;
(3) Undertake part of the urban functions, for example, underground parking and storage;
(4) Save energy, reduce carbon emission;
(5) Beneficial to protection of open ground space and historical and cultural legacies;

At present, the development and utilization of underground space in China has been accelerated, and sufficient attention has been paid to compilation of underground space planning. In addition, many cities have carried out overall planning of ground and underground space, compile planning at various levels, and provide guidance in rational, highly-efficient and sustainable utilization of underground space. The urban underground space planning of China commenced at the beginning of the 1990s, with its theoretical basis coming from urban planning. And a series professional planning such as planning for civil air defense, subway planning, and planning for municipal facilities have been integrated in practice. Over 30 domestic cities such as Beijing, Shanghai, Chongqing, Tianjin, Shenzhen, Nanjing, Qingdao, Hangzhou, Xiamen and Changzhou etc. have currently compiled overall planning for urban underground space, and such planning has become the statutory documents for guiding utilization of the underground space of the cities. Detailed underground space planning has been specially compiled for some key sections which demand urban upgrading and development. For example, “Underground Space Planning for CBD” of Beijing, “Controlling Detailed Planning for Central Areas of Xinjiekou Street” of Nanjing, “Controlling Detailed Planning for Underground Space of Qianjiang New Town” of Hangzhou, Wangjiadun CBD of Wuhan, and core area of Tangshan Airport New Area etc..

The basic information about the current urban underground space development of China is summarized through the following examples:

## 1. Utilize underground shallow geothermal energy, construct circular cities

Utilize the features of underground space such as sealed, stable and heat preservative to save energy and guarantee energy supply.

According to the medium and long-term development planning for renewable energy of China, the proportion of renewable energy in total energy consumption will rise from the current 8% to 15% in 2020, which is equal to 600 million tons of standard coal. Take Beijing for example, it is one of the capital cities of the only 6 counties in the world that have geothermal resources. According to "Geological Survey Report on Shallow Geothermal Energy Resources in Plain Areas of Beijing", the potential underground shallow geothermal energy resources of Beijing can be converted to 662 million tons of standard coal and can supply heat for an area of 959 million square meters. Beijing is planned to utilize shallow geothermal energy resources in a floor area of 7 million square meters, saving 36000 tons of standard coal, reducing carbon dioxide emission by 840000 tons, sulfur dioxide by 10000 tons, smoke by 13000 tons and nitrogen oxides by 3900 tons every year. In addition, the shallow geothermal energy will be utilized to promote construction of geothermal pumps for heat supply and cooling. By the end of 2008, over 500 projects and 13 million square meters of buildings in total had utilized such technology for heat supply and cooling. For example, the geothermal pump and air-conditioning system of Sinopec Management Cadre College is currently the largest domestic geothermal pump system project, and geothermal energy has been utilized for 30% of the air-conditioning load in the World Expo in Shanghai.

## 2. Underground space Plan of Expo Boulevard in the Shanghai Expo Site

The World Expo site of the 2010 Shanghai World Expo lies on the banks of Huangpu River between Lupu Bridge and Nanpu Bridge. The holding of the World Expo will promote a new round of old-town upgrading, accelerate adjustment of urban functions and industrial structure, and add riverside landscapes to the banks of Huangpu River as well as facilitate sustainable urban development. The axis of the World Expo site lies in the core zone, and is the largest single project and a multi-functional large-scaled business and transportation complex. In addition, it is also the main entrance to the World Expo site, and undertakes about 23% of the visitor flow into the site. The World Expo axis is 1,045 meters long, 99.5-110.5 meters wide underground, and 80 meters wide on the ground with underground space of a total floor area of 180000 square meters divided into 4 floors (2 ground floors and 2 underground floors). The ground floors are mainly for lining up and waiting, VIP entrance and business service. The first underground floor is mainly for various service facilities, and the leisure site for visitors entering the World Expo site. The second underground floor is mainly for lining up, waiting, security check, various operational management and business service, and is the main entrance and passage of the railed traffic stations. Sunshine has been sufficiently introduced into the underground space of the World Expo axis, and the sunshine valley passes through the aerial platform to the second underground floor, introducing sunshine and fresh air into the underground space. Meanwhile, rainwater is collected and diverted to the underground rainwater channels to realize recycle and utilization of rainwater, substituting about 75% of the running water and saving about 71000 cubic meters of running water during the World Expo.

## 3. Underground space accompanying rapid development of Chinese railed traffic

By the end of 2009, 10 cities in China have opened operational railed traffic lines with a total operational mileage of over 900 kms. It is estimated that 22 inland cities such as Beijing, Shanghai and Guangzhou will newly construct nearly 80 railed traffic lines with a total mileage of over 2,200 kms. Utilization of the underground space in the surrounding land of the railed traffic stations during the large-scaled construction of express railed traffic to realize integrated comprehensive of the underground space has been widely valued. Several issues such as railed traffic transit, passage through the street and underground travelling by the pedestrians, underground parking, arrangement of vehicle sections, comprehensive space utilization, land reserve, safety and disaster prevention etc. are involved in practice.

According to the conditions in Beijing, Beijing has carried out integrated design for over 20 stations, and research

on underground space utilization for over 190 stations. For example, the Guogongzhuang section of No. 9 subway of Beijing, which adopts comprehensive development of the upper cover and underground space of the section to achieve close combination of the stations, various means of traffic organization, underground parking, underground pedestrian commercial space and upper properties. With a total floor area of 1.8 million square meters and underground space of 200,000 square meters, it has formed station integrated development and realized comprehensive utilization of ground, surface and underground space and brought along the overall regional construction.

**4. Futian Underground Traffic Hub of Shenzhen**

The starting point of Guangzhou-Shenzhen dedicated passenger transport line lies in Guangzhou Railway Station, and passes by Dongguan City and Shenzhen City and ends at West Kowloon Station. CRH train with a speed of 200-350 kms per hour has been adopted. Futian Railway Station of Shenzhen mainly undertakes inter-city passenger flows among Guangzhou, Shenzhen and Hong Kong and lies in Futian central area of Shenzhen Cit, which forms comprehensive transit hub with the urban railed traffic system and the first large-scaled underground railway station of China with a total floor area of about 220000 square meters. Comprehensive traffic hub of Futian station will be constructed based on Futian Railway Station, including Futian station of Guangzhou-Shenzhen-Hong Kong dedicated passenger transport line, No.2, 3 and 11 subway stations, conventional bus, taxi and social vehicle stations etc.. In addition, connection between the hub and the surrounding urban underground space has been realized. Futian station is planned to be constructed in 2012, and the subway stations and supplementary traffic connection facilities will be constructed in June 2011.

Shi Xiaodong
Beijing Municipal Institute of City Planning and Design
Deputy Planner-in-general, professor-level senior planning

# Analysis of the Reuse of the Beijing Reclaimed Water

Wang Jia
(Beijing Municipal Research Institute of Environmental Protection, 100037, Beijing)

Abstract: As long as water shortage becoming one of the key factors restricting the development of Beijing, sewage recycling has been taken as the significant way of easing water shortage, reducing water pollution, solving water supply, and promoting the sustainable development of fresh water resources. In Beijing, renewable water treatment and reuse has begun to take shape these years. This article has introduced the treatment technology which is relatively mature, including Coagulating Sedimentation, Membrane Filtration, Disinfection, Activated Carbon Adsorption, Ozone oxidation, ABF, MBR etc, and the technological processes of reclaimed water works in Beijing. Currently, the disposed water has already been reused massively in industry, agriculture and urban areas. However the utilization of reclaimed water still presents parts of quality issues and promoting resistance. Aiming at these issues, this article will propose the solutions and recommendations from the standpoints of municipal plan, finance and administrations. Thereinto, the plan points consist of conceptions that "according usage requirement, produce variety classes renewable water and apply separately" and "increase the renewable water's application in daily life". Among finance points, extending financing mode besides government grant and BOT mode, and improving price mechanism including fixing price and charging reasonably are mostly proposed. Other than those, well-found legal system and codes standards, rigid supervisal and citizens' environmental awareness are advantageous to the improving of water reusing. By the final phase of 12th Five-Year Plan, the using of reclaimed water in Beijing would be over 1 billion cubic metres, mend lakes water environment all-round, guarantee the water supply of industrial cooling of urban area and municipal non-potable use, and take suburb agriculture use into account. With the swift development, Beijing would not only lead the country also be the world advanced.

Key Words: water resources crisis; the reclaimed water; treatment and reuse; existing problems; solutions

## 1. Strategic Significance of the Reclaimed Water

Our country is deficient in water resources seriously-three fourths out of over six hundred and sixty cities in China lacks water resource, and Beijing is one of one hundred and eight cities being short of water badly. The water resource per capita in Beijing merely takes up one-seventh of the national average and one-twenty-fifth of the world average level [1]. The water resource in Beijing is not only short in quantity, but the quality is also comparatively poor. The evidence shows that among 86% of the river channels in Beijing, 5.8% of them are slightly polluted, 14.1% of them are moderately polluted and 17.4% of them are seriously polluted. The wastewater osmosis leads to pollution of different degrees of the groundwater as well. The water resources problems have become one of the key factors that limit the Beijing municipal development. Faced with the double pressures of shortage of water resources and water pollution, the wastewater regeneration and reuse is of strategic significance to the sustainable development of Beijing.

The reclaimed water refers to the wastewater which has been treated properly until it reaches a certain water quality index and satisfies the requirements of reuse. Compared with drinking water resources, it has the following advantages [1,2] :

(1) Stable water source. The reclaimed water takes wastewater as water source. The sewage discharge is stable, and does not effect by rainfalls, so it should be considered to be a water source with stable quality and quantity.

(2) Local availability. Urban sewage is available locally at any time without allocation and long-distance

transportation.

(3) Lower cost. From an economic point of view, the water source of the reclaimed water is the sewage of poor quality, so the cost will be lower. Meanwhile, the reuse of the reclaimed water also saves the potable water sources with higher costs.

(4) The environmental benefits are obvious. Developing and using the reclaimed water not only achieves resource reutilization, but it also reduces sewage discharge, which is good for improving the ecological environment as well.

2 The Status Quo and Existing Problems of Treatment and Reuse

Beijing has started to use the reclaimed water on a scale since 2003, making a breakthrough from nothing to zero. By 2010, the availability reached 680 million cubic meters and the reuse rate was about 50%. By 2015, the availability of the reclaimed water is expected to more than one billion cube meters [9].

**2.1 Treatment Technology and Process**

Currently, the secondary effluent of sewage treatment plant still contains a certain concentration of suspended matters, heavy metal, inorganic salts like nitrogen and phosphorus which tend to cause eutrophication, lots of bacteria and viruses. It usually fails to meet the standard of the reuse of reclaimed water and needs further treatment to achieve the goal of reuse. The treatment technology has become more mature after nearly a decade of development, which includes physicochemical technologies like coagulation, filtration, activated carbon adsorption, membrane separation (including microfiltration (MF), ultrafiltration (UF), nanofiltration (NF) and reverse osmosis(RO)) [3,5], ozonation, disinfection[6] and biotechnology like biological aerated filter (BAF) and membrane Biological Reactor (MBR). The most widely used process at home is coagulation→ sedimentation→filtration→disinfection, while Beijing has developed the new process of membrane separation. The following typical treatment processes of the reclaimed water are being used: MBR process: aerated grit chamber→MBR→ozone decoloration→chlorine dioxide disinfection; MBR+RO process: aerated grit chamber→MBR→RO→chlorine dioxide disinfection; 2 RO process: microfiltration→RO→pH adjustment→ RO→chlorination[4,7,8]. As of 2010, the water supply system and treatment process of the reclaimed water in the main urban area of Beijing are as shown in Table 1.

Table 1 List of the water supply system of the reclaimed water in the main urban area of Beijing in 2010[14]

| Areas | Water Supply System | Treatment Process |
|---|---|---|
| North | QingheReclaimed Water Plant (80000$m^3$/d) | microfiltration membrane |
| | Beixiaohe Reclaimed Water Plant (60000$m^3$/d) | MBR+RO |
| | Beixiaohe Reclaimed Water Plant (3600$m^3$/d) | MBR |
| East | Jiuxianqiao Reclaimed Water Plant (80000$m^3$/d) | coagulation-sedimentation-filtration-disinfection |
| Southeast | Gaobeidian Pump Station (470000$m^3$/d) | Sand filtration+$O_3$+BAF (the reuse project of the reclaimed water) |
| | Fangzhuang Reclaimed Water Plant (10000$m^3$/d) | lime method |
| Southwest | Wujiacun Reclaimed Water Plant (40000$m^3$/d) | Micro-flocculation |
| | Xiaohongmen Pump Station (300000$m^3$/d) | -- |
| | Lugouqiao Reclaimed Water Plant (100000$m^3$/d) | Biofilters for denitrification + Biofilters for nitrification |

**2.2 Ways of Reuse**

The ways of the reuse of the Beijing reclaimed water are as follows:

(1) Industrial Reuse

The reclaimed water is mainly used as the cooling water of thermal power plant. At the moment, all the four thermal power centers (the northwest thermal power center, southwest thermal power center, northeast thermal power center and southeast thermal power center) are taking the reclaimed water as the cooling water. The total use of water accounts for over 50% of the reuse of all the reclaimed water [9, 10].

(2) Agricultural Irrigation

The reclaimed water used for fiels irrigation not only ensures the recycling of water resources and but also reduces water transportation projects. The standard of the reclaimed water used for agricultural irrigation is relatively undemanding. The standards of nitrogen and phosphorus can be lowered, which will be better for the crops growth. Currently, almost 30% of reclaimed water in Beijing is used for irrigated farming area in the suburbs [11,14].

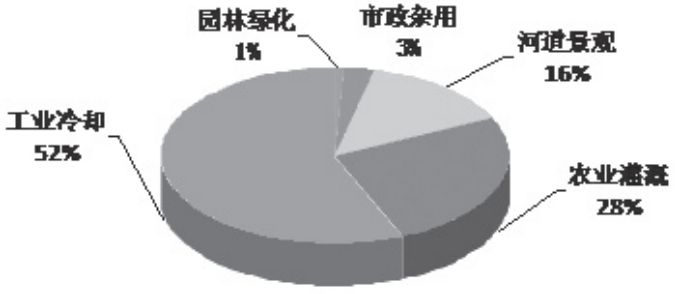
(3) Supply of Landscape Water

According to the water body functions and water quality standards of rivers and lakes in Beijing, the landscape water use of rivers and lakes of Ⅳand Ⅴwater bodies can take the reclaimed water supplement. By doing so, the problem of the landscape water use in the 290km of river channels in the central city, 374hm$^2$ of lake surface and Yongding River will be solved, thereby improving the environment of urban rivers and lakes [14,15].

(4) Municipal Miscellaneous Use and Garden Watering

The reclaimed water used for municipal miscellaneous use and garden watering takes up about 4%. The municipal miscellaneous use includes the flushing water of toilets, roads cleaning, green belts watering, spraying water for dust fall, vehicles washing and spraying water for dust fall in the construction sites. They don't require water of good quality, but they may have direct or indirect contact with our bodies during use. Beijing plans that all the main roads and secondary roads will be flushed with the reclaimed water during the twelfth five-year plan of Beijing and all the public green lands will be watered with the reclaimed water as well [16].

The percentage of the reuse of the urban reclaimed water in Beijing in 2010 is as shown in Figure 1.




| | |
|---|---|
| 工业冷却52% | Industrial Cooling Water |
| 园林绿化1% | Garden watering |
| 市政杂用3% | Municipal Miscellaneous Use |
| 河道景观16% | Landscapes of River Channels |
| 农业灌溉28% | Agricultural Irrigation |

Figure 1 the percentage of the reuse of the urban reclaimed water in Beijing in 2010[14]

**2.3 Existing Problems**

The reclaimed water reuse projects have began to take shape after nearly a decade of positive developments, but

now there exists the following two main problems:

(1) Safety of Water Quality

There still exist poisonous and harmful substances like organics, heavy metal, nutrition salt and disinfection byproducts in the reclaimed water, which may bring potential safety hazards like water eutrophication, groundwater and soil pollution and public health hazard. As a result, ensuring the safety of water quality is the first problem we need to solve.

(2) Production and Operations

Currently, the production capacity of the reclaimed water is insufficient. For instance, the production capacities of the reclaimed water of Qinghe and Beixiaohe Reclaimed Water Plants merely account for one-sixth of the sewage treatment capacity [9]. Besides, the inadequate charging system of the reclaimed water results in lacks of operation and maintenance funds and even causes some investors to face losses; the transportation and distribution system is imperfect and the coverage of users is incomplete. In the meantime, the price of the reclaimed water affects the enthusiasms of the customers and even its sales.

## 3. Response Strategies

Based on the existing problems of the Beijing reclaimed water projects, the author has put forward the following suggestions from perspectives of technology, economy and management:

### 3.1 Technology

(1) Technological Innovation

Technical advancement is the source to maintain the sustainable development of the reuse projects of the reclaimed water. In recent years, the development of the membrane separation technology has greatly improved the quality of the reclaimed water and brought broad prospects for development. At present, the technical bottlenecks of the membrane separation lie in the following aspects: the prevention and treatment of membrane and its operating cost need to be solved; besides, the high quality reclaimed water has strict requirements regarding nitrogen and phosphorus, which promotes the development of such new technologies as the short-term denitrification and the microalgae nitrogen and phosphorus removal, but it has a long process from research to application; in addition, the improvement of treatment efficiency an the reduction of treatment cost still depends upon the optimization and transformation of the existing processes by the scientific and technological personnel.

(2) Treated by Grades and Used according to Qualities

Appropriate treatment is an important guarantee of the quality of the reclaimed water. Cost-effective and highly efficient new technology will promote the reuse of the reuse of the reclaimed water, but the technological innovation is a lengthy process. Under the present conditions, “Treated by Grades and Used according to Qualities” is an effective way to give full play to technical superiority and utilize water resource rationally.

Based on different reuses of the reclaimed water, the requirements of its quality are totally different: The requirement of water use of landscapes is strict, whereas the requirements of water use of agricultural irrigation and urban landscaping is low. For different requirements of water quality, the treatment processes and cost will be different. The operating cost of the reclaimed water of poor quality obtained by the traditional coagulation-sedimentation-filtration process is 0.11 yuan/m³, while the operating cost of the highly efficient membrane separation process is between 0.37 yuan/m³ and 1.89 yuan/m³ [3]. Currently, the big users of the reclaimed water from landscape water supply need high quality reclaimed water, while the existing reclaimed water products cannot meet the all the need. Meanwhile, part of

quality reclaimed water is used for agricultural irrigation-some elements like nitrogen and phosphorus removed through the advanced treatment process have to be added back as fertilizers, which caused great waste of resources.

Therefore, we should specify the ways of reuse of each reclaimed water supply system in accordance with the municipal planning and customer requirements. Moreover, we should design appropriate advanced treatment processes on the basis of the quality requirements of the reclaimed water to achieve the goal of "Treated by Grades and Used according to Qualities". Last but not least, we should make the most use of the existing resources, improve the treatment and reuse efficiency and alleviate the problem of water shortage quickly and effectively.

(3) Risk Control

Risk control is also an important part of the reclaimed water technology. We can reduce the new pollution likely to occur in the process of reclaimed water treatment, transportation and utilization and avoid potential safety hazards arising from improper operation. The controlling units include the quality control of water sources, production and transportation control, risk control during use by customers and so on. The author holds the idea that the quality control of reused water sourcesis a top priority of current risk control and the quality of water source directly affects treatment efficiency and product quality. For this reason, the quality of sewage from urban sewage treatment plant will be a basic guarantee for the quality of the reclaimed water.

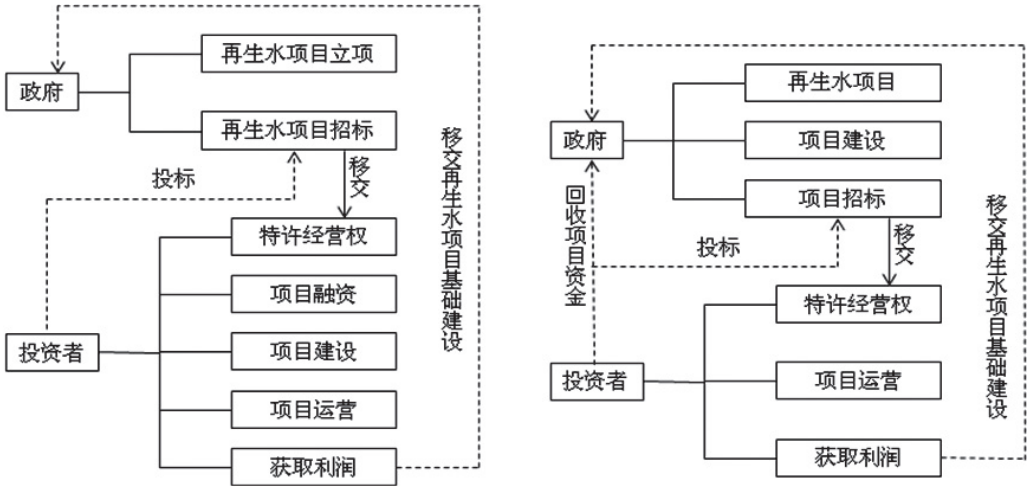
**3.2 Economy**

(1) Expanding Financial Resources

The reclaimed water project has predictable and stable market demands, so it is suitable for project financing through which the problem of government finances can be solved effectively. Meanwhile, it will be able to attract more private or foreign capital which can be used for the urban water projects, achieve the goals of loans repayment, construction and development of the projects through charging the reclaimed water and promote the marketing of the reclaimed water [17]. There will be at least three parties in the process of project financing. The first party is the project sponsor. In most cases, it will be governments or the state-owned organizations managed by the governments. The second party is the company that is responsible for the reuse project of the reclaimed water. The third party will be investors. Currently, there are the following commonly used financing models: BOT (Build-Operate-Transfer), TOT (Transfer-Operate-Transfer) and TBT (Transfer-Build-Transfer). BOT and TOT are as shown in Figure 2.

The BOT model which is widely used in the present sewage and reclaimed water projects has the following features: Not only can it attract social and foreign funds to reduce the financial burdens of the governments, but it can also transfer the investment risk of the governments. However, it has higher investment risks for the enterprises due to its long cycle. The TBT model is the combination of BOT and TOT, and the government can transfer the ready-made facilities and franchise rights to the investors through compensation (or free of charge) and at the same time start a new BOT project. When the period of franchise rights is over, the investors will transfer it to the government. The advantage of this model lies in that it can accelerate capital recovery and revitalize the fixed assets. However, the TBT model provides strict requirements for the investors, so they should also make a reasonable evaluation on the project returns to reduce the investment risk. The TOT model means that the government transfers the franchise rights of the constructed facilities (for example, the treatment facilities of the reclaimed water, the treatment facilities of sewage and waterlines) to the investors. Based on the specific features in Beijing, the author thinks that the TOT model is more applicable to Beijing Reclaimed Water Projects for the following reasons: First, the financial investment of the Beijing municipal government is enough to construct the treatment facilities of the reclaimed water. By doing so, it can ensure the efficiency and quality of the project and prevent the investors from having the idea of making money first during

construction. Second, the government can recover its investments by transferring the franchise rights when the project is completed. Besides, the government can make use of capital recovery to further expand the scale of the reuse project of the reclaimed water and to promote its development. Third, to the investors, lower investment risk will be able to make them more interested in the investment of the reclaimed water projects.




(a) BOT Financing Model (b) TOT Financing Model

| (a) | | (b) | |
|---|---|---|---|
| 政府 | Government | 政府 | Government |
| 投资者 | Investors | 回收项目资金 | Project capital recovery |
| 投标 | Bidding | 投资者 | Investors |
| 再生水立项 | Project approval of the reclaimed water | 投标 | Bidding |
| 再生水项目招标 | Project Bidding of the reclaimed water | 再生水立项 | Project approval of the reclaimed water |
| 移交 | Transfer | 项目建设 | Project construction |
| 特许经营权 | Franchise right | 项目招标 | Project Bidding |
| 项目融资 | Project financing | 移交 | Transfer |
| 项目建设 | Project construction | 特许经营权 | Franchise right |
| 项目运营 | Project operation | 项目运营 | Project operation |
| 获取利润 | Making Profits | 获取利润 | Making Profits |
| 移交再生水项目基础建设 | Transfer infrastructure of the reclaimed water project | 移交再生水项目基础建设 | Transfer infrastructure of the reclaimed water project |

Figure 2 Project financing models of the reclaimed water [17]

(2) Reasonable Pricing

Compared with the price of drinking water, the price of the reclaimed water has no advantages. That is one of the important reasons why the people are not interested in the reuse of the reclaimed water. The price of water resources in China remains at a low level. As for users, using the reclaimed water is not better than using the drinking water in terms of saving the cost. Therefore, the present water price system cannot encourage the users to utilize the reclaimed water. Only by establishing a reasonable pricing system of drinking water and reclaimed water can we improve their enthusiasms for

actively using the reclaimed water and also have the marketing of the reclaimed water go back on track [15,16].

### 3.3 Management

Perfect supervision and management system is the core of maintaining the healthy and sustainable operation of the reclaimed water projects and laws and regulations provide a basic guarantee for improving the management system. Therefore, we expect relevant government departments will improve relevant laws about the reclaimed water and strengthen supervision and management of the following aspects: monitor the water quality of the reclaimed water plant; supervise and manage the quality and volume of the reclaimed water where it is used; add the reclaimed water to the water supply plan and establish an integrated water resources management system including water supply, reclaimed water and wastewater management. In addition, the reuse standard of the reclaimed water should be specified and the establishment of risk assessment system is an important measure of promote the reuse of the reclaimed water as well.

Beijing is one of the earliest cities that develop the reclaimed water. Compared with other cities in China, the public awareness of environmental protection is much higher in Beijing. However, taking the sewage as water sources of the reclaimed water is still not totally acceptable. So it is very necessary to improve the understanding on the reclaimed water. Furthermore, increase the public awareness of environmental protection to make everyone realize that using drinkable water for other purposes is unreasonable and a waste of resources.

## 4. Prospects

In the "Twelfth Five-year" Development Plan of Beijing, it is suggested that Beijing will continue to invest nearly 10b yuan on the upgrading and reconstruction projects [14] of the existing sewage treatment plants before 2015 with the goal of improving the quality of the reclaimed water, meeting the reuse requirements and alleviating the problem of the present water shortages in rivers and lakes through safe reuse.

In the long run, Beijing will gradually establish perfect system of the reuse of the reclaimed water and make full use of the urban sewage to produce the reclaimed water. The dried-up riverways will be filled with the reclaimed water through all-round allocation, which will be able to improve the water environment in the city center and achieve the goal of linking all the supply areas. In addition to water-use for environment, all the industrial cooling and municipal miscellaneous use of water in the urban area Beijing as well as the agricultural irrigation in the suburbs will also use the reclaimed water. By doing so, we can make the best use of urban sewage resource, satisfy the demands of the non-potable water by the reclaimed water and guarantee the demands of the drinkable water. As the reclaimed water industry develops, Beijing will be not only a leading city in the reclaimed water area in China, but also become a leading city in the world.

References

[1] Li Yanqun and He Tongguo et al. The Status Quo and Prospects of the Reuse of the Municipal Reclaimed Water. Resource Development & Market, 2011.

[2] Zhang Qiuju and Wang Boduo et al. Analysis of the Reuse of the Reclaimed Water in Xi'an City. Groundwater, 2011.

[3] Du Jianguo. Study on the Reclaimed Water Supplement in the Olympic Park. Water-saving Social Construction, 2005.

[4] Feng Yunling and Dai Qianjin et al. Comparative Analysis of the Effluent Quality of Several Kinds of Typical Recalimed Water Treatment Processes. Water & Wastewater, 2011.

[5] Huang Ying and Wang Li. The Application of Membrane Separation Technology in Water Treatment. Industrial Water Treatment,

2005.

[6] Zhang Pengfeng and Li Xiaoyan et al. Discussion on the Disinfection Techniques of the Reclaimed Water. Value Engineering, 2011.

[7] Xu Bo and Zhuo Yirou. The Application of MF+RO Double Membrane Process on the Reclaimed Water Project. Journal of Anhui Agricultural Sciences, 2009.

[8] Li Chunguang. Discussions on the Water Quality and Treatment Process of Wastewater Reclamation and Reuse. China Water & Wastewater, 2009.

[9] Li Wuqin and Zhang Jun. Discussion on the Status Quo and Future Development of Beijing Municipal Reclaimed Water. Beijing Water-affair Authority, 2011.

[10] Wang Huixiao and Cai Yan et al. The Status Quo and Research Progress of the Reuse of the Reclaimed Water in Agriculture. South to North Water Transfers and Water Science & Technology, 2009.

[11] Shi Liyu. Research Progress and Application of the Municipal Reclaimed Water Recharge. China New Technologies and Products, 2012.

[12] Yun Guichun, Pi Yunzheng and Hu Jun. Discussion on the Health Risks of the Groundwater Recharge of the Reclaimed Water. Water & Wastewater, 2004.

[13] Li Yanqun and He Tongguo et al. The Status Quo and Prospects of the Reuse of the Municipal Reclaimed Water. Resource Development & Market, 2011.

[14] Huo Jian. The Development Course and the "Twelfth Five-year" Development Plan of Beijing Municipal Reclaimed Water. The First Academic Week of Water Resources Development Research, 2011.

[15] Wang Xiaolin and Wei Ning et al. Analysis of Beijing Municipal Wastewater Treatment and Reuse. MunicipalEngineeringTechnology, 2012.

[16] Liao Rihong. Study on the Comprehensive Utilization Strategy of Beijing Municipal Reclaimed Water. Water Resources Development Research, 2004.

[17] Gao Xukuo and Liu Xiaojun. Comparative Analysis of the Financing Models of the Reuse Project of the Reclaimed Water. Theoretical Investigation, 2007.

About the Author

Name: Wang Jia

Sex: Female

Date of Birth: July 29th, 1985

Academic Background: Majored in the Environmental Engineering of Harbin Institute of Technology- Bachelor of Engineering Beijing Municipal Research Institute of Environmental Protection-Master's Degree

Correspondence Address: NO. 59 of the Center Street of Beiyingfang, Xicheng District, Beijing.

Beijing Municipal Research Institute of Environmental Protection

Zip Code: 100037

Contact Number: 13426204982

Email: dongdejia@yahoo.cn

# Study of Human Health Risk Assessment on Gas Stations sites'Contaminated Groundwater Caused by Leakage

Wang Shuqian
(Beijing Municipal Research Institute of Environmental Protection, Beijing, 100037)

Abstract: With the increase of motor vehicles, gas stations have widely scattered in today's society. However ,the leakage during operation on the gas stations and storage of gas/oil caused underwater pollution, this already has become one of the major environmental problems. Concerning with the urgency of gas/oil leakage pollution, this paper will discuss methods to analysis risks of underwater pollution and the specific procedures for making a risk assessment on contaminated sites of gas stations. Hoping to minimize the environmental/human hazards caused by gas/oil leakage, this paper also tend to offer supports for risk assessment on gas/oil leakage areas in China.

Key words: gas station, leakage, human health, risk assessment, groundwater

With the popularization of vehicle , the number of gas stations has been increasing, and their pollution and hazards problems have brought to the forefront increasingly. According to the investigations of this year, petroleum has become more and more hazardous to mankind. The investigation made by foreign environmental protection department shows that gas stations with underground oil tanks are the key responsible party to the potable water pollution. About over 25% of the underground tanks leak more or less, especially those oil tanks and refueling equipment with poor antiseptic treatment. Such hidden dangers as leakage and splashing have become worsened gradually. Potable water pollution caused by underground oil tank leakage will become one of the greatest environmental hazards in the future decade around the world [1]. Oil leakage in some areas of the USA has once caused the shutdown of waterworks. The Finger Lakes area in New York, USA, has once forbidden oil development around the lakes due to serious oil leakage [2]. Oil leakage at gas stations is even more serious in China. Over 1,000 gas stations were tested in Beijing, more than 50% of which were corroded, with groundwater polluted. Oil in the oil tank of a gas station in Jilin Province leaked into the inhabitants' water well, which could even ignite the water from the well. A gas station leaked in Changzhou, Jiangsu Province, which led to oil stains appearing in the fish pond and gasoline oil stains floating in the river nearby at the same time [3]. The pipeline in a gas station of Yiwu, leaked, led to 1.7-ton gasoline flowing into the sewers [4]. Therefore, this Paper attempts to draw lessons from the available literatures and examples both at home and abroad , and work out the procedures and methods for evaluating human health risks of gas/oil leakage areas, thus providing supports for risk assessment on gas stations' contaminated sites in China and maximum protection of human health.

## 1. Petroleum Hydrocarbon Contaminated area Management Method

Health risk assessment is the focus of the narrow-sensed environment risk assessment which sprang up after 1980s. It takes the risk degree as the evaluating indicator, relating environmental pollution to human health, to describe the risks of human health exerted by pollution quantificationally [5]. The risk-based petroleum hydrocarbon contaminated area management method is represented by the" Risk-based Corrective Action (RBCA) Applied at Petroleum Release Sites"which was developed in 1995 by American Society for Testing and Materials (ASTM) [6]. It is a process in

which the risk and exposure assessment methodology is adopted to help underground storage gasoline tank agents make a decision. The objective of this corrective action is to lower the risk to a level and to protect human health and environmental safety. The method has been widely applied in the USA and even North America as well as Europe even since its development. In order to help and promote the popularization and implementation of the RBCA Method, the environmental protection agencies (EPAs) (the USA) also developed several key RBCA tools, such as the RBCA Tool Kit, which completed the risk assessment and target determination step by step, based on risk assessment .

### 1.1 Methods to Health Risks Assessment

The most commonly-adopted methods to health risks assessment include the NAS Four-step Method and the EPA Four-step Method. The NAS Four-step Method was put forward by US National Academy of Science in 1983, The key parts of The NAS Four-step Method as follows: qualitative hazard identification, quantitative dosage reaction assessment, quantitative/qualitative estimation/calculated exposure assessment and risk characterization. The method can not only make a qualitative analysis on groundwater pollution but also make a combination of qualitative analysis with quantitative analysis. This is beneficial to quantify and analyze the risk characterization results and also can provide for risk management decision-makers with more informative reference, while providing data support for pollution control and remediation. The EPA Four-step Method was put forward in the Risk Assessment Guidance for Superfund--Health Hazard Evaluation Manual (RAGS/HHEM) which was issued by United States Environmental Protection Agency in 1989.The key parts of The EPA Four-step Method as follows: data assessment on preliminary site survey, toxicity assessment on the possible relationship between the level of population exposure to pollutants and the negative effects, determination/estimation of exposures(exposure quantity, exposure frequency, exposure duration), assessment on exposure approaches, comprehensively analysis/judgment of a certain hazard in population, provision of pollution risk information of exposed population, providing risk characterization as a scientific basis of risk management for environmental regulators. The EPA Method is relatively specific, focusing on the collection of various parameters for contaminated sites. When did you adjust to assessment on contaminated sites, it is more operative. Besides, it is common in contents with the NAS Method, and applicable to comparing various health risk evaluations as with a wider scope of application. As to in practical work, people can adopt the two methods comprehensively.

## 2. Specific Application of Human Health Risk Assessment Methods to Contaminated Site of Gas Stations

### 2.1 Site Survey

The site survey includes the fast Expedited Site Assessment (ESA) Process and the Cassical Site Assessment (CSA) [13]. Both of the two types of assessments tend to obtain the initial conceptual model by evaluating the site information existing at present. The ESAs process is to quickly describe the conditions of underground gasoline tanks in order to determine the framework of corrective actions' decision-making. It generally takes only several days to collect and analysis the data of original position on the site, and to collect samples. It can be integrated in RBCA, to obtain three-dimensional situational model of the site conditions, and in order to establish and update the conceptual model. However, in general, the CSAs tends to install a groundwater monitoring well in the area with less underground information.,then conduct a strict analysis on the samples and define the quality and positions of the wells. Most of the data analysis and sorting are done out of the site, which generally takes several weeks or even several months to complete. The assessment results generally draw the border of the groundwater plume rather than the pollution source area or finding out the maximum pollutant mass. Therefore, the fast site survey is more feasible than the CSAs Method

in term of risk assessment.

The fast survey & assessment methods for contamination of underground gasoline tanks sites mainly include: the geophysical method, such as geological radars used to provide information on the initial position of the buried article, geological & hydrogeological conditions, positions of floating plates and regional products; the soil-gas testing method, such as portable gas chromatography ,used to provide the existence of pollutants, types and general information of position. All these methods can help determine the sampling area more accurately. The site sampling ,such as the direct penetration method, which can sample the soil or groundwater.

**2.2 Target Pollutant**

2.2.1 Determination of Target Pollutant

Extremely complicated in compositions, petroleum contains hundreds of chemical compounds. It is hard and unnecessary to make a risk assessment on each chemical compound. Therefore, some "target chemical compounds" are generally selected in risk management. With a view to the RBCA Method, it is generally deemed that straightchain hydrocarbons are low in toxicity and the dissolved phase is strong in mobility, therefore aromatic hydrocarbons that are strong in toxicity and relatively poor in mobility are often selected when choosing target chemical compounds. Besides, the selection of target chemical compounds should be conducted in accordance with the features of the area. For instance, in case of some light oil areas that are polluted by gasoline, refined oil and aviation fuels, the relevant chemicals that are most commonly selected include benzene ,methylbenzene, ethylbenzene, and BTEX. Based on the characteristic of the leakage, it may also take lead and other fuel additives, such as MTBE, etc., into consideration. In case of areas polluted by kerosene and fuel oil, PAHs are often considered at first. See Table 1 for categories for target chemical compounds that are often selected [7]. In addition, it may also evaluate based on the classification of petroleum distillates [8~9]. According to the relationship between the carbon equivalent in petroleum hydrocarbons and the migration rate of chemical compounds in the environment, the method shall classify petroleum into 13 distillates after calculating the leaching coefficients and volatility coefficients of over 250 mono compounds. It also describes the threshold, toxicity and feature of each distillate by utilizing a "substitute" chemical compound or RfDs and RfCs of mixture. In this way, it can quantificationally simulate possible exposure and risks situztion due to various migration property. In the general, when take indicator assessment, it shall make a privileged assessment on the target chemical compounds that may exist in the area, including benzene, lead and cancerigenic polycyclic aromatic hydrocarbons, etc., and then take petroleum distillates into consideration. After selecting a target pollutant, it shall collect information on its physico-chemical property and make concentration determination of pollutant in the area [6].

Table 1 Commonly Selected Chemicals of Concern for Petroleum

| Chemical Compounds | Lead-free Gas | Leaded Gas | Kerosene | Diesel Oil | Heavy Fuel |
|---|---|---|---|---|---|
| Benzene | × | × | × | - | - |
| Methylbenzene | × | × | × | - | - |
| Ethylbenzene | × | × | × | - | - |
| Xylene | × | × | × | - | - |
| MTBE, TBA, MEK, MIBK, Methanol, Ethanol | It depends | It depends | - | - | - |
| Lead, EDC, EDB | - | × | | - | - |
| Polycyclic Aromatic Hydrocarbons (12 types) | - | - | × | × | × |

Note: ×indicates recommended selected target pollutant, - indicates disrecommended ones

2.2.2 Data Collection of Target Pollutants

The physico-chemical property of pollutants can be inquired from the RBCA database, or can be searched via various historical documents, data and database. The site pollutant concentration data can be obtained via historical monitoring data or sampled and tested by field drilling. Arrangement of monitoring wells, sampling and selection of determination methods shall be based on the specific conditions of the site. Under the premise of obtaining the basic data on the site, it shall make a subjective judgment of the arrangement or make a systemic arrangement [10] of the monitoring wells, select proper tools at the arranged positions, sample the soil and surface groundwater at varied depth and select the proper testing methods.

**2.3 Risk Assessment-NAS**

2.3.1 Hazard Identification

It determines the carcinogenicity and non-carcinogenicity of a target pollutant. It gives priority to the Carcinogen Classification Schemes published by the International Agency for Research on Cancer (IARC), which means that a target pollutant is determined to be a carcinogen

when it is of Grades G1, G2A and G2B in IARC Database. Otherwise, it shall enquire into the IRIS Database of the United States Environmental Protection Agency. A target pollutant is determined to be a carcinogen

when it is of Grades A, B1, B2 or C in IRIS Database, with others of a non carcinogenic pollutant.

2.3.2 Dose-response Assessment

After a target pollutant is determined to be a carcinogen, it shall conduct various quantitative studies on dose-response, for instance, to establish a dose-response relationship for carcinogenic effect based on experimental data from laboratory animal sciences, statistical data from clinical science and epidemiology, etc. Since the human exposure level in actual environment is generally lower but the dosage in the study of laboratory science or epidemiology is relatively higher, therefore, when evaluating the dose-response relationship in case of actual human exposure, it is always to extrapolate from a mathematical model to a low dosage level based on the data for the high dosage (including test data on animals and survey data on epidemiology), work out the dose-response relationship in case of low dosage by means of extrapolation, thus obtaining the carcinogenic toxicity values. Now the linear multilevel LMS Model is the most common, which extends the upper confidence limit of the maximum tolerance limit to the origin and utilizes the low-dose area of the line to evaluate the dose-effect curve of an exogenetic chemical or its toxicity.

When a target pollutant is determined to be non-carcinogenic, it shall work out its non-carcinogenic toxicity value. The calculation of a non-carcinogenic toxicity value is based on a threshold (also known as reference dose RfD) method. The calculation method is:

$$RfD = \frac{NOAEL(LOAEL)}{UF}$$

Wherein: $UF = F_1 \times F_2 \times F_3 \times MF$

In the formula: RfD refers to the reference dose of a threshold chemical (mg/kg/d); NOAEL refers to the highest the no-observed adverse effect level (mg/kg/d); LOAEL refers to the observed adverse effect level (mg/kg/d); UF refers to the total uncertainty factor (non-dimensional); F1 refers to the inter-species coefficient of uncertainty, with a value of 1~10 (non-dimensional); F2 refers to the intraspecies coefficient of uncertainty, with a value of 1~10 (non-dimensional); F3 refers to the coefficient of uncertainty for toxic properties, with a value of 1~100 (non-dimensional); MF refers to the coefficient of uncertainty for database completeness, with a value of 1~10 (non-dimensional).

At present, a great deal of study and researches has been made abroad on carcinogenic toxicity value and non-

carcinogenic toxicity value, with multiple databases established. The acquisition of these two factors can be verified by inquiring the authentic toxicology databases for chemical substances in the world. These databases mainly include: EPA's Integrated Risk Information System (IRIS); WHO Concise International Chemical Assessment Documents & WHO Environmental Health Criteria (WJPCICAD;WHOEH); EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs); ATSDR's (Agency for Toxic Substances and Disease Registry) Minimal Risk Level (MRL) and EPA's Health Effect Assessment Summary Table (HEAST).

2.3.3 Exposure Assessment

Chemical compounds are often contained in a carrier medium (such as water, air and food) and exposure is the condition that a chemical compound contacts an external receptor. Exposure assessment is a process to evaluate the level, frequency and time duration of exposure [11]. Exposure may occur in the contact of polluted media now or in the future. Therefore, an exposure assessment involves in the determination of a receptor, the identification of exposure pathways and the quantitative assessment on each exposure, in order to determine the exposure concentration and the uptake ratio of pollutants contacted by a receptor as time goes by [12]. In order to determine the exposure of each pathway, it requires a pollutant track and migration model. The application and calibration of the model however, can forecast and estimate the concentration changes of future pollutants. Quantized exposure is always expressed by Chronic Daily Intake (CDIs).

2.3.4 Risk Characterization

Risk characterization mainly refers to the quantitative assessment on carcinogenic and non-carcinogenic risks. It can be calculated via a specific model formula and also can be worked out directly via such application software tools as RBCA software. The formula of direct calculation is as follows:

1) Carcinogenic Risk

For carcinogenic substances, it is generally deemed that there are no dose thresholds. Only the existence of traces of such substances can have an immediate adverse impact of human body. A carcinogenic risk is often expressed by Value at Risk (Risk). It is defined as the product of CDIs and carcinogenic slope factors, which means that the cancer incidence exceeding the normal level in lifetime due to exposure to such a substance can be calculated via the following formula:

Low-dose exposure Risk = CDI×SF

High-dose exposure Risk =1 - exp( - CDI×SF) (use this formula when the calculated value is more than 0.01 in case of low-dose exposure)

In the formula: SF is the carcinogenic slope factor of a pollutant (mg-1•kg•d).

When calculating risks of various substances and pathways, it shall generally work out all the carcinogenic and non-carcinogenic risks and then make summation, without taking the synergistic action and antagonistic action between them into consideration.

2) Non-carcinogenic Risk

It is generally deemed that a dose threshold exists in terms of the response of a living body against non-carcinogenic substances. There will be no adverse impact in case it is lower than the threshold. Non-carcinogenic risks are often described via a Hazard Indicator (HI), which is defined as a ratio between CDIs and reference doses due to exposure. It can be calculated by the following formula:

HI = CDI/ RfD

In the formula: CDI refers to the Chronic Daily Intake (mg•kg-1•d-1); RfD refers to the reference dose of pollutants (mg•kg•d).

**2.4 Uncertainty Assessment**

Great uncertainty exists in risk assessment. Certainty is resulted from numerous factors. EPA classifies the uncertainty in exposure and risk assessment into three types: uncertainty in scenes, parameters and models. Uncertainty in scenes refers to the uncertainty resulted from missed or incomplete information, which requires defining the exposure and dosage in full. The sources include descriptive error, aggregation error, error of professional judgment as well as analysis on incompleteness. Uncertainty in model refers to the uncertainty resulted from forecast made based on a causal relation deduction. The sources include modeling error and relationship error. Uncertainty in parameters refers to the uncertainty resulted from parameters. The sources include measurement error, sampling error variability and application of surrogate data. Uncertainty is an issue of subjective confidence. Different people make a different conclusion on uncertainty. It depends on experience, world outlook and quantity & level of available information. At present, a qualitative description method is mainly adopted for uncertainly in China. A quantized expressed has also been adopted abroad, such as the Bayes Approach. An assessment on uncertainty determines the reliability of risk assessment[12].

## 3. Summary

1) The impact exerted by leakage in gas stations on human health becomes increasingly greater. It can determine the restoration target and clean method for contaminated sites by adopting a risk-based petroleum hydrocarbon contaminated site management methods from abroad. It shall apply the mature foreign fast site survey techniques, target pollutant determination methods and general procedures for risk assessment to the human health risk assessment in China, which is quite significant for developing the human health risk assessment in China.

2) Leakage and contamination in gas stations have become an environmental cancer. However, since the oil leakage risk analysis is still in the initial stage in China, relevant databases for assessment are not perfect, relevant laws, regulations and assessment standards have not been issued or improved and unified instruction manuals have not been issued. The future development goal is to develop the risk assessment procedures and tools conforming to national conditions in practice, with the risk assessment indicators and system the focus of future research and development.

3) It becomes more urgent to develop countermeasures to reduce oil leakage and contamination, which mainly including: to replace corrosive oil pipes and oil tanks timely to prevent leakage accidents, improving the technologies and providing online monitoring techniques for oil leakage; to construct a gas station far away to coastlands, scenic spots and population centers; to identify the geologic structure around a gas station and determine the contamination pathway, controlling the pathway rationally; to strengthen the individual precaution awareness and select the residence and working place rationally.

References

[1]WANGLili,Wan Xuewen,Gas station oil tank leakage water polluted is significant[A/OL], Check the daily, Voice weekly, Two special report,2007,3.

[2]ZHAO Zhangyuan, Environmental experts :Oil pollution is the second categories of aquatic environment pollution sources, Water world industry news. http://www.chinacitywater.org/zwdt/swyw/75767-1.shtml,2010.9.10

[3] Gas station gasoline leaks, Changzhou fire in time for risk [OL], China Fire Online ,
http://www.jyz.com.cn/Article/ShowArticle.asp?ArticleID=122924, 2009.7.22

[4] A Yiwu gas station pipeline leakage one point seven tons of gasoline into the sewer [OL],
http://news.qq.com/a/20070428/000901.htm, 2007.4.28

[5] Han Bing,He Jiangtao,Chen Honghan etc, Primary Study of Health-based Risk Assessment of organic pollution in groundvater [J] Earth Science Frontiers,2006,13(1):224~229

[6] Cao Yunzhe, She Lieyan,Li Lihe etc., Petroleum hydrocarbons-contaminated sites and related risk-based management strategy [J],Asian Journal of Ecotoxicology, Vol.2,No.3, 2007.9, 265~271

[7] ASTM(American Society for Testing and Materials).2002.ASTM standard E1739-95(2002). Standard Guide for Risk—Based Corrective Action Applied at Petroleum Release Sites[S 1. West Conshohocken, PA. USA

[8] TPHCWG (Total Petroleum Hydrocarbon Criteria Working Group Series). 1997.Selection of Representative TPH Fractions Based on Fate and Transport Considerations, Volume 3[M]

[9] TPHCWG(Total Petroleum Hydrocarbon Criteria Working Group Series).1999.Human Health Risk. Based EvMuafion of Petroleum Contaminated Sites: Implementation of the Working Group Approaeh, Volume 5[M.Amherst, Massachusetts: Amherst Scientific Publishers. Amher

[10] Oil pollution storage tank system and verify the survey reference manual [M], Environmental protection administration, Executive Yuan(Taiwan), 1995.9

[11] Li Jinhui, Environmental Risk Analysis [M], School of environment, Tsinghua University, 2011.3

[12] Mads Troldborg, Risk assessment models and uncertainty estimation of groundwater contamination from point sources[D], DTU Environment Department of Environmental Engineering

Technical University of Denmark, July 2010.

[13] Expedited Site Assessment Process[R],USEPA, March 1997:II-v~II-29.

Author: Wang Shuqian (female), born on September 15, 1988, graduated from China University of Mining and Technology (Xuzhou) as a major in environmental engineering.

Now studying at the Graduate School of Beijing Municipal Research Institute of Environmental Protection, mainly researching on underground space vulnerability assessment and groundwater risk assessment. Mailing address: Room 1233, Beijing Municipal Research Institute of Environmental Protection, No. 59, Middle Beiyingfang Street, Xicheng District, Beijing.

Zip code: 100037 Tel: 13718797067 E-mail: k24cr9@163.com

# Research on Application of County Main Functional Regions Under New Urbanization Background

Wu Fengwen
College of Architecture and Urban Planning, Beijing University of Technology

Abstract: The current complex situation and environment of urbanization make the new urbanization increasingly urgent, so on the basis of the new urbanization background analysis, the paper proposes a basic approach to achieving the new urbanization. The paper combines with the current urbanization situation to explore the overall planning mode of small towns from the perspective of main functional regions. The small towns overall planning is also a basic guarantee of coordinating county's space resources, natural resources, and first-level industrial structure in the public service system. Based on current urbanization situation analysis, the paper summarizes the basic mode of the new urbanization and put forward the idea of main functional regions and new urbanization layout implementation. At last, the paper introduces an example in which the Qinyuan County in Shanxi adopts county main functional regions as carriers for overall urban planning's functional orientation adjustment, land use coordination and industrial optimization, so as to achieve coordination promotion and joint development of each town in main functional regions.

Keywords: new urbanization; urban planning; planning mode; main functional regions

## 1. Introduction

By the end of 2012, Chinese urban population is 712 million, 2.103 million more than that by the end of 2011. The proportion of urban population in total population reaches 52.57%, 1.3% higher than that by the end of 2011[1]. However, with the accelerated urbanization process, in the current urbanization process, there are a series of urban problems such as traffic congestion, environmental pollution, land sustainable development, etc.

Each city also faces a series of problems brought by household registration system and urban-rural dual social security system in urbanization process, such as the aging problem in rapid urbanization process. Chinese elderly population dependency ratio will rise from 11.4% in 2010 to 16.7% by the end of 2020, which means Chinese population structure will usher in a significant turning point in a few years and the demographic dividend will come to an end [2]. Recently, the State Department and various ministries provide an increasingly clear description for urbanization.

## 2. Related Concepts and Research Significance

### 2.1 Urbanization and New Urbanization

Urbanization is an important indicator of the modernization level, which is a historical process in which non-agricultural industries continuously gather to cities with industrialization development, as a result, the rural population constantly transfer to non-agricultural industries and cities, rural areas are transformed to urban areas, the number and scale of cities unceasingly increase, and urban production and life styles and civilization are continuously spread to rural areas [3].

New urbanization is a strategic approach aiming at a series of problems unsolved in urbanization progress with

the gradual promotion of urbanization process in China. There is currently no a clear and coherent concept of new urbanization. The 18th Party Congress raises the new urbanization to the same level of industrialization, informatization and agricultural modernization. The new urbanization will become an engine of domestic economic development. We summarize its main characteristics and implications as follows:

Firstly, the new urbanization is an urbanization collaboratively promoted by "Four Modernizations": industrialization, informatization, urbanization and agricultural modernization; secondly, it is an urbanization integrated with population, resources, ecology and environmental sustainable development; thirdly, it establishes an urban pattern in which urbanization is closely linked with the regional economic development and the industrial layout, the urban layout is reasonable and the urban development is coordinated; and finally, it is an urbanization in which urban and rural areas are combined, public service facilities supply is equalized and urban-rural harmonious development is achieved.

**2.2 County Main Functional Regions**

The main functional regions are that based on different regions' resource and environment carrying capacity, current development density and potential, etc., specific areas are identified to one type of spatial units with specific thematic functional orientation types [4].

The country main functional regions are that interdependent town clusters of different functional divisions, different scales, different levels, and orderly and closely related spatial distributions are integrated for research on functional division differentiation and industrial development specialization.

**2.3 Influence of Urbanization on the Planning Mode**

In consideration of particularity of domestic urbanization process, the following aspects should be focused on in urbanization process: firstly, the core issues such as development planning layout, urban-rural sustainability, urban-rural integration and rural modernization should be properly solved in urbanization process; and secondly, the implementation and coordination work in urbanization process should be well done, the urbanization is a process in which various professional disciplines develop collaboratively, and innovations in policies and pattern mechanisms are required in this process. The paper herein introduces in detail innovations in the planning mode, and explores the contents of innovations in the urban-rural planning mode based on country main functional regions in urbanization process.

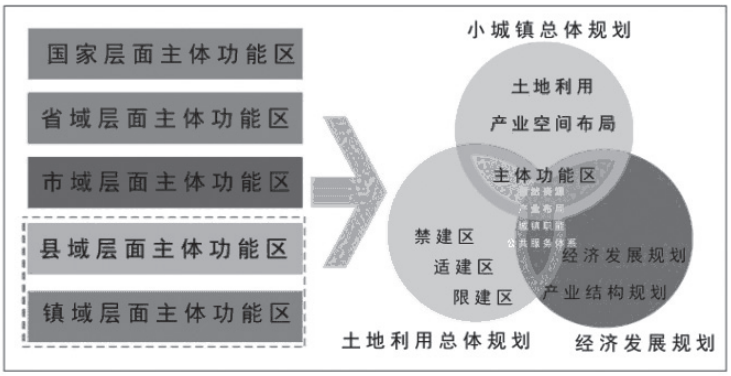
**2.4 Research Significance**

The tasks of main functional regions are detailed to specific towns in the perspective of county areas, which has positive significance on main functional region implementation. All functions of main functional regions should be implemented in each town's plan formulation process. The establishment of main functional regions within county areas can coordinate township development, so as to guide township development direction in the aspect of functional regions, scientifically and reasonably coordinate natural resources, strengthen the township horizontal competitiveness comparison, and implement the higher-level main functional region construction target layer by layer.

Cooperated planning is performed in each town through comprehensive comparison of each town's planning objectives, function orientations and land use planning within county areas. It will be helpful to coordinate the layout from county area perspective, achieve joint development of towns and effectively avoid the homogeneous competition phenomenon. The low development costs and large resources environment capacities will be achieved. The regions with low development cost, large resource capacity and strong development demand are responsible for high-intensity social-economic activities, and the regions with high ecological value and high development difficulty are mainly responsible

for ecological maintenance functions. As a result, the contradictions between economic development and ecological environment will be coordinated on the whole. (See Figure 1)

Figure 1: Schematic Diagram of Application of County Main Functional Regions in Overall Urban Planning Level



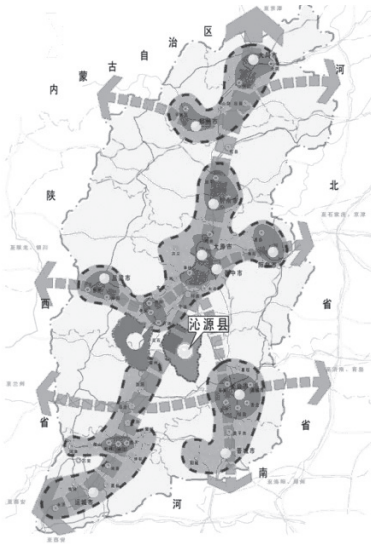

图片中文字：

国家层面主体功能区 national main functional regions
省域层面主体功能区 province main functional regions
市域层面主体功能区 city main functional regions
县域层面主体功能区 county main functional regions
镇域层面主体功能区 town main functional regions
小城镇总体规划 small town overall planning
土地利用 land use
产业空间布局 industrial space layout
土地利用总体规划 land use overall planning
经济发展规划 economic development planning
其他看不清

## 3. Application Research - Research on Application of Qinyuan County Main Functional Regions in Overall Urban Planning

### 3.1 Functional Region Overview

Table 2: Qinyuan County Location



Qinyuan County is located in central and southern of Shanxi Province, northwest to Changzhi City and at eastern foot of Mountain Taiyue. It is the cradle of Qinhe River and surrounded by mountains. It is high in northwest and low in southeast, with total area of 2554 square kilometers, and the total population of 161 300. It is an important node located in North-South Economic Spindle in Shanxi and is a key county of Shanxi Province. See Figure 2.

**3.2 Background of Main Functional Regions**

In the former planning formulation process, each town and county conduct urban-rural planning separately, resulting in differences of planning formulation directions of towns. Meanwhile, due to the limit of administrative jurisdiction and other factors, there are difficulties in process from planning to spatial implementation. Coordinated with Qinyuan County's administrative departments and based on main functional region platform, the Qinyuan County land use planning and general urban-rural planning of four towns (Guodao Town, Liyuan Town, Wanghe Town and Lingkongshan Town) are performed simultaneously in this planning.

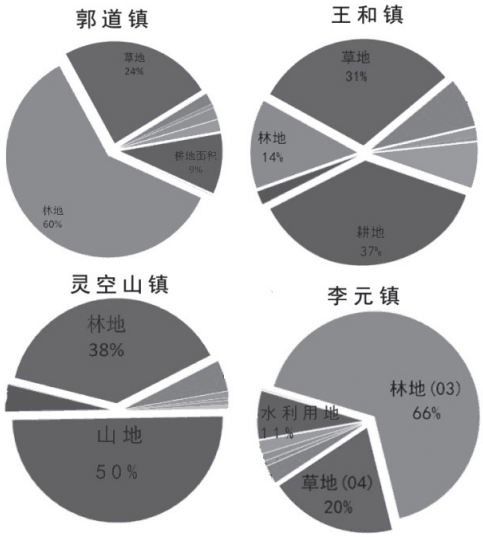
**3.3 Research on Current Situation of Main Functional Regions**

3.3.1 Non-sufficient Intensive Land Use in Main Functional Regions

The land use planning core content is to make main functional regions carriers for research on land use structure and intensification degree in main functional regions, so as to propose the alienation-produced land use mode for different small towns.

There are significant differences among towns' current land use structures due to their functional nature differences and natural conditions limitations. Guodao Town has abundant arable land resources and is one of the major grain production bases of Changzhi City; Wanghe Town is mainly grassland-based, as a result, its livestock development is prosperous; Lingkongshan Town has a fine ecological foundation because of Lingkong Mountain scenic reserve resources, nevertheless, it lacks arable land resources and is mainly covered by forest land; Liyuan Town has the most prominent land structural contradictions with massive forest resources and fragile forest ecological basis. As shown in Figure 3, there are distinct differences among the four towns' land use structures.

Figure 3: Analysis Diagram of Current Land Use Structures of Main Functional Regions




图中文字：
林地：forest land
山地：mountain land
草地： grass land
水利用地：water conservancy land
郭道镇 Guodao Town
王和镇 Wnaghe Town
灵空山镇：Lingkongshan Town
李元镇：Liyuan Town

The land use planning's core content is to make main functional regions carriers for research on land use structure and intensification degree in the main functional regions, so as to propose the alienation-produced land use mode for different small towns.

3.3.2 Large Town Scale Difference and Unreasonable Spatial Structure

Influenced by natural and social-economic development conditions such as topography, landform, climate, hydrology, etc, town spatial distribution in Qinyuan County is uneven and the majority of towns are in a relatively closed space. The roads crossing the county bring about various economic opportunities. These opportunities become the economic driven force for the towns and attract all kinds of commercial facilities and industrial enterprises to choose the sites by the roads as construction sites. Water is essential to life, so the village development has a strong dependence on transport infrastructure and rivers. In consequence, higher levels of provincial roads and rives generally develop into the key areas of township layout development. At the same time, as an important energy base in Shanxi Province, Qinyuan County is rich in coal resources. Industries are heavily influenced by coal resources and township development depends highly on resources. Besides, the township development scale and spatial structures show a certain convergence.

3.3.3 Irrational Industrial Structure and Inhomogeneous Economic Development

Currently, the major existing industries in main functional regions are resource-intensive and labor-intensive industries. The primary industry is in the majority of county areas which are dominated by farming and accounts for 30% of regional GDP, the agricultural modernization level is relatively low, and most agricultural output is produced by manual, low-level and simple operations; the secondary industry mainly consists of simple coal mining and processing, which accounts for more than 70% of the county's secondary industry output value, however, because coal and other traditional industries dominate, there is an imbalance status between light and heavy industries, the products have low technological contents and added value, the downstream industries and emerging industries which directly follow the changes of consumer market develop slowly, and the industrial primitivation characteristic is obvious; and the third industry is concentrated in trading and catering service, which is mainly distributed in four towns with convenient transportation and large population, the four towns' third industry output value has exceeded 12 billion Yuan, accounting for 80 % of total third industry output value in main functional regions, but other regions have low industrialization level, poor marketization degree and lagging third industry development, and meanwhile, restricted by investment environment, the foreign direct investment proportion is negligible and export-oriented economic development lags behind.

Under the pressure of industrial structure adjustment and economic development transformation, there are homogeneous competition phenomena when all towns are faced with new industrial adjustment tasks.

3.3.4 Prominent Ecological Contradictions and High Sustainable Development Pressure

Resource is the material basis of achieving national social-economic development and improving people's living standards, while ecology is the basic guarantee of achieving sustainable development in main functional regions. The main functional regions have abundant minerals, hydropower and tourism resource endowments. The mineral resources are mainly distributed in areas of the central county, which are resource-rich regions as well as ecologically sensitive areas. Whereas, in other regions, the mineral resource amount per capita is desperately low. Furthermore, the vegetation in main functional regions is seriously damaged by mining.

In recent years, with industrialization and urbanization development, rapid population expansion drives various resource demands to continuously rise. Lack and shortage of resources as well as environmental degradation not only constitute a social-economic development bottleneck for main functional regions, but also cause serious threats to county ecological safety and environmental quality. As a result, spatial difference degree in main functional regions

is exacerbated and the main functional regions are facing severe challenges of sustainable development. The most significant contradiction is from Liyuan Town. Because its coal industry GDP accounts for 29% of the county economy, the town ranks first in total GDP of Qinyuan County. However, it also ranks first in ecological problems such as ground subsidence, surface water infiltration, etc.

**3.4 Overall Urban Planning Formulation with Main Functional Regions as Carriers**

Based on above comprehensive analysis of current situation in each town, we will conduct research by regarding Qinyuan County as a main functional region in overall urban planning stage. We will determine each town's optimal development strategy and direction in the aspects of functional orientation, land use and industrial development etc. The main functional region's coordinated development will be achieved by coordinating function orientations and industrial layout.

3.4.1 Functional Orientation Coordination

To research Qinyuan County, we perform an in-depth analysis on each town's superior resources. On this basis, we aim at county-town linkage, urban-rural coordination and sustainable development. Meanwhile, we take into account resource advantage complementation among the towns to avoid resource allocation duplication. Each town's functional orientation is adjusted as shown in Table 1:

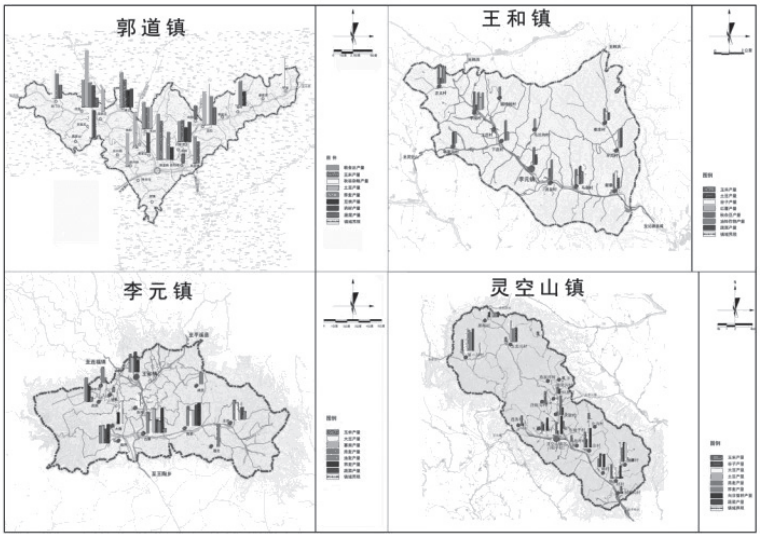
Table 1: Comparison of Towns' Function Adjustments in Main Functional Regions of Qinyuan County

| Town | Status Positioning | Key Features | Planning Orientation |
|---|---|---|---|
| Guodao Town | Qinyuan deputy center, mining-typed town | the first agricultural base, relatively rich natural resources, better commerce foundation; fragile ecological basis. | County deputy center, specialty agriculture type, commerce circulation base |
| Wanghe Town | Small modern agriculture town | Near Pingyao, good location resources; preferable tourism resources; fragile ecological basis, frequent natural disasters | Northern gate of Qinyuan, tourism service-oriented, small forest conservation town |
| Liyuan Town | Energy base | rich resources, preferable modern agriculture foundation, fragile ecological basis | Suburban central own, mining-development forest-conservation type |
| Lingkongshan Town | Energy base<br>Tourism type<br>Traditional agriculture type | Good but fragile ecological basis, high tourism potential, prominent water resources contradiction | Western county economic center, small tourist-oriented town |

3.4.2 Industrial Development Coordination

In the consideration of main functional region's guiding role in regional development, it is most effective to establish a county-town functional area management system with county as the core, and perform analysis evaluation with town as the basic unit [5]. Taking town as the basic analysis evaluation unit can basically guarantee that each town has its own "key development area". In overall planning of Qinyuan County, through horizontally comparing towns' current industry situations and characteristics and taking the county main functional region as the unit, the comparative competitive and absolute competitive industries of towns are identified, and further, the county's industrial development is determined. The industrial spatial distribution is obtained by industrial comparisons and shown in Figure 4:

Figure 4: Industrial Spatial Distribution Diagram of the Main Functional Regions




郭道镇 Guodao Town　　王和镇 Wnaghe Town
灵空山镇：Lingkongshan Town　　李元镇：Liyuan Town

Industry is the driving force behind the main functional region development as well as the main element of main functional region's vitality. Main functional region industrial layout mainly refers to strengthening industrial strength horizontal comparison among the towns in the aspect of county area in overall planning stage. The comparison includes agricultural layout and its characteristic comparison, industrial layout and its characteristic comparison, the third industrial strength comparison and development potential assessment, etc.

## 4. Conclusions

As a key county in Shanxi Province, Qinyuan County's coordinated spatial development, especially the scientific development under urban-rural coordination, has an important significance for achieving new urbanization goals. Based on a series of analyses, the paper tries to provide a certain base for main functional region development of Qinyuan County. Meanwhile, it should be noted that any functional region's division can only be implemented by combining with corresponding policy measures, and major functional region's division is no exception. Different countermeasures should be adopted according to different functional regions. In this way, various main functional regions can play their own roles, and the implementation the main functional regions will be effectively guaranteed. It is a complicated systematic project to propose and implement the policy measures aiming at major functional areas. It not only requires basic-level functional departments to improve working ideas according to regional subjectivity function, but also requires various departments to coordinate arrangements and conduct scientific cooperation. The paper herein dose not specify this topic, however, it is an in-depth research direction in the future. Limited by data resources, the paper is unable to include comparisons of surrounding counties, which shall be a further direction for the research.

References:

[1] National Bureau of Statistics website: http://www.stats.gov.cn/tjgb/;

[2] NetEase DATABLOG, http://data.163.com/13/0916/04/98SB3TB700014MTN.html;

[3] Zhang Zhanbin, Strategic Significance and Reform Challenges of New Urbanization Beijing, January, 2013;

[4] National Main Functional Region Planning Formulation Leading Group Office, National Main Functional Region Planning References[C], 2008;

[5] Luan Guiqin, Tian Fangmeng, Ren Zhenshi, Study on Main Functional Region Industrial Policy Planning [J], Shanghai, 2008.

About the author:

Wu Fengwen, female, graduated from School of Architecture, Harbin Institute of Technology in 1997, Master of Architecture Degree, Associate Professor, Master Instructor, National Registered Planner, Senior Urban Planner, and the present Deputy Director in Department of Urban Planning, College of Architecture and Urban Planning, Beijing University of Technology.

# Determination of Polycyclic Aromatic Hydrocarbon and Source Analysis in PM2.5

Xu Sushi

Abstract: Polycyclic Aromatic Hydrocarbon in PM2.5 is a kind of powerful carcinogen which can be inhaled by human body and has influence in the human body. This paper enumerates several methods for monitoring PAHs, including pretreatment method and instrumental analysis, of which the ultrasonic extraction method is widely applied for actual monitoring, and liquid chromatography and gas chromatography/mass spectrography are common analysis means. Through proportional relationship between the compounds, and combining local typical pollution sources and making use of model tool and other means, the source analysis of PAHs is carried out to help accurate establishment of emission reduction measures to improve air quality.

Key words: PAHs, monitoring methods, source analysis

Polycyclic Aromatic Hydrocarbons (PAHs) is a kind of hydrocarbon containing two or more benzene rings, and an organic pollutant having "carcinogenic, teratogenic and mutagenic" effect. And, the carcinogenicity of PAHs is increased with increase in number of benzene rings, and the PAHs derivants that are produced when the PAHs are interacted with nitro, hydroxyl and amino group have stronger carcinogenicity. Such 16 PAHs as naphthalene, acenaphthene, acenaphthylene, fluorine, phenanthrene, anthracene, fluoranthene, pyrene, chrysene, benzo[a]anthracene, benzo[b]fluorathene, benzo[k]fluorathene, benzo[a]pyrene, ideno[123-cd] pyrene, dibenzo[a,h] anthracene, and benzo[ghi] perylene determined by the Environmental Protection Agency (EPA) as priority pollutants to be controlled, among which the benzo[a]pyrene is specified as an index for measurement of total quantity of PAHs. The PAHs emitted from the human being's activities (such as automobile, cooking, heating, smoking and etc.) can be directly existed in the atmosphere, and absorbed onto the particulates, of which about 70%-90% PAHs are absorbed onto the inhalable particulates smaller than 2.5μm. The PM2.5 can be inhaled and deposited in pulmonary alveolus to damage the respiratory system, and further enter into the blood system to cause general harm. As a powerful carcinogenic component in PM2.5, monitoring of the PAHs is of importance, and the final goal is to analyze the source through monitoring results and further reduce PAHs from the source.

## Monitoring of PAHs in PM2.5

As a component of particulates, polycyclic aromatic hydrocarbons are extracted from the particulates after pretreatment. The extraction method available at present mainly includes Soxhlet extraction, accelerated solvent extraction, microwave extraction and critical fluid extraction method and etc. Through comparison among the methods, the soxhlet extraction method consumes much more time, and it is required to further purify the extract; the critical fluid extraction method is at high cost, and its operation is complicated; the ultrasonic extraction and microwave extraction method usually requires small amount of solvent, and features fast operation and low cost, so that it is widely applied in extraction after pretreatment.

The extract is analyzed with help of instruments after being concentrated. The most common method includes gas chromatography, gas chromatography-mass spectrography, method, high performance liquid chromatography. The high

performance liquid chromatography is often advantageous in being not limited by PAH evaporation and heat stability, which can be used for analysis of PAHs with high boiling point that cannot be analyzed by gas chromatography. The gas chromatography together with mass spectrography significantly improve qualitative ability, and the most common type of mass spectrography is quadrupole mass spectrography, as well as iron trap mass spectrography and time-of-flight mass spectrography and etc[1]. The gas chromatography-mass spectrography technology also improves separation efficiency and measurement accuracy. The following content enumerates the methods and detection limit applied in the references.

Zheng Hongyan builds a method to measure the 16 polycyclic aromatic hydrocarbon compounds simultaneously in the atmosphere by use of high performance liquid chromatography [2]. In the method, a dust sampler is used to enable air to pass through the PTFE filter membrane and XAD-2 absorption tube in a flow rate of 2L/min. The sampling lasts for 2-6h, and the filter membrane is eluted by acetonitrile/methanol (60:40) and dichloromethane, and constant volume of the solution is determined by use of acetonitrile/methanol (60:40) after the elution solution is subject to vacuum drying. The acetonitrile and water are used as mobile phase to accomplish gradient elution and separation of reverse phase high performance liquid chromatography, and a wavelength fluorescence detector is used for detection. Relative standard deviation measured for 16 polycyclic aromatic hydrocarbon compounds is 1.1%~5.6%, detection limit of the method is $2.14\times10^{-4}$~ $4.32\times10^{-2}$μg/mL, and recovery is 83.6%～98%, which all meet methodology requirements. It is required to analyze the 16 PAHs by means of gradient elution because the PAHs contain 2 and more benzene rings and several pairs of isomers are produced due to difference in its connection. The acetonitrile and water are used as mobile phase in the study because of small variation in viscosity of acetonitrile/water solution. In this study, the acetonitrile initially takes account for 65%, and is used to separate naphthalene, acenaphthene and fluorine containing small amount of benzene rings, and then the proportion of acetonitrile is increased so that two pairs of isomers, namely phenanthrene and anthracene, fluoranthene and pyrene, are separated in an ideal manner. When concentration of acetonitrile reaches 100%, PAHs containing more than 4 benzene rings can be separated. In addition, a porous macromolecule microsphere absorption tube is linked with filter membrane in a serial manner in this method to collect the gas, and acetonitrile/methanol (60:40) solution is used to elute filter membrane and absorption tube, respectively, so as to enable the components containing more than 4 benzene rings are 100% absorbed by the filter membrane. As the relative molecular mass is decreased and the quantity absorbed by the absorption tube is increased, the compounds with small amount of benzene rings, namely naphthalene and acenaphthene, are fully absorbed onto the absorption tube, ensuring measurement accuracy and avoiding influence of the factor on the monitoring accuracy because the substance containing small amount of benzene rings is vulnerable to loss at the time of colleting gas with fiberglass filter membrane. However, if the acetonitrile is used as mobile phase, the fluorescence detector that controls wavelength by a procedure is used for detection and analysis, improving sensitivity of analysis, featuring excellent repeatability, realizing fast and accurate monitoring task with strong repeatability.

Peng Xilong builds a high performance liquid chromatography [3] by connecting a diode array detector with fluorescence detector in a serial manner. This method uses quartz sampling membrane to collect atmospheric particulates, and after 24 hours sampling, the particulates collected are extracted twiceby use of dichloromethane (10 mL dichloromethane for each time) in an ultrasonic cleaner (the ultrasonic strength is 40mA, and water bathing temperature is 22℃). The dichloromethane extracts obtained by two steps are mixed in a concentration tube, and after the mixed dichloromethane extract is concentrated to 0.1mL with nitrogen blowing concentrator, its constant volume is determined to 1mL by use of methanol by placing it at room temperature for volatilization. During measurement of high performance liquid chromatography, this method uses methanol and water as mobile phase for gradient concentration

and elution, and the methanol volume ratio is progressively increased to 100% from 80%. Among them, two substances are detected by a diode array detector, and others are detected by fluorescence detector. The determined optimum emission wavelength is 390nm, and double-excitation wavelength is supplemented to effectively solve the difficulty that the sample is not separated. In the chromatographic conditions set, detection limit of 16 PAHs is 0.11μg/L ~39.83μg/L, average recovery is 76.7%~98.3%, and relative standard deviation is 3.6%~14.4%.

Hu Jian builds a method to measure 16 polycyclic aromatic hydrocarbon compounds in atmospheric particulates by means of high performance chromatography by taking acetonitrile/water as mobile phase [4]. This method uses fiberglass filter membrane to collect the sample, and take dichloromethane as solvent, and extract the sample by ultrasonic means; the extract is separated and purified on the C18 silica gel column after being filtered and transferred by the solvent; the alkane absorbed onto the silica gel column is washed off by use of n-hexane; and the polycyclic aromatic hydrocarbons are eluted away by use of dichloromethane. The constant volume of elution solution is determined after being dried and concentrated by argon gas, and acetonitrile/water is used as mobile phase for gradient elution and separation, as well as a fluorescence detector is used for detection by a procedure of varying the wavelength. For the optimized separation and detection method, the detection limit for measurement of 16 PAHs is 0.023～0.45μg/L, and is applicable for determination of trace.

Li He builds an analysis method to measure trace polycyclic aromatic hydrocarbon by means of microwave-assisted extraction-gas chromatography-mass spectrography. By optimization of extraction time, solvent quantity, microwave radiation power and other microwave extraction conditions, the microwave power obtained is 110W, extraction time is 4 min, pressure is 1~ 5 atmospheric pressures, and the maximum recovery is reached during extraction by use of n-hexane/ dichlormethane (2:1)[5]. During increase in microwave power, the heating will be sped up, and the solvent rapidly reaches boiling point to lead to leakage, so that the power is decreased. When the power is 110W, the best extraction efficiency is achieved. The extraction is insufficient when the microwave radiation time is short, and if the extraction time is too long, it is possible to cause loss of substances to result in decrease in extraction efficiency, and the extraction efficiency is highest when the extraction time is 4 min. It is considered that the PAHs have excellent solubility in dichloromethane in the process of solvent extraction, so that the PAHs can be easily dissolved in the extraction solution, and the effumability of dichloromethane shortens the time required for concentration process during subsequent concentration process. The n-hexane is added because absorption of microwave is weak, so that the temperature rise will not be too fast, and it is possible to prevent the components to be analyzed from being lost by over-temperature. However, the proportion of n-hexane cannot be too high, otherwise the system's absorption efficiency of microwave is decreased, enabling the decrease in extraction efficiency. In the gas chromatography-mass spetrography analysis, the compounds can be separated by temperature programming. The conclusion for determination of 13 PAHs by this method shows: except for acenaphthene and fluorine, the recovery of microwave extraction method is 85% ~ 130% ; and detection limit of this method is 0. 002~0.016μg/$m^3$. This method is advantageous in fast analysis, consumption of small amount of solvent, and low detection limit.

Qin Xiaohai arranges 5 PM2.5 collecting points in the workshop of lead zinc mine concentration plant, and the sample collected are pretreated by Soxhlet extraction, K-D concentration and nitrogen blowing concentration method, as well as the polycyclic aromatic hydrocarbons are measured by gas chromatography-mass spectrography[6]. 16 typical PAHs are detected from the samples, and concentration of strongly cancerogenic benzo[a]pyrene is 0.24～18.75 ng/$m^3$, and the average value is 3.91 ng/$m^3$.

The pretreatment method and instrument analysis mentioned above can be combined on the basis of actual sampling and other conditions.

**Source Analysis of PAHs in PM2.5**

After obtaining monitoring results of PAHs concentration, it is required to carry out analysis on source of PAHs based on the concentration distribution of compounds, and by combining local meteorological condition, economic structure and other factors, so as to further conduct emission control, improve atmosphere pollution, and mitigate the harm to human body.

Some studies show that the source can be inferred by ratio between different compounds in PAHs. When ratio of fluoranthene/(fluoranthene+pyrene) is less than 0.2, the pollution comes from petroleum source; when the ratio is 0.4～0.5, the main pollution cause is the exhaust gas emitted from motor vehicles; when the ratio is more than 0.5, the pollution mainly comes from combustion of grass, wood and coal and etc.[7]. Additionally, some scholars suggest that when the ratio of benzo[a]pyrene/coronene is more than1, it indicates that the pollution comes from combustion of coals [8]; and when the ratio of benzo[e] pyrene/(benzo[a]pyrene+benzo[e]pyrene) is 0.18～0.72, it indicates that the pollution usually comes from exhaust gas emitted from motor vehicles [9]. The studies mentioned above are shown as following table.

Table 1 Relationship Between Proportion of Compounds in PAHs and Corresponding Sources

| Proportion of compounds in PAHs | | Sources |
|---|---|---|
| Fluoranthene/(fluoranthene+pyrene) | ＜0.2 | Petroleum source |
| | 0.4～0.5 | Exhaust gas of motor vehicles |
| | ＞0.5 | Combustion of grass, wood and coal and etc. |
| Benzo[a]pyrene/ coronene＞1 | | Coal |
| Ratio of benzo[e]pyrene/(Benzo[a]pyrene+benzo[e]pyrene) within 0.18～0.72 | | Exhaust gas of motor vehicles |

Cui Rong discovers during study on pollution characteristics of PM2.5 and PM10 in heating period in Beijing that phenanthrene concentration in PAHs with 2 and 3 rings is the highest, accounting for 85.2% and 87.3% in total concentration of PAHs with 2 and 3 rings in PM2.5 and PM10, respectively [10]. The study shows that concentration of PAHs with smaller molecular weight which are emitted from cooking by use of oil, gas and woods is the highest, inferring that higher concentration of chrysene, fluoranthene, pyrene and phenanthrene shows that coal combustion and family cooking is a source of possible PAHs.

In the research result, the ratio of fluoranthene/(fluoranthene+pyrene) in PM2.5 and PM10 is 0.50～0.51 and 0.51～0.52, respectively; and the ratio of benzo[a]pyrene/coronene is 2.5～3.8 and 1.9~5.7, respectively, which are more than 1; benzo[e]pyrene/(benzo[a]pyrene+benzo[e]pyrene) is 0.66～0.67 and 0.63～0.70. By combining the relationship listed in Table 1, the PAHs mainly comes from civil and traffic pollution within research period. For the pollution in typical industrial area, it is easy to determine the pollution source. Wu Manli monitors concentration of PAHs in industrial area and living area in Xi'an city, and discovers in the study that the PAHs with three rings takes account for more than 60% of total quantity of PAHs in monitoring area [11]. For the reason that average temperature during the study and sampling is low, and the existing form of PAHs is affected by environmental temperature, as well as the PAHs with number of rings less than four have higher vapor pressure, and exist in solid form in lower temperature environment, the PAHs in particulate form in atmosphere are existed in three-ring form. Among them, the concentration of PAHs in industrial area is higher than that in living area. PAHs are produced in thermal decomposition condition in incomplete combustion or reducing atmosphere. The organics is subject to thermal cracking in high temperature and anoxic condition to produce basic particulates formed by PAHs, namely free radical of hydrocarbon or fragment. These

fine particles are extremely active, and composed to thermally stable PAHs in high temperature condition. The coking process is a typical case to produce PAHs in a high temperature and anoxic environment formed by heat flash through isolating the air. Comparing to the coal combustion, the coking can produce several times of PAHs. The sampling points in industrial area are located in downwind direction of a coke-oven plant, which excellently indicate the source of high PAHs in industrial area.

Scholars often use such model tools as factor analysis method, chemical mass balance method and positive matrix factor analysis method and etc. to carry out source extrapolation in the process of source analysis process. First of all, Guo Lin carries out sampling in functional subareas in Nanchang city. These subareas include living area, industrial area, commercial area, main traffic line area and suburbs [12]. PM2.5 is collected to carry out analysis and determination of PAHs in summer of 2008. Through factor analysis method, main pollution sources of PAHs include vehicle emission source, high temperature heating source and coal pollution source. The losing substances are benzo(g.h.i) perylene, pyrene and fluoranthene, and Through multiple linear recovery method, their contribution ratios in PAHs are 37.9%, 28.2% and 22.0%. Strengthening exhaust gas emission control of motor vehicles is the measure obtained from source analysis and required to be taken.

## Conclusion

PAHs are absorbed onto the atmospheric particulates and can enter the human body and are harmful to the human body. At present, the monitoring means include ultrasonic extraction, microwave extraction or Soxhlet extraction method and etc., which are used to extract the sample into organic phase, and separate it and measure its concentration by use of liquid chromatography or gas mass spectrography instrument. The emission reduction measures, such as reduction in emission of motor vehicles, improvement in incineration process and etc., can be conducted based on the analysis results obtained through conducting source analysis of pollutants by use of measured concentration results, inferring the pollution source by making use of proportional relationship among different compounds in PAHs, determining the pollution source by combining local industrial pollution condition, or calculating the type of sources by means of modeling, so as to achieve the goal of reducing pollution.

References

[1] Dianne L Poster, Michele M Schantz, Lane C Sander, et al. Analysis of polycyclic aromatic hydrocarbons (PAHs) in environmental samples: a critical review of gas chromatographic (GC) methods[J]. Anal Bioanal Chem, 2006(386): 859-881

[2] Zheng Hongyan, Wang Limin, Tan Hao, et al. Determination of 16 PAH Compounds in Atmosphere by Use of High Performance Liquid Chromatography [J]. Journal of Industrial Hygiene and Occupational Diseases, 2006, 24(9): 564-566

[3] Peng Xilong, He Zongjian, Liu Xiaozhen, et al. Determination of PAHs in PM2.5 by Use of High Performance Liquid Chromatography [J]. Environmental Science and Technology, 2009, 32(9): 132-135

[4] Hu Jian, Zhang Guoping, Liu Congqiang, et al., Purification of Solid Phase Extraction Column-Determination of PAHs in Atmosphere by Use of Liquid Chromatography [J]. Earth & Environment, 2004, 32(3): 94-97

[5] Li He, Li Gongke, Chen Hongwei, et al. Determination of Trace PAHs in Inhalable Particulates in Atmosphere by Use of Microwave-assisted Extraction-Gas Chromatography-Mass Spectrography [J]. Analytical Chemistry, 2002, 30(9): 1058-1062

[6] Qin Xiaohai, Ai Guanghua, Zhu Yichun, et al. Analysis of PAHs in Aerosol (PM10, PM2.5) in A Lead Zinc Mine Concentration Plant [J]. Forum of Preventive Medicine, 2005, 11(6): 645-647

[7] Yun Ker MB, Macdonald RW, Vin Garzan R, et al. PAHs in the Fraser River basin: a critical appraisal of PAH ratios as indicators of PAH source and composition [J]. Organic Geochem, 2002, 33: 489-515

[8] Zhong Jixian, Li Honghai, Zhang Fengzhu. Relativity Study of PAH in Beijing District [J]. Environmental Chemistry, 1983, 2(4): 22-27

[9] Kavouras IG, Lawrence J, Koutrakis P, et a1.Measurement of particulate aliphatic and polynuclear aromatic hydrocarbons in Santiago de Chile: source reconciliation and evaluation of sampling artifacts[J]. Atmospheric Environ, 1999(33): 4977-4986

[10] Cui Rong, Guo Xinbiao, Deng Furong, et al. Characteristics Analysis of PM2.5 and PM10 Pollution in Heating Period in Beijing [J]. Chinese Journal of Sanitary Inspection, 2008, 18(8): 1505-1508

[11] Wu Manli, Shi Xinbin, Yang Liuqing. Content and Source Analysis of PAHs in Atmospheric Particulates in Urban Industrial Area [J]. Journal of Xi'an University of Architecture & Technology (Social Science Edition), 2007, 39(2): 259-262

[12] Guo Lin, He Zongjian, Yin Li. Source Analysis of PAHs in PM2.5 in Summer in Nanchang City [J]. Environmental Pollution & Control, 2010, 32(11): 58-62

Introduction of author: Xu Sushi, female, 1987.07.05, postgraduate in Environmental Science and Engineering, is graduated from the School of Environment under Tsinghua University in July of 2012. Organization worked with currently: Beijing Environmental Monitoring Center Title: Technician Tel: 010-68459232, Email: xusushi@163.com.

# Analysis on Problems of Environmental Monitoring Informationization Construction and Countermeasures and Suggestions

Zhang Fan

Abstract: Environmental monitoring informationization is an important means of environmental management modernization. The information construction is an important part of monitoring modernization. On account of current status of environmental monitoring information construction, the paper analyses the issues of “information isolated island”, system imbalance, progress delay, etc. It proposes countermeasures and suggestions for doing the IP planning in the initial stage and focusing on project management in implementation stage, and describes the key points on implementation stage according to the working experience in the monitoring station. To solve these problems will promote the work of environmental monitoring information construction to be more efficiently and reasonably implemented, and enhance the monitoring information level, which is significance for improving the environmental management and decision-making level.

Keywords: environmental monitoring; information construction; IT planning; project management

## Introduction

Environmental monitoring is the basis of environmental protection. Environmental monitoring informationization is one important means of environment management modernization and scientization. It can effectively improve the environmental supervision and service level [1]. As the public pays more attention on the environmental protection, in order to improve the environmental monitoring level, environmental protection departments at all levels gradually push forward the environmental monitoring informationization construction. First of all, with the operation of automatic monitoring system, manual handling the mass monitoring data has been inadequate, thus, all kinds of report generation tools and data processing software have been constructed. Secondly, the public requirement on environment monitoring service increases, which urges the environmental monitoring agency to gradually standardize and electronize its working procedure. The information systems for internal business procedure, such as laboratory information management system (LIMS), etc. have also started to be constructed. Finally, with more and more data from different sources, in order to solve the "information isolated island" problem [2], various data centers and data warehouse systems have started to be constructed.

The whole process above witnessed the environmental monitoring informationized development history. It is the typical situation of the industrial development. Environmental protection industry, especially the environmental monitoring informationization construction is still at the initial stage. There are still many problems in the process of construction.

## Analysis on Problems of Environmental Monitoring Informationization Construction.

### 1. Informationization application causes many "information isolated islands"

With the depth of informationization, more and more business of environmental monitoring department needs the support of information system. As for a provincial environmental monitoring station, application system requirements

will include that—the whole unit needs office automation system (OA), management department needs personnel management system and assets management system, monitoring department needs the automatic monitoring system for environmental quality and pollution source, analysis laboratory needs laboratory information management system (LIMS), comprehensive planning office needs every kind of data analysis system and data receiving (from lower monitoring department) and reporting system.

The above systems are not isolated. They share and exchange data among each other. If there is a whole planning before constructing these systems, only corresponding information system based on some business requirement is constructed, it may lead to "information island" and cause a series of problems. First of all, the data can't be shared in real time among different application systems, and needs to be imported and exported manually, or needs another interface, otherwise, it not only easily causes errors, but also increases the workload; secondly, the same data is always stored in different databases, resulting in poor data consistency; and finally, a lot of analysis and decision-making tools cannot be applied or the effect is not ideal.

**2. System imbalance due to the complicated business demands**

In the process of informationization, monitoring department has no enough attention to organize the business demands. Implementation of informatization are not mostly based on the clear future overall business demands, thus, due to incomplete understanding of the business entirely, the information system unable to keep pace with the needs of business development, further, and many informational systems have to be constructed to achieve some data exchange through a variety of conversion, which not only leads to overlapping investment, but also makes the structure of the whole information system imbalance, high maintenance cost and poor stability, as a result, it is difficult to establish data analysis and decision support system based on the whole business.

**3. The project schedule is extremely easily delayed**

After initiating the informationization construction project, the project is extremely easily delayed due to some problems existing in the project management of monitoring department. Basically, the environmental monitoring information system was developed by commissioning at present. In the initial stage, as the developer, the environmental monitoring station often only has preliminary ideas, which can't describe accurately the problems, such as the intended propose and implementation level of the project etc, so it is difficult to determine the scope of the project. In the research stage of the system, it is more difficult to determine the needs of the project. With the deep understanding of employees on information system and rapid improving of environmental protection industry, the demand will change at any time. In the aspect of project management personnel, environmental monitoring department usually only assigns one employee as the liaison. Except making demands by the liaison, most of the projects are controlled by the contractor. Developer is very weak on the control on the project, as a result, the project is often delayed.

## Countermeasures and suggestions on environmental monitoring informationization construction

**1. Make a good IT planning at the initial stage**

In order to solve the above problems on the environmental monitoring informationization construction, it is the most important to make a good planning, namely, IT (Information Technology) planning, at the beginning of the implementation.

Informatization has specific purpose. Variety of monitoring systems and OA systems are all subjected to informatization for some specific demands. IT planning is for the future informatization of the monitoring station:

(1) applications does needing the support of IT technology, such as monitoring systems for the business department needs, systems for the management departments needs to assist their work, etc.

(2) relationship among various demands, such as systems providing business data displayed in OA system, systems providing the data in the reporting system, applications in data analysis system needing business system and management system to provide data for analysis, etc;

(3) the ideal informationization goal in the future, and the gap between the present situation and the goal of the informationization.

(4) on the different demand's priority, application systems developed at first developed later. and consideration of investment on them to reach the target state gradually.

Through the understanding on specific IT planning, you can also understand why the informationization needs IT planning.

(1) Sort and perfect the business procedure and define business requirements

Informationization is a revolution of working method[3]. The primary task of IT planning is business procedure innovation, including the sorting of existing business procedure and overall improvement suggestions. Only through the analysis and optimization of business procedures, the future business demands can be identified, which can avoid that the new developed system will soon be proved unable to meet some new requirements. Define the interface among different business, on this basis, understand the same information circulation and exchange among different systems, to avoid the "information isolated island" phenomenon; define the key control points of daily business (normally adopt the leader' approval method), strengthen the control of key control points through the information system, so as to promote the business management preferably; and define the data requirement, on this basis, ensure the quality of data preferably.

(2) Design the overall architecture of IT system and implement planning gradually

The next task of IT planning is IT system innovation, which includes three aspects: firstly, on the basis of defined IT application requirements in the future, understanding what business applications do not be supported by the current information systems through business procedure, secondly, according to the future IT applications and the relationship among different applications, design of future target IT system architecture, and finally, comparison of the distance between current information system and target future structure of IT system to make the implementation planning of information systems.

Taking an environmental monitoring station as an example, the overall design of IT system should follow the following principles:

(1) the principle of unity and standardization

Monitoring station needs more applications, and its business is very complex. Its organizational structure and business are distributed across regions (for example, different levels of environmental monitoring departments exchange data). The scale and complexity of IT system suitable for this adaptation are very high. Following the principle of unified and standardization is the most important for the benefit of integration of information system. The principle of unity is embodied in five aspects: unified planning, unified standards, unified platform, unified development and unified management; and standardization is reflected in the reference of general industry standard, such as Java, CORBA, XML, TCP/IP, etc, reduces the complexity of system and management.

(2) The Principle of advancement and prospectiveness

Fast development of the environmental protection industry, gradually strengthening environmental monitoring and development change of information technology determine the the IT planning must follow the principle of advancement and prospectiveness, namely, tracking the latest developments in the industry of information technology. According to domestic and international best practice, the mature technologies and products should be selected reasonably.

(3) the principle of practicability and economy

As a public institution, environmental monitoring station's information technology planning should fully consider the national situation, industry characteristics and the unit's nature. The selection and design of application system should fully understand the specific business demands. The system should have successful implementation cases, and good operation interfaces, and is easy to learn and use. Practical information system should be safe and reliable. It is more important under the rapid development of network. The investment on modern information system is huge, so it should be done economically. Key points should be seized and investment benefit should be improved.

(4) the principal of flexibility and expansibility

Business and environment are changing, and new application systems will continually come into use. The systems with good flexibility and scalability can be easily modified and upgraded to meet the new demand with lower cost, and integrate with the new system. This requires the system to maximize using standard and open technologies, modularization and component object-oriented designs, three-layer structure and B/S mode. In addition, complete and reasonable documents are also the base of guaranteeing the flexibility and scalability.

As mentioned above, in accordance with the principle, make good architecture of IT system, and implement the planning step-by-step, to ensure the informationization is integrated and in good structure. An environmental monitoring station's future information system architecture is illustrated in figure 1.

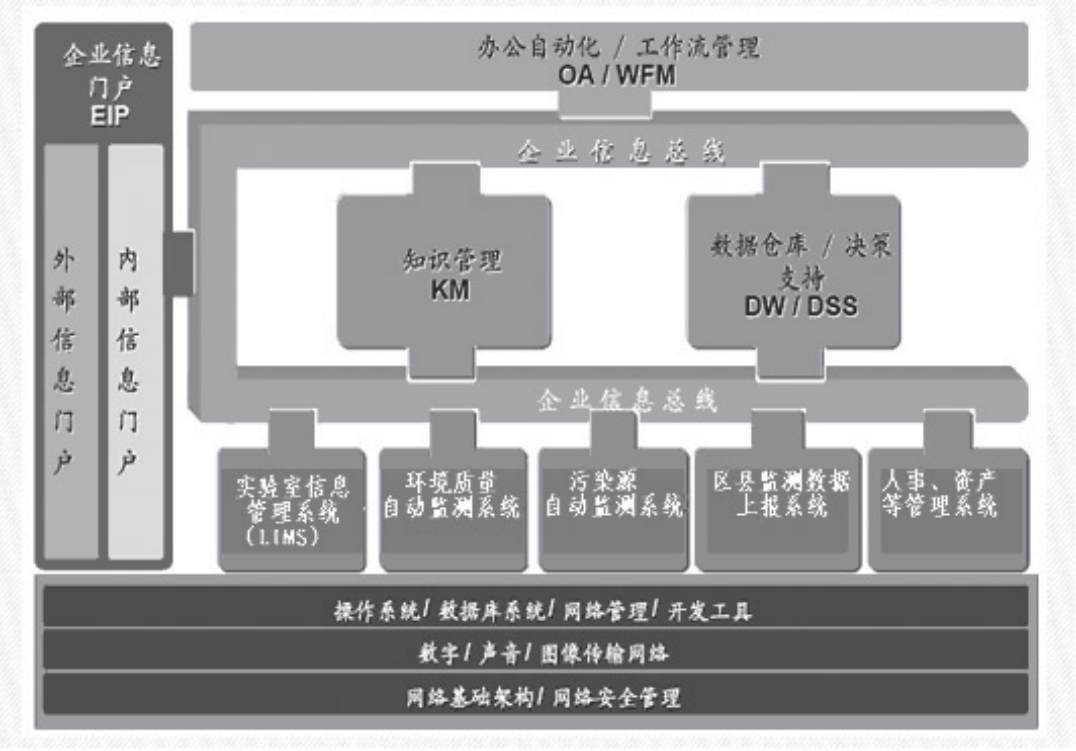



Fig. 1 Environmental monitoring station's information system structure diagram

办公自动化/工作流管理 Office automation/workflow management

企业信息门户 Enterprise information portal

外部信息门户 External information portal

内部信息门户 Internal information portal

知识管理 Knowledge management

数据仓库/决策支持 Data warehouse/decision support

实验室信息管理系统 Laboratory information management system
环境质量自动检测系统 Environmental quality automatic detection system
污染源自动检测系统 Pollution source automatic detection system
区县检测数据上报系统 Region and county detection data reporting system
人事、资产等管理系统 Management system for personnel, asset, etc.
操作系统/数据库系统/网络管理/开发工具
Operation system/database system/network management/development tool
数字/声音/图像传输网络 Digital/voice/image transmission network
网络基础架构/网络安全管理 Network fundamental architecture/network safety management

**2. The implementation stage emphasizes on project management**

Making IT planning at the initial construction stage does not mean that the informationization construction will be successful, and it needs to do the project management well at the implementation stage. In this way, the excellent planning can be formed successfully and the project can be constructed successfully.

In the implementation stage of informationization construction project, international popular advanced project management method as reference[4] is suggested to use. A systematic view to treat the entire life cycle of project is used. Through the deep understanding of the mapping among 5 process groups and 9 areas of knowledge[5], from the vision of systemaltization, the work at each stage and the correlation among them should be comprehended and are used in the project implementation. Practice has proved that these scientific management methods can significantly improve the problems.

(1) Strengthen project change control

In the process of project construction, the changes which are reasonable and do not affect the overall project schedule and quality requirements should be immediately implemented. But some changes which have big influence should be controlled better. Considering the project's quality and the principle that efficiency is prior, the changes which involve the project's scope should be controlled strictly. The key issues should be solved intensively quickly; the others can be solved slowly in the subsequent projects.

(2) Pay attention to the project's schedule management

Schedule issue is related to the project performance and team morale, which needs more attention. In the environmental monitoring informationization construction, strengthening the communication is the key point of schedule management. The first is to strengthen the communication with leader, it should be realized that the construction of information system basically is "top leadership project", and only through getting leader's attention, the project will be promoted smoothly. The second is to strengthen the communication with the contractor, and only through communication in time, the problems can be found and solved in time.

(3) Promote the project's human resource management

The current construction of the environmental monitoring information system of environment monitor department universally has the situation of "maximize investment, ignore management". The situation of "ignore management" is due to inadequate human resources. According to current situation that the monitoring station generally has no dedicated project management organization, if the project is not big, a developer project manager who knows the business, has the technical background, and is good at management can be appointed to join the project team to represent the developer for full responsibility for coordination of project construction. If the project is large, you need to set up a project management team, and establish a set of effective project management system to ensure the completion of the project.

## Conclusion

The environmental monitoring informationization construction is an important part of monitoring modernization. In the current stage of development, it encounters many problems, for example, information application mostly causes "information isolated island", business demand is complicated to cause system imbalance, project progress is very easily delayed, etc. For these problems, suggest to makes good IT planning in the initial construction stage and pay attention to management at implementation stage. At the initial construction stage, the first is to sort and improve the business procedure, define business demands, then design the overall architecture of the IT system, gradually make planning and implement it. Sharpening your axe will not delay your job of cutting wood. In the implementation stage, the advanced project management method should be introduced, through scientific management methods adopted in change control, schedule management and human resources management, to ensure that the construction of information system will be completed successfully. After these problems are solved, the environment monitoring informationization construction work will be promoted more efficiently and reasonably, and the monitoring informationization level is improved, which has an important significance for improving the environmental management and decision-making level.

References:

[1] Ren Xiaolong, Yang Qian. Restrictive Factors of Improving Base Station's Informatization and Countermeasures [J]. Environmental Science and Management, 2012, 37 (4): pp166-168;

[2] Liu Peng, Cao Hong. Thinking on Environmental Monitoring Informatization[J]. Environmental Protection Science, 2010, 36 (3): p96 – 98;

[3] Wang Hesheng. Thinking on Environmental Monitoring Informationization Construction [J]. Administration and Technique of Environmental Monitoring, 2008, 20 (4): pp57 – 59;

[4] Lu Youjie, Wang Yong, trans. Project Management Association, Guidance on Project Management Knowledge System (the third Edition) (PMBOK Guidance) [M]. Publishing House of Electronics Industry, Beijing, 2005;

[5] Liu Chunlu, Liu Mingliang. Project Manager Tutorial of Information System [M]. Tsinghua University Press, Beijing, 2005.

About the author:

Zhang Fan, female, was born in 1976, master degree, senior engineer, and work for: Beijing Environmental Protection Monitoring Center.

Address: 14 #, Chegongzhuang West Road, Haidian District, Beijing

Zip code: 100048

Tel: (010) 68428784

Fax: (010) 68428861

E-mail: 15010387986@163.com.

# Survey Report for Recycling of Disposable Plastic Food Containers

Beijing Kaifa Environmental Protection Technology Consulting Center
Zhang Yanan  Tuition Expert: Dong Jinshi

Abstract: After the ban on sale of disposable plastic-foam food containers was lifted, the problems about recycling of the disposable plastic-foam food containers have become social concerns. It is found from the survey on recycling of disposable plastic-foam food containers carried out by the International Food Packaging Association in Beijing, Shanghai, Hangzhou and Guangzhou that the plastic food containers that are mainly of polypropylene (PP) are recycled by people in individual cities, but the disposable plastic-foam food containers are not recycled by anybody; the recycling price of colored plastic food containers made of polypropylene (PP) (including porcelain white and other colors) can reach RMB 1.2 yuan/kg at most, and the recycling price of transparent polypropylene (PP)plastic food container can reach RMB 4.6 yuan/kg at most which is about four times of colored PP food containers; the plastic-foam food containers are not recycled by anybody at present because the containers feature big volume, light weight and difficulty in cleaning the highly absorbed oil stains , as well as other problems, so it is inevitable to face more severe environmental pollution and resource waste after lifting the ban on sale of disposable plastic food containers.

Key words: Disposable plastic food container, polypropylene, plastic-foam food container, recycling, pollution

On February 16th, 2013, the National Development and Reform Commission issued the Decision of the National Development and Reform Commission on Revising the Relevant Clauses under the Catalogue for the Guidance on Adjustment of Industrial Structure (2011) (NDRC No. 21 Order) which came into effect as of May 1, 2013. The Clause 36 therein specifies that the Item 6, "disposable plastic-foam dinnerware" under the obsolete catalogue "Two. Outmoded products" "(Nine) Light industry" is removed. This means that the disposable plastic-foam food container banned as "white pollution" for 14 years struggles to be "free" from May 1, 2013.

The recycling problems triggered after lifting the ban on sale of disposable plastic-foam food containers have become social concerns. At present, are the plastic-foam food containers recycled by some agencies or individuals? Will the pollution be caused again after lifting the ban on sale of plastic-foam food containers? Which kind of disposable food container is more environmental friendliness, taking a comparison between polystyrene foam food container and polypropylene plastic food container? These doubts are always concerns of the public. In recent, it is found by the survey on recycling of disposable plastic food containers carried out by Beijing Kaifa Environmental Protection Technology Consulting Center in Beijing, Shanghai, Hangzhou and Guangzhou that:

## First. Transparent PP food containers are highly favored by recycling agencies and individuals, but the plastic-foam food containers are not recycled by anybody.

The plastic food containers that are mainly of polypropylene (PP) are recycled by people in each city, but the disposable plastic-foam food containers are not recycled by anybody. Among them, the recycling price of colored plastic food containers made of polypropylene (PP) (including porcelain white and other colors) can reach RMB 1.2 yuan/kg at most, and the recycling price of transparent polypropylene (PP) plastic food container can reach RMB 4.6 yuan/kg at most which is about four times of colored PP food containers, becoming the plastic recycling industry's favor. In Nansha

Landfill in Guangzhou, the boss, considering time and staff cost, directly gives up sorting of colored food containers priced RMB 0.8 yuan/kg, but only sorts the transparent polypropylene plastic food containers (see following table for details).

List for Statistics of Recycling of Disposable Plastic Food Containers

| Recycling price of various food containers / Survey places | Transparent polypropylene (PP) plastic food containers | Colored polypropylene (PP) plastic food containers | Polystyrene plastic-foam food containers |
|---|---|---|---|
| Zhanghua Village Waste Recycling Station, Haidian District, Beijing | 3.2—3.5 yuan/kg | 0.6 yuan/kg | Be not recycled because they are not purchased by anybody. |
| Xiaokou Village Recycling and Distributing Center, East Changping District, Beijing | 3.5 yuan/kg | 0.5—0.6 yuan/kg | Be not recycled because they are not purchased by anybody. |
| Xiulong Village Waste Recycling Station, Xiupu Road, Pudong New Area, Shanghai (Opposite to the GreenLand East Shanghai community) | 4—4.6 yuan/kg | 1—1.2 yuan/kg | Be not recycled because they are not purchased by anybody. |
| Longqiang Waste Recycling Station, Meiyuan Street, Lujiazui, Shanghai | 4—4.6 yuan/kg | 1—1.2 yuan/kg | Be not recycled because they are not purchased by anybody. |
| Sanba Shenqi Recycling Chain Stores , Xihu District, Hangzhou | 4—4.2 yuan/kg | 1 yuan/kg | Be not recycled because they are not purchased by anybody. |
| Jiangcun Village Recycling Station, Xihu District, Hangzhou (Chongren Road) | 4—4.2 yuan/kg | 1 yuan/kg | Be not recycled because they are not purchased by anybody. |
| Waste Transfer Station, Tanghe Village, Xihu District, Hangzhou | Be sorted, and sold at price of 2 yuan/kg | Be sorted by the pickers and sold at price of 1 yuan/kg | Be not sorted because they are not purchased by anybody |
| Nansha Landfill, Guangzhou | Be sorted, and directly sold to plastic granulation plant at price of 3—4 yuan/kg | To be sold at price of about 0.8 yuan/kg, but not be sorted in the landfill. | Be not sorted and be broken into pieces and land-filled together with household refuses |
| Compression Station in the south of Humen Town | Be not sorted, and be compressed together with household refuses and delivered to the wasteyard. | | |

Transparent polypropylene (PP) plastic food containers sorted by the recycling station

Colored polypropylene plastic food containers (red/black and porcelain white food containers) sorted by the recycling station

Disposable plastic-foam food containers that are not sorted and wait to be land-filled together with household refuses are discarded everywhere in the Nansha Landfill, Guangzhou.


Waste Compression Station in the South of Humen Town, Dongguan: the responsible person, Mr. Ren, says that the wastes are delivered to the waste compression station by the persons recycling the wastes, and then the iron, paper box, glass bottle, etc. are sorted by them, but the discarded food containers are not sorted, and delivered to the wasteyard after being compressed with the household refuses.

**Second. It is found in the follow-up survey on discarded food containers that only the food containers having benefit can be recycled**

It is found in the survey on discarding, recycling and final destination of disposable plastic food containers carried out by the international Food Packaging Association that most wastes recycling stations are operated by private operators, and the recycling station is a transfer link of the whole recycling chain, which has business relationship with upstream material processing plants and downstream pickers; for example, the recycling station recycles discarded plastic food containers from the person picking wastes, and then sell them to the plastic food container crushing plant to obtain price difference. Then, the plastic food container crushing plant breaks the waste food containers purchased into pieces, and sells them to the plastic product factory.

**Link one: Discarding and picking**

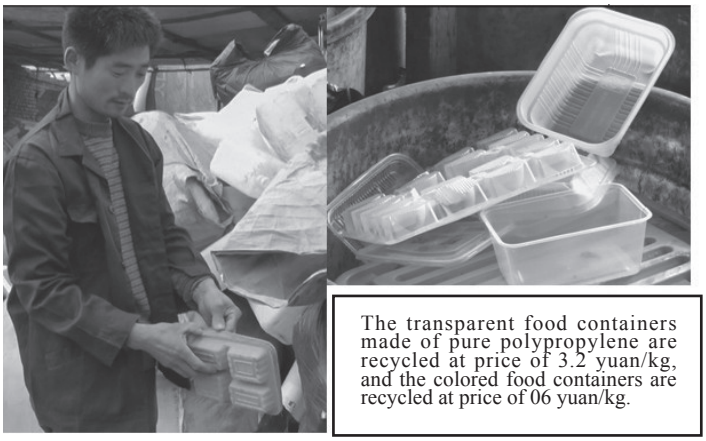
As usual after lunch, the workers of International Food Packaging Association throw the discarded plastic food containers into garbage can outside the office for handling by cleaners. A cleaner will bring black garbage bags to reclaim the garbage at about 1:30 p.m. The cleaner sorts the colored and transparent food containers during reclaiming the garbage, and packs the plastic-foam food containers with other wastes in a bag. It is known by enquiry that the cleaner sells the colored polypropylene (PP) plastic food containers and transparent polypropylene food containers to the pedlar riding a tricycle and recycling wastes at price of 0.6 yuan/kg and 0.2 yuan/kg, respectively. When asking why the white plastic-foam food containers are packed with household refuses, the cleaner takes the bag packing plastic foam food containers and says “these are wastes and cannot be reused, so they are handled as wastes”.


The cleaner sorts out the colored polypropylene (PP) plastic food containers and transparent polypropylene food containers and takes the plastic-foam food containers as household refuse for handling.

**Link two: Wastes and recycling**

It is known from the survey on the Zhanghua Village Recycling Station and Dongxiaokou Village Recycling and Distributing Center carried out by the International Food Packaging Association that waste recycling station purchases various recyclables, such as metal, glass, plastic, and etc., and the plastic food containers only account for a small part, as well as the transparent food containers and colored food containers are recycled, but the plastic-foam food containers are not recycled. Among them, the transparent polypropylene food containers are recycled at price of RMB 3.2 yuan/kg,

and the colored polypropylene food containers are recycled at price of RMB 0.6 yuan/kg. The plastic food containers are sold by them to the plastic processing factory. At present, the waste plastic food containers recycled in Beijing district are mainly transported to the Wenan and Xiongxian County of Hebei province.



The transparent food containers made of pure polypropylene are recycled at price of 3.2 yuan/kg, and the colored food containers are recycled at price of 06 yuan/kg.

The boss of a recycling booth in Zhanghua Village Waste Recycling Station told us the recycling price and that the waste plastics are mainly transported to the Wenan and Xiongxian County of Hebei Province.

**Link three: Purchase and processing**

The International Food Packaging Association traces the food containers recycled, and finds the Xiaoshahe Plastic Processing Factory. The factory mainly recycles polypropylene plastics, of which most plastics are transparent polypropylene plastic food containers. It is known from the factory leader that they purchase transparent polypropylene food containers at price of 5—6 yuan/kg and the colored polypropylene food containers at price of 1 yuan/kg; the food containers recycled can be sold at price of 8400 yuan/ton after being broken into pieces, or the crushed materials are transported to their processing factory for pelletizing in Wenan County.

A great amount of transparent polypropylene food containers are placed in the Xiaoshahe Plastic Processing Factory


Left figure: Crusher in Xiaoshahe Plastic Processing Factory
Right Figure: This kind of crushed plastic material is RMB 8400 yuan/ton.

**Link four: Sale and product production**

The International Food Packaging Association traces the recycled food containers, and comes to Wenan County of Hebei Province. Various plastic processing factories are located beside the roads in Zhaogezhuang Town of Wenan County, of which includes family workshops with the store in front and a factory at the back. It is known by the visit to Shunxing Plastic Factory, Hongxing Plastic Factory and Fengyuan Plastic Industry Factory that the crushed materials of polypropylene plastic food containers are processed into pellets and can be sold to the factories producing garbage bags and daily plastic products at price of 8000—10000 yuan/ton. The workers of International Food Packaging Association see the plastic chairs produced by use of recycled and processed materials by the factory in the office of Fengyuan Plastic Industry Factory.


Left figure: Crushed materials of colored polypropylene plastic food containers in Shunxing Plastics Factory
Right figure: Crushed materials of transparent polypropylene plastic food containers in Shunxing Plastics Factory


Pellets processed by use of recycled polypropylene plastic food containers in Fengyuan Plastic Industry Factory

Left figure: Chair produced by use of plastic pellets processed by the Fengyuan Plastic Industry Factory
Right figure: The coal ash and recycled plastic food containers can be used for production of tiles.

**Third. It is inevitable to face difficulty in recycling of plastic-foam food containers after lifting the ban**

At the end of 1990s, disposable polystyrene plastic-foam dinnerware was used widely, and the discarded foam dinnerware had caused serious "white pollution". In 1999, the No. 6 Order of State Economic and Trade Commission (original SETC), Catalogue for Eliminating the Backward Producibility, Processes and Products (first batch) was issued to require that the disposable plastic-foam dinnerware in China by the end of 2000. Afterwards, the disposable plastic-foam dinnerware was included in obsolete products by the National Development and Reform Commission in the Catalogue for the Guidance on Adjustment of Industrial Structure (2005) and (2011), respectively, and banned for production, sale, and use. Until February 16th, 2013, the National Development and Reform Commission issued the Decision of the National Development and Reform Commission on Revising the Relevant Clauses under the Catalogue for the Guidance on Adjustment of Industrial Structure (2011) (NDRC No. 21 Order) to remove the "disposable plastic-foam dinnerware" from the obsolete catalogue, so the ban on sale of plastic-foam food containers is lifted.

The plastic-foam food container has been banned for 14 years. It is inevitable to face difficulty in recycling after lifting the ban. On one hand, disposable plastic-foam food containers are of polystyrene resin, and butane foaming agent is used in the process of production. After being foamed, the plastic-foam food containers feature big volume, low density and light weight, leading to high transportation and storage cost of plastic-foam food containers. For example, a 130 truck with load carrying capacity up to 3 tons can only carry more than 200 kg plastic-foam food containers which occupy a large space without profit being earned; on the other hand, the used plastic-foam food containers highly absorbs oil stains which are extremely difficult to be cleaned, and it is difficult to handle the waste oily water after cleaning, and liable to cause pollution. Additionally, after the plastic-foam food containers are cleaned and crushed into pieces to produce polystyrene pellets which can be only used for production of low-end plastic products or such ordinary building materials as insulation boards, having very low benefit. Even more, some illegal enterprises use purchased recycling waste materials to produce plastic-foam food containers with lower recycling value.

The recycling station does not recycle plastic-foam food containers, but also the "3-cent Project" established for the plastic-foam food containers by the Shanghai Municipal Government cannot be normally operated up to now. On May 19th, 2013, a report titled as Recycling of Foam Dinnerware City Encounters A Waterloo in Experiment in

Shanghai, was released in the Hangzhou City Express Press, stating that the quantity of plastic-foam food containers recycled by the only one foam dinnerware recycling and processing enterprise in China-Jiangsu Kunshan Baolu Plastic Resources Regeneration Processing Co., Ltd., was insufficient for operation, and most production lines were in shutdown condition.

**Fourth. The plastic-foam food containers are not recycled by anybody and cause pollution**

In 2001, the original Economic and Trade Commission issued the Urgent Circular on Immediately Stopping Production of Disposable Plastic-foam Dinnerware (NETI (2001) No. 382), stating "there existed serious problems in individual links, such as production, use and recycling of the disposable plastic-foam dinnerware". Nowadays, the recycling mechanism of plastic-foam food containers is not established completely, but the ban on plastic-foam food containers is lifted. In terms of the survey, the pollution momentum has been manifested after lifting the ban on plastic-foam food containers.

On one hand, it is shown that the used plastic-foam food containers are discarded everywhere, and not sorted out and recycled by anybody, resulting in visual pollution and increasing the environment and sanitation cleaning work; on the other hand, the plastic-foam food containers that are not recycled by anybody are crushed and landfilled together with household refuses; however, the plastic-foam food containers cannot be broken down for hundred years, and so landfilling of plastic-foam food containers results in deposit of a great amount of crushed pieces, which do not only pollute the soil, but also affect the underground water quality.

A great amount of discarded plastic-foam food containers in front of shops in Xiaoshan Commercial City, Hangzhou

A great amount of plastic-foam food containers are thrown into garbage cans everyday in Guangzhou, but not sorted out by anybody and directly transported together with household refuses.

The plastic-foam food containers are crushed down and landfilled together with household refuses, and the landfilled plastic-foam food containers cannot be decomposed and will pollute the soil.

**Five. Polypropylene plastic food containers are more environment-friendly than plastic-foam containers.**

At present, the discarded plastic-foam food containers are not recycled by anybody due to big volume, light weight, and uneasy to transport, as well as difficulty in cleaning the highly absorbed oil stains, so a great amount of plastic-foam food containers substantially consumes petroleum resources. However, the plastic food containers that are mainly of polypropylene(PP) are recycled eventually in an economic manner. The leftovers in the polypropylene plastic containers are easy to clean after the food containers are discarded, and the recycled food containers can be used for production of daily plastic products, plastic desk and chair, and building tiles and other products. From the perspective of recycling of plastic resources, the polypropylene plastic food containers are more environment-friendly than plastic-foam food containers.

The polypropylene plastic food containers are picked and recycled by somebody after being discarded, so there is not environment pollution. On the contrary, a great amount of waste plastic-foam food containers are discarded at will, and are not sorted out by anybody, and eventually crushed, landfilled, and incinerated together with household refuses. However, the plastic-foam food containers that are landfilled under the ground cannot be broken down for hundred years, which do not only occupy the land resource, but also pollute soil and underground water. And, this kind of materials cannot be incinerated, otherwise it can produce carcinogens.

Burning of plastic-foam food containers pollutes environment and produces a great amount of carcinogens.

**Suggestion: The government should establish a sound and long-term recycling system as soon as possible.**

After the ban on the plastic-foam food containers is lifted, there is a potential risk of causing "white pollution" again. If we do not take corresponding prevention measures, the potential risk will become a trouble sooner or later. In the last 14 years, the ban on plastic-foam food containers had solved the food container pollution problem along the railway, indeed. Nowadays, the ban on plastic-foam food containers has been lifted, so the government should build a practicable recycling mechanism regardless of whether the "liberated" disposable plastic-foam food containers are recognized by the consumers. For this reason, the reputed environment expert and executive vice director of the International Food Packaging Association, professor Dong Jinshi suggests that:

1. The government should explicitly determine the competent department and suspension department responsible for recycling of waste plastic-foam dinnerware as soon as possible;

2. The legislation should be perfected, and the recycling work of plastic foam dinnerware should be included in the legal scope, so as to provide suspension department with a legal basis;

3. The government should invest funds and makes an overall plan to set up waste plastic foam dinnerware recycling stations and assign special personnel to be in charge of suspension and management;

4. The government should establish requirements and by-laws for such links as recycling, transportation, storage, cleaning, reuse of waste foam dinnerware;

5. It is required to avoid the phenomena that the manufacturer only seeks for profit, but does not pay attention to the pollution, and the enterprises and dealers should pay reserve fund for recycling based on certain criteria;

6. It is required to intensify the intensity of propaganda and education of policies, encourage the public to participate in recycling work, positively guide the consumers not to use or rarely use disposable dinnerware and not to discard the disposable dinnerware at will after use of it, and to advocate to handle the wastes by category, as well as improve utilization rate of recyclable resources.

The "white pollution" can be prevented from revival only through establishing and improving a long-term recycling system and intensifying suspension and management by the government.

Author: Dong Jinshi, male, M.S. in environmental chemistry in the Chinese Academy of Science and Director of Beijing Kaifa Environmental Protection Technology Consulting Center, is mainly engaged in food packaging research.

Zhang Yanan, female, bachelor in science of law in Beijing University, works in market department of Beijing Kaifa Environmental Protection Technology Consulting Center.

Add: Suite 18E, Building B, Zhiye Yard, Shuguang Garden, Beijing Road, Haidian District, Beijing

Tel: 010-88465537/39-12, 88466551

Fax: 010-88465537/39-15

# Strengthening the delicacy management of comprehensive disaster reduction in capital area is imperative

Da-Wei Zheng

## Origin of delicacy management

### 1. Offer of the delicacy management

Delicacy management is a management style to make organizations and units at the various levels operation exactly, efficiently, synergistically and continuously using programmed, standardized, digitized and informationalized method; to simplify complex things, normalize simple things, program normalized things, standardize programmed things.[1]

Delicacy management acts as modern enterprise management method originally, deriving from the enterprise management practice of developed countries. With the delicacy of social division and service quality, which is exact, micromesh, in-depth and normalized, delicacy management aims to minimize the management resources and costs.

Delicacy management can date back to Taylor of American in 19th century. He summarized a set of reasonable operation methods and tools by studying and analyzing steel mill workers' operation to make the most of the people can reach or exceed the quota after training in 1881. He published Scientific Management Principles which is the first delicacy management book in the word in 1991 and he was known as "the father of scientific management".

Lenin realized the significance of Taylor management system as early as 1918. The Present Task OF Soviet's Regime indicates that capitalism's latest invention Taylor system in this area is the most ingenious and cruel exploitation method of bourgeoisie, and on the other hand it's also a series of the most abundant scientific achievements. It should be studied and taught, and tried out in a systematic way and adapt it in Russia. [2]

### 2. Connotation of delicacy management

Modern management thought scientific management has three levels: standardization, delicacy and individuation. Delicacy management is required to be implemented in all the management activities of the enterprise, including operation, control, accounting, analysis and planning etc.

The principle of delicacy management: simplifying complex things and concentrating on details; routing management and controlling details; starting with details and cultivating habits.

The main methods of delicacy management: everybody takes his place to establish professional post responsibility system; to build the target management system; to establish scientific evaluation system; to build evaluation result application system. [3]

### 3. The rise of the delicacy management in our country

Employee motivation is bound by average cauldron rice forming from long-term planned economic system of our country, leading to enterprises lack of energy. Since China's reform and opening up, especially after the state-owned enterprises are reformed and establish modern enterprise system, learning, referencing and implementing delicacy management is on the agenda and the delicacy management has been implemented in many enterprises. Beijing Boster Management Consultants Limited which engages in the delicacy management training establishes delicacy management network of china.

Although the elaborating management comes from enterprise management, the basic idea and method is also applicable to other management. In the Beijing municipal government work report, Mayor Wang Anshun definitely talked "Effectively improve the level of urban delicacy management" as a content of the government's general requirements on January 22, 2013.[4] In the national disaster reduction and relief work conference, Jiang Li, China's vice minister of Civil Affairs, demanded that perfecting disaster relief policy system, further strengthening the disaster relief standardization and delicacy management, ensuring that each system connects in order on February 19 and 20.[5] Seismological bureau of Shandong province carried out "Delicacy management activities" in 2012. Local meteorological departments makes delicacy public meteorological service platform with GIS, improves the precision of time and space of disaster weather forecast observably. [6]

## Delicacy management of urban comprehensive disaster reduction is imperative

### 1. The characteristics of the modern urban management

With the rapid development of modern cities, the traditional management means and methods cannot satisfy the requirement of modern urban management. The cities have to integrate into delicacy management concept of the modern industrial era.

Modern urban management needs: advancement and scientificity of urban management concept, which is embodied in the concept and mode of social oriented management; integrality and systematicness of urban management system, forming hierarchical classification management mode with both division of labor and comprehensive coordination; legalization and Standardization of urban management, requiring to build systematic urban management laws and regulations systems, law enforcement agencies and social supervision mechanism; socialization of urban management needs governmental agencies, NG0, society groups, all sectors of the society and general public to play their main role and participate in urban management activities actively; The market operation of city management can reduce urban management costs and improve management efficiency; specialization of urban management make itself more scientific, standardized and efficient.[3]

### 2. City safety problems caused by rapid urbanization and global change

Our country is in the development stage which rural people are rapidly urbanizing, the contradiction between man and nature and the social contradictions is prominent. Beijing acts as a capital of large developing countries which is short of nature resource and focus on contradictions at home and abroad, and the urban infrastructure, environment renovation and safety and disaster reduction work lags behind the development of urban construction and global climate change. There are many potential safety hazard and risk in Beijing.

(1) Nature risk

The population of Beijing increase from about 3 million in 1949 to the current about 21 million. Per capita water resource is less than 100 m3.Some of the deep groundwater are also depleted because of the long-term over exploitation of groundwater which dries almost all the rivers and shallow groundwater.

Expansion of urban and replacing nature vegetation and soil with impermeable land makes runoff coefficient increase several times. Combining local torrential rain caused by urban climate, urban waterlogging are increasingly prominent and the threat of human health and the supply of urban water and electricity caused by high temperature because of the heat island effect and climate warming.

(2) Technical risk

Chimney effect of high-rise buildings and chemical decoration materials makes it difficult to put out a fire in urban.

Infrastructure deficit is more, urban lifeline system is weak and accidents frequently occur.

Rural-urban fringe zone which gathered many migrants has very basic equipment, fire and electrical accidents risk is more.

Urban atmospheric circulation and rapidly increasing of mobile vehicles make the air pollution is increasingly serious, the water pollution and the waste pollution is more prominent.

(3) Social risk

Beijing which acts as a large developing country capital with international influence is an important target which concerned and attempted to destroy by hostile forces at home and abroad.

Local instability also moves to Beijing because we are in the social and economic transition period and there are many unfair things in our society.

With the large amount of rural people rushing into the city, resource carrying capacity and environment capacity is gravely insufficient. They are hard to integrate into urban society.

Population composition is rapidly ageing and low income people lack social security especially.

Constructing a world city is the long-term strategic goals to Beijing, if the safe hidden trouble cannot be solved, the construction of a world city is unrealistic.

**3. Consider the necessity of refining city comprehensive disaster reduction management from the torrential rain and flood in 7 • 21**

On 21 July 2012, the torrential rain and flood caused significant casualties and property losses. Although the municipal government and relevant departments mobilized urgently and made every effort, there were also many lessons to be learned:

Although we have compiled a variety of contingency plans and implemented early, most of them are divided into city and county two levels and Focus on the responsibility of leadership and coordination of command. Most enterprises did not develop contingency plans. In the face of catastrophe swept the city, it was also hard to handle even thousands of people had been mobilized urgently. When the fire department received 20000 calls, there are few staffs can be mobilized while thousands of firemen have been dispatched. Although the phone early warning has been opened, most citizen did not receive the early warning because of the capacity limitation, and warning on all kinds of media and electronic screen could not be made the most of. On the account of the short of specify on how to improvise when meet catastrophe, public recreational activities were still as usual, many public places could not open to the suffering public, blocked private cars were still punished, freeway also charged, even several ambulances transporting the bodies of the victims had to charge. Although many scientific publicities  concerning disaster reduction had been carried out, many citizen's lack of knowledge and skills on self-help and mutual rescue made many accidents occur, including drowning, falling into wells, electric shock and asphyxia. Some citizens contacted and organized private vehicles through microblog to help rescue themselves, but most of the citizens were lack of organizational guidance and didn't know how to help. There was not a national orderly rescue formed.

The most important point of the above problems is the lack of details. There are too many principles and provisions and too little operation details in existing plans. Plans are always compiled by government while grassroots communities and enterprises don't. Science propagandas are always carried out through the media while most citizens don't. Rescue is limited to professional team while there is a lack of national mobilization mechanism.

When faced with a devastating disaster, even the ability of a able leader or a professional team is finite and a perfect plan also has defects. In order to minimize disaster losses, we have to use the delicacy management of

comprehensive disaster reduction to mobilize the whole social energy and implement to all communities and links.

## Connotation of the delicacy management of comprehensive disaster reduction

The delicacy management of comprehensive disaster reduction should keep to the principle of system engineering and cover the whole process and all links.

**1. Delicacy of organization and post responsibility**

City and district emergency agencies have been established and perfected at present, but the emergency agencies of grassroots community and units are not perfect enough. Many units have a very specific stipulation on daily duties, and lack stipulations on responsibilities and obligations when cadres, workers and residents facing emergency. Delicacy management requires to implement to all levels and units. Although grassroots units are not able to set up specialized agencies, a special person who is responsible for emergency work and fully realizes that ensuring the safety of units is very important is necessary.

**2. Delicacy of the recognition, monitoring, forecast and early warning of disaster risk**

We need to master the exactly spatial and temporal distribution of all kinds of disaster risk by making full use of satellite remote sensing, aerial photography, GIS, GPS, the internet and the internet of things and other modern information and communication technology. We need to increase the accuracy of spatial and temporal of forecasting and early warning and the coverage of the crowd by determining the density and time limit of monitoring according to the urgency degree of disaster prevention and mitigation. Beijing has a good start at present, such as, the Municipal Water Affairs Bureau monitored the flyovers with a large amount of water after raining and issued warning signals; the Municipal Weather Bureau provided forecasts to each stadium during Beijing Olympic Games, and provided forecast of short time intervals through monitoring severe convection weather with Doppler radars; in order to direct traffic in time, the Municipal Traffic Bureau installed thousands of camera to master the congestion of main road in real time. This should be gradually extended to the monitoring and early warning of major risk sources and hidden dangers in all areas in the future.

**3. Delicacy of disaster preparedness and Prevention**

Although Beijing has built several disaster shelter, the most of them aim at earthquake and flood etc. We should plan, design and construct severally in allusion to population distribution and physical geography condition of different areas and hidden risk of different type in the future. Many disasters can make use of the existing public facilities. In order to use those facilities scientifically, legally and reasonably, we should make specific provisions based on delicacy research.

China has built several warehouses of relief supplies and manages effectively. When catastrophic disaster occurs, local supplies reserves are always gravely insufficient. As transmitting the supplies outside needs time, the most efficient method is making good use of existing resources around. And the looting needs to be prevented. What public resources can be used and what procedures need to be ratified in the event of an emergency must be made specific provisions in advance. Communities and residents in high disaster risk areas should reserve necessary number of life-saving appliances and materials themselves.

**4. Delicacy of emergency response and rescue**

Although the city and district, some towns and streets have prepared a series of emergency plans, the response and rescue of the government can only cover part of the heavy disaster areas where the government could reach. According to the requirements of delicacy management, emergency response and rescue mechanism should be set up in all communities and units, or even every family to make the whole society deals with emergencies in order.

**5. Delicacy of recovery and reconstruction**

Recovery and reconstruction is the last link of disaster reduction. Because of the mismanagement of Beijing and accumulated living difficulties over the years after Tangshan Earthquake, constructing everywhere and optionally bring many troubles to urban transformation. Arrangements transferring the victims from the temporary placements to transitional resettlements or permanent residences have to make provisions in principle. Formulate reconstruction schemes respectively according to the disaster situation, regional characteristics and the amount of resource. Amend and supplement the schemes according to the actual situation after a real disaster occurs.

## Some suggestions to strengthen the delicacy management of urban comprehensive disaster reduction

Comparing with developed countries, the emergency response and management ability of our government is good, the technology of disaster prevention and disaster relief ability is also in an advanced level approximately. But the scientific literacy of citizens and social public moral level is relatively low and the covering degree of the advanced technology application is also not enough. Disaster losses are still too large. In order to improve the delicacy management level of urban comprehensive disaster reduction and narrow the gaps with The world city safety management, some suggestions are given below:

**1. Compile grassroots plan roundly**

According to the requirement of comprehensive and the main risk sources of Beijing, organizing enterprises and urban and rural communities to compile all kinds of emergency plan, and make clear the security disaster reduction management responsibilities of officials and the standards of conduct that all staffs should abide by.

**2. National education plan of security disaster reduction**

Compile medium and long term plan for quality education about security disaster reduction throughout the city. Make training plan, written and audio-visual science materials according to major accident risk and different types of people covering all enterprises and urban and rural communities.

**3. Organization of volunteer team combined with special groups**

Inherit and carry forward the glorious tradition of the mass line and organize a volunteer team of security disaster reduction combined with special groups. The professional volunteer teams organized by the water, earthquake, meteorology, geology, health and municipal departments is demanded to be lean and specially trained. They can make up for the short of professional team with their professional technology when major disaster accidents occur. The amount of volunteer teams organized by urban and rural communities is large. They are familiar with the local natural and social environment and can play an important role after training properly. They can also organize the self-help and mutual aid immediately and assist professional teams to rescue. They are mainly made up with high grade students and just retired staffs with enough vigor. The two kinds of volunteer teams both have to establish strict registration, swearing, certification, training and exercises, appraisal, reward and punishment system. Actively participate in rescue when there is a disaster and propagandize, prevent, manage environmental, regulate disputes, help the people in trouble etc well at ordinary times.

**4. Examine and mark disaster accident risk by using the internet of things and the modern information technology**

Beijing has organized several risk examination, which still does not cover all the departments and communities. The water, public security, transportation and other departments achieved good results on marking hidden risk by using the internet of things and the modern information technology. This should be gradually extended to all sectors and areas. For example, if each community can master the opened manhole covers, broken trees and wires, the depth of water and

other risks in their jurisdictions in the torrential rain in July 21st, and report those risks to related departments and set alarms immediately, the casualties and property loss can be greatly reduced.

**5. Pay attention to weak links and vulnerable groups**

Significant loss of disaster accidents often occurs in the weak links and vulnerable groups. The delicacy management of security disaster reduction especially requires to strengthen the management of weak links and the protection of vulnerable groups.

Such as the rural-urban fringe zone which gathered many migrants, the villages in the city which have not transformed completely, suburban residential districts which are empty during the day, the outer suburb rural with only olds and children after the young adults leave and the villages in remote mountains etc.

With Beijing's rapid population aging and children accounted for an absolute majority, empty nester and children become vulnerable groups in the city. Many tragedies that the old and children's death was only discovered several days later occurred around recently. Research the hidden risk to safety that these crowds are faced with and explore the methods to strengthen monitoring and communication, alarm rapidly and rescue locally.

Reference

1] Wang Weiguo, Yao Shihong. Knowledge and Practice on Meticulous management, Petroleum Technology Forum, 2010 (4) :43-46, 86

[2] Lenin. Soviet regime's current task. Lenin anthology in translation Volume III, Beijing: People's Publishing House 1972 Second Edition. 511

[3] Guo Liqiao, Modern Urban Sophisticated Management Decision-Making Ideas, China Construction Information, 2010 (2) :10-15

[4] Wang Anshun, 2013 government work report in Beijing, Beijing Daily January 31, 2013

[5] National Disaster Mitigation and Relief Work Conference urban planning communication. 2013 (5): 16

[6] Yao Nan, Chen Zhe, Liu Yulin, GIS-Based Grid Meteorological Disaster Monitoring And Early Warning System Development. Electricity Information 2013 (3) :46-5

Beijing Disaster Reduction Association Da-Wei Zheng

# Beijing as an Underground Metropolis in The Future

Zhu Wenyi, Shang Qian

Abstract: Today urban underground spaces in Beijing are under rapid construction, it is an important issue for the future discussion of Beijing's important underground architecture (IUA). This paper put forward the space layout and forms of Beijing's important underground architecture. The hierarchy of Beijing's important underground architecture would be as "Underground Cities, Underground Park, and Underground Landmark". Among which, the "Eight Underground Cities" would be well distributed and might become Beijing's important underground architecture in eight directions; the "Underground Loop Park" would focus on restoring the moat and might reemerge the glamour of ancient city wall from the point view of underground architecture; "the Underground Landmark" could be a symbol of Beijing's important underground architecture, with a unique underground form, it would show the special charm of Beijing's underground architecture.

Keywords: Beijing, Important underground architecture (IUA), Hierarchy, Underground City, Underground Park, Underground Landmark

Important underground architecture (IUA) is the underground building and block which epitomizes the city. Nowadays, development of Beijing's underground architecture has entered a golden age. The subway and underground architecture with all sorts of functions are rapidly developing. A large number of large-scale, multi-functional underground architecture, like the underground space of Zhongguancun's West District and Olympic Park's underground yard, have showcased their own characteristics. Under these circumstances, it is a task of vital importance to study the future layout and shape of Beijing's IUA from architecture and urban design perspective. This article, from a whole urban space view and studies points out the hierarchy of Beijing's IUA and ideal forms of IUA in each level. Specifically, the paper put forward the possibility of establishing unique IUA on Beijing's central axis.

## 1. The Hierarchy System of Beijing's IUA

From the view of city, the underground architecture created by one building or one block is not adequate to demonstrate the entire city's underground architecture. From the angle of underground architecture, on one hand, a city should have a IUA; on the other hand, it should have formed a macro hierarchy system of underground architecture. From the angle of the development of today's underground architecture, it is a rare case that a city has a hierarchy of underground architecture in overall space range. Beijing, as a city with rapid development of underground architecture, has the condition to form a hierarchy of IUA. This paper discusses a hierarchy of Beijing's IUA in the future ——"Underground Cities, Underground Park, and Underground Landmark", (Figure 1) and further points out the "Eight Underground Cities", designs the "Underground Loop Park", and imagines the "the Underground Landmark". (Figure 2).

"The Underground Landmark" is located in the Axis of Beijing and in the south of Beijing old city. It will be the core of IUA of the Beijing city, and will be the lead the underground architecture with its unique concepts and excellent architecture space. Its culture lying behind will endow something new to the underground architecture and the axis of Beijing city. The "Underground Loop Park" refers to the underground park designed with the moat that rounded four city walls circling the second-ring-road, namely the east city wall, the west city wall, the south city wall and the north city wall. From the view of Beijing old city's conservation, it is a shame to have the old city walls demolished.

Regardless of the historical development factor, the demolition still leaves a huge regret for today's Beijing city. Today, the second ring road, which was built according to the location of the demolished city walls, still is the important image of the Beijing city. The Underground Loop Park aims to present the concepts of four old city walls and create a brand new public space with the reconstructing the second ring road. "Eight Underground Cities" refers to the layout of the underground city radiating from eight directions of the Beijing city including Underground Zhongguancun, Olympic Underground Park, Wangjing Underground Street, CBD Underground City, Underground Fatou, Nanyuan Underground Park, Lize Underground Street, and Shougang Underground City. The eight-direction Underground Cities, will create tremendous underground spaces with hundreds of thousands of construction area.

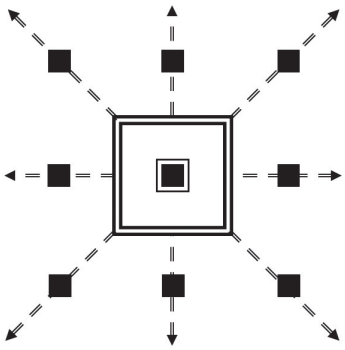


Figure 1

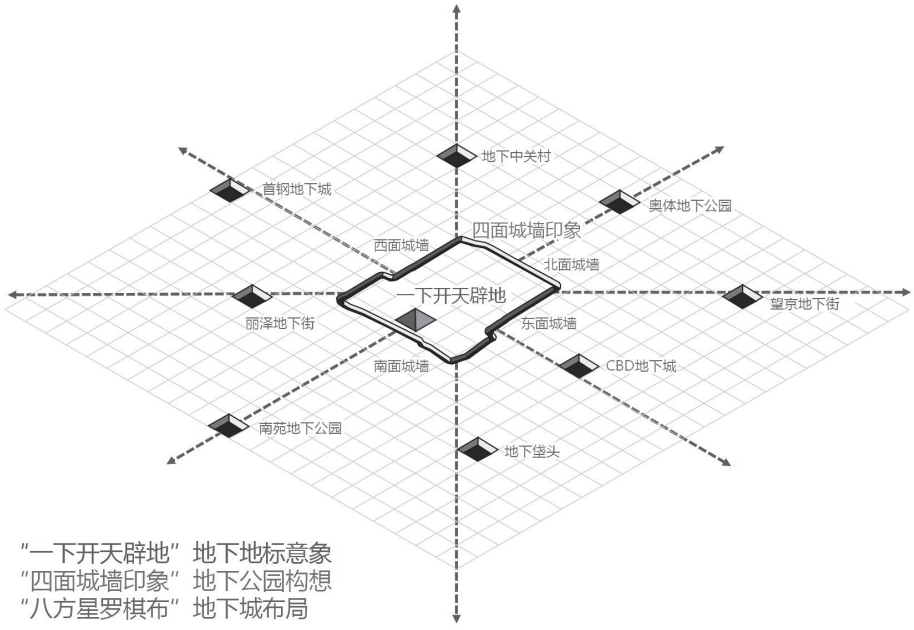



Figure 2

The "Underground Cities, Underground Park, and Underground Landmark" hierarchy draws more attention for Beijing city which is a historical and cultural city, by attempting to discuss about the underground city development, inheriting the old city essence and creating new underground spaces with new culture features. In the meantime, the hierarchy could also provide a new insight for the future of building the Beijing city into a world-class underground metropolis.

## 2. Eight Underground Cities

Eight Underground Cities refers to the eight large-scale underground spaces that are put forward by this article in Beijing city in the future. The layout has considered the underground space planning and the current situation of the underground architecture. Referencing different functions of the city districts, the eight underground cities namely Underground Zhongguancun, Olympic Underground Park, Wangjing Underground Street, CBD Underground City, Underground Fatou, Nanyuan Underground Park, Lize Underground Street, and Shougang Underground City could form their unique space feature. (Figure 3)

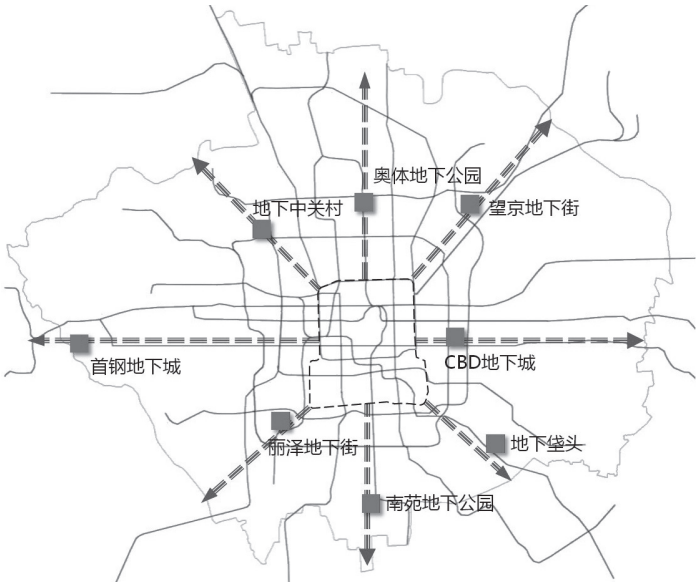



Figure 3

Some of IUA among Eight Underground Cities have already been built and are being improved. Underground Zhongguancun was built in 2004, is Beijing's IUA in the northwest. It is now one of the largest underground architecture in Beijing, including underground commercial space with an area of nearly 200,000 square meters and underground pipeline colligate allure with an area of 9.5 million square meters. Its overall development concept makes a useful exploration for the development Beijing underground architecture. To some extent, underground Zhongguancun reflects the cultural characteristics of "Science and Technology Beijing". Olympic Underground Park has been completed in 2008 and 2011 . As Beijing's IUA in north central axis, Olympic Underground Park embodies the Olympic cultural characteristics of "Cultural Beijing", and it formed another large public space of Beijing city in the northern part besides Tiananmen Square in the southern part. CBD Underground City is an IUA which is located on East Chang'an Avenue of Beijing, it has already formed a group of large underground spaces such as the World Mall, Yintai Center, Jianwai SOHO, and in the further there will be more large-scale underground spaces. In the planning, there will be five storey underground spaces in CBD core area, and CBD underground city would become a large-scale underground city with cultural characteristics of business culture.

Besides, some important areas in the planning of Beijing have potential to become IUA. Wangjing Underground Street is an IUA in the northeast of Beijing City, it is currently under development. As a city-level large community, Wangjing central area has the possibility of developing large-scale underground architecture. The advantages that its location is adjacent to the airport road also make Wangjing Underground Street has potential to become IUA. Underground Fatou which is currently being planned is possible to become Beijing's IUA in the southeast. As the city gateway from Beijing to Tianjin, Fatou will be Bohai Rim Business Headquarters in the future, and it has the potential for the development of large underground architecture. Its heritage of the old industrial area will also bring cultural characteristics of "Cultural Beijing" to Underground Fatou. Nanyuan Underground Park might be an IUA in southern Beijing, it is being planned now. As the future scientific and cultural city in south central axis of Beijing , Nanyuan area has great potential to form large-scale underground architecture. Nanyuan Underground Park has possibilities to design the new mode of underground architecture, which reflects the concepts of "Green Beijing" and "Cultural Beijing". Lize

Underground Street would be Beijing's IUA in the southwest direction, which is currently under constructed. At present, there is already the proposal of Lize Road integrated underground space . As Beijing's important financial business district in the future, Lize area has the potential for developing large-scale underground spaces. One third of Lize area is on the relic of Mid-Capital of Jin , so that in the design of Lize Underground Street, the historical sites could be shown. Shougang Underground City which is currently being planned might become the IUA that located on Wast Chang'an Avenue of Beijing. New Shougang high-tech area would provide an excellent platform for designing underground architecture. With Shougang industrial heritage protection, Shougang Underground City could be formed an important cultural underground architecture with the concept of "Cultural Beijing" .

Eight Underground Cities would be scattered on eight different direction of the city, bringing better underground space, and they would show cultural characteristics of different districts in Beijing in manner of each one. In the future, it is possible that Eight Underground Cities could pioneer the way for Beijing's underground architecture and further promote Beijing's development.

### 3. Underground Loop Park

The aim of design Underground Loop Park is to reproduce mainly via underground architecture the charm of the entire enclosure of the ancient city wall of Beijing. Today, the Second Ring Road, which was built on the spot of the ancient city wall, still remains the most distinctive space image in Beijing from the aerial view. Today, its problems such as transportation, function, form, and so forth remain to be addressed. In order to solve these problems, many experts have already brought up with reconstructing plans. The traffic problem of the Second Ring Road is a complex, professional and tough one. Drawing lessons from existing solutions, this paper charts the future architectural form of the Second Ring Road, and brings up the possibilities of building a mega underground park with the guidance of reproduce Beijing's ancient city walls.

The ancient city wall of Beijing was 33 km long and its enclosure is a Chinese character "品" like form. It has 13 gates and four sides which are the eastern, western, southern and northern. The moat surrounding the city lies right next to the wall. It is about 30m wide and was used to defend the city from invasion. Due to historical reasons, the wall was demolished from 1952. Today, only Zhengyang Gate and its watchtower Qian Gate, Desheng Gate's watchtower and Dongbian Gate's turret. Remaining parts of Xibian Gate and Ming Dynasty city wall at Dongbian Gate were repaired in 1988 and 2011 separately. And in 2004, Yongding Gate was also reconstructed. During the construction of the subway line 2, the moat was covered and then became a subterranean river . The Second Ring Road was built in the original spot the wall. There are three possible cases in terms of its spatial relation with the moat. First, the major road of the North Second Ring Road overlaps the position the wall and the moat still exists outside of the wall. Second, northern parts the East Second Ring Road and West Second Ring Road overlap the position of the wall and the moat is a subterranean river which is 6m under the ground . Third, the moat at the South Second Ring Road and southern parts of the East Second Ring Road and West Second Ring Road still exists and the major road is outside the position of the city wall. Nowadays, elevated roads in the Second Ring Road are overloaded, which severely shuns the city from improving its spatial quality. (Figure 4)

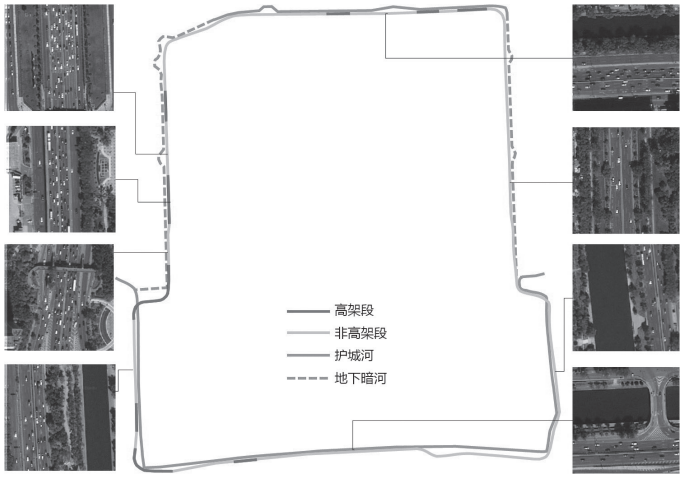



Figure 4

From the point of view of urban development around the world, the elevated road occupy the city's most central locations in many developed cities due to historical reasons, and they play a leading role in space in the city. In recent decades, some western developed cities have explored a variety of ways of reconstructing the elevated road in city centers, many of which got successful experiences to learn from. Among which, Boston Big Dig project removed the elevated road which was built in 1950s, changed it to an underground tunnel, thus creating 45 public park and plazas which is more than 1.21 square kilometers on the ground area, including the 2.4 kilometer Rose F. Kennedy Greenway in city center . Seoul Cheonggyecheon restoration project removed 5.8 kilometer elevated road, reproduce the old river, and designed bridges with a variety of features across the river, creating a great underground leisure space for the citizens and visitors . (Figure 5) In addition, some cities take different solutions, they keep the elevated roads. For example, New York High Line Park kept the elevated railway and transfers it into a 2.8 kilometer elevated park, which has activated the surrounding areas . (Figure 6) On the tributary of Cheonggyecheon, the Naebu elevated road was totally retained with its transportation use, and under the road, nice public river space was designed, which not only meet the needs of urban transport, but also create a peaceful underground leisure space. (Figure 7) Zhu Wenyi studio put forward a concept for the referbishment of San Francisco 280 highway. In the proposal, the elevated road was preserved and redesigned to be an animal orphanage, thus the old space in the city are brought new vitality, both on and under the elevated road. (Figure 8) The way of remain the elevated road during the reconstruction makes full use of old buildings, reflecting the concept of sustainable development in the refurbishment of cities, and it is more worthy learning.

For the parts on Second Ring Road without elevated roads, the underground park proposal conceived to restore the moat and show the memory of the ancient city wall in a unique way. For the west Second Ring Road that with no elevated roads, the proposal restores the moat space by opening the existing cover and redesign the river, planting a variety of plants, designing landscape ramps , plateaus and many different revetment, thus creating a variety of underground leisure spaces. (Figure 9) For the east Second Ring Road that with no elevated roads, the proposal also restores the moat and designs variety kinds of revetment to create underground river spaces. In addition, the proposal designs two floors of underground of space, including the first underground floor for commercial space and the second underground floors of the Second Ring Road, while the position of the of the walls become public park. At the position of the ancient city wall, a variety of architectural elements could be design to memorize the city wall, such as pavement with pattern of the city wall, part of city wall with different materials, and virtual city wall that is formed by light. (Figure

10) For the parts that are near the gates of the ancient city wall, there are long distances from the moat to the wall because the spaces of watchtowers outside the wall which is now the position of the Second Ring Road. In addition to restoration the moat space, the proposal also designs the space between the Second Ring Road and the moat to be large parks, and through ramps, stairs and other architectural elements, the proposal creates several old city gate underground parks that are suitable for leisure, sports, and all kinds of slow life. (Figure 11)

For the parts on Second Ring Road with elevated roads, the proposal restores the moat and transfers the elevated roads into parks. For some of the elevated roads on the west Second Ring Road, the proposal keeps the elevated roads on it and transforms it into high parks, and plus redesigns the public areas underneath, re-explore the moat space, and add ramps, platforms and other revetments to create diversified leisure spaces underground. The proposal would also design the commercial areas underground alongside the watercourse, and create a versatile recreational underground park. (Figure 12)

For the parts on Second Ring Road with elevated roads, the proposal has also imagined the possibility of restoring the moat based on the continual utilization of the elevated roads. For the elevated roads on the west ring road, the proposal recovers the moat space meanwhile preserve the elevated road as the main route on the Second Ring Road. Also the proposal use different space elements to redesign the area under the elevated road, to activate the space underneath and make it become the relaxing and sporting areas along with the watercourse underground space, consequently the mode including both the elevated roads and the moat would come into existence. (Figure 13)

The Underground Loop Park discusses and put forwards a possibility from view of underground architecture for the historical and cultural city of Beijing, based on the ancient city wall and the moat which have glorious history. Though the vision of "City Wall Park" which was prompted by Liang Sicheng in 1950s is no longer able to be achieved, it provided an ideal reference for today. The Underground Loop Park would commemorate the ancient city walls of Beijing from another dimension, and will create a large underground park for citizens and tourists.

Figure5

Figure6

Figure7

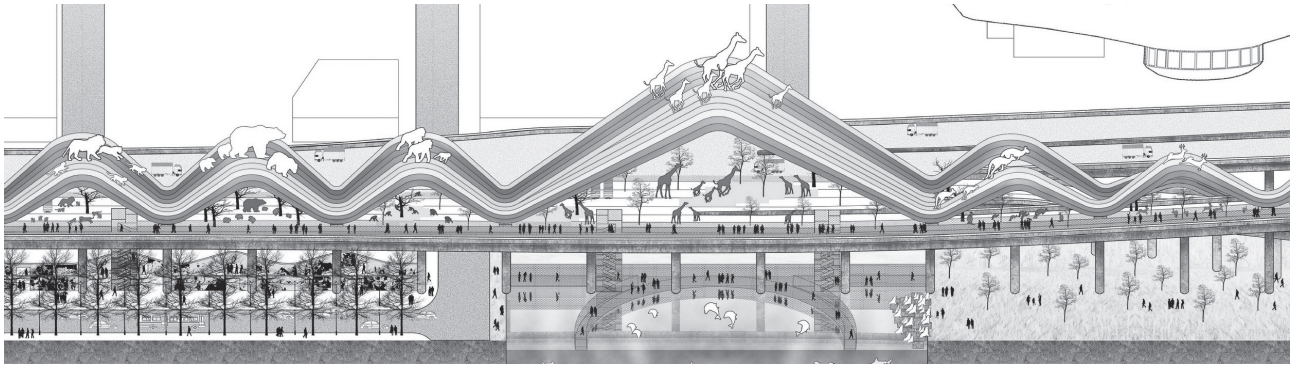


Figure8

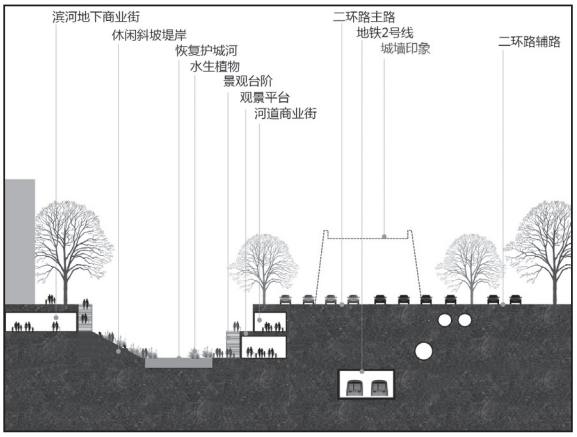



Figure9

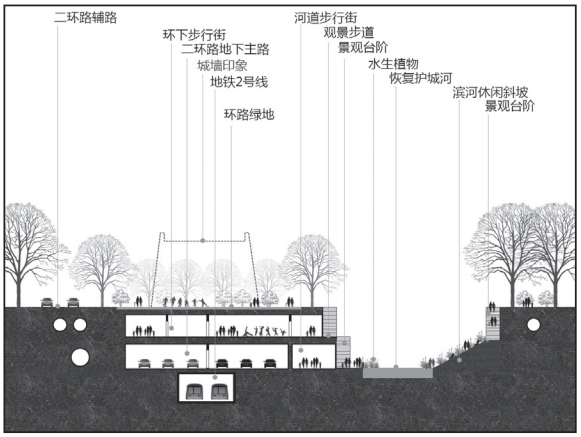



Figure10

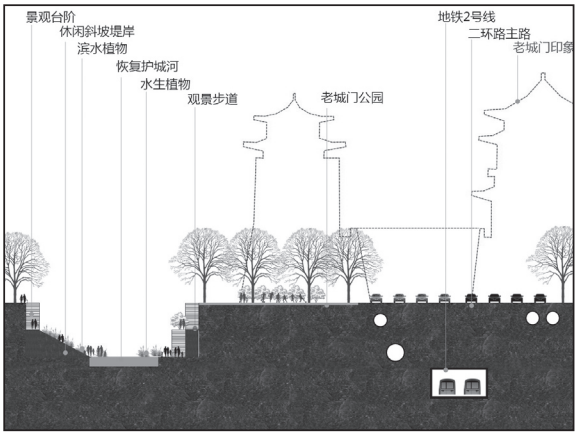



Figure11

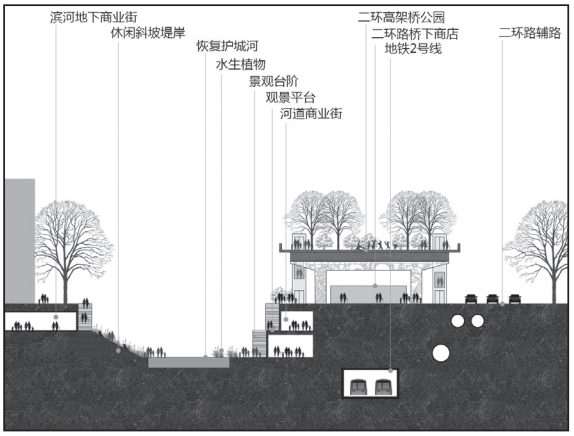



Figure12

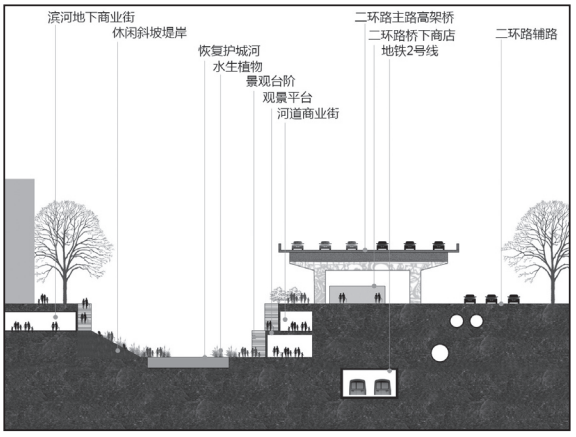



Figure13

**4. The Underground Landmark**

"The Underground Landmark" might become the distinctive symbol of the underground architecture in Beijing. The site of it would be located in Yongding Gate Park, which is on the southern axis of the city. The site selection has fully taken the space order on the Beijing axis into consideration and it would respect the axis and the historical relics around according to the future development of Beijing's underground space. It's both feasible and innovative, bringing nice perspective for Beijing city and the global underground architecture development.

The underground landmarks serve as the flagship of the underground architecture's development, meanwhile makes the key point of the whole city space. Some of the underground landmarks in the world become the symbol of the city and gain global attention due to their unique architectural forms and leading-edge conceptions. For instance, the underground space in the Louvre Museum contains three floors, covering 62 thousand square meters in total . The incredible underground entrance of the museum creates diverse cultural and relaxing functions. The National September 11 Memorial Museum in New York utilized the remains basement of the former World Trade Center and designs an underground memorial space as well as museum, exploring new cultural places underground in downtown . The symbolical underground architecture has become the local landmarks on account of its extraordinary imagination. There are some other proposals in the world picturing the underground landmark architecture, such as the proposal of "GuangzhouWell" which was raised by the Zhu Wenyi Studio. It pictures the new 160-meter-deep Guangzhou landmark which creates a comprehensive system with an attractive central hotel, imaging a unique underground architecture, and brings unprecedented space experience. The "GuangzhouWell" besides the Baiyun Mountain will along with the previous Guangzhou Tower become the new landmark layout of "East Tower & West Well" in the city. (Figure 14) Beijing is a metropolis that in the period of great development of underground spaces, it is probable and necessary for Beijing to have an underground landmark.

As the core of the IUA hierarchy "Underground Cities, Underground Park, and Underground Landmark", the site selection of The Underground Landmark is on the axis of the city, specifically in the Yongding Gate Park in south city of Beijing. Initially, the central axis is the symbol of space order in Beijing city which inherits its development and sustains the cultural essence of the city space from back in time to nowadays. To the underground architecture on the axis, the Olympic Underground Park in the northern part represents Beijing's development before the Olympic Games in the 21st century, while the Nan Yuan Underground Park in the southern part will symbolize Beijing's upcoming underground architectural, whereas its central part, which is of the old-city, will serve as the transitional factor both chronologically and dimensionally. For several possibilities on the axis of the old-city, the Tian'anmen Square has both the need of service functions and enough space to exploit. Yet it is rather unrealistic to develop large architecture beneath it owing to its important political position. The area on the north of the Bell & Drum Tower is a preserved area, whose underground landmark exploitation seems also unrealistic. Relatively the site selection in the Yongding Gate Park would be quite doable both in short term. Since the development of the south old-city is inferior to that of other regions, "The Underground Landmark" would bring positive effects to the evolution of the south old-city, and also has the potential to promote the development of the whole south Beijing. Second of all, the Beijing Central Axis was included into the Tentative List of the World Cultural Heritage in November 2012 . The proposal site being selected on the axis will bring out the significance for Beijing's underground architecture. Thirdly, in the planning of the subway system, the line 8 would run through the park from north to south alongside the axis . If the subway station of the Yongding Gate Park is set up, there will be positive influences towards the architecture of the underground space beneath the park. It was pointed out by the Beijing Underground Space Planning (2004-2020) that the area around Yongding Gate has is location advantage, and the advantages of its developing underground space will prevail much more when the subway line 8

embarks on its architecture1.

The proposal designs a reversed pyramid with a 160-meter-wide top, and a pool in the base. It is a typical Chinese term, meaning breaking the sky and the ground, the connotation of which is to develop, so that the design adds a sense of cultural significance to the central axis of Beijing. The reversed pyramid would have seven floors underground with a total area of 80,000 square meters. The first and the second underground floors are the extended green areas of the Yongding Gate Park above ground, making it quite natural to dissolve into the scene. From the first to the fourth underground floor, there are large parking areas in the east and west sides. Subway line 8 would pass the fourth floor, creating a new station. The fourth, fifth and sixth underground floors have commercial, culture, entertainment, sports and exhibition spaces, enriching the function of the Landmark The platforms with trees provide large areas for citizens and tourists to relax and exercise their body. The bottom two levels lay the "Spring Pool" symbolizing the "Break of heaven and the springs gush". In short, the proposal is featured with spectacular views and cultural implications. (Figure 15) Considering the maturity level of underground construction technology, The Underground Landmark would be feasible and the budget is reasonable as well, and due to its underground architectural art, it might be the most distinguished IUA of Beijing.

Yongding Gate Park in which would be located The Underground Landmark stretches 800 meters from south to the north and 200 meters from east to west. It is divided into two parts, currently the majority being green areas. A north-south walkway goes right through the park. The Landmark is square-shaped and 160-meter wide. It is located in the middle of the north part of the park and its downward walkway would be smoothly linked with the north-south walkway and there are paths as wide as 20 meters at both sides of the park. (Figure 16) The Landmark neither changes the existent layout of the park nor changes the traffic situation around. On the contrary, it makes full use of the public space and enriches cultural significance of the central axis. The Landmark's total underground form would pay special attention to the protection of the central axis and the surrounding historical sites, such as Yongding Gate, Tianqiao South Street, The Temple of Heaven, and Xiannongtan, so it would be highly operable.

As one of the most important architecture in the central axis of Beijing, The Underground Landmark would contribute to the spatial sequence of Beijing's central Line, along with Yongding Gate, Zhengyang Gate, Qian Gate, People's Memorial, Tian'anmen and the Forbidden City, Jingshan mountain, the Bell & Drum Tower and Olympic Park, which –together will make up a new spatial sequence of Beijing's central axis. Among them, Jingshan Mountain was laid in Ming Dynasty, relative height 43 meters ; and The Underground Landmark is 40 meters deep, which pairs with the Jingshan Mountain in a "Up-and-Down" spatial relationship. (Figure 17) The Underground Landmark would be envisioned to be a monumental stage of the whole development of the central axis of Beijing.

As the core of Beijing's IUA hierarchy, The Underground Landmark might represent a key stage of Beijing's underground architecture and would signal the arrival of a new climax of the development of Beijing's underground architecture. It would also drive the development of other IUA s. In the same time, as a world-class underground landmark, The Underground Landmark would make a parallel with the Louvre Museum in Paris and the National September 11 Memorial Museum in New York, writing a new chapter for the development of the world's underground architecture.

## 5. Conclusion

As a vision to the future, this article presents a macro-imagination of Beijing's IUA hierarchy. City developments will face multi-uncertainties, this kind of discussion would function as spatially guide, and it hoards diverse possibilities for the city's future development. It is the spatial hierarchy and morphology of underground architecture in the process

of Beijing's development that makes the focus of this article.

References

Beijing Municipal Commission of Urban Planning, Beijing City People's Air Defense Office, Beijing Municipal Institute of city planning. Beijing underground space planning. Beijing: Tsinghua University Press, Beijing. 2006

Xiao Ran. Connecting Underground Places in Zhong Guancun. Construction Science and Technology. 2004.9

Zhang Yu edit. 2008 Olympic architecture designed by BIAD. Tianjin: Tianjin University Press.2008

Beijing City Planning Committee. Urban design of the central axis in Beijing. Beijing: Machinery Industry Press. 2005

Integrated underground space proposal of Lize Road in Lize financial business district [EB/OL]. http://www.bjghw.gov.cn/web/static/articles/catalog_26/article_ff8080813ce10bca013d808f9f16026c/ff8080813ce10bca013d808f9f16026c.html

Yue Shengyang. Planning of Beijing Lize financial business district and conservation of Mid-Capital of Jin's relics. Beijing City Planning & Construction Review. 010.05

Dong Yu. Stuides in the Construction of Beijing City Wall Site Park. Thesis. Beijing: Beijing Forestry University. 2009

Wen Lidao Planning and transformations of Beijing old city's Moat. Beijing City Planning & Construction Review. 2000.05

Wu Chen. A Study on Beijing Second Ring Road's partially going underground and the revival of the old city's style and features. Beijing City Planning & Construction Review. 2011. 01

The Official Website of The Massachusetts Department of Transportation [EB/OL]. http://www.massdot.state.ma.us/

Leng Hong, Yuan Qian. The Restoration and Reconstruction of Cheonggyecheon in Seoul of Korea. Urban Planning International. 2007.4

The official Web site of the High Line and Friends of the High Line [EB/OL]. http://www.thehighline.org/about/faq

Tong Linxu. Underground architecture. China Building Industry Press.2012

National September 11 Memorial [EB/OL]. http://handelarch.com/projects/type/public/national-september-11-memorial-public.html

Zhu Wenyi, Shang Qian, Li Yu. Guangzhou Well. Beijing: Qinghua University Press. 2011

Beijing central axis is on the World Heritage Tentative List [EB/OL]. http://news.xinhuanet.com/local/2012-11/18/c_113711854.htm.

Exhibation of the third phase planning of Beijing subway line 8 [EB/OL]. http://www.bjghw.gov.cn/web/dtsqghzl8/

Wang Hong. The history of Jingshan Mountain. China Forbidden Society Proceedings Vol2 . 1997.11

Sources of figures:

Figure5, Figure7:Photo by Zhu Wenyi

Figure6:http://www.thehighline.org/galleries/images/high-line-park-photos

Figure8:Zhu Wenyi Studio

Figure14: Zhu Wenyi, Shang Qian, Li Yu. Guangzhou Well. Beijing: Qinghua University Press. 2011

All the other figures are drawn by author.

# Presentation in International Conference Hosted by Beijing People's Association for Friendship with Foreign Countries

Director of the Confucius Institute at Kogakuin University
Saionji Kazuteru

First, I would like to express my sincere respect to you, representatives of all circles, for your relentless efforts to strengthen human peace and progress.

The 20th century is the times of war. Though World War II was over in 1945, Cold War set in following the end of war in battlefield. It is till 1989 when structure of Cold War collapsed that the man started to step into a new era.

Collapse of Cold War brings the whole world significant changes including globalization. Advance of communication technology accelerates the pace of globalization development. Not only people but also other objects even thoughts and culture cross borders and access to a free exchange information era.

Globalization age represents the "multicultural" times. Countries release their information to the world, for which one culture starts to touch with others from all over the world. This results in two phenomena. One is cultural friction and cultural conflict. Some people solely acknowledge the culture of their own countries or nationalities and reject that of others. This gives rise to cultural friction that is further escalated into armed conflict. The other is cultural coexistence. Cultures stimulate peace of the world by mutual exchange, learning and understanding.

Culture represents crystallization of wisdom of each country and nationality. We should exercise the peaceful "arms" like "culture" still more firmly so as to protect our world and maintain the peace.

China's extending of "Confucius institute" as a great cause dates back to ten years ago. It voices the world by native language and local culture. This is extremely essential and commendable. By learning Chinese culture, the peoples of all countries can be able to have more precise and profound understanding of China. Besides China, many other countries, like Germany, French, UK, America, Japan and Korea, are developing such cultural activity. Only a minority of Japanese considers "Confucius institute" marks Chinese "cultural aggression". Slander and libel, such statement is completely ridiculous and of ignorance. Presenting the language and culture of own country to the world plays an essential and boundlessly beneficial role for "cultural coexistence" and "symbiosis of multi-culture".

Next, I would like to deliver a brief introduction of our activities of "Confucius Institute at Kogakuin University".

Recent years have witnessed Japan implementing national policy of Open University for society-oriented education. University should not only cultivate preeminent personnel for society but also make contribution to the development of local society by any means. University is responsible and liable to contribute to and repay society with years of ambulated technological strength and academic knowledge. Our Confucius Institute in a sense exactly has a share in Kogakuin University's contribution to society. Apart from providing a platform for students who take Chinese as elective course to learn Chinese, we place emphasis on the needs of society. Members of our institute are mainly from all circles and classes of Japan.

Currently, there are 13 Confucius institutes in Japan. Every institute is yielding featured and unique cultural activities. The Confucius Institute at Kogakuin University, broadly speaking, is developing cultural activities in five aspects:

1. Chinese teaching activity

2. Chinese culture teaching activity

3. Cultural activity concerning Chinese culture and China-Japan friendship

4. China-Japan friendship exchange activity

5. Research activity concerning China and China-Japan Relations.

The purpose of developing mentioned activities is, by language and culture teaching and exchange activity, to show Japanese people the image of New China, enhance their awareness of modern China, and further non-governmental exchange and mutual understanding between Chinese people and Japanese people.

Meanwhile, we still deliver on the commitments of serving and contributing to local society based on local society as a Confucius institute. For instance, Shinjuku District, where our institute is nested in, is the heart of Tokyo and a "multinational living area". The District is the "disaster prevention demonstration area" of Japan. How to respond to natural disasters or earthquake represents a subject that needs our preparation and practice from time to time. Therefore, Japanese Central Government, Tokyo Metropolitan Government, Shinjuku government and universities in this area together with local residents jointly form an association to conduct regular disaster prevention drills. Complicated problems inevitably arise while holding such activity in "multinational living area", which is attributed to differences of culture, living habits and languages. Language difference in particular more often than not creates communication barrier and even may lead to misunderstanding. Our Confucius Institute gives our strength into play at the very moment. Prior to and at occurrence of disaster, we convey correct evacuation instructions and information to local residents in Chinese. Through close cooperation with disaster prevention and disaster relief principal office, we deliver the latest instructions and information in Chinese to them. Besides, we assign interpreters to shelters for exchange of concerned information, guaranteeing a smooth and reliable communication between local government and Chinese people living in the area.

Known to all, some people and media in Japan are smearing and demonizing China with intent. Influenced by that, Chinese people have a cognitive bias toward Japan. In spite of limited power, we are determined to demonstrate Chinese current rapid development to Japanese nationals by varieties of language teaching activities and cultural activities. We will work diligently to exert salutary influence of education and make unremitting endeavor to strengthen mutual understanding and friendship between Chinese people and Japanese people. I believe the relationship between the peoples of the two countries will have a bright future. The words Prime Minister Zhou Enlai told me 50 plus years ago still reverberate around my ears: "Reviewing history, if China and Japan conflict, Asia will be in a tumult; however, if China and Japan cooperate, Asia will remain peaceful."

Thank you very much.

# Educational culture and international communications in the training of personnel for the tourism industry

Key words: tourism, personnel training, educational culture, professional competence, international community, cross-cultural communications.

Abstract: this article deals with inter-linkages in the process of training professional personnel for the tourism industry, it also deals with educational culture, the international educational environment and with high-quality communications.

The political, economic and socio-cultural development characteristics of the modern world clearly demonstrate growth in inter-linkages and interdependence between various countries. At the basis of this interaction there should be friendship between the people of the world, the integration of different countries into the international scientific, educational and cultural environment, based on the principles of equality and tolerance. It seems that the greatest opportunities here are provided by the tourism and hospitality industry, which currently allows almost everybody to overcome any distance, break down political and economic borders and submerge us in the culture and national way of life of different countries.

We note that, currently, various types of communications, as such, permeate all spheres of modern daily life. In these conditions, the problem of cross-cultural and international communications clearly comes to the fore, and reaches its apogee in the sphere of social interaction, which is what tourism represents. The definition of cross-cultural communications is obvious from the term itself: it is communications between people representing different cultures. In our opinion, this concept was comprehensively explained by Y.M. Vereschagin and V.G. Kostomarov, who defined cross-cultural communications as the adequate mutual understanding of two participants in an act of communication, belonging to different national cultures. [1]

Cross-cultural communications, as an essential factor in modern tourism dominating international tourist activity, can be considered from different angles, including as an activity in itself, its conditions and organizational principles, in addition to the factors and quality criteria of the tourist product, which are directly influenced by the competence of specialists involved in providing this product. Consequently, it seems important to note that to successfully establish high-quality international links at the level of specific individuals, and satisfy their requirements as consumers of a tourist product, cross-cultural communications should be considered a key component of professional tourism education, and in the future - a key professional quality of a specialist in this area. For example, the communication skills of hotel staff at a reception desk may be a significant factor determining the quality of tourists' impressions, influencing their opinion of a country.

The importance should be noted of a variable approach to the level and degree of cross-cultural communicational competence for client-facing and non-client-facing tourism personnel. For personnel providing organizational, housekeeping services, i.e. non-client-facing personnel, a basic skill level can be considered necessary and sufficient, while for client-facing staff, providing social, cultural, excursion and other services involving inter-personal contact, the requirements should be objectively higher. Factors influencing the expected level of cross-cultural communication skill should also include the nature of contact, including its type and form, progression, duration, intensity, etc. The cross-cultural skill of specialists directly employed as guides, translators, tour guides, animators and also as specialists in

tourism marketing will ultimately influence the level of quality of the tourist product, the main components of which are reliability of information, aesthetics, innovation, safety and cross-cultural communicability. [3]

In the context of the importance of developing cross-cultural communications as a professional skill of tourism specialists, one has to agree with the opinion widespread in the scientific community, according to which training of personnel for the tourism industry is cross-border in nature and cannot be performed in a closed system of national higher vocational education.

It seems necessary to look for effective ways to establish close cooperation between science, education and the tourism sector in the real sectors of the economies of various countries in the field of training specialists for the tourism industry, who are prepared to work effectively immediately after graduating from an intermediate and higher level educational institution, carrying out international scientific research in the theory and methodology of international tourism, applied research projects and innovative measures aimed at developing communications in the tourism industry. [4]

Successful examples include the so-called Bologna and Copenhagen processes, which selected the promising area of creating a universal educational space and the form of integrating academic mobility in its higher institutes. The goals set down in the Bologna (1990) and Copenhagen (2002) declarations aim to standardize education in signatory countries and to bring educational systems to a common world standard. The mechanisms for achieving these goals are not only based on common principles and development vectors, formed over the past two decades, they also require joint, coordinated efforts between the participants in these processes. [4]

Remember, that academic mobility is taken to mean the movement of students or employees involved in education for a certain period to another educational or scientific institution (in their own country or abroad) both individually and as part of a joint educational and/or research activity by higher education institutes and scientific centres for learning, teaching, research or increasing qualifications, after which the student, teacher researcher or administrator returns to their primary educational institution. [5]

In our opinion, the practice of international academic mobility may be in particular demand in the process of training personnel for the tourism industry, offering the possibility of combining training with the direct process of cross-cultural communications, in which the specialist participating in the academic mobility programmes is involved.

It also seems important to note that, as part of any such educational programmes, cross-cultural communications to a certain extent moves from the plane of communications between individuals to the level of cooperation between educational cultures in general. The educational culture of each society always acts

as a component of its so-called national culture. Without a common cultural environment, the functioning of an educational culture in its entirety is virtually impossible. Taking this into account, it seems possible at the same time to highlight educational culture as an independent subsystem of society, in which the originality of cultural activity is reflected and the features of the specific system of goals and values of a given society are determined, as well as the real place in these of the institution of education.

Educational culture, consequently, can be interpreted as a sort of space that combines specific material and idealistic manifestations, norms and values, thereby becoming a necessary component of social life.

As an objective indicator of the social actors, society and the state in general, educational culture also objectively reflects the level of social activity of people, being an indicator both of the level of education of a country's population and the development of its society in a specific historical period.

Consequently, it seems possible to consider the educational culture of a society as an entirely social phenomenon, of interest both for in-depth research and - in the context of the current work - closely linked to the problem of cross-

cultural communications, as a direct product of the culture of an individual society. [4]

In the context of educating tourism sector specialists, using academic mobility programmes, several important factors for strengthening international cooperation can be touched upon simultaneously, which makes it possible to simultaneously develop both cooperation in the sphere of tourist activity, and the educational institutions in participating countries.

The increasing popularity of tourism highlights the problem of cross-cultural communications in the modern world, permeating all spheres of human life. These circumstances logically entail the need to foster respect, tolerance and a spirit of hospitality with regard to tourists as representatives of other cultures and, at the same time, raise the bar for specialists in the tourism and hospitality industry, who are at the forefront of cross-cultural communications and act as intermediaries in this sphere.

At the level of the Russian Federation, the next serious trial to test the competence of specialists in cross-cultural communications at the highest level will be large-scale international sporting events, which always attract a large number of tourists from various social and cultural strata – the Olympiad-2014 in Sochi and the World Cup in 2018.

Reference:

1. Vereschagin, Y.M., Kostomarov, V.G. Language and Culture. - M.: Indrik, 2005. – 1038 p.

2. Kostin, R.A., Kuchina, O.V. Training Personnel for the Tourism Sector: Experience of the North-West Region of the Russian Federation. – Information Package from the First International Scientific Practical Conference “Internal Tourism as a Factor in Regional Development in a Market Economy (based on the example of Samara region)”. – Togliatti, VRSUS, 2012. – 5 p.

3. Moshnyaga, Y.V. Social and Pedagogical Conditions for Improving the Training of Tourism Specialists: Dissertation. … Candidate of Pedagogical Science. - M., 1997 - p. 62-63

4. Radugina, O.A. Educational Culture in Society and an Integral Social Phenomenon // Philosophy and Society – 2001 – No. 1 (61) – p. 130-141

5. Semin, N.V., Artamonova, Y.D., Demchuk, A.L., Lukshin, A.V., Muravyeva, A.A., Oleinikova, O.N. Academic Mobility in Russia: Regulatory and Methodological Support - M: MGU Printing Press, 2007. - 208 p.

O.V. Kuchina
Candidate of Economic Science, Associate Professor,
Director of the Scientific Development Department
FSBEI HPE SUSE,
M.D. Kuchina
Senior Manager, Records Department
Progress Scientific Technical Information Centre

# Atron Gregory speech

Hello my name is Atron Gregory, thank you for having me here. I am the co-founder of the Internet Jazz Society and the COO of Roxboro Entertainment which is owned by Stanley Clarke a multiple grammy winning recording artist. I also have been involved in working with other Multiple Award winning musical Artist and music projects over the last three decades and have been involved in selling millions of cd's. In addition I have just completed my third documentary film. In association with EEC and Easton Wang, one of my emphases at this time is sharing the true history of jazz with the world and helping developing countries be more successful.

While I was in college I could not find a major that supported my interest so through a program at San Francisco State University in California called the study of interdisciplinary arts, I crafted a program that took the best from the business department with classes in marketing, public relations, finance and accounting as well as what I could find in the Arts department, theatre arts' management, performing arts management and the study of performance arts, to make a comprehensive program to suit my interest.

So it is my belief that my years in college and my extensive experience in the entertainment industry have prepared me for this new challenge.

Much like my college program jazz, which some consider American classical music, is not a historical journey from one society but a collaboration of different societies and sounds that was developed in the southern part of the United States. Some may say that jazz is the clashing of European Classical melodies with African Rhythms.

The history of jazz is endless and there are many writings and films about jazz history and it's origins but what is clear is that jazz is a beloved art form that spans generations and also spans the globe.

My personal goal is to have a musical cultural exchange between countries and not only spread the knowledge of jazz but to allow the youth to experience the true legends of jazz. Though jazz is now an international medium and there are many great jazz musicians in multiple cultures, the creations of jazz is still from the bayous of the southern part of the United States. Wouldn't it be tremendous for the youth of the world to hear and be taught by the legends of today who have spent time with the true innovators of the art. One of the things we are doing at the Internet Jazz Society is doing a series of films called "Conversations With" "Conversations With" is a series of films with renown jazz musicians talking to them about there craft and their influences and how they became who they are.

For generations music has played an influence on most people around the world.

It is performed for almost every occasion whether it is a funeral a wedding or any and all gatherings of the state or personal birthday celebrations.

There are traditions that spurn centuries of cultural rituals and a musical history.

But because jazz in the scheme of musical traditions is relatively young there are still musicians on this earth that have preformed learned and spent time with the innovators of this form of music. That is why "Conversations With" is so important.

One thing that can bring all cultures together is art and there have been many cultural exchanges throughout time that has proved to be successful in bringing people together.

There are multiple organizations throughout the world that bring musicians and music of multiple cultures together.

Where musicians of different styles come together and share their virtuosity with each other and the youth.

From those encounters sometimes harmony among cultures and countries can be realized at least within the sharing of music.

What our goal will be is to partner with countries and organizations to bring the history of Jazz to countries through master classes for the youth and to do lectures and performances and the showing of films sharing the culture of Jazz.

The question then becomes how does this help a culture.

There are two main issues regarding music in developing countries one is the business of music and the other is the sharing of music through education.

The sounds that most musical instruments make are soothing to us.

Whether it is rhythms of drums or the melodies of the string instruments

Or the strength of horns, but what they really help is the confidence of young people.

One of the ways to build stronger nations is through the youth and one of the ways to build stronger youth is through the arts.

All children are creative and need an outlet for their expression but more importantly it helps promote a productive citizen in society.

Education in the arts is more important than ever. In the global economy, creativity is essential. Today's workers need more than just skills and knowledge to be productive and innovative participants. To succeed today and in the future, children will need to be inventive, resourceful and imaginative. The opportunity to learn about the arts and to perform as artists is an essential part of a well-rounded curriculum and complete education.

The arts help students explore the realities, relationships and ideas that cannot be conveyed simply in words and numbers. And the arts engender innovative problem solving that students can apply to other academic disciplines while at the same time, provide experience working as a team.

Researchers have studied the benefits of music education for decades, consistently finding strong correlations between music and academic achievement. Regardless of socio economic background or cultures, music lessons help students. Whether higher or low quality music programs, students still perform better in Languages and Mathematics than those students receiving no music classes.

Also a study emphasized that participation in music does not hamper achievement in other domains. Widespread notion is that instructional time spent on music courses is wasted because it takes away from time used for academic core subjects and thus slows down student's progress in those courses. Results imply that music participation benefits students in ways that are directly or indirectly linked to higher academic achievement in general.

Research has clearly found that music instruction helps develop the capacity for spatial-temporal reasoning, which is integral to the acquisition for important mathematics skills. One explanation is musical training in rhythm emphasizes proportion; patterns, fractions and ratios expressed as mathematical relations.

In the case of language development, the relationship between music and skill transfer is less obvious or direct. Nonetheless, what we write, read and hear involve words that are used an understood in specific contexts. These contexts can be seen as spatial networks where words are related to other words and expressions. Thus, overall reading skills improve with exposure to music, as does the quality of a students writing.

Performing with others also helps students build critical thinking and problem solving skills. Students who play and instrument in a band need to acquire certain social and emotional skills necessary to be a contributing member including discipline, collaboration, patience, persistence and motivation. In addition performing in front of others helps

boost children's self esteem and gives them the opportunity to overcome fears and see they can succeed.

If a country wants to be a leader in the world and knowing that one of the most important subjects in school is math because of the needs for all of the engineers, technicians and math related fields throughout the world it would be only prudent for a developing country or all countries to incorporate music education as much as possible.

Remember not only are the children our leaders of the future and not only do they need to be proficient in the various academic subjects but they need the mind to create the newest and boldest technologies. How better to develop that mind than through music and the arts.

There are those students that may want to continue with music as a career or arts related professions as a career this is where the challenges comes in. If a child hears music and says "I would like to do that" and I want to do that for a living where are his income streams? That is were some developing countries may need to help. But before I get into that let me share why that is important for some children to see music as a career. Because like most things we have heroes and people we look up to and most often it is people on some type of stage. Whether it is a musician, an athlete or a politician, we need to develop those careers, so that we can have children interested in exploring those idioms willingly. Very few will have the opportunity to become professionals but as stated earlier the opportunity and willingness to learn an instrument will help in a multitude of ways.

The more a developing country gives the youth the opportunity to learn through the arts and more importantly music the more of an opportunity that country has an ability to be a leader on the world stage.

In order for they're to be a large interest in music there needs to be an infrastructure for artist to make money. In many countries there are multiple revenue streams for artist to make money and in many countries there are not especially in some developing countries where there is minimal disposable income. Rampant piracy is happening in many countries.

In the US there was an Internet platform called Napster that was a music-sharing platform where anyone and everyone could upload music and share it for free. So the premise was if you bought a cd and several others bought a different cd then you could upload it to Napster and everyone could share it.

So what happens in a case like that is one cd could be purchased and a million people could have it for free. Obviously that is a huge loss of revenue for the musicians and there companies. But just as important as the revenue is the dream of becoming a professional recording artist, because if that dream is not there on a world stage then the desire of practicing a instrument to the level of perfection needed to become a professional de-minishs. And consequently all of the things that can come from a person enriched with learning an instrument as stated earlier from education to the development of new technologies potentially diminish within those regions. So though many developing countries and people as a whole do not see the significance of protecting copyright laws and paying the musicians and those representing them to either purchase there art or listen to it. The consequences are much farther reaching than just an economic issue. It is an issue of building the youth in all countries to be leaders of tomorrow and we know that music can provide that platform.

There seem to be two main forms of music that cross all socioeconomic and cultural barriers. Those are classical and jazz. And I would submit to you that jazz would and is the style of music that would be most accepted.

Jazz is difficult to define and I would submit to you that there lies the reason that jazz is the perfect format to teach.

One of the definitions of Jazz is " a spontaneity and vitality of musical production in which improvisation plays a role" and "contains a sonority and manner of phrasing which mirror the individuality of the performing jazz musician".

In other words it teaches and allows an individual to be as creative as he wants to be within only boundaries that

the individual creates for himself.

Think how critical that is for a developing nation that is looking towards its youth to be its future if they were taught that the only boundaries are boundaries that they create for themselves. And how better to teach that through music and most specifically jazz.

And I submit to you that the opportunity through film and direct master classes would be a considerable benefit to the youth and leaders of the future.

I look forward to being able to offer this opportunity to whoever is interested.

Thank you

# Beijing People's Committee On People To People Friendship International Conference 2013
# The Importance of Education and Culture In Shaping Values, Friendship and Cooperation Among Nations

Presentation By Audrey E. Kitagawa

## I. Expression of Appreciation

I wish to express my deepest appreciation to the Beijing People's Committee on People to People Friendship with Foreign Countries for convening this international conference. I especially wish to thank Mr. Deng Shaohui, Mr. Wang Xinchao, and Ms. Yu Zhou, of this Committee for their dedicated efforts, and for extending to me an invitation to this conference.

I am a citizen of the United States, born and raised in Honolulu, Hawaii, and currently living in New York City and Honolulu. Hawaii is a small archipelago of islands in the middle of the Pacific Ocean. It is a land of great natural beauty. New York City is the most populous city in the US.

At the end of my presentation, I will share through a short video, the cultural offerings of both cities, as well as the friendship between China and the US, which we must continue to deepen,as well as among all countries of the world.

## II. Why is the China-US Relationship Important?

The US is a land of immigrants, comprised of peoples from most of the world's countries, who came to the US to seek out the American Dream, the promise of a better life. The Chinese were instrumental in building the transcontinental railroad system in the US in the 1800s. There are nearly four million Chinese living in the US, with the greatest concentration of Chinese living in New York City and California. There are also many Chinese living in Hawaii. The Chinese have made significant cultural and educational contributions to the US, that encompass a wide range of activities that include schools, temples, and thousands of cultural organizations. The more countries can share their culture with each other, the greater the understanding and appreciation for each other.

## III. What has been done with specific modes of international cultural exchanges in the US?

The US government has always recognized the importance of education and culture, and has a State Department Bureau of Educational and Cultural Affairs. It seeks to build friendly, peaceful relations between the people of the US and the people of other countries through academic, cultural exchanges, sports, publi -private partnerships, and professional exchanges.

Examples of the types of educational and cultural programs offered are:

- The famous Fullbright Scholars Program, which operates in more than 160 countries. It serves to increase understanding between US citizens and citizens of foreign countries.
- The Sports Diplomacy Program covers a range of sports that involve over 100 countries in a wide range of sports from basketball, martial arts, soccer, swimming, track and field, volleyball, baseball and disability sports.

• The Center Stage includes the performing arts. It introduces artists from abroad to American communities, and invites Americans to engage with contemporary artists from around the world. More than 63,000 people in 27 states connected with Center Stage artists last year through over 100 performances and 380 activities of songs, dances, theater, artist-to-artist exchanges, workshops, classroom visits, school concerts, panel discussions, master classes, community dinners, jam sessions, and more.

• There are also Residential Programs where students can live with families while they undertake their studies in the US.

• The many nonprofit organizations and for profit, private organizations put on cultural events throughout the year that cover a large variety of programs and events.

**IV. What channels are available for establishing international exchanges and contacts at different levels?**

There are many channels available for establishing international exchanges in the US. Examples of them are:

• Education, offered by elite, Ivy League schools, such as Harvard, Yale, Princeton, Cornell, Columbia, Massachusetts Institute of Technology, Stanford, as well as many other high ranking private and public universities, place many Chinese and other foreign students in intellectually stimulating and competitive programs that also provide a wide variety of culturally creative experiences.

• The Critical Language Scholarship (CLS) Programis a program offered by the State Department as part of the National Security Language Initiative. It offers language students of those languages deemed critical to the needs of the US, full scholarship to live and study in the desired country. Students live in host family environments and are completely immersed in that country's language and culture. Students are expected to continue their study of the desired country's language and culture following completion of the program.

• The International Visitor Leadership Program (IVLP), seeks to bring promising or current leaders of foreign countries to the US in hopes of building lasting ties. Former US Secretary of State Colin Powell estimated in 2003 that 39 of the then Heads of State were former participants in this program.

• The Peace Corps is a cultural exchange program run by the United States Government. Founded in 1960 students live and work in foreign countries. The Peace Corps serves as a vital federal agency for promoting understanding of foreign cultures among Americans and of American culture among foreigners. Over 200,000 Americans have volunteered in the Peace Corps in 139 countries.

• People to People Student Ambassador Programprovides four core programs, including Student Ambassadors, sports Ambassadors, Leadership Programs, and Citizen Ambassador Programs. More than 500,000 people have participated in these programs.

• Hundreds of thousands of nonprofit, private and for profit cultural organizations in the US span regional areas that are ethically specific as well as multi-ethnic, religiously based, performance based, and include festivals, fairs, fine and performing arts events. There are many museums, arts and cultural centers, and local, state and national commemorations and holidays that are celebrated in culturally diverse ways.

**V. What experiences should the Chinese learn from the Americans?**

Both countries appreciate and recognize the importance of education and culture. Cultural development and

expression are encouraged because they allow for the flourishing of human creativity, thereby contributing to the overall aesthetic and cultural richness of the country.

In the US, people from diverse ethnic, religious, educational and cultural backgrounds live together in relative stability and peace because they are afforded fundamental respect, and their respective cultural heritages are celebrated, appreciated and recognized. We adopt their foods, songs, dances and linguistic idioms into American culture.

All peoples everywhere wish to be happy, and to live in peace. Therefore, when we embrace good values that demonstrate respect for others such as compassion, loving kindness, harmony, cooperation, peace and friendship towards everyone, we are all actively creating a better world together.

What made America great was its open hand of welcome to peoples from all over the world. On the Statue of Liberty, which is the symbol of welcome for people to America, these famous words are written:

"Give me your tired, your poor,
Your huddled masses yearning to breathe free.
The wretched refuse of your teeming shore,
Send these, the homeless, tempest-tossed to me,
I lift my lamp beside the golden door."

**VI. Conclusion**

What China demonstrated to the world of its positive messages was best seen in the Beijing Olympics opening ceremony, which without a doubt was the most spectacular opening ceremony in the history of the Olympics. The cultural richness that China offered the world, with its clear message of harmony, and the unity of all humanity was well received. The theme song of You and Me succinctly expressed the beautiful message that China wanted to share with the world:

"You and me from one world, we are family. Travel, dream a thousand miles, meeting in Beijing. Come together, put your hand in mine. You and me from one world. We are family.

When President Richard Nixon, the first US President to visit China came here in 1972, he said in part, in a toast to Premier Zhou Enlai, "We saw what is truly one of the wonders of the world-the Great Wall. ..The wall tells us that China has a great history and that the people who built this wonder of the world have a great future. The Great Wall reminds us that there are many walls that divide many people…We are determined that those differences will not prevent us from living together in peace… respecting one another."

May we always remember that we are all members of one family living on one, irreplaceable home, and we live the best together when we care for each other and share our loving kindness with one another. May this international conference plant many seeds of friendship that will bring great harvests of peace to the world. I would like to conclude my presentation with a video that will show the importance of education and culture in creating this world of friendship and cooperation. The video will show the two places where I live, New York City and Hawaii. In Hawaii, we say, "Aloha," which means, "Love." May we always have aloha in our thoughts, speech and actions for each other. Let us all say this word together, three times, "Aloha."

Show Video (4 minutes long)

After showing of video, I will resume the microphone to say:

It has been my privilege to share with all of you today. I welcome all of you to visit the United States. Thank you everyone. I hope to return to beautiful Beijing many times in the future.

# BEIJING INTERNATIONAL FORUM ON PEOPLE TO PEOPLE FRIENDSHIP SUB-FORUM : EDUCATION CULTURE AND INTERNATIONAL COMMUNICATIONS

Rosalinda Rodríguez Olvera

Educar es creer en la perfectibilidad humana, en la capacidad innata de aprender y en el deseo de saber que la anima, en que hay cosas (símbolos, técnicas, valores, memorias, hechos…) que pueden ser sabidos y que merecen serlo, en que los hombres y mujeres podemos mejorarnos unos a otros por medio del conocimiento.

Me siento muy honrada de haber sido invitada a participar en este Forum e intercambiar opiniones y experiencias relacionadas con la educación la cultura, el arte, particularmente el intercambio internacional cultural educativo que beneficia a la humanidad.

Hay que nacer para humano, pero solo llegamos plenamente a serlo cuando los demás nos contagian su humanidad a propósito y con nuestra complicidad. Llega a ser humano del todo –sea humano bueno o humano malo- es siempre un arte.

Estoy convencida de la creciente necesidad e importancia de la cooperación internacional para el acercamiento entre organismos internacionales e instituciones de educación de las diversas Naciones que permite profundizar el entendimiento mutuo y estrechar los lazos para diseñar soluciones conjuntas a retos comunes en un entorno globalizado diverso y complejo Las diversas modalidades de cooperación coadyuvan a la formación cultural educativa y contribuye al desarrollo nacional. Por medio de la movilidad de personas, el desarrollo de proyectos de investigación, publicaciones conjuntas, exposiciones entre otras actividades, México consolida su proceso de intercambio internacional con base en convenios de intercambio establecidos en una gran diversidad de Organismos e Instituciones científicas culturales y de educación superior tanto públicas privadas internacionales México a través de sus instituciones ha establecido múltiples convenios de intercambio orientadas al logro de una extensa cooperación con Instituciones asentadas en los cinco continentes

Estos convenios abren y fortalecen espacios interinstitucionales de cooperación académica y permite a su vez la asociación de miembros o grupos de la comunidad con sus pares o contrapartes ubicadas en centenares de instituciones, distribuidos a lo largo y ancho del mundo.

Existen innumerables oportunidades de movilidad e intercambio que se difunden por distintos medios para beneficio de la comunidad y existen una enorme oferta de Organismos diversos que ponen a consideración de diferentes sectores

El beneficio de estos intercambios lo reciben tanto los estudiantes o participantes, ya que fortalecen el aprendizaje del lenguaje del país anfitrión, enriquecen su experiencia personal e impulso a su desempeño profesional y coadyuvan en el desarrollo de los proyectos, los Centros e Instituciones del área científica, como el campo de las Ciencias Sociales, las Humanidades así como las orientadas a la difusión de la cultura y al turismo.

## CULTURA Y DESARROLLO

Todas las formas de desarrollo en sus dimensiones individuales y colectivas están determinadas en última instancia por valores culturales

Cultura y desarrollo son aspectos constitutivos de la identidad y la vida de una comunidad, de un pueblo, la cultura no es simplemente un elemento ornamental sino parte esencial del progreso material, es el origen y el fin último que hace mover a la gente en busca de una mejor vida.

Las culturas son procesos dinámicos que evolucionan y avanzan debido a la energía que ellas mismas generan y a la interacción con otras culturas con las que se relacionan. En el torrente cultural se mezclan la sangre propia y la ajena. De ahí que igualmente el desarrollo constituya una empresa a la vez ambiciosa y compleja que trata de asegurar a los seres humanos del mundo y de todos los niveles las condiciones de una vida digna.

Asimismo la idea de progreso no se da en un vacio sino en la continuidad histórica que la globalidad solo se concibe como la suma de los elementos locales de identidades que se van fecundando con otras, creando nuevas formas y enriqueciendo la diversidad

Con esa base que lo que tenemos y lo que habrán de heredar los que vendrán después de nosotros será el patrimonio cultural o natural que determinará el futuro de la humanidad Ya que el papel de la cultura no se reduce a ser un medio para alcanzar fines sino que constituye la base social de los fines mismos, ya que el desarrollo y la economía forman parte de la cultura de los pueblos Es por eso que celebro que sea China el país en desarrollo constante el que haya convocado a este Foro que definitivamente producirá beneficios para nuestros pueblos. quiero felicitar a este FORUM y a los organizadores de este encuentro cultural, porque ustedes han construido un nuevo canal que facilitará el conocimiento y la comprensión mutua entre las naciones del mundo.

## CHINA MÉXICO

Como ustedes saben existen en el mundo culturas milenarias ese es el caso particular de México y la República Popular China, que coinciden como pocos países al contar con esa riqueza. Los dos países, con historia de intercambio desde la famosa ruta de la seda, en la que embarcaciones chinas con seda, porcelana y té a bordo navegaban hacia Acapulco, desafiando las grandes olas, hace ya varios siglos

En la actualidad China es el segundo socio comercial de México en el mundo y México es el segundo socio comercial de China en Latinoamérica, Nación que se ha convertido en fuente de crecimiento económico y factor de equilibrio internacional".

A lo largo de los últimos años el intercambio cultural entre China y México viene estrechándose cada vez más, México ha enviado grandes exposiciones a China, como la Exposición de la Cultura Maya y como la Exposición de la Cultura del Jaguar, por mencionar algunas, asimismo, China ha enviado exposiciones, espectáculos y cientos de artistas y maestros a nuestro país para participar en encuentros, intercambios y actividades culturales Estoy segura que incrementar los intercambios culturales y la cooperación bilateral en el futuro nos ayudará a profundizar la amistad y fortalecerá los mismos tomando en cuenta que involucra a la gente, con sus experiencias, intelecto, valores y emociones favorece las debilidades propias, aprendiendo lo bueno de la otra parte e impacta de manera positiva en cada comunidad

### Un ejemplo de intercambio

Yo quiero en esta esta ocasión compartir con ustedes mi experiencia en la realización del Segundo Forum Universal de las Culturas (Monterrey 2007) que fue inaugurado por el entonces Gobernador del Estado.de N.L:, Ahora Presidente de la Empresa Internacional de Consultoria Estratégica Primer Círculo Dr. José Natividad González Parás,

luego del rescate y restauración de lo que fuera la Fundidora de Fierro y Acero de Monterrey, transformada en el Parque fundidora considerado Museo de Sitio que conserva gran parte de las magnificas estructuras de la primera Siderúrgica integral de América Latina, donde se produjo el hierro y el acero con el que se construyo México

El Forum Universal de las Culturas Monterrey 2007 consistió en un conjunto de eventos de gran nivel sin antecedentes en el Estado de Nuevo León. El Gobierno del Estado de Nuevo León junto con la Cd. De Monterrey, asumieron el compromiso de organizarlo como una oportunidad para honrar la filosofía y los principios que el propio evento convocaba. La Cultura y el Humanismo son elementos cruciales del desarrollo integral de las naciones por ello, frente a los grandes planteamientos del siglo XXl en el Forum se propicio una renovación de la conciencia a través de la reflexión y el diálogo. El intercambio de ideas en torno a los temas : la educación, el desarrollo del conocimiento, la paz y los derechos humanos.

Todos las actividades del Forum- conferencias, exposiciones, debates, presentaciones musicales o artísticas- no fueron sino diálogos entre la sociedad y los especialistas nacionales e internacionales, sesiones de reflexión, con intercambio de significados, emociones y contenidos con el fin de fomentar la aceptación del otro con dignidad y respeto

Fueron 80 días seguidos, un acontecimiento para reflexionar acerca de las grandes problemáticas del mundo contemporáneo

## CULTURA PATRIMONIO DE LA HUMANIDAD

El desarrollo cultural implícitamente remite al derecho de una colectividad a compartir historia, patrimonio y códigos de convivencia

Un desarrollo disociado de su contexto humano y cultural es solo un crecimiento sin alma (Axioma de La UNESCO)

Coadyuvemos para que se sigan incrementando los Intercambios Internacionales y se logre un mayor beneficio para nuestros pueblos

Y para terminar aprovecho esta plataforma para proyectar un poco de mi país México

## TURISMO

En México consideramos al Turismo como una pieza clave para el desarrollo económico, la palanca de desarrollo que ofrece la generación de empleos y captación de divisas. México cuenta con Patrimonio natural, cultural, histórico, arqueológico, gastronómico, infraestructura hotelera y servicios de calidad.

México ofrece una extensa variedad de atractivos turísticos: la herencia de civilizaciones prehispánicas y el desarrollo de sitios arqueológicos como símbolos de identidad nacional, la incomparable belleza de sus playas, el encuentro de los vestigios de culturas milenarias conjugadas con grandes urbes, extensas áreas naturales con elementos históricos que lo hacen único en el mundo, así como una infraestructura turística de vanguardia internacional Un gran potencial turístico.

Desde el norte con la incomparable belleza natural de la Bahía del Mar de Cortez, o las maravillosas Barrancas del Cobre en Chihuahua, en el centro Ciudades Coloniales como Puebla, Taxco, Guanajuato, Oaxaca o Guadalajara la tierra del Tequila y el Mariachi, San Cristobal de las Casas, las Cascadas de Agua Azul, y las Lagunas de Montebello y el Cañon del Sumidero en Chiapas así como los sitios arqueológicos El Tajin en Veracruz, Teotihuacán en el corazón de México o Mitla y Montealban en Oaxaca, y ChichenItza en Yucatán o la espectacular Costa del Caribe Mexicano, por citar algunos de nuestros destinos La verdad No me alcanzaría el tiempo para enumerarlos todos.

México es el destino Numero 1 para el turismo procedente de Estados Unidos. Estamos preparándonos con

estrategias de promoción diferenciadas para el turismo Asiatico, particularmente de China y Japón

Con orgullo los invito a visitar México, a disfrutar de esa extraordinaria diversidad biológica, natural, arqueológica, de los Pueblos Mágicos, de las ciudades patrimonio cultural y de mucho más, los invito a deleitarse con la música y con la riqueza de la gastronomía mexicana, pero sobretodo de nuestra gente que los recibirá con calidez y alegría.

Muchas Gracias

# SPEECH DELIVERED BY Mr. VALIYARA BHASKARAN, SECRETARY GENERAL , INDIA –CHINA FRIENDSHIP ASSOCIATION , AT 2013 BEIJING INTERNATIONAL FORUM ON PEOPLE TO PEOPLE FRIENDSHIP HELD FROM 14TH – 15TH NOVEMBER .

Distinguished Guests and Delegates,

First of all , I would like to express my sincere thanks for having invited me to deliver a speech on the subject of education, culture and international communication.

Representing India-China Friendship Association, and being the General Secretary, I have immense pleasure to meet you and interact with the distinguish

Representative from Asian Countries.

A Close look in the history of the entire Asian countries , it is evidently seen that

There was a common thread linking this culture and the civilizations of the people

Who led a unique way of life which was unheard on any other part of the world.. . Therefore , people to people co-operation exchanges of education and friendly relationship were common among the Asian countries ,especially between India and China.

India and China have a long History of culture and civilization. Both the Countries have assimilated each others Cultural heritage and Philosophical thoughts to develop and build up a great cultural legacy with their own unique Characteristic . Like wise , the neighboring countries in Asia also have similar exchanges of friendly relationships .Territorial conflicts and wars among the Asian countries were very rare and hence, there existed tranquility prosperity.

In the past Agriculture Cottage industries like weaving , pottery making traditional medical treatment, Art and literature were attained at its peak.

Trade and commerce were flourished and rare and invaluable commodities were transported to Europe and other part of the world by sea routs and through the farmers silk route. Even today the remains of silk route is seen proclaiming the legacy and glory to the present day generation.

The famous Chinese TRAVELLER, HUAN Tsen and FA HAIEN , The Buddhist Monks and scholar came to India during the reign of Emperor HARSHA VARDHANA and stayed more than 15 years in India visiting almost all the pilgrim Centers ,Monasteries and Education Centers like NALANDA and Taksha shila.

So, in every sphere of the life of the people the influence of constant contact and interaction have helped in molding their own Culture and way of life with distinct features.

Thousand of years of this long history of friendly relations and cooperation had come to a standstill when the European POWERS , Established their Colonies in Asia ,They plundered these colonies and extracted people wealth and land and sent to their Countries. The whole of Asia ,Latin America and African were the victims of European invades.

Just before and after the world war II the colonies were liberated from the imperialist powers , after protracted struggle s wages by the people .The newly independent nations had to face and overcome a number of hardships

from the internal and external forces. They had to build up new nations from nothingness .But because of the firm determination, commitment and sacrifices of many lives they could protect their freedom and sovereignty

The independent new nations in Asia had successfully overcome these challenges and slowly but steadily began to develop in key sectors except , perhaps in certain areas.

In the last phase of the 20th Century , the world has witnessed unpredictable

Development both in world politics and social systems in the world over .The collapse of mighty SOVIET –UNION and the emergence of Unipoler world order paved the way for a NEW ECONOMIC SYSTEM GENERALLY KNOWN AS GLOBALIZATION. THE DEVELOPING AND UNDERDEVELOPED countries in Asia ,Africa and Latin America often fell victims of their Socio –economic and political turmoil. Social Prosperity of the people and friendly relations between the nations are threatened with the New world order propagated and implemented by the advanced countries like U SA and other European Powers.

How to overcome this menace of engulfing the freedom , democracy and economic independence of developing and under developed Countries are a major problem that they have to tackle.

Despite pragmatic approach to implement a comprehensive economic policies on various levels , friendly relations and co –operation on all fronts with neighboring countries shall be established with a view to expand trade relations, exchanges of Technological knowhow ,new method in agricultural productivity

Medical education and latest development in communication sector.

Fortunately India and China have achieved tremendous progress both in Communication and science and technology sector. Development and progress on these areas could be doubled if India and China cooperate each other and fruits of the joint efforts is to be spared for the benefit of the underdeveloped countries.

The developing Countries shall open up their doors of Educational Institutions and Universities to accommodate students from under developed countries .For want of research facilities in our educational institutions. Brilliant students are forced to migrate to USA and European countries for higher studies and suitable employment opportunities. The brain drain from developing and under developed countries could be put under control if the developing countries like China ,India and Japan would provide educational facilities to them. Now China has become an important destination for medical education as the expanses are low. , when compared with other countries, Even though the Asian ,African and Latin American Countries have abundant natural resources and wealth but it could not be utilized for the development and benefit of their people. These are one of the major problems that the underdeveloped countries are facing. The New policy of the Chinese Government is quite help full to the transfer their technical knowhow and highly skilled man power to the underdeveloped countries for their industrial and scientific research work.

The Chinese Government has given due important for promoting friendly relations between the people to people and their co operations ,Cultural exchanges are another key factor to be build up people to people relationship. This would not be limited to the neighbors only but expand to the entire Asian

Countries. Irrespective of their government policies and government to government relationship.

The people of Asia want to live in peace and prosperity. Regional Conflicts will not have no place if the people to people relationship and co operations are developed in the minds of the people.

I hope that this conference and the deliberations would help in promoting the profound ideas and objective that , Beijing International forum on people to people friendship put forward.

The objective of BIFPPF are to be handed over to the Next Generation for a better Asia a prosperous ASIA.

Thank you All.

# DIALOGUE BETWEEN CULTURES: GREECE AND CHINA A COLLECTIVE EFFORT OF APPROACH THROUGH CULTURE

## Introduction

Culture is the safest conduit of approach between peoples. Through the exchange of ideas, social accomplishments, educational advancements, technical innovations and works of art, the understanding between peoples and their mutual progress are achieved. This fact lies at the core of the effort to bring together Greece and China, two countries with unique traditions, through cultural dialogue. Greece and China are the ancient cradles of western and far eastern civilisations. Their dialogue can be organised across several fields and can be applied on specific actions, which will become the starting points for further cooperation.

## Partners

The initiative of the NGO 'Horizons - Actions' and the Greece-China Association for dialogue between the cultures of Greece and China is deployed across five fields (I-V) and six actions (1-6) with the support of further institutional partners from Europe (Demokritos - National Centre for Scientific Research, University of Edinburgh, Foundation of the Hellenic World, Benaki Museum, International Olympic Academy, European Commission). The main partners in China are: The People's Government of the Municipality of Beijing (Xincheng District), The Chinese People's Association for Friendship with Foreign Countries, The Chinese People's Institute for Foreign Affairs and the China NGO Network for International Exchanges.

## Next stop: Beijing

The Greek partners are planning to participate via delegates in the 2013 Beijing International Forum on People-to-People Friendship (13-16 November 2013) with the aim to broaden the scope of collaboration with their respective Chinese partners.

The five fields across which the initiative is deployed are: I. Philosophy, II. Mathematical Thought, III. Art and Museums, IV. Olympic Ideal, V. Culture and Tourism.

## Field I. Philosophy

**Action 1. In Dialogue with World Thinkers: Socrates and Confucius. Living Library Project.**

The Living Library Project (LLP) is a new world cultural landmark for the 21st century digital age. It aims to create a digital environment, an online library, populated by the great thinkers of the world. The inaugurating journey of the LLP into universal thought will take place in ancient Greece and ancient China through the digital re-animation of Socrates and Confucius. The user will be able to participate in live dialogue with the two philosophers, debating with them on philosophical and social matters and also extending the dialogue on contemporary issues. The LLP is based on authoritative philosophical knowledge and on advanced language and digital personalisation technologies. The project envisions the sages of the past becoming part of our everyday life as guides and consultants.

**Institutional partners:**

University of Edinburgh - Ancient Philosophy, United Kingdom
Demokritos - National Centre for Scientific Research

## Field II. Mathematical Thought

**Action 2. Mathematical Thought and Applications through the Ages**

The aim of the action is the joint development by the Greek and Chinese delegations of a number of projects for the creation and exchange of digital interactive exhibits for use in learning communities within both formal and non-formal educational environments (schools, museums, life-long learning outlets etc.). The particular choice of subject is founded on the realisation of the degree in which mathematics and mathematical thought have penetrated and shaped the civilisations which have developed since antiquity. The suggested actions will focus on the implementation of interactive exhibits (e.g. recreations of famous experiments, models of astronomical machines etc.) which will demonstrate the continuation of core mathematical concepts and thinking through the centuries and their contribution in scientific achievements of our age (particle physics, space exploration, information science et al.) and in everyday life. These digital - interactive exhibits will be developed in suitable formats for their use in travelling exhibitions and virtual museums online.

**Institutional partner:**

Foundation of the Hellenic World

## Field III. Art and Museums

**Action 3. Introducing Chinese and Greek Culture**

Getting acquainted with a culture's artistic heritage is the easiest and most direct way to approach it. The varied strands of this heritage can be experienced first-hand in museums during one or several visits. The Benaki Museum is the only museum in Greece where the entire cultural trajectory of Hellenism is deployed from prehistory to the 20th century. This unique quality makes it the ideal entry point into Greek culture for the uninitiated visitor. By 2015, an interactive 'virtual visit' website as well as personal audio tour equipment on site will allow Chinese-speaking visitors to better prepare and experience their visit - this action is already being implemented. The Benaki Museum is actively seeking partners in China for a series of future actions: a festival of contemporary Chinese creativity (architecture, design, gastronomy, fashion); the exchange of art exhibitions with the aim to introduce the two countries' public to their respective modern cultures; and the employment of the Benaki Museum Chinese art collection as an educational resource which will allow Greek- and Chinese-speaking audiences as well as international visitors to approach Chinese history and culture in Athens.

**Institutional partner:**

Benaki Museum, Greece

## Field IV. Olympic Ideal

**Action 4. Reviving the Olympic Ideal**

Measure, harmony, rhythm, precision and clarity were the constitutive elements of Greek culture and were taught in gymnasia through music, poetry, rhetoric, philosophy and conduct. Greek youths were also trained in racing, jumping, wrestling, boxing, javelin- and discus-throwing. It was in Olympia where the games were institutionalised for the first time and the Olympic ideal was developed. It was the ultimate expression of athletic spirit shared by a congregation of free men. The games symbolised the effort for life and prompted participants to display strength, courage, noble

competition and intelligence; they were founded on the freedom and value of humans, on the acceptance of their shared responsibility and on their participation in public affairs. In these ways, the games were a further stage of the educational framework created by philosophers, the framework which promoted citizens into agents of social development. The restitution of this relationship between the body and the spirit which was born in 776 BC and was revived in AD 1896 is the aim of the proposed collaboration between the Greek and the Chinese participants of the International Olympic Academy. It will be implemented through joint actions taken on the occasion of the forthcoming Olympic Games in Brazil.

**Institutional partners:**

International Olympic Academy - Greek participants

NGO 'Horizons - Actions,' Greece

## Field V. Culture and Tourism

**Action 5. A Cultural Mapping of Greece**

The leading role assumed by Chinese economy in the world stage over the past decade and the newly-developed extroversion of the Chinese population have amplified the wave of tourists from China into Europe. Chinese visitors focus on the history and culture of the countries they tour by visiting museums and monuments, by approaching works of art and literature and by partaking in collective actions and entertainments. Greece has to establish itself as the threshold of these visitors' European cultural experience, the nodal point from which they will begin their tour of the continent's historic capitals. The opening of direct air routes from Beijing and Shanghai to Athens is the first and foremost priority for the implementation of this ambition and this action aims to take steps in this direction. Having reached Greece, visitors will be guided in their private perambulations by historical and cultural signage with detailed content and through online applications accessible through 'smart phones' and mobile devices. This cultural mapping will allow visitors to create simple or elaborate itineraries based on affinities of subject matter, geographic proximity or the timelines of the cultural categories they are most interested in (history, philosophy, science, art et al.). This action will make an important contribution to the economic and cultural development of Greece.

**Institutional partner:**

NGO 'Horizons - Actions,' Greece

**Action 6. The Silk Road in the Black Sea**

The action 'The Silk Road in the Black Sea,' which is already in the stage of implementation, is a 90% European Commission-funded project. The countries participating are Greece, Turkey, Armenia and Georgia. The action is a model application relevant to 'Field V. Culture and Tourism' aims. The cultural mapping of the 'silk route' landmarks alongside tourist trails signposted, located and explored through 'multimedia' is an ideal combination of culture, tourism and regional development of the areas crossed by this virtual 'route.' The future aims of this action include the participation of partners from China so that the 'route' can be extended to its point of origin and so that the substructure created by the original project can be utilised within the framework of Greek-Chinese tourist exchanges. This way a 'silk highway' will be laid, allowing a two-way traffic between Europe and China.

**Institutional partner:**

European Commission

# LIVING LIBRARY PROJECT
# DEBATING WITH WORLD PHILOSOPHERS
# CONFUCIUS & SOCRATES

In antiquity people took it upon themselves to erect the Great Library of Alexandria; a monumental repository of knowledge, a grand gesture in the very human battle against time and oblivion. Taking our cue from the ancients, the Living Library project aspires to be a new type of World Cultural Monument, for the digital age of the 21st century and beyond. Our pursuit is to establish a diachronic dialogue with the past, through the creation of a digital space where the ancients live again, a digital library populated by the Great Thinkers of the World themselves, digitally re-animated.

The Living Library project's inaugurating journey into Universal Thought will take place in ancient China and Greece - the birthplaces of fundamental principles, rights and ideas that still define the world today. The access to Universal Knowledge will be achieved through the digital reanimation of Confucius and Socrates. The user of the Living Library site will have the chance to come, literary, face-to-face with these two philosophers, directly debating with them on issues that the philosophers dealt with, and even expanding on contemporary problems, thus allowing them to be actively involved in our everyday reality, as guides and consultants and teachers.

Advanced knowledge, language and personalization technologies will be used to offer a versatile and dynamic interaction between the users and the digital philosophers, creating the impression that the Great Thinkers themselves respond to each visitor's own individual interests helping to shape tomorrow's dreams and visions.

Besides the debating feature, the philosophers' wisdom will be further conveyed by access to biographical anecdotes, historical information about them and their era, responses to them by their peers and successors, and the cultural impact they have had through the ages, through lively text, audio and video interfaces that will animate the context of the interaction between the user and the Greats.

Essentially what is offered is a complete access in the thought of the two philosophical pillars of our cultures through total engagement. This means the analysis of Confucius and Socrates as philosophical, cultural and historical milestones, through the digital reconstruction of these principal thinkers as active, interacting, engaging subjects. The revolutionary character of this approach does not just lie in the notion of knowledge acquisition through activity, but on turning an interactive media into an interacting one. Instead of conversing on the subject "Confucius and Socrates", we turn them into subjects and converse with them.

**Greek partners:**

[1] Non Governmental Organization 'Horizons': Founded in 2003, 'Horizons' has been involved in a broad range of activities, centred on the promotion of cultural creativity, with an emphasis on Hellenic culture, including organising exhibitions, seminars and symposiums, as well as actively supporting films, documentaries and audio-visual programs on the popular arts and other areas of culture.

[2] University of Edinburgh: The University of Edinburgh (www.ed.ac.uk) is one of the largest and most successful universities in the UK with an international reputation as a centre of academic excellence. The University is the leading research university in Scotland, ranking 5th in the United Kingdom, and 17th worldwide. Philosophy has been taught at the University since its foundation in 1583. The Philosophy Department is internationally renowned for

its research strengths in ancient philosophy, consciousness studies, ethics, and epistemology.

[3] National Centre for Scientific Research 'Demokritos': NCSR 'Demokritos' (www.iit.demokritos.gr) is the largest self-governing research organization, under the supervision of the General Secretariat for Research and Technology of the Greek Government. NCSR-D will participate with the Software and Knowledge Engineering Laboratory (SKEL, http://skel.iit.demokritos.gr) of its Institute of Informatics and Telecommunications. SKEL has coordinated/participated in numerous national and EU projects and has very substantial expertise in the areas of language technology, knowledge representation & acquisition, machine learning and personalisation.

[4] D.G. Dimension: The company was founded in 1997, and has been leading a number of culture related projects and initiatives, including the organisation of international exhibitions, the creation of distinguished audio-visual digital productions and documentaries on cultural, historical and educational subjects, as well as digital archiving and the design of online cultural hubs.

**Chinese partners:**

There are a number of functions and responsibilities of the LL project that require the expansion of the partners list to Chinese organisations and experts in the relevant fields. This will not only provide the project with the expertise necessary to cover the Chinese dimensions of the project, but will also intensify and deepen the essential inter-cultural dialogue which is at the centre of the whole endeavour.

# Beijing NGO Association for International Exchange – Greek Horizons-Human and Cultural Activities Association Cooperation Memorandum (draft)

According to the partnership memorandum the two sides signed in 2011, the two associations organized and implemented the “Beijing and Athens Constructive Dialogue between Cultures"on November 14, 2013 in Beijing, and achieved fruitful results. The two sides reached an agreement on further development of association partnerships to effectively promote cultural exchanges and cooperation between Greece and China. On the basis of thorough consultation, the two sides reached the following agreement on specific cooperation projects in the future:

First, the two associations agreed to jointly drive popularization and promotion of Mathematical Electronic Science and Technology Museum project among primary and middle school students in Beijing and Athens as a medium to promote youth exchange between Greece and China, with the participation of Federation of Social Sciences Circles in Beijing, Beijing Association for Science and Technology of Haidian District, Beijing Tourism Industry Association and HellenicWorld Foundation.

Second, the two associations reached an agreement to jointly promote the academic exchange of ancient philosophy between Greece and China, and jointly explore Confucius - Socrates Living Library Project, in cooperation with the scientific community in Beijing,Beijing Association for Science and Technology of Haidian District, Beijing Second Foreign Language Institute and the Department of Philosophy of the University of Edinburgh, in hope of giving positive guidance to people in their work and life as the representative philosophy and ideology of the birthplace of Eastern and Western civilizations.

Third, the two sides agreed to jointly promote interlibrary exchange in Beijing and Athens, to carry out mutual exhibitions of contemporary art and sculpture, with the participation of Beijing Museum Society and Athens Benaki Museum, so as to promote Beijing and Athens citizens’ understanding of each other's culture.

Fourth, in order to expand cultural exchange between Greece and China, the two associations will join Greece and China Relations Association, Beijing Tourism Industry Association, and Athens silk weaving enterprises to create "Contemporary Greece and China Silk Road”, aiming to publicize rich cultural and touristic resources of China and Greece to citizens in Beijing and Athens and to enhance mutual understanding and friendship through a variety of channels.

Fifth, upon request of the government of Xicheng District, the two associations are willing to serve as a bridge to jointly promote the friendly relations between Xicheng District and relevant districts in Athens, and to assist them to dispatch visiting delegations to each other for the purpose of establishing friendly relations.

Beijing NGO Association for International Exchange
(LiXiaoqiang)
Greek horizon of human and cultural action association
(Pinos • Horse Curry)
November 14, 2013 in Beijing

# Some Remarkable Features of Ancient Chinese Mathematics ——A Brief Presentation in Reference to Ancient Greek

What features did Ancient Chinese Mathematics have? We may select a typical knowledge system for comparison. The most ideal example is the Ancient Greek mathematic. Not only is it deemed as the specific embodiment of western scientific spirit, but also the mathematics education received by us may easily impressed human beings that the contemporary achievements in mathematics are developed along the only "Royal Road" blazed by the ancient Greeks. Comparing to ancient Greek mathematics, ancient Chinese mathematics has the following evident features.

## 1. Quick numeral system and calculating tools

Considering that symbol-placed decimalist principle is so simple and popular, we usually neglect the great significance of the invention. As for it, we can imagine that if the present numeral system we are using is not symbol-placed decimalist, but the alphabetical numeration system that is described in Archimedes' The Sand Reckoner, then how much energy and time should everyone spend on learning and mastering numeral system? We might as well try to use the numeral system of ancient Chaldaic people or Romans for a simple elementary operation, which we believe even though the most disciplined accountants will find difficult. This is to say, it is vitally important for humans to adopt a reasonable numeral system. In fact, ancient Chinese mathematicians were in the leading position in the world in the fields of arithmetic and algebra. Instead of saying that they were smarter than their foreign peers, we may say that they were luckier than the latter. It was because that they enjoyed unique exceptional advantages in numeral system and calculating tools. The counting-rods calculation, developed on the basis of symbol-placed decimalist, not only provided powerful tools for numerals and counting, but also led the important mathematical method of separation coefficient. The application of quick numeral system and calculating tools are involved in and incorporated into investigating the outstanding achievements in ancient Chinese mathematics, such as fraction, negative number, decimal number, ratio, extraction, solving the equation of higher degree, expression and solving of linear system of equations, algorithms of greatest common divisor and least common multiple and congruence calculation. On the contrary, it is unimaginable for a nationality which uses clumsy numeration system and despised calculating tools to develop perfect arithmetic system.

## 2. Abundant reasoning methods

Different from ancient Greeks only accepting the deductive logic reasoning, ancient Chinese mathematicians utilized all kinds of reasoning methods freely. Firstly, let's unveil a mystery. For a long time, many people believed that the knowledge without following strict deductive principles shall not be regarded as science. Following this logic, today's physics and chemistry are not a scientific discipline, let alone the biology; then many branch disciplines are not within the scientific scope, either. It is unreasonable. Furthermore, even though strict axiomatized deduction is realized, the system still cannot include everything. This is one of the most profound propositions in the contemporary mathematic philosophy. Secondly, we should ascertain the structuring form of ancient Chinese mathematics system. Generally, ancient Chinese mathematics is a system starting from actual issues, through analyzing and summarizing general principles, norms and methods, so as to finally settle a large category of issues. The practice, which uses out-in complementary principle, sum of infinite excision and compare of cross section to solve problems concerning the

volumes of various solids, embodies the ancient Chinese mathematicians' initial understanding of axiomatic method. Liu Hui's Annotation to the Nine Chapters, 263 AD, also reflected the strong trend of deductive reasoning, but did not sufficiently reveal its logic structure due to the limitation of annotation. The "Distinguishing Notes" in Li Zhi's (1192-1279) Sea Mirror of Circle Measuements, 1248 AD, and "Common Senses" in Li Shan Lan's (1811-1882) Explanation of the Secrets in Squares and Circles (1845), were the basis for the authors to expound "circle inscribed right triangle" and "Jianzhui method" respectively and also reflected some deductive style. But in ancient Chinese mathematics, reasoning was more commonly realized through perceptual intuition, analogy, observation and induction. Liu Hui was bold to resort to experience and intuition in his reasoning, such as the application of diagram verification and solid model verification. Analogy reasoning was used preliminarily in Chapter Shanggong of Nine Chapters of Mathematical Art. Shen Kuo (1031-1095) , Yang Hui (13th century)，Zhu Shijie (1291-1314), Wu Jing （15th century）and Li Shanlan used these methods proficiently. Observation and induction are also frequently used reasoning methods. Zhu Shijie's research on formulas of sum of triangles and higher order interpolation and Li Rui's (1769-1817) exploration on equation roots and coefficient relations are successful examples. The combination of numbers and shapes and incorporating principles into calculation are perfectly justified for ancient Chinese mathematicians. Methods of extraction of square roots, extraction of cubic roots and solving higher order equation are derived from geometrical models. The diagram demonstration advocated by mathematicians in Song Dynasty was the same as the ancient diagram verification, but it focused on expounding the rationality of algorithm instead of geometrical relation. All of these facts demonstrate that although ancient China didn't have the complete deductive system of Euclid's Elements, it cannot be thought that ancient Chinese mathematics didn't have logical thinking or proving. On the contrary, the reasoning ways of ancient Chinese mathematicians were quite diversified.

### 3. Issue of construction and mechanized algorithms

If ancient Greek mathematicians were happy to discover the geometrical theorem, then ancient Chinese mathematicians took the responsibility of constructing elaborate algorithms. Reduce the actual issue through constructing means to one type of calculating model, and then use a set of mechanized algorithms to find out a specific numeral solution. It is the most striking mark in ancient Chinese mathematics, thus ancient Chinese called mathematics as counting learning. Since ancient times, we have had many methods including Jinyou method, Qitong method, Kaifang method, Fangcheng method, Cyclotomic method (Geyuan method), Gengxiangjiansun method, Zengcheng Extraction method, Tianyuan method, Siyuan method, Chinese remainder theorem, Tiaori method and Zhaochai method. Although these methods are either simple or complex, in fact, they are a set of mechanized calculation program. They can almost be copied in modern computers. The idea of mechanized was obvious among the works of ancient Chinese mathematicians. For example, tests like "find the solution by Yingbuzu method","use Zhengfu method to solve" and "use Fangcheng method" used in "Annotation to the Nine Chapters" amount to using the programs of method of excess and deficiency (Yingbuzu method), Zhengfu method (positive and negative) and "equation" (Fangcheng method) as orders of calculations. Among the programs of Geyuan method and Dayanzongshu method, ideas of loop statement and subprogram are very obvious. The basic formulas in arithmetic of right triangles are creatively used for expressing algebra identity of order 2 and reasoning. After establishing some basic algorithm, ancient Chinese mathematicians were also particularly concerned with their universality. For example, Rule of Double False Position can not only be applied to the five basic types of excess data and deficit data that are already known, but also solve the issues of algebra problem of order 1. They can be realized by "supposing twice" the number of excess and deficit data. Method of double differences comes from measuring the high of the sun on the plane land, the complex technology in Sea Island

Mathematical Manuel of the 3th century AD and the method of double positions applied in an inclined surface proposed by Li Chunfeng (604-672) virtually constructed the two poles of the located surface according to different measuring conditions. Then by means of proportional relation, the applied data of fundamental formula were deducted to solve issues. Jiaxian Triangle played a very important role in ancient Chinese mathematics in that its constructive property conformed to the mechanized algorithm explored by ancient Chinese mathematicians. The researches of method of extraction of addition and multiplication, stack accumulation method and interpolation method are related to Jiaxian Triangle.

### 4. Demonstrative function of classical works

Just as the western world regards Euclid's Elements as "Bible of Science", ancient Chinese mathematicians saw Annotation to the Nine Chapters and the notes as the standards for researches and works. From the following names, we can assess the relations between them and the ancient Nine Chapters, including, Detailed Explanation to the Nine Chapters (1261), Computational Techniques in Nine Chapters (1247), General Algorithms in Nine Chapters (1424), Fully Comprehensive Collection of Computational Methods in Nine Chapters (1450) and The Wing of Nine Chapters (1898). From Western Han Dynasty to the late Qing Dynasty, Nine Chapters on Arithmetic became the academic stack accumulation of scientific community across time and space and a research tradition with vitality. Not only did it provide unified glossary and dictionary and writing layout, it also provided diversified instructive thinking modes. The terms used by the medium and mathematicians of later times were not very different from the terms used by mathematicians in Han Dynasty. Most of ancient Chinese mathematicians' works appeared in the form of chapters and sections with collections of questions. Each typical issue had different classified items like "question", "answer", "method" and "note". "Question" proposes the questions with specific values; "answer" gives specific answers; "method" means the methods solving the questions, sometimes amounting to a formula or a theorem; and "note" is the basis of developing "method", like a kind of proving in essence. Since Song and Yuan Dynasties, owing to the development of printing technology, one more item of "draft" was used to describe the calculation procedure finding out "answer" according to "method". The form of this style is closely connected to Nine Chapters on Arithmetic and the notes. Nine Chapters on Arithmetic was also the origin of the questions and methods in Chinese ancient mathematics. The research on circles and balls made by Liu Wei and Zu Chongzhi (429-500) originated from the adjustment of "method of circle" and "method of sphere". The exploration of "numeral solution to equation of higher degree" made by Wang Xiaotong (7th century), Liu Yi (10th century), Jia Xian (11th century), Qin Jiushao (1208-1261) and Li Zhi started from "method of extraction". Gougu Arithmetic referred to several questions in "Gougu Chapter". The large formula system in Sea Mirror of Circle Measuements stemmed from "circle inscribed right triangle". In the Song and Yuan mathematicians' research of "stack accumulation", the difference between reasoning thoughts of Shanggong and Shaoguang are quite obvious. The research on "infinite power series" in Qing Dynasty was diversified, which didn't fundamentally break away from the set patterns of Nine Chapters on Arithmetic.

### 5. Profound humanistic touch and vivid sociality

In contrast to the ancient Greeks regarding mathematics as the spiritual activity of pure notion, ancient Chinese mathematics had a profound humanistic touch and vivid sociality. Plato boasted that "mathematics forces souls to reason with abstract numbers and deserts introducing visible objects into debates". Euclid wiped off all the living resources in his Elements. On the contrary, ancient Chinese mathematicians never negated that their knowledge originated from social practice. Gougu Theorem from Mathematical Canon of Zhou Gnomon of the 1st century BC, came from the

demand of ancient elites who wanted to measure the sky. Nine Chapters on Arithmetic also mapped in the politics, economy, military and culture aspects during the formation of a unified feudal empire during Qin Dynasty and Han Dynasty. Sumi Chapter came from materials bartering; Cuifen Chapter originated from distribution in different grades; Shanggong Chapter came from civil and water resources conservancy project; Junshu Chapter stemmed from official dispatched labor. Computational Rules of the Five Offices of the 6th century, reflected the technical requirements on administrative officers made by the state under the dominance of Confucianist country running spirit. Computational Techniques in Nine Chapters of 1247 reflected the writer's broad knowledge and refined cultivation in the fields of astronomy, geography, meteorology, music, architecture, commerce and military. Liu Wei quoted widely in the notes, such as the classics including Mo-tse, Zuo Zhuan and The Records of Examination of Craftsman, and actual material objects like "gold sphere of one cun" and "Lvjia standard measures". The fields and cases beneficial to reasoning were compiled into the book. Many outstanding achievements in ancient Chinese mathematics had the obvious actual background. "Dahengqiuyi method" is related to "computation of the initial point in a calendar" in the calculation in ancient calendars. The conversion issue of fractions, decimals and different numerical system resulted from the demand of "standard pitch pipes" determined in musicology. Moreover, these issues such as the mathematicians' social status, their bureaucracy, the relationship between mathematical subject development and academic trend can strengthen our conclusion: ancient Chinese mathematics enjoyed its profound humanistic touch and vivid sociality.

# A Vivid Expression of the Charm of Ancient Culture ——An overview of the development of museum in Beijing

Cities are a major achievement of the development of human society, as well as a symbol of social progress, and the culture of city determines the degree of civilization. A city needs to possess its every kind of culture display methods to show its glory and to express its cultural character and charm. Museum is exactly this kind of carrier of culture.

As a famous historical and cultural city, with over 3,000 years' history being a city and 860 years' history being the capital, Beijing is the capital of the People's Republic of China, and the political and cultural center. It becomes a symbol of the Chinese civilization of five thousand years because of its long history, splendid culture and brilliant achievements. In the long process of historical development, Beijing culture has had its own important features, which are continuity, gradual ascending, diversity, blending and creativity of historical culture. Beijing Museum shoulders important historic missions, which are inheriting and promoting the excellence of Beijing culture, and making it the driving force for modern China. The development of Beijing Geological Museum can be regarded as a microcosm of the development of Chinese museums. It has been 100 years since the pioneers of New Culture Movement like Cai Yuanpei and Lu Xun founded National History Museum at the beginning of the last century. Since the founding of New China, after the late 1950s, it reflected the development of Beijing museum entering into the fast lane with the establishment of Chinese History Museum, the Museum of Chinese Revolution, Chinese People's Revolutionary Military Museum, the National Agricultural Exhibition Center and Cultural Palace of Nationalities. Since the Reform and Opening up, the career of museums in Beijing show a healthy and fast development trend, becoming an important force for Beijing's cultural construction. This is mainly reflected in:

## 1, The museum system is basically formed, with the unprecedented increase in the number and category of museums.

Before the Reform and Opening up, Beijing had only 14 museums of all types, including just five municipal ones, of which most were old museums from the last 1950s, showing the basic trend of small quantity, single type and delayed development. Since 1978, on the basis of rapid development of the country's economy and increasingly strong government finance, the development of museum has gained unprecedented support and entered different periods of construction boom one after another. In 1978, there were 14 museums officially open to the public in Beijing; in 1988 there were 56; in 1998 there were 107; in 2008 there were 148 registered museums. Since the 1990s, the number of museums has been increasing at a rate of three to four registered museums every year. In 2008, a total of seven museums were registered within one year. The number of museums registered annually in Beijing has reached 166 by the end of 2012. At the same time, the categories of museums are increasing rapidly. In the beginning of the Reform and Opening up, categories of museums in Beijing area just included history, natural science and technology, and military. By 2012, museums in Beijing have covered dozens of categories, including history, nature, military, science, astronomy, space, culture, art, religion, folklore, architecture, communications, railways, celebrities and so on. The number of registered private museums has increased from scratch to 22. After winning the bid for 2008 Olympic Games in 2001, Beijing started a new round of construction boom of museums, with a powerful building momentum of big and new museums. National Museum of China, New Museum of China Museum of Science and Technology, China Film Museum, and

the Capital Museum were opened in succession. Besides, a number of museums, like China Geological Museum, the National Art Museum of China, China Agricultural Museum, and Beijing Planetarium, were reopened after a large-scale renovation and expansion. Moreover, a number of featured industrial museums, such as China Civil Aviation Museum and Beijing Railway Museum were opened, taking the museums in Beijing to a new level. At this point, a museum system with more complete categories that can fully reflect the cultural characteristics of Beijing was basically formed, and it is matches the historic status of Beijing. Museums of various kinds, different sizes, and distinctive characteristics have become bright pearls decorating the ancient capital, painting a magnificent picture.

**2, Legal construction improves gradually from scratch, providing a guarantee for the development of museums.**

Before the Reform and Opening up, because both the number and scale of museums in Beijing were small, the actual demand of legal construction and regulations was not obvious. The legal construction of industrial regulations was basically blank. After the Reform and Opening up, especially in the 1990s, for the objective need of a prosperous museum industry, culture industry authorities continue to devote more efforts in constructing laws and regulations, and have draw up more than 10 articles of government rules and regulations to provide a legal guarantee for the development of museums in Beijing. These laws included "Beijing Cultural Relics Protection Regulations", "Beijing Cultural Relics Management Regulations", "Beijing Precious Relics Replication Management Approach", "Beijing Museum Registration Measures", "Beijing Museum Regulations" and so on. Among them, "Beijing Museum Registration Measures" enacted in 1993 was the first local government regulation on the registration of museums. Accordingly, museums opened before the implementation this law was subjected to be registered after a comprehensive evaluation. In 1996 three private museums were reviewed and registered according to this law. Since then, private museums appeared in the Mainland for the first time, which was a landmark in the history of the cultural development of the new China and the history of the development of museums, receiving widespread attention from media both at home and abroad.

After years of efforts, the construction of laws and regulations of museums in Beijing gradually went on a formalized scientific track from scratch. At present, laws and regulations on museum management of the city have basically been sound, leading the development and construction of museums in Beijing to a high-speed, orderly, healthy and new stage of sustainable development.

**3, To firmly establish the principle of building museums “for the community and social development" and to turn the museum into a lifelong education classroom for citizens.**

Since the Reform and Opening up, in order to better perform the social functions of museums, the museum professionals have taken efforts to improve the professional level, to change the ideas for work of waiting for visitors at home or relying on government executive orders to attract visitors, and to make full use of advantages. In addition to traditional routines such as organizing exhibitions, museums should also carry out specialized cultural activities compatible with the connotation and extension of their business, take efforts to expand the social influence of museums, and improve social benefits of the museum. Internally, they shall build up themselves in the training of service skills and service awareness for staff on various positions, achieving remarkable results. In more than 30 years of practice, a cultural brand of serving the public has been gradually formed, such as the series of cultural activities of the annual "5.18" International Museum Day, essay competition named "I love Beijing, I love museums" for primary and middle school students, the museum profile competition, the issue of museum pass and so on. Especially in the past 20 years, activities organized by museum volunteers have become a beautiful landscape in Beijing. From last year, the campaign

of "Charming Beijing" that contains hundreds of lectures and is organized by volunteers of Beijing museums has been to factories, communities, schools, and the countryside, receiving positive response. This year they were invited to make presentations in Ningbo and Xiamen and were warmly welcomed and highly praised. This is an important achievement of humanistic construction in Beijing.

**4, To introduce the concept of curation and to enhance the social influence of museum with high-quality exhibitions.**

Exhibitions are a unique social education means and the main way to serve the society in museum. Since the Reform and Opening up, museums began to focus on visitor research and choose topics and exhibitions on that basis. For example, "Factual Show of Chongqing Sino-US Cooperation Camp", "Yan'an Spirit Exhibition", and "Twelve • Nine Sports 50th Anniversary Exhibition" conducted by Capital Museum have attracted a large quantity of visitors. Into the 1990s, the museum laid emphasis on social needs. According to social hot social issues that the public is concerned with and the characteristics of the museum's collections and location, it planed exhibition shall be organized specifically, such as "Dunhuang Cultural Relics", "Qingzhou Stone Art Exhibition" organized by the China Museum of History, the "Century Treasures" organized by China Millennium Monument, etc. They bring out the museums' advantage of direct and strong visual impact, meeting the audience's psychological needs to the biggest extent, and trigger a strong social response. By 2000, museums in Beijing have been able to launch more than 200 kinds of exhibitions to the community every year, and have played an important role to improve Beijing's status as the country's cultural center and to serve the general public. In 2001, the concept of "Humanistic Olympics" took museum curation and exhibition quality in Beijing to a new level. The program "Beijing Olympic Double 200 Regional Museum Exhibition Project" that had come up with at that time has become a powerful push to enhance the level of exhibitions. Since 2006, a number of exhibitions with great social impact have been orchestrated in museums in Beijing, which were launched after the Olympics. They have won unprecedented success and gained high praise from people from all walks of lifeindustries and the society. These exhibitions included "Ancient Painting and Calligraphy Exhibition", "Empress Clothing Exhibition" carried out by the National Palace Museum, "Art of War" exhibition by Military Museum, "Exhibition of Inventions of Ancient China" by the China Science and Technology Exhibition, "From Sanxingdui to Sands Exhibition" by the Poly Art Museum, "Yung's Family Collection Exhibition" by the China Millennium Monument, "Beijing cultural Relics Exhibition", "Chinese Memory - 5,000 Years of Civilization Treasures Show", "Yangtze River Civilization Exhibition", and "Fair Competition - Exhibition of Ancient Greek Athletic Spirit" by the Capital Museum. The introduction of exhibition from the world's ancient civilizations and the world's famous antique museums became a highlight of this period. A number of exhibitions from ancient Rome, ancient Greece, ancient India, Mexico, the British Museum, the Louvre Museum of France were introduced by National Palace Museum, the National Museum, the Capital Museum and the China Millennium Monument, including. This series of exhibitions showed the brilliant achievements of human civilizations from a multi-dimensional perspective and featured various topics. They have not only affectionate chant for indigenous civilization, but also heartfelt praise for foreign civilizations. Therefore, they have attracted tourists from all over the country and around the world with rave reviews, becoming a brilliant chapter in the development history of Beijing museums.

Beijing museums have gone through 100 years' journey. For centuries, especially since 30 years after the Reform and Opening up, Beijing Regional Museum has contributed to the construction of city culture. As Beijing is developing and being built into an international metropolis, it needs museums to keep in mind the historic mission and trust to make new contributions to the construction of cultural centers, to enhance level of city culture, and to build a humanistic Beijing.

# Aiming at world cities Offering good environmental services Speech delivered at Urban Construction Administration Forum of the Beijing International Friendship Forum in 2013

Director of Municipal Commission of Xicheng District of Beijing
Liu Shudong

Distinguished guests, leaders and friends:

Good afternoon!

I have great pleasure to meet you, and would like to take this opportunity to introduce the construction management of Xicheng District in Beijing, share the achievements, discuss and solve the problem, and clarify new direction of city construction and the new idea of management to make the sky of Beijing bluer, ground more green, the water more clear, and the city more beautiful.

## 1. City management of Xicheng District

Xicheng is located in the center of Beijing. It is the leading organ of the party and the state, the core function district of the capital and an important carrier of country's political center. It has a financial center with international influence, a cultural center with a fusion of traditional and modern development, and domestically and internationally well-known commercial centers and touristic area. Xicheng is a harmonious and livable healthy district. Its city management function is very prominent and plays a very important role.

The area of the district is 50.7 square kilometers. The district has15 streets and 255 communities. Registered population composes more than 470 thousand households and reaches more than 1,380 thousand people. The resident population is more than 1,287 thousand. With complete road construction in the region and all kinds of municipal facilities, Xichen has a high level of hygiene system and city operation.

There are 1,662 roads altogether, among which there are 78 municipal roads with traffic mileage of 198.6 kilometers (not including the street blocks and alleys), 1,564 roads under regional managementwith traffic mileage of 415.44 kilometers. Density of the road network is 3.92 kilometers/square kilometers. Network spacing between roads is 510 meters. The regional road network pattern of "nine vertical and twelve horizontal" is basically formed. The Area has 108 bus lines, 415 bus stations, and the coverage of the service within 300 meters around the bus station reaches about 85%.

Possession of motor vehicle (including bus, truck, car, motorcycle) is 445 thousand in total, per 100 households owning nearly 40 cars. And the district has 162,800 berths at 1,277 parking lots of all kinds. Among them, 121,000 berths are at 726 business parking lots, 41,800 berths are at 551 non-operational parking lots. The ratio of motor vehicles and parking lots is 1:0.23.

Average traffic index of morning-evening rush hours at working day is 7.4, which means "moderate congestion", but would become "serious congestion" during specific time periods (7:30-9:00 and 17:15-18:30). Congestion mainly occur in import and export sections of Erhuan road and regions such as Xizhimen, Xidan at morning-evening rush hours.

There are a total of 77 closed cleaning stations and 1197 toilet blocks (not including 84 mobile toilet blocks). Annual garbage refused totals about 620,000 tons. Removal rate is 100%. A total area of road cleaning is 8,274,000 square meters. Washing rate of key streets and key areas reaches 96.45%. Erosion rate reaches 96.14%. Spray and dust reduction rate is 100%.

Average concentrations of the main pollutants in the air such as Sulfur dioxide, nitrogen dioxide, respirable particulate matter (Pm10), and fine particles (Pm2.5) were 32.3, 58.1, 114.8, 94.4 mg / m3 respectively. The average dust capacity is 6.5 tons / month• square kilometers.

The average annual volume of water consumption is 93,237,000 cubic meters. Possessive quantity of water supply pipeline (diameter is DN300mm above) is about 291 km. The drainage system adopts the rain-sewage divergence system. Possessive quantity of rainwater pipes is about 248 kilometers. Possessive quantity of sewage pipes (including combined sewer) is about 504 km, basically forming the water supply pattern of “three vertical and seven horizontal" and drainage system pattern with a rain-sewage divergence system.

A total area of centralized heat supply within the district is 7,160,800 square meters. The heating pipe network covers major roads, and the quantity of heating pipelines with above 500 mm diameter covers 80 kilometers, accounting 50% of the total heating area. The district has a 800-kilometer medium pressure gas pipeline network, for residents' cooking and heating boiler.

City construction and management function is divided into two parts: municipal and regional. The management of trunk roads and key streets in the city is in the charge of Municipal Road Bureau of Construction Management, and construction and management of hydropower gas heating and communication is in the charge of relevant municipal departments and industry construction. The district government departments are jointly responsible for the specific affairs such as construction and management of regional branches and urban blocks and alleyways, management and services of part of the infrastructure for water, electric, gas and heat supplying, and the management of city appearance, and safe operation of the city.

**2. Environmental construction management of the city**

To guarantee safe, orderly and efficient operation, the city should seize the opportunity of Beijing Olympic Games, adhere to the scientific outlook on development as guidance, focus on humanized, refined, digital, international standards, and stay in line with the concept of "carrying out construction and management simultaneously with an emphasis on management", strengthen the construction of city environment and constantly improve the level of fine management.

Forming the new landscape in environmental construction. The “Three Roads" landscape construction has built quality work for the city environment. Improvement work of environmental landscape in culture preservation districts is promoted strongly. Repair of " two vertical and four horizontal " roads including Lingjing alleyway, Xi'an men Street and Nanbei street, renovation of building façade, putting overhead line into the earth, underground pipeline construction and landscaping construction were all completed. Renovation of the landscape lighting facilities of Xichangan Street and its extension line, "three parks and one bridge" , and residential buildings located at the Qiansanmen Street brings a new luster to the beauty of Beijing. Renovated Ganshi Bridge and Yindian Bridge, and the new footbridges and pedestrian bridges in Xidan area, have improved the road capacity, and become the new landmarks of Beijing. The construction of 16 boutique streets and 18 boutique residential communities becomes the new standard model of qualified streets and communities. Determined and consistent demolition of illegal building effectively eliminates illegal constructions in the city, restores the original appearance of the building, and reshapes the spirit of the city, which establishes good

environment foundation for new Xicheng with activity, charm and harmony.

Capacity of municipal roads is enhanced continuously. Through the repair of 40 to 50 roads, micro-circular improvement of about 8 roads annually, and the improvement of water, electric, gas, heat supplying and telecommunication infrastructure, the upgrading of city facilities is promoted. Intact rate of regional business and roads in Tourist District reaches 95% and intact rate of the general streets and road reaches 85%. At the same time, the government should adhere to using unoccupied municipal land and unbid construction land to construct temporary parking lots, renovating residential parking lots, opening parking lots with social units, adopting peak-avoiding parking and limited parking, and roadside parking if allowed, increasing 3000 - 4000 parking lots annually, which effectively improves the traffic efficiency, and continuously improving the capacity of the city. Xicheng is a "national demonstration zone of barrier free facilities". Public places such as roads in district and various large or mid-scale hospitals, organs, schools all achieve the standard of barrier free facilities construction, forming a barrier free environment in accordance with international cities.

Remarkable achievements in city appearance management. Through continuous rectification of "village in the city" and "marginal land" and environmental improvement of key areas and streets, especially the renovation of the back alleys and old communities, the area of urban landscape continuously grows, the appearance of the city is effectively improved, and the living environment of the residents is continuously improved. The green area of the district is 1,044.95 hectares, and green coverage rate is 28.92%. Green parkland green per capita is 3.32 square meters. Shichahai scenic area and financial street area won the "China Habitat Environment Award" successively, showing the new image of a modernized city and the traditional style of a historical and cultural city. City landscape lighting and advertising plaques are all in accordance with the "Guidance of Plaque Marking Setting in Xicheng District". The city furniture is standardized and in order, “three stalls" governance is significantly effective. Environmental sanitation of key streets and key areas in the district is mechanized; sanitation cleaning level has been ranked first in Beijing.

### 3. Main management mechanism

After years of exploration and practice, environmental construction of Xicheng District is divided into six clear function areas including overall planning, coordination scheduling, implementation, examination and approval, supervision and inspection, and emergency relief. The six systems including approval, inspection and supervision, classification management, implementation, comprehensive law enforcement and financial security are continuously improved. Public service function of the government obviously changes, the level of administrative capacity is upgraded, and the role of the government is played well, forming a complementary win-win city construction management system and mechanism which is unified with central ministries, various big enterprises, municipal units, representing the level of management modernization of Beijing.

Adhere to new standard and new ideas, and promoting new development of city management. The practice forms new ideas of city management such as “management and approval are a reasonable allocation of resources", "fine management is the effective management", and "carrying out construction and management simultaneously with an emphasis on management". Government’s management function is to realize the shift from "work type" to "service type". Adhering to the theoretical exploration and innovation of management means, the district has taken the lead in Beijing to bring out new methods and he new modes such as environmental classification management, parking management of street and community of "four in governance for two limits," city management linkage of "four in one" , urban management and law enforcement of "five objectives one check" , "three rapid one clean " and so on, promoting the fine management of city.

Focusing on strengthening the coordination function and enhancing the environmental management level. On the district level, adhere to the integrated city association management system , strengthen the overall coordination, and ensure the responsibility performed. On the street level, convene a coordination meeting of urban management every two months, analyze the details of city management, and research the improvement measures next.

The district insists on extensively mobilizing social forces to participate in environmental construction. In the area, the central and municipal units have made a model in using open source for parking, beautifying the courtyard, actively saving water and electricity, reducing kitchen waste treatment in organ canteens.

Various regional units form a new pattern of environment construction and management of “special block system". Departments in charge of management, operation, law enforcement, and supervision are balanced with each other, and cooperate with each other, to realize whole linkage of city management.

Actively promote city management to move from regional level to lower levels. Give full play to the role of coordination development of the streets and regions. The streets shall fully command the territorial law enforcement power, uniformly coordinate and solve the problem of environmental order within respective area, and enhance administrative law enforcement force of the city management. The entire district forms a new pattern of city management which is taking localization management as the main body and industry ownership as the main responsibility. It shall be guided and coordinated by comprehensive departments, actively cooperated by law enforcement departments, and monitored by urban management departments, changing street environment management and management from the "point, line, sheet" to "full scale" management.

Setting up a classified and informational mode of city management, and ensuring that the city operates safely, orderly and efficiently. It shall be adapted to the change of city management from the function portfolio management to function partition management. According to the resource distribution and function orientation of the area, the city is divided into seven types including regional government activity area, financial business district, the downtown business district, the district of traditional features, transportation hub areas, public leisure areas, and residential areas, formulating corresponding management objectives and management standard, adopting relative work methods and evaluation index to effectively solve “no difference” problem of environmental management standard and evaluation, and forming a new mode of classification environmental management of city to solve environmental problems of non key areas and non key parts.

Strengthen the construction of city management platform. The city is divided into 2,432 grids of 10 thousand meters. The coverage area of the "grid management " shall be improved to achieve platform docking, utilization of resources, online supervision, and performance appraisal of basic information sharing system, forming a new service model of city operation and management which combines normal city management and emergency management, government management and convenience services, operation monitoring and key points security, commanding and decision-making and analysis, to ensure the completion of various services.

Encourage social public participation to realize "people govern the city". In government decision-making and consultation, it shall set up consulting institutions of the city management composed of government, experts and scholars, representatives of the public, let the public participate in city management in the aspects such as decision making, supervision, law enforcement, and effectively avoid error rate of decision-making. For social supervision, efforts shall be made to expand public participation and social oversight, to improve the two-way transmission and exchange mechanisms. Government publicity system shall be intensified to effectively expand the function of NPC deputies, CPPCC members and the citizen reception day system, and to prompt the city management to change from passive to active, and government behavior to joint participation of government and public.

Especially in the publicity aspect, it shall give full play to the advantages of streets and communities (commission), and extensively encourage central units, social enterprises in the zone to participate in environmental protection, waste classification and reduction and other promotional activities. It shall try to educate, mobilize and rely on the masses, advocate civilized lifestyle to raise the awareness of environmental protection and cultivate the concept of green travel and consumption, forming a good atmosphere of better city life with home sharing.

**4. Difficulties facing the area's construction management**

Firstly, Xicheng District has a large population base. It has a large number of motor vehicles in the region, lots of transit vehicles, and serious traffic congestion. The ratio of the quantity of motor vehicles and parking lots is 1:0.23, far from the proportion of 1.1-1.3 of parking lots and vehicles proposed in relevant standards.

Secondly, municipal infrastructure is weak. Aging and overload of facilities are serious. The contradiction between culture preservation and housing improvement is protruding.

Thirdly, it is difficult to improve the regional air quality continuously.

City construction management is a dynamic process, and also an eternal theme. Solving this or that kind of contradiction is in itself a process of continuously promoting the city's development and progress. We hope people to strengthen exchange and cooperation, and seek common development and progress. The strategic transformation of the city's environment construction and management of Xicheng District shall be promoted, as well as the quality of city construction.

Make our earth more and more clean, more and more beautiful, more and more harmonious, and more and more livable.

Thank you all.

# Presentation in International Conference Hosted by Beijing People's Association for Friendship with Foreign Countries

Director of the Confucius Institute at Kogakuin University
Saionji Kazuteru

First, I would like to express my sincere respect to people around the world for whose relentless efforts to strengthen human peace and progress.

The 20th century is the times of war. Though World War II was over in 1945, Cold War set in following the end of war in battlefield. It is till 1989 when structure of Cold War collapsed that people started to step into a new era.

The collapse of Cold War brings the whole world significant changes including globalization. Advance of communication technology accelerates the pace of globalization development. Not only people but also other objects even thoughts and culture cross borders to enter a free information exchange era.

Globalization age represents the "multicultural" times. Countries release their information to the world, for which one culture starts to communicate with others from all over the world. This results in two phenomena. One is cultural friction and cultural conflict. Some people solely acknowledge the culture of their own countries or nationalities and reject that of others. This gives rise to cultural friction that is further escalated into armed conflict. The other is cultural coexistence. Cultures drive the world peace by mutual exchange, learning and understanding.

Culture represents crystallization of wisdom of each country and nationality. We should exercise the peaceful "arms" like "culture" still more firmly so as to protect our world and maintain the peace.

China has been engaged in extending "Confucius institute" for ten years . It speaks to the world by native language and local culture. This is extremely essential and commendable. By learning Chinese culture, people around the world enable to have more precise and profound understanding of China. Besides China, many other countries, like Germany, French, UK, America, Japan and Korea, are developing such cultural activities. Only a minority of Japanese criticizes "Confucius institute" as "cultural aggression". Such statement is slander and libel, which is completely ridiculous and of ignorance. Presenting the language and culture of own country to the world plays an essential and boundlessly beneficial role for "cultural coexistence" and "symbiosis of multi-culture".

Next, I would like to deliver a brief introduction of our activities of "Confucius Institute at Kogakuin University".

Recent years have witnessed Japan implementing national policy of Opening University for society-oriented education. University should not only cultivate preeminent personnel for society but also make contribution to the development of local society by any means. University is responsible and liable to contribute to and repay society with years of technological strength and academic knowledge. Our Confucius Institute in a sense exactly has a share in Kogakuin University's contribution to society. Apart from providing a platform for students who take Chinese as elective course to learn Chinese, we place emphasis on the needs of society. Members of our institute are from all walks of life of Japan.

Currently, there are 13 Confucius institutes in Japan. Every institute is taking featured and unique cultural activities. The Confucius Institute at Kogakuin University, broadly speaking, is developing cultural activities in five aspects:

1. Chinese teaching activity

2. Chinese culture teaching activity

3. Cultural activity concerning Chinese culture and China-Japan friendship

4. China-Japan friendship exchange activity

5. Research activity concerning China and China-Japan Relations.

The purpose of developing above mentioned activities is, by language and culture teaching and exchange activity, to show Japanese people the image of New China, enhance their awareness of modern China, and further non-governmental exchange and mutual understanding between Chinese people and Japanese people.

Meanwhile, we still deliver on the commitments of serving and contributing to local society based on local society as a Confucius institute. For instance, Shinjuku District, where our institute is nested in, is the heart of Tokyo and a "multinational living area". The District is the "disaster prevention demonstration area" of Japan. How to respond to natural disasters or earthquake represents a subject that needs our preparation and practice from time to time. Therefore, Japanese Central Government, Tokyo Metropolitan Government, Shinjuku government and universities in this area together with local residents jointly form an association to conduct regular disaster prevention drills. Complicated problems inevitably arise while holding such activity in "multinational living area", which is attributed to differences of culture, living habits and languages. Language difference in particular more often than not creates communication barrier and even may lead to misunderstanding. Our Confucius Institute gives our strength into play at the very moment. Prior to and at occurrence of disaster, we convey correct evacuation instructions and information to local residents in Chinese. Through close cooperation with disaster prevention and disaster relief principal office, we deliver the latest instructions and information in Chinese to them. Besides, we assign interpreters to shelters for exchange of concerned information, guaranteeing a smooth and reliable communication between local government and Chinese people living in the area.

Known to all, some people and media in Japan are smearing and demonizing China with intent. Influenced by that, some people have a cognitive bias toward China. In spite of limited power, we are determined to demonstrate Chinese current rapid development to Japanese nationals by varieties of language teaching activities and cultural activities. We will work diligently to exert salutary influence of education and make unremitting endeavor to strengthen mutual understanding and friendship between Chinese people and Japanese people. I believe the relationship between the people of the two countries will have a bright future. The words Prime Minister Zhou Enlai told me 50 plus years ago still reverberate around my ears: "Reviewing history, if China and Japan conflict, Asia will be in a tumult; however, if China and Japan cooperate, Asia will remain peaceful."

Thank you very much.