



**11 - 13 OCTOBER, 2015**  
**ADNEC | Abu Dhabi, UAE**  
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# Conference Proceedings

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Proceedings of the 11th Ecocity World Summit, Abu Dhabi – UAE

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## SUSTAINABLE CHINESE ECO-CITIES: DENSITY AT HUMAN SCALE

中国可持续发展生态城市：的密度，以一个人的尺度

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### ABSTRACT

A growing housing demand will be fostered by the migratory flows prospected for the reduction of restrictions related to the *hukou* system that regulates working permits (2013 ECFIN report), to the extent that in 2030 half of the city population will be composed by migrants. Although eco-city still do not provide a fully satisfactory answer to the need for social housing, these will be a key element for future urban development. Opening up to migrants implies the need for a more in-depth intervention on the construction, where social housing may replace those high-quality residential dwellings of the eco-city, often too expensive for the real market demand.

Local authorities' efforts directed to sustainable cities are significant and aim to produce a reliable duplicable model. However private investments are mainly driven by speculative reasons which favor standardized projects serially repeated and completely not contextualized, that may turn out to be ecologically and economically unsustainable. Indeed despite some best practices, the eco-city are designed more to draw the market attention than for local needs.

The article wants to compare the results of some eco-city project in terms of livability and density of proportions, with those acknowledged factors of urban degradation that already affected the functionalist neighborhood of the International Style, built in the 50s to face the European housing emergency. By demonstrating the excessive standardization and functionalism of some of these new settlement, it is proposed to restore a human scale and to conceive the eco-city starting from the end-users and the context.

**Keywords:** China, Eco-cities, *hukou*, sustainable development , urban planning model

### INTRODUCTION

Centralization in progressively wider cities is becoming the typical urbanization model. In parallel, the shortage of natural resources made recycling, cities' sustainability and garbage regeneration a fundamental issue that is debated internationally.

Many research branches focused on this subject aim at finding morphologies and parameters – from experimental methodologies to urban/single building metabolism – that adequately support domestic regulations. The object of these studies is urban modeling and buildings' coding.

Cities' sustainability plays a strategic role in the future of urban development. The Kyoto Protocol, the *Agenda 21* and the Aalborg Charter are among the first international agreements aimed at regulating sustainable development. Europe implemented the Kyoto Protocol with Directive 2010/31/EU, requiring Member States to reduce of 20% energetic consumption in the European Union within 2020 through the use of renewable sources for the buildings that are responsible of 40% of the EU total energy consumption.

The consumptions' reduction is parallel to the foreseen growth of global population. The estimated increase is 2 billion people, with 66% of them living in the cities. 90% of urban growth will be in Asia and Africa. In this context, Chinese cities will have to face the demand for residence of 300 million people, i.e. half of the European population.

## New Urbanization Perspectives

With the opening to foreign markets since 1979, Chinese urbanization significantly grew. The number of residents in the cities rose from 20% of population to 52% in 2013 with an average migration of 15-20 millions people per year from countryside to cities.

With the reduction of the limits to the moving for the *hukou* (户口), such number will further increase with forecasts of a 68% rate of urbanization in 2030.

Until now, Chinese Government – with the *hukou* system providing for restrictions aimed at limiting the moving of population – managed to pre-empt uncontrollable mass migrations and partially regulated the phenomenon of the increasing urbanization.

The *hukou* consists of a register of the births established with the Xia Dynasty (about 2,100-1,600 B.C.). Only in 1958, this register became an instrument to control migrations from rural areas to urban ones, with the application of strict repatriation measures. With the Great Leap Forward, the division between rural and urban *hukou* became a Government's instrument to assign work. Rural *hukou* were collectivized in order to provide the city dwellers with food. Urban *hukou* lived with a completely different status, receiving social, economic and cultural benefits. In addition, urban residents working in the industries had food rations established by the central Government with 1,500 Kcal per day, while farmers could benefit only from the residual food (that was usually not enough to survive). This unsustainable system led in only 20 years to almost 30 million deceases.

Only from 1980s, in parallel with the opening of the Chinese market to foreign capitals, the situation started to change.

Today, the *hukou* system is a deterrent for migrations because it binds residence to the birthplace through the recognition of public primary services such as education and sanity. Due to the opening to foreign markets, state-owned enterprises (SOE) and public cooperatives have been substituted by private enterprises. With the reduction of the number of public cooperatives that cut down about 100 million workplaces, rural *hukou* have been forced to look for job in other cities offering more opportunities. These migrations are not always authorized and rely on temporary living permits released on the basis of specific requirements. In any case, in the last 30 years, more than 200 million Chinese people looked for job illegally, living on the edges of society.

By illegally migrating from their birth cities to work in private industries, farmers usually live in spontaneous slums that do not meet basic hygienic and sanitary requirements (and, if they are lucky, they live in dormitories inside the factories). The net division that for more than 20 years marked the population made *de facto* rural *hukou* a sub-category of urban *hukou*. This is demonstrated by the fact that migrants' salary is far below that of city residents. The need to illegally migrate to find work increased with the public centralization of the production, which jeopardized local economies. Social differences favored the industries in the Export Processing Zones (EPZs), where today more than 20 million people work with extremely low salaries. For example, in Guanxi region the average salary *per capita* in 2006 was only 2,000 USD. The most famous EPZs are the Special Economic Zones (SEZs), spread since 1979, the Technological Development Zones (ETDZs), and the High-tech Industrial Development Zones (HIDZs).

In order to improve the condition of rural *hukou*, since 1990 Chinese authorities started a number of reforms, in small cities or villages, which facilitate the release of temporary working permits, or promote conversions of the residential rights.

The Chinese Government, which was already sensible to the *hukou* issue, during the 12<sup>th</sup> Five-Year Plan (2011-2015) promoted a political and economical reform to help work mobility. The Prime Minister, Li

Keqiang, analyzed in his PhD thesis the need for a liberalization of the *hukou* system to push the country's economic development. Indeed, the need to balance the *hukou* system – by favoring freedom to move to the cities – would permit to implement the national economy and to restore the economic consequences of the western crisis and of the growth of domestic welfare.

Currently, migrations are mainly temporary (with an average duration of 5 years) because of their illegal nature that does not allow migrants to move regularly with their families. A reform would increase the number of migrants moving permanently in the cities with their families. After such a reform, urbanization would be the key to increase domestic demand. This would constitute a necessary balancing mechanism for Chinese economy.

The Chinese Government, in these last 50 years, reacted promptly to residential demand by implementing different strategies. Urbanization in China is a phenomenon without any precedents in terms of speed and sprawl.

Even if with very different scales, the settlements that have been created tried to respond to the same request of residential housing emerged with post-industrial urbanizations. In terms of architecture, accelerating the planning processes with well-established models has been adopted and applied on a large scale. Therefore, it is not difficult to find various analogies between these new settlements and the post-war European and Soviet urban types.

The speed with which China had to face this residential demand and the poor experience managing such a relevant phenomenon in terms of legislation and building techniques, favored the current pollution rates. The CO<sub>2</sub> emissions in the cities are mainly due to the use of fossil combustibles in the outskirts' industries and for 1/5 to the energetic consumption of buildings. Cities are surrounded with a fog that is caused by the levels of micro-particles suspended in the air, which exceed 24 times the levels allowed by the World Health Organization (WHO). In 2007, the World Bank estimated the annual cost of pollution in China as 5.8% of the GDP, taking into account the costs of sanity, the lost man-hours, the 700,000 annual premature deaths and the damages to the harvest. This data does not take into account the desertification and the deterioration of lands, factors that will progressively significantly impact the environment.

By balancing residential demand and protection of the environment, China must accelerate the legislative development to face this situation. "*Instant-cities planning*" became one of the strategic elements to regulate and manage in a sustainable way the fast development China is facing.

## **ECO-CIVILIZATION IN CHINA**

The concept of ecology already spread in China since 1980s, but only in 1994, with the adoption of the principles of the Agenda 21, buildings have been considered in terms of planning sustainable settlements. In 1996, the State Environmental Protection Administration (SEPA) issued the "Guidelines for the buildings of the Eco-Communities" to address the interventions and promote the construction of sustainable buildings in the country.

With this directive, the first pilot projects of Eco-Cities started to spread. In 2003, the projects of 135 ecological settlements were already in progress. They concerned different places and were at different scales, from urban project to quarter one.

In 2006, SEPA issued the first official report on the environment conditions, which outlined the dramatic effects of the growing pollution. Since then, the development of ecological settlements became crucial to try to restore an ecological balance. Programs and pilot projects have been promoted at national level by the Ministry of Housing and Urban-Rural Development (MoHURD), and by the Ministry of Environmental Protection (MEP), but also thanks to international cooperation and universities with private funding.

Eco-Cities proliferated and transformed the territory with interventions on a large scale. Chien defines this as the third wave in the country, just after the SEZ development in 1980s and the College Towns in the 1990s. Indeed, in 2011, more than 80% cities at the prefecture level already had at least one project of Eco-City in progress or under construction.

These experimental projects, favored by public incentives, investigate new planning concepts. In a context where attention is paid to the environment, they became an important instrument of promotion of the territory at the local level.

Eco-Cities in China have become a real trend. The pilot projects of these settlements are extremely diversified both for dimensions and for objectives, so that it has become difficult to adequately classify the interventions on the basis of their results.

In addition, a strong speculative component lies behind these settlements, so that the same promoters in the planning phase tend to label their projects as Eco-Cities to attract the attention of mass media. Therefore, on the one hand, these experimental settlements attract the attention of the international audience, aiming at achieving the best results in terms of sustainability of buildings, while on the other hand attract the internal average class that sees a good opportunity of investment in the ecological quarters in terms of buying a second or third house. Both these factors maintain prices higher than the average level making them good investments for the builders.

### **Hyper functional planning**

The complexity of the Chinese territory, which is divided into 22 Provinces, 5 Autonomous Regions, 4 Municipalities and 2 Special Administration Regions, roots in the Yuan, Ming and Qing Dynasties, with the addition of some recent changes as the creation of the Hainan Province, of the Chongqing Municipality and of the Special Administrations Regions of Hong Kong and Macau.

In order to manage the wide territory and population, the administrative division is based on 5 levels: the Province, the Prefecture, the County, the Commune and the Village. There is a corresponding level of career in the PRC Civil Service for each level of administrative division.

This complex administrative structure makes difficult to coordinate at a local level the objectives set at national level. For this reason, the Chinese decisional system is pyramidal, with a strong top-down approach and strategies defined by political choices of the Central Government, which operates at urban level in terms of direction and control. Local authorities are chosen by the party (i.e., without being elected locally), and the politicians' careers depend on a system that attributes points on the basis of the achieved objectives, the number of foreign investments (FDI) or economical indicators such as the GDP. Therefore, local authorities respond more to national instances than to real needs of the society. This system is necessary to control the initiatives at local level, but it usually leads to strong inter-territorial competitions.

Citizens do not participate to the mentioned strategies and local authorities define the priorities of the interventions usually without aligning the objectives with the development plans. Such poor consistency between national decisions and local implementation leads in some case to duplicate infrastructures and buildings. This is the case, for example, of the Eco-City in the Suzhou Province and of the competition inside its Municipalities that leads to the development of SND SIP, Kunshan Wujiang and Zhangjiang. This is also the case of Jangsu Province with Nanjing Wuxi, Changzhou, Zhenjinag, Yangzhou and Suzhou.

Chinese local leaders promote autonomously initiatives to achieve specific results established by the Central Government. Planning is constricted in extremely reduced times to allow politicians to rapidly advance in their careers, without leaving time to pre-emptively verify the real need of the settlements. Interventions are left to sediment and results are not assessed before re-proposing the settlements. If this speed of action were catalyzed consistently between territories, it would be unique in its genre.

As the political system responds to a strongly pyramidal structure, so the planning process is based on a top-down system. The national regulatory framework on territorial planning is the “Urban and Rural Planning Law” (城乡规划法), revised in 2008. It regulates at national level the use of the land, the improvement of the ecological landscape and the rational use of resources and of cultivable lands, and provides for limits to urbanization per Province.

At Provincial level, authorities use real city planning instruments, which distribute the urbanization limits on the basis of their strategies. The Municipalities set their own planning within the provincial boundaries, and so on up to the smallest local level. The Municipalities also adopt internal regulations such as the “Urban Planning Guidelines” (总体规划), the “Land use Law” (土地管理法) of the Ministry of Land Resources. At local level there are the “Overall Use Plan” (土地利用总体规划) and the “Detailed Plan” (详细计划).

The limits imposed at national level for the urbanization and urban sprawl depend on the need to ensure an adequate agricultural production for 1.35 billion people, also in view of the next urbanizations. This limit has been imposed to restrain the conversion of rural lands to urban lands, which is favored by the public speculation of private concessions. Thus, based on the foreseen urbanization and population growth, urbanization is limited by the need to maintain 1.8 billion of Mu (亩 or 畝, equal to 120 billion hectares) of cultivable terrains distributed in the territory.

Notwithstanding these strict policies safeguarding cultivable terrains, until 2008 about 1 million hectares were lost each year. Being only 12% of the land cultivable on the basis of the orography and of the climate stiffness, it is extremely important for China to limit urban sprawl.

The limits to urban development at Provincial level are therefore established by the Central Government and therefore each single Province sets – for its area of competence – the maximum area it may urbanize, up to the village level. This system of urban terrains’ allocation is centrally controlled by the Ministry of Land Resources, but is fragmented due to the choices of the local governments. The distribution of the urban areas aims at self-promotion more than a shared plan that is oriented to sustainability.

Indeed, Provinces favor the urbanization of the areas with more demand worsening the already constricted urban spaces of the megalopolis. This system favors big conurbations instead of creating a coordinated plan at multicenter national level that could challenge the binomial “*metropolis v. residual rural areas*”.

The urban planning is regulated at national level by different acts such as the “Procedure for Drawing Up Urban Planning” (城市规划编制办法), the “Standard for Planning and Constructing Residential Zones” (城市居住区规划设计规范), the “Standards for Planning and Constructing Roads” (城市道路交通规划设计规范). This is true also for the power installations, garbage, water supply, while the “Standards for Urban Use and Construction” (城市建设用地分类与规划建设用地标准) of the Ministry of Construction sets the minimum square meters *per capita*, such as for example, the green public areas with 8 square meters *per capita* or public services with 5.5 square meters *per capita*.

### Indicators system

In the 2008 Nanjing World Urban Forum organized by the UN-Habitat, a model of sustainable Chinese city was presented for the first time: the “*harmonious city*” (和谐城市), result of the pilot projects. Only 3 years later, in 2011, with the 12<sup>th</sup> Five-Year Plan (2011-2015), a new model of sustainable city was ideated and new projects were started in 13 different cities and Provinces: the “*low-carbon cities*” (低碳城市).

The theories behind the phenomenon of the Eco-Cities are multiple. Parameters and specific indicators marking out the main aspects have been set. The indicators relate to: energy use, water use, waste disposal, air quality, total green surface, green surface *per capita*, noise, transportation, heat island, social aspects of residents’ satisfactions, access for disabled people, social housing, number of beds in the hospitals, economy of the area as a percentage of industries on the total GDP, net turnover *per*

*capita*, and number of sustainable buildings. Each category is divided into sub-categories with parameters that provide the minimum values.

The indicators vary on the basis of the type of intervention. For example, “*Eco-Garden Cities*” are characterized by 19 indicators set by the MoHURD. There are 184 Eco-Garden Cities all over China on the basis of these indicators. In 2011, the SEPA and the MEP published a list based on 22 indicators that recognized only 38 cities as “*Ecological Cities*”, while more than 40 projects were considered “*Low-Carbon Cities*”.

In some cases, the most relevant projects at national level set their own indicators.

Indicators provide a control by limiting the proliferation of settlements that self-define as “ecological”. Otherwise, these settlements cannot be catalogued univocally.

An aspect that is not yet well characterized by indicators concerns the urban form. Generally, parameters define aspects related to residents’ satisfaction, housing density, distances between services and residential areas, while there is not a univocal list of indicators related to the form in terms of buildings’ aesthetic and functionality.

At international level, the benchmark is represented by different systems such as the Leadership in Energy and Environmental Design (LEED), promoted by the U.S. Green Building Council. The LEED, which is spreading as the main evaluation system of buildings’ efficiency, certifies the buildings’ performance in terms of sustainability on the basis of different indicators.

With the Building Energy Efficiency Codes (BEECs), China is one of the main emerging countries that introduced a code regulating the construction of sustainable buildings. This system is based on variable requirements related to the climate zones, which in China are tempered only for 3%.

In addition, in 2006, the MoHURD issued the certification system Green Building Evaluation Standard (GBES) to qualify buildings on the basis of qualitative and quantitative parameters. Buildings are divided into in 3 different levels: “one”, “two” or “three stars”. Such distinction is based on parameters like energy saving, use of water and material resources, environment quality (lighting, air conditioned, water warming) and maintenance. At the end of 2013, the GBES-certified projects were 1,446 for a covered surface of 16 million square meters, which is about 2% of the total built square meters. For 2020, the “National Urbanization Plan” provided that 50% of buildings in China shall comply with the minimum energetic requirements and GBES is becoming a necessary instrument to certify the buildings’ requirements. GBES has been updated in 2015, by modifying the parameters and the methodology to assign points, thus making the release of certifications stricter.

An issue that is linked to sustainability is the recovery of buildings constructed between 1949 and 1979. Such buildings are mainly made of economic materials, with clay walls or wastes of industries or of blast furnace, and without acoustic and thermic isolation.

Notwithstanding these national regulations, the systems to catalogue the interventions remain multiple and a unitary reading of the complexity of the interventions constructed in the international context is still difficult.

## Outcomes

The results of this “ecological phenomenon” can be inferred from the current output. It is sufficient to look at the new settlements to see the quality of the constructions and the attention paid to green and sustainability. In each new districts there are wind turbines, solar panels and large green areas.

These pilot interventions aim not only at satisfying the need of local urbanization, but also at finding – through a practical example – a replicable and adaptable model of sustainable city that can be reproduced with different scales in other Chinese cities.

There are many examples of best practices that are known at international level. The most ambitious ones are the Tianjin Eco-City, Shuzou (SIP), Congqin, Whuan, Dongtan, and Caofeidian, even if the real substance of such interventions is not yet clear. Once constructed, these cities do not correspond to what is provided in the planning phase. Sometimes, the number of residents of these settlements does not reach the required level. Otherwise, changing the political needs, the interventions are suddenly re-modulated or cancelled, like some of them lost their *momentum*.

For example, the Tianjin Eco-City derives from the cooperation between the Chinese and Singapore Governments. The Prime Minister Wen Jiabao has launched this bilateral project in November 2007. The works started in 2008 and the city is currently still under construction. The preliminary masterplan has been developed on the basis of the experience gained with new sustainable settlements thanks to the cooperation and the support of both the countries’ governments. The city has been planned on the basis of 26 indicators of power efficiency and urban sustainability. A system of water recycling and waste disposal is provided, there are solar panels and wind vanes on the roofs of the buildings as well as on the lighting poles, while at the same time many apartments still have independent air conditioning systems outside the windows.

The planning of the area has been developed starting from an ecological concept module that has been adapted to local needs. The intervention is inside the Bohai Economic Rim, an area with about 240 million people that, among other cities, includes also the metropolis of Beijing and Tianjin. This area is in

competition with other two important urban conglomerates: the areas of the Pearl River Delta and that of the Yangtze River Delta.

The area has been subdivided on the basis of a scheme of eco-sustainable of 400x400 meters modular areas (the so-called “*eco-cells*”). These areas have been planned to support up to 2,500 apartments and about 8,000 residents. 4 *eco-cells* define an “*eco-community*” of about 9,000 apartments and 30,000 residents, and 4 connected “*eco-communities*” compose a district. Each *eco-cell* has a series of pedestrian routes and public transportations. The project of the Tianjin Eco-City provides 4 districts connected between them by a green pedestrian corridor (the Eco-Valley) with a light surface tram that allows moving between the various points of interest. The urban density is 10,300 people per square kilometer and the urban space *per capita* is 76 square meters below what is required under the national standards of 90-100 square meters.

The road infrastructure has a regular scheme composed by 67-meters large connection roads with 3 lanes per direction. The roads are separated by regular margins as *eco-cells* are divided in a scheme. Notwithstanding cycle-pedestrians lanes and pavements, the roads separating blocks are difficultly accessible for pedestrians and became real borders. Moreover distances to reach buildings with different functions are prohibitive for pedestrians. The city is planned for cars and great attention is paid to pedestrians’ routes, which however do not have continuity from one block to another.

Buildings are oriented to the inner module instead of creating a margin along the streets and are screened from the streets with the high basements that connect the covered multiple buildings of the same block. These *podia* outline the division between the different functional blocks and made difficult to use the main streets as typical quarter streets. This is because the streets are without accesses that favor the pedestrian and the commercial permeability on the street front.

More than 10 blocks in New York or in Rome (but also in the ancient Chinese cities) correspond to a single *eco-cell* block of 400x400 meters with its compact and impenetrable single front of 1.6 kilometers. This disposition increases traffic outside the blocks making them accessible from a unique access with the subsequent problems related to isolation and emergency access. In this sense, the ancient Chinese districts, with their variety of functions, must be considered a benchmark when planning the new settlements. From the ground floor, it is possible to access to the residential block where there is also an access to the block’s parking. On the contrary, the basement walls separate communities.

Building an area from the beginning is complex in terms of management, technology and architecture, and in particular economically. Generally, dwellers are attracted by the installation of enterprises and economic activities. Thus, in order to attract industries in the area, in 2011, the Singapore Government allocated 150,000 USD for each re-located company and in 2012 announced a 9.5 million USD allocation to assist companies that decide to invest in the area. However, the area is not yet able to attract enough residents to make the intervention a real livable and vibrant city.

More problems in attracting residents have been experienced in Tangshan Caofeidian Eco-City in the Hebei Province. The city developed in an area of 150 square kilometers with a foreseen population in the planning phase equal to 1,000,000 inhabitants. The project is born from the cooperation between the Swedish company Sweco and the Tsinghua Institute of Urban Planning and Design. The intervention is defined by 57 different indicators. Although the high quality of the settlement, the types of residential / cultural buildings, and the primary services, the area constructed in the first phase of 30 square kilometers for 500,000 inhabitants currently hosts only a few thousands people.

These and other settlements remain uninhabited as real “ghost towns” because the sustainable apartments are too expensive. Notwithstanding each apartment has its own parking, these settlements are usually inserted in rural contexts where the residents’ status does not either allow to have a car.

The Dongtan case – i.e., the intervention of 2009 that were cancelled for political and environmental reasons such as preserving cultivable terrains and the difficulties in managing the finance subsequent to the western crisis – is emblematic. Dongtan was an Eco-City in the Shanghai area planned for 500,000

residents. The project started in 2004 with the cooperation between the Chinese and U.K. Governments and between the Shanghai Industrial Investment Corporation (SIIC) and Arup. The 6.3 square kilometers Eco-City is located in the end of the Chongming Island, in a reserve for birds. The area had been planned

to host 400,000 residents in 2050 and the first phase of the project provided the development of three villages around the city center. Compared to the typical Chinese building models, the project – completed by Arup in 2006 – had average high buildings with about 8 floors. Today in the area there are only 8 wind vanes.

These cities represent an antithesis of the concept of suburban area. Being external to cities, they have the features of cities without the centralities of a consolidated city.

Usually, planners import models of western cities without sounding new architectonic possibilities. The need to reduce construction times influences planning imposing a serial approach that recalls industrial production.

Projects are usually originated by repetitive modules and are not well inserted in the context. On the contrary, they tend to be reproductions of sustainable models. The utility to provide a standard module concerns the need to plan and build rapidly. In a context of such massive proliferation of constructions all over the territory that is hardly controllable, modules allow to easily calibrate requirements and technological needs. The trend is creating real functional blocks that may be changed on the basis of the number of inhabitants or of the power / water needs.

The definition of modules to be serially applied limits the planning costs and leads to a more technical approach than to innovation. Also entrusting the planning of too wide areas leaves the problems related to the human scale unsolved. A unique type that is repeated usually individuates residential buildings.

These blocks that lie ajar produce discontinuities marked by interconnections that cannot be raided. The dimensions of these interventions are macroscopic and their planning is comparable to functional zoning. The dimensions of the buildings and roads cannot always be considered at human scale, but they rather recall settlements that are abstractly planned and then inserted in the territory.

Those areas are usually made with functional single blocks, i.e. residential, commercial, cultural, green areas, and industrial areas. Chinese zoning derives from the soviet example with the construction and the industrialization of the country in 1949. During the years, this architectonic trend it has been combined with the modern trends of the International Style. The urban planning approach today recalls the functionalistic context of 1970s in Europe and somehow that of the soviet settlements.

Planning is intended to be sustainable in its social, economic and environmental meaning. Costs must be optimized. A lot of the multiple projects that are largely advertised also at international level cannot be closed or do not have real ecological aspects. The Eco-Cities look like more a slogan than a real solution to the problems related to urbanization and environment's preservation. On the one hand, the fact some Eco-Cities are not yet concluded depends on the fact that the planning started only less than 10 years ago. In addition, the phenomenon of the ghost towns (*sicheng*) is a problem of space-time coordination between demand and offer.

Although one of the prerequisites of the Eco-Cities is to re-conciliate the idea of the city with that of nature, usually local Chinese authorities favor their development on a speculative standpoint, and without real considerations on the environmental consequences of such thoughtless urbanizations. The realization of pilot projects on such a large scale is a risk both for investors and for territory on which extremely high environmental costs reverberate.

China became a lab for realization of futuristic projects that do not meet real needs. Cities respond to energetic requirements of urban metabolism in terms of waste and water recovery, while it seems that the level of planning is still facing a process of accrual. Settlements attract attention exclusively for their features of sustainability and poor attention is paid to livability of areas and context's characterization.

Time and economical/management efforts in the areas do not justify the choice to create new settlements instead of solving the living problems. While the best experiences of ecological settlements relate to the smallest interventions, the sprawl of large-scale interventions continues. Architecture firms must balance their international experience with local technic and sensitivity.

Small blocks and appropriate road infrastructures may increase the exposition of buildings along the road fronts making quarters more livable. Inserting commercial functions at the bottom of the buildings helps

creating pedestrian spaces and favors the use of pavement or cycling routes instead of public transport between areas.

Notwithstanding the strong social inequalities, Chinese Government is implementing improvements of the living standards through new regulations on rental that limit the number of residents per square meter or for the new constructions with dimensional standards. Indeed, the foreseen construction of social housing inside the area must be at least 20% of the total in 2013. This threshold has been imposed with the 11<sup>th</sup> Five-Year Plan (2006-2010) that imposed a percentage of 15-20% of new residences to be destined to social housing. Cities like Shanghai, Xian, Dalian, Shanzen e Zhengzhou have a range of 15-25%.

## PAST EXPERIENCES

Residential emergency in China differs in terms of scale from what happened in the XXth Century in Europe, but under many aspects it reproduces its results. With European industrialization, a massive movement of interest from countryside to city took place with a passage from an agricultural economy to an industrial one.

In Europe in the beginning of 1900 the E. Howard's movement of the new towns, the so-called "*Garden-Towns*" or "*Garden-Cities*", faced the problem of overpopulation of the cities and the subsequent moving from rural areas after the Industrial Revolution. The *Garden-Cities* were born from the idea of creating autonomous settlements around the main city. The urban conglomerate had to be dimensionally limited to maintain an ecological balance between the different cities, connected by infrastructures and green belts of such dimensions that could meet the agricultural needs.

Private speculation without an adequate planning leads to the exploiting of terrains and makes the city growing without a limit. The *Garden-Cities*, on the contrary, aimed at limiting the extension of conurbations solving the two main deterrents to the growth of cities: pollution and overpopulation.

The dimensions of these cities, being inspired to the requirements of the Greek polis (πόλις), were limited to a population of 30,000 inhabitants, threshold over which it was necessary to develop a new "conurbation".

Also with Chinese planning, the interposition of green areas avoids an excessive growth of cities. This is because there would be limits to the dimensions of urban centers, making the countryside always reachable from the city. According to Howard, the green zone should be enough large to replenish the city with agricultural products. This would allow movements to be limited and avoids losses of time in the route from the city to the countryside and from the city to the industries.

The very same principles were recalled with the decentralization of the workers' villages. In the first half of the XXth Century, the ideas of R. Owen, pioneer of utopic socialism, on the planning of workers' villages, spread in England.

The buildings close to the industries hosted workers and became self-sufficient settlements. The low living density was combined with the type of houses in row. This limited the possibility of uncontrolled social aggregation because moving from a building to another one was more easily monitored. At the same time houses lying side-by-side limited conflicts.

Chinese Eco-Cities as workers' villages are born from the idea to put workers' houses beside (sustainable) industries.

The system of American suburbs showed similar results of workers' villages starting from very different assumptions. The American lifestyle based on house property focuses on possess of the space, garden and car, aiming at a concept of modernity and improvement of life in terms of increased welfare, comfort, services and security. This favored the spreading of suburbs close the industrial areas.

The “diffused” city has been the consequence of this favored urban dispersion. Then, industries progressively emptied with an elbowing third sector concentrated in the main cities, and this has progressively led to an increased use of cars congesting the roads.

Also now, although the low density contributes lowering pollution and increasing privacy, the use of cars in these suburbs is usually endemic and the planning of public transportation becomes more expensive, imposing the Government to build freeways and larger parking.

In the 1930s the strong urbanizations created entire spontaneous settlements in the cities’ outskirts, which did not comply with the minimum hygienic-sanitary requirements. The housing demand was mainly social, and the main actor of such interventions was the State. In order to meet the residential need, European Governments started to promote public interventions, but they also promoted private-public interventions to accelerate their sprawl. In this context, a decisive push was driven by the international congresses of modern architecture (*Congrès International d’Architecture Moderne* - CIAM) promoted by Le Corbusier. In particular, with the Athens Charter presented at the CIAM in 1933, the basic principles of contemporary city were established. They referred to the International Style and residential quarters. The construction of big residential quarters was entrusted to private parties with public financing or through concessions of public lots.

## **URBAN REGENERATION**

With the end of the great age of urban growth, European cities had to face the consequences of their sudden development. The quarters constructed in the previous decades started to show strong social imbalances and urban decay, imposing serious reflections on the effects of the new ways to build cities.

The first studies on environmental psychology trying to find a relationship between space and social behaviors were accompanied by the first qualitative assessments of quarters. The functionalistic interventions were under discussion: the standards and the open tissue as life complexities, the zoning and the quarter as a simplification of the urban complexity, and the concept of organic and common quarter as anachronistic heritage of the pre-industrial society.

The logic of the indiscriminate expansion has been abandoned in Europe in the last decades, favoring a qualitative transformation.

Currently, Europe is facing what it has built in more than 50 years. Having the results of that rapidly built settlements in mind, the elements of decay have been found and new solutions aimed at improving the living conditions of residents are being experienced. Europe is currently the scenario of various examples of urban regeneration. France, Netherlands and United Kingdom are among the best ones.

The reasons and the entity of the decay are due to the many variables with social decay being linked to the urban one. The decay of the areas is caused by the exclusion and the isolation from the rest of the city and from the zoning. Isolation is not based on the place of the intervention but also on the walls or lines that are interposed, the distances or the net image variations from the center.

The causes of the decay related to architecture concern the nature of the spaces, the language of the buildings, and serialism. Blank areas are common in many post-war quarters. Indeed, according to the Modern Movement, buildings should “navigate in the green” to ensure an increased healthiness and pleasantness of the living spaces. However, usually the green is not qualitative because it is not natural, nor agricultural, nor cultural, but it remains just an empty space. The main features of these quarters are often the emptiness and the asphalt, with the street being destined only to viability and not to relationships. The absence of street margins, with the buildings being backward, contributes to the sense of emptiness.

Cities must be in Europe, as in China today, more at human scale. It is necessary to integrate the quarter making it a not isolated place through a weave of roads that eliminates the urban fractures and improves the security re-designing the space. The design of public space creating more little open spaces, instead of leaving them as empty spaces, increases the sense of security.

Increasing the accesses by favoring the permeability, densifying or re-compacting the urban space through the construction of new buildings, and re-sewing tissues are the principles currently applied in re-qualifying European cities.

It is necessary to introduce functions of excellence or new centralities that are reachable by feet to attract citizens and not only inhabitants. It is also necessary to re-model the excessively serial volumes to make them aesthetically appreciable, transforming the prospects.

The interventions aimed at recovering the existing buildings associate the functional restoration of implants of the internal division with the external restyling through partial demolitions, and the insertion of new volumes/bosses. Thus, surfaces are re-modeled and the serialism is interrupted, resulting in the buildings' differentiation and customization. The architectonic composition of the urban conglomerates is strictly connected to the perception of the buildings' human scale.

Urban regeneration provides also the substitution of entire building types or complete demolitions.

In order to adapt to demographic and economic needs, China is assisting to a significant development of new constructions that jeopardizes the historic ones, cutting the links with the urban memory and constructing the so-called "tofu-buildings" that sacrifice the quality of materials and technologies to reduce the production costs and execution times. This determined for example in the last 5 years the collapse of at least 18 bridges in China, all of them with less than 15 years. In Shanghai, in the Minhang District, an entire building collapsed without breaking; the flooding of many quarters of Beijing has been caused by the total lack of planning of the drain system, which for various sections dates back to the Ming Age.

In addition to these clear examples of "bad mixture" in terms of planning and construction, there is so much social housing with significant and dangerous lacks. Eco-Cities with abandoned houses leave doubts on the effective results of such an inconsiderate urbanization.

It is really necessary to build from scratch cities, in a way that already recall the abandoned European settlements, and investing in the attempt to attract residents? Or is the solution already present and it would be sufficient to focus on urban re-qualification, compacting the density and improving on the basis of the experience of livability?

A unique solution does not exist, but it would be opportune that the Eco-Cities would be re-dimensioned in terms of scale, by investing more on "Eco-Quarters" instead of entire cities.

## **DENSITY AT HUMAN SCALE**

The concept of urban density in the Asian countries transits through squares so wide that they do not allow to see the contiguous buildings and which are constructed to host thousands people – like Tiananmen Square – to spaces so compressed to be inhuman.

According to the World Bank, if Ghuanzhou had the same density of Seoul, it could host 4 million more residents. According to the World Bank's report, densifying the city would contribute to reduce the costs of infrastructures of about 1,400 billion USD and it would help to preserve rural terrains. The Chinese Government speculating on the sale of terrains converting them from agricultural lands to terrains suitable for building still looks for an extensive approach.

Cities must become denser and not bigger. However, there is a right density for each specific settlement and densifying is not sufficient to solve the problem of the housing demand. It would be necessary to review the concept of city as we currently know it, on the basis of the experience gained with western settlements.

With a smaller planning scale and the division among more planners, the functionalism of areas and the serialism of interventions would be eliminated.

According to a survey, the rate of empty houses in Beijing is 28.9%. An unofficial survey of Universities resulted in 65 million empty apartments while millions Chinese people still continue living in slums in the cities' outskirts or in illegal houses.

This is because, on the one hand the apartments in Eco-Cities, being qualitatively better than conventional housing, are also more expensive and therefore they often remain unsold. The average-high class, investing in apartments, buys them as second or third houses, while the real demand of social housing is not met. In addition, as it happened with the ghost towns, the construction of the settlements is promoted by the authorities without verifying the real local needs in the absence of a central planning, thus resulting in

oversized constructions. On the other hand, the buildings in the existing cities built in 1949, became obsolete and usually abandoned due to the too small apartments and the moving of industries to the SEZs outside the

cities. All this results in emptying residential areas for the migrant workers. In such a context, it is necessary to intervene on the existing.

Today, world is more oriented to the SMART technology and to shared digital platforms. Old objects, which used to be a status symbol, are now common in a view of sustainable sharing. Technologies allowing sharing cars, books, houses and networks allowing sharing private property are spreading. Technology, with these types of experiments, is indicating a promising road to the improvement of social life through shared services.

In a context of global alienation, where you cannot recognize anymore your neighbor, sharing mobility and resources will make the city more attractive for residents. Investing on these services is therefore a commitment for administrations and politics.

Also in Chinese cities it is a must to investigate these sharing urban networks (Sharing Cities), to understand how architecture is contributing and will contribute to the undergoing transformation, what public spaces are destined to be and how urban asset will change.

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