

Evolution and Future Prospect of Urban Ecological Planning in Modern China

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Abstract: The evolution of urban ecological planning in China since 1949 is divided into four periods: initial germination period, slow growth period, framework setting period, and all-round development period. Through reviewing the relationship between socio-economic environment and urban ecological planning, this paper concludes with the evolution features of urban ecological planning in China from both theoretical and practical perspectives, and analyzes the main problems in China's urban ecological planning. With a clear understanding of the evolution trends of ecological planning in China, five aspects are discussed, including adapting to the spatial planning reform; improving the serviceability of urban ecological planning; expanding the niche of urban ecological planning in multiple dimensions; exploring institutional innovations on urban ecological planning; and constructing a theoretical and practical system of urban ecological planning with Chinese characteristics. Thereby, an outlook for the future of urban ecological planning in China is developed and elaborated.

Keywords: Urban Ecological Planning in Modern China, Evolution Period, Theoretical Evolution Features, Practical Evolution Features, Future Outlook

It is a well-known fact that though cities cover a relatively insignificant area of the earth surface, the tremendous “energy” they contain renders them increasingly influential and attractive as time goes. Meanwhile the impact of cities on global ecosystem is too big to be ignored. In the light of that, urban planning of all kinds are playing an increasingly important role in the development of mankind. Among various kinds of urban planning, “urban ecological planning” is without a doubt a particularly important one. As China is celebrating the 70th anniversary of the founding of the People’s Republic of China, it is all the more relevant to have a review as well as an outlook on the evolution of China’s urban ecological planning in the last seven decades. Such studies will certainly bear historic significance, inspire current practices, and enrich academic research.

1 Evolution of urban ecological planning in modern China

1.1 Division of stages

In reference to Li Hao's six-period division of urban planning in China since 1949^[1], taking into account the ecological planning practices in China since the founding of the PRC, this paper divides urban ecological planning in modern China into the following periods: initial germination period (1949-1977); slow growth period (1978-1989); framework setting period (1990-2000); all-round development period (2001-present). A review on the background and the significant events that have impacted ecological planning is summarised in the appendix.

1.2 Urban ecological planning in each evolution period

1.2.1 Initial germination period (1949-1977)^①

1949 to 1952 is the restoration and initial period for urban planning, when the theme was developing productivity and changing consumption-led cities into production-driven cities. Planning programmes regarding urban ecosystem were primarily on environment rectification. For instance, Beijing organised campaigns to: improve urban sanitation, clean garbage, restore the water courses and lakes, divert water from Yongding River to downtown, restore old and build new sewage pipelines, improve city appearance, etc. An example is the treatment of odorous sewer ditches dubbed "Longxugou". Similar projects were carried out in Shanghai, e.g. in 1954, the transformation project of Zhaojiabang, an odorous sewer course in Shanghai, was launched, in which the entire line from Ruijin 2nd Road to Xujiahui was filled and the sewage runoff was completely solved, and 1,704 households who used to live by the river moved into Caoxi Xincun. The project cost a total of RMB 7.54 million and was recorded as a major achievement in Shanghai after the founding of P.R.C^[2].

During 1953-1957, the Soviet model of urban planning was introduced to China. Priorities were given to the planning of industrial cities, by means of deploying industrial productivity and supportive service facilities for 156 key projects. No much emphasis was placed on ecological planning. However, some ecological considerations were obvious in the planning of Lanzhou city, with a pattern of "clusters in belt shape"^[3].

Later in the period from 1958 to 1965, urban planning in China went through some drastic ups and downs. Political movements like "the Great

① As it is still a "initial and germination period", the descriptions of "social and economic background" and "trends on urban ecological planning" are combined into one section.

Leap Forward” and “Forming Rural People’s Communes” caused the protocols of urban planning to be reduced, giving way to “quick planning” and “Great Leap Forward in Urban Construction”. As the State Treasury failed to make the ends meet for rapid urban development, shortly afterwards the construction shrunk and urban planning fell into a low ebb, consummating in 1960 when the government announced “urban planning will be suspended altogether for three years”. Still in this period, some planning projects bear some features about ecosystem, like the “three stretched wings with gardens wedging in” windmill-shaped planning pattern in Hefei, the “scattered clusters” in Beijing, and the “clusters in belt shape” of Panzhihua, etc.

The Cultural Revolution that lasted from 1966 to 1976 brought a stagnation period for urban planning, when the national economy was on the verge of collapse, urban planning and construction experienced unprecedented disruptions: planning agencies and teams were dismissed, data and records were destroyed, and planning governance was halted. In cities, housing, utilities, roads, environment, and daily supply were all mired in a stagnant situation; production was seriously impacted, and problems in people’s day-to-day life mounted to an unbearable level ^[4]. In that period, the issue of urban environment pollution became apparent, yet it was not duly noticed, not in the least that ecological planning was non-existence then.

1.2.2 Slow growth period (1978-1989)

(1) The social and economic background

The reform and opening-up that started in 1978 has executed substantial influence on the society, the economy, and the ecosystem in China. A milestone in this period is the establishment of the Ministry of Urban-Rural Construction and Environment Protection May 1982, showing the new guiding idea in approaching urban-rural construction and environment protection as connected tasks. At the Third National Urban Work Conference in March 1978, the concept of “severely polluted cities” (including Zunyi, Yan’an, Guilin, Luoyang, Suzhou, and Wuxi) was first raised ^[4], showing that the environment pollution in Chinese cities had been duly noticed. Thereafter, in September 1979, the first comprehensive basic law for environment protection in China since 1949 was promulgated, i.e. the “Environmental Protection Law of the People’s Republic of China (trial)”. The Law defines the pathway, fundamental tasks, and policies on environment protection in China. At the First City Development Strategy Conference in August 1982, the studies of an urban ecosystem in Beijing and Tianjin were established as Key Research Projects for China’s “Sixth Five-Year Plan Period”, which has great implications for urban ecological planning in the future. In

December 1983, the Second National Conference on Environment Protection was held, where Vice Premier Li Peng announced on behalf of the State Council that environment protection was established as a national policy of China. In July 1988, the State Council issued the “Resolution on Conducting Quantitative Evaluation on the Performance of Urban Environment Improvement”, making comprehensive improvement of urban environment an “important responsibility” of city governments. Mayors were designated to take chief accountability in this regard, whose career performance would be evaluated against twenty plus environment criteria in the five aspects of air, water, noise, solid waste, and greening. The “performance evaluation on urban environment comprehensive improvement” is a watershed of urban development approach in China, i.e. the important role of pollution control and ecological environment improvement in urban development started to gain recognition.

(2) Trends in urban ecological planning

The aforementioned facts demonstrate to some extent the importance attached to urban environment at that time. But some other facts indicated the opposite. First, there was no mentioning of urban ecological environment in the memorandum of National Seminar of Urban Construction Bureau Chiefs held in June 1981^[4]. Second, the Fourth Urban Planning Academic Committee was founded in December 1981, later specialised teams were set up for settlement planning, landscape and environment planning, respectively^[4]. The inclusion of “environment” into “landscape” specialty shows that not enough importance was given to urban ecological environment. Third, at the National Conference on Environmental Protection in Urban-Rural Construction held in June 1982, Minister of the Ministry of Urban and Rural Construction and Environmental Protection, Li Ximing did not mention urban ecological environment in his speech which laid out many requirements for urban planning in cities nationwide^[4].

The First National Symposium on Urban Ecology held in Shanghai in December 1984 was regarded as a milestone that marks the official start of urban ecology studies. Also in 1984, The Special Committee on Urban Ecology was founded under the Ecological Society of China, opening a new chapter for ecology studies in China as well as international communications in the field, thus having profound impact on urban ecological planning in China.

The planning of urban green system was a main trend for urban ecological planning theories and practices at the time, e.g. the “Landscape and Greens Planning of Xi’an (1980)” reviewed and improved its urban planning in the 1950s. In terms of planning concepts and ideas, making up for the previous shortfall in greening is consistent with the demands

of urban development at that particular point of time; while in terms of specific contents, the emphasis on the integration of greening with cultural and historic elements represented advanced thinking ^[5]. A representative case of greens planning in South China in the 1980s is the “Landscape and Green System Planning for Shanghai (1983)”, which is also the first of its kind in Shanghai since 1949. Some highlights of that planning proved effective in guiding and managing city landscape. These include the green systems that combine spots, lines, and areas, the pattern with loop- and wedge-shaped greens, the multi-level design for public green spaces, the principle of keeping greens “small, numerous, and evenly distributed”, as well as the idea of building exclusive greens and developing regulatory criteria in this regard ^[6]. In this period, the priority of planning was on urban areas. Spots were the primary feature and green coverage was a key indicator. The understanding and methodology of green space planning was rather biased. The type of urban greens is not diversified; few planning programmes and measures were in place to conserve biodiversity, old trees, etc. The role and function of urban greens as strategic safeguards for socio-economic development was not properly recognised. As a result, the urban greening initiatives failed to catch up with the pace of economic growth and infrastructure construction in cities ^[7].

On another hand, the development of “eco-cities” was embarked on at this time. Yichun City in Jiangxi Province set forth the goal of building an eco-city in 1986 and implemented the pilot programme in early 1988. That is acknowledged as the first official and practical attempt in building eco-cities in China.

1.2.3 Framework setting period (1990-2000)

(1) The social, economic, and environmental background

Relative shortage of resources, fragile ecological environment and insufficient environmental capacity have gradually become major problems in China’s development.

The famous “South Inspection Speech” made by Deng Xiaoping in 1992 played a vital role in fuelling economic reforms and social advancing. However, extensive development had long been the pathway for economic growth in China. In many regions local economic growth had taken tolls on the environment and ecosystem. At the centre of all environment issues was urban pollution caused by bulk dumping of municipal solid waste and industrial discharge. The environment problems that developed countries coped with in multiple stages over a century’s time now took place in China in an explosive manner. The resource shortage, environmental fragility,

low environment carrying capacity, etc. gradually became fundamental issues in China's development.

The State Environment Protection Administration drafted the "Outlines of Development Plan on National Ecological Demonstration Zone (1996-2050)" in 1996. In the next year, the Administration made the decision to develop and accredit National Model Cities on Environment Protection. A total of 30 plus cities were given that title, laying a sound foundation for eco-city development in full swing. The State Council enacted "The National Plan for Ecological Environment Construction" in November 1998, which stipulates the near-, intermediate- and long-term goals for eco-environment development till mid-21st century and divides China into eight categories of regions for ecological and environmental development based on the planning and jurisdiction of land, agriculture, forestry, soil management, natural reserves, etc. However, "urban ecology and planning" is not the focus of this plan ^①.

(2) Trends in urban ecological planning

In his article "Goals and Plans for Environmental and Ecological Development in Cities" published in 1991, Zhou Jilun argues that the primary tasks of urban ecological and environmental planning are to define economic and social development limits for cities according to environmental objectives, and to offer technical solutions to mitigate such limits, i.e. to determine the proper environment carrying capacity and offset the loss caused by overloading.

The "Study on Urban Ecological Planning for Chengde City" was completed in 1991, in which the goals and regulatory measures for eco-environmental protection in Chengde were proposed. In the next year, the "Urban Comprehensive Improvement Plan and Ecological Planning of Chengde City" was formulated, which was a good attempt in exploring the methodology for ecological planning for small and medium-sized cities in North China. With reference to ecology theories, the planning was done by means of field survey, satellite imaging, and computer simulation, to find out solutions to challenges in urban population, land use, construction development, industrial pollution control, coordinated economic growth, and environment protection, etc. Besides, through mathematical analysis, environment restoration technology and projects were developed and planned on multiple levels and fronts.

At the Earth Summit 92 Global Forum held in Rio de Janeiro, the study "Ecopolis: Concept and Criteria" by Professor Huang Guangyu's team was

① In the planning, the word "city" or "urban" come up only twice.

awarded Honorary Certificate for International Architecture Institutes and Invention Star Award for UN technology and information promotion agencies. In 1998, Zhengzhou City started the initiative to build “Eco-city Environment Demonstration Districts”. In the case study of land use in Guangzhou Science City Development, Huang Guangyu et al. (1999) studied the application of ecological planning in urban planning from the perspective of ecological suitability, ecological sensitivity analysis ^[9]. The “Research on Urban Eco-environment Planning in Wenzhou” led by Zou Deci was awarded with the First Prize for Outstanding Urban Planning Projects in Zhejiang 2000.

In October 2000, the “Seminar on Issues in Urban Eco-environment” was held in Xiangfan, Hubei, sponsored by Urban Planning Society of China (UPSC). Also in 2000, UPSC founded its Academic Committee of Urban Ecological Planning and Development, with Huang Guangyu as the director. That, in a sense, marks the inclusion of urban ecological planning into the scientific discipline of urban planning in China.

1.2.4 All-round development period (2001 to present)

(1) The social economic background and trends in ecological environment

In this period, China sees rapid growth in GDP as well as urbanisation. By 2010, China became the world’s second largest economy; by 2015 China reached the tipping point and turned from a traditional agriculture country to an urbanised country with its urbanisation rate higher than the global average ^[10].

However, ecological environment remains the Achilles’s heel of China, as demonstrated in: 1) The climate is very fragile (Figure 1). The average surface temperature rise in China is twice the world’s average ^[10]. Some cities are susceptible to high risk of flooding. 2) Resources are being

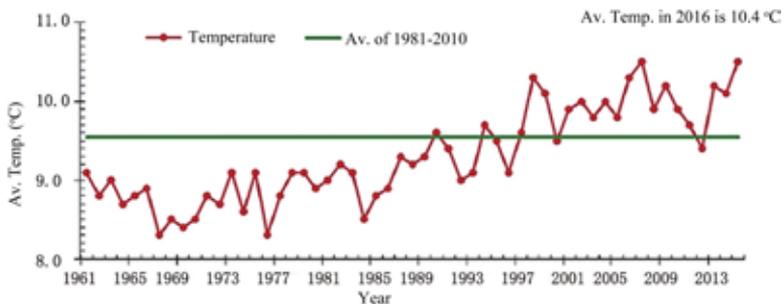


Figure 1. Change of annual mean temperature in China during 1961-2015
Source: Reference [10]

wasted while their supply is short. E.g. a lot of “development zones” are scantily occupied; many cities are short in water supply. 3) Environmental challenges are daunting. Many cities have exceedingly high CO₂ level. Urban sewer is undertreated; air pollution deteriorates; environment degradation is taking increasingly heavy tolls; and so on so forth (Table 2).

Table 2. Economic losses caused by environmental degradation in China during 2008-2010

Year	Economic losses caused by environmental degradation (10 ⁸ RMB)	Annual increment (10 ⁸ RMB)
2008	12,745.7	-
2009	13,916.2	1,170.5
2010	15,389.5	1,473.3

Source: Reference [11]

(2) Trends in urban ecological planning

- High priority was given to eco-environment by state and local governments, giving rise to urban ecological planning in China

In this period, the state pays tremendous attention to the eco-environment in cities as well as over the whole territory, which reflects the increased weight of “ecology” in the system of economy, politics, ecology, and culture (Figure 2). Evidence includes: First, environmental protection planning was done in an increasingly comprehensive manner^[13]. Second, in the national strategic development planning, i.e. “National New Urbanisation Planning (2014-2020)”, unprecedented importance was attached to eco-environment.^① A great number of “ecological missions” were identified in the planning, testifying that the state government has bound urbanisation and eco-environment closely together. Third, in the Guidelines for the Thirteenth Five-Year Plan, “accelerating the improvement of eco-environment” was clearly stated and emphasised, showing the state government’s full commitment to environmental

① That includes: eco-environment protection, eco-environment protection regulations, eco-environment pressure, ecological civilisation, ecological restoration, eco-environment quality, ecological security, ecological and environmental costs, eco-environment carrying capacity, ecological network, ecological conservation area, ecological conservation, ecological and environmental planning, ecological space, ecological-purposed land use, ecological leisure park, ecological nursing area, ecological sensitive area, ecological buffer zone, ecological conservation red lines, ecological corridor, cultural ecology, ecological culture, ecological stewardship, ecological returns, ecological fragility, ecological functional area, ecological compensation, eco-environment damage, ecological system conservation, ecological system restoration, etc.

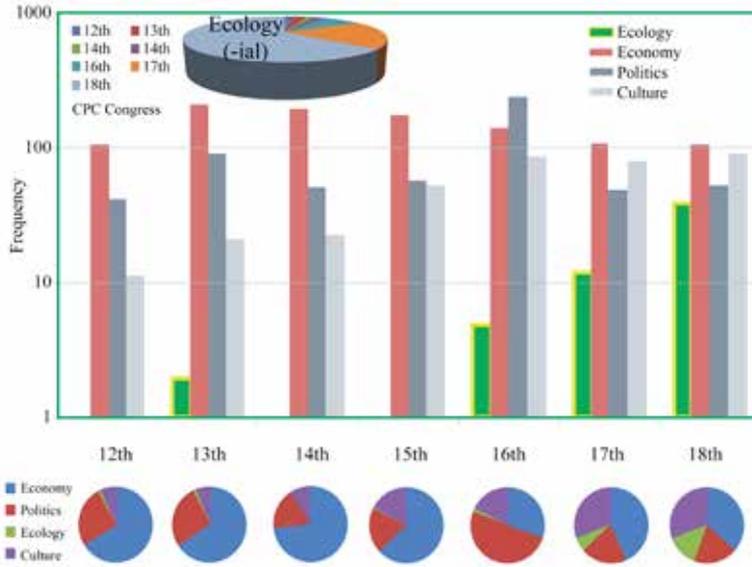


Figure 2. Occurrence frequency of the word “ecology (ecological)” and other keywords in successive sessions of CPC Congress Report
 Source: Reference [11]

protection. Fourth, the “National Plan on Urban Eco-environmental Protection and Development” was promulgated in December 2016, which puts developing urban ecological spaces, ecological landscaping and restoration, urban biodiversity conservation, pollution control, resources and energy conservation and recycling, green architecture and green mobility high on the agenda; and it proposes two types of indicator systems, one for assessment, the other for guidance. Besides, legislative efforts in this period also reflect the state’s commitment to environmental protection and have greatly facilitated the implementation of urban ecological planning. Laws and regulations enacted in this respect include: “Law on Environmental Impact Assessment” adopted at the 30th meeting of the Ninth National People’s Congress in October 2002; “Criteria for the Development of Ecological Counties, Cities, and Provinces (trial)” in May 2003; “Outlines of Construction Planning for Eco-counties, Eco-cities (trial)” and suggestions for implementation released by the State Administration of Environment Protection in 2004; etc.

At local level, eco-environment also draws substantial attention. For instance, in Shanghai’s Guidelines for the Thirteenth Five-Year Plan, many concepts related to eco-environment come up as keywords: ecological resources, ecological red line protection mechanism, ecological spaces, ecological conservation areas, ecological corridors, ecological barriers,

ecological strategic safeguard space, ecological spatial pattern, etc. ^① In the “Biodiversity Conservation Plan for Nantong (2017-2030)”, the concept of “developing the biodiversity culture” was proposed, which was to be realised through fulfilling key tasks and developing key projects. ^②

- Low-carbon eco-city planning became an important type of planning to improve urban eco-environment in China

Starting from 2009, the idea of low-carbon city ^③ and its planning became a topical type of urban ecological planning in China. As a type of eco-city with Chinese characteristics, it offers the guidance for the transformation of urban development model in China ^[14], thus having a big impact on the evolution of urban ecological planning. The publication of “China Low Carbon Eco-city Development Report (2010)”, which combines the low-carbon eco-city development with the latest social and economic trends, marks a key achievement in China’s urban ecological planning ^[15].

Zhuzhou City and the Pan-Port Area in Shanghai are two representative cases in low-carbon eco-city planning. Zhuzhou took both active and passive approaches. The former is ecological conservation, i.e. to form a regional ecological security and balanced resources-environment system within the geographic divisions of river valleys; while the latter is low-carbon “implantation”, i.e. to create space use systems with axes and branches, featuring cluster pattern, growth units, integrated functions, circular operation, vitality and sustainability, low consumption at high efficiency, and balanced development ^[16]. The “Eco-City Planning of Pan-Port Low-carbon Demo Area in Shanghai (2017)” sets expectations for the development of port low-carbon parks. The criteria for future-oriented low-carbon city was established and will be implemented by the five strategies of integrated functions, urban micro-climate, sponge infrastructure, green mobility, and green architecture ^[17].

- Ecological civilisation has become the focus and key for urban ecological planning

In the Report of the 18th CPC Congress published in 2012, it is stated that “ecological civilisation should be put at a prominent position and be integrated into the course of economic, political, cultural, and social development.” In March 2018, the “Amendment to the Constitution of the People’s Republic of China” was adopted by the Third Plenary Session of the First Assembly of the 13th NPC Congress, in which ecological

① See: <http://www.shanghai.gov.cn/nw2/nw2314/nw2319/nw22396/nw39378/>

② See: <http://www.nantong.gov.cn/ntsrnzf/zthjbhjdhy/content/7b92ce9c-9583-475f-9557-11023cae81df.html>

③ It was firstly proposed by Qiu Baoxing at the 2009 International Forum on Urban Planning and Development.

civilisation was clearly stated for the first time in history. Ecological civilisation thus began to have significant impact on urban ecological planning and even became an important keyword. That is reflected in the diversity of urban ecological planning types, as explained in the following paragraphs:

First, “ecological civilisation” planning has become a clearly defined type of planning ^[18-19], and an important basis and guidelines for urban ecological planning as well as the planning for eco-cities ^[20-22]. Second, the alignment of ecological civilisation with ecological security and urban security planning programmes such as flood control plan and river valley basin planning has broadened the scope of urban ecological planning, offering better safeguards to urban ecological security ^[23-24]. Third, the diverse forms of urban ecological planning under the principle of ecological civilisation give urban ecological development multi-faceted momentum: e.g. green corridor planning ^[25-26], conservation plan for old trees in cities ^[27-28], environmental protection planning ^[29-30], living-production-ecological space planning ^[31], basic ecological regulatory planning ^[32], green mobility planning ^[33], etc.

Apart from in the general sense, some specialised ecological civilisations are also included in urban ecological planning, forging substantive relations between ecological civilisation and physical planning ^[34-36]. In addition, progress was also made in theories and practical projects against the background of ecological civilisation. For instance, studies about ecological civilisation cover not only environmental planning theories ^[37], but also practices aiming to build “ecological civilisation projects” ^[38].

One noteworthy example is the ecological and environmental planning for Xiong’an New Area which conveys important information for urban ecological planning in the new era. The ecological and environmental criteria set forth in the “Guidelines for the Planning of Xiong’an New Area in Hebei” cover 38 indicators that fall into three categories: innovation and intelligent technology, green and eco-environment, liveability and people’s happiness. Under “green and eco-environment”, there are 17 indicators including the proportion of blue and green space, forest coverage, quality of water for important uses, sewer collection rate, yearly average PM_{2.5} value, MSD safe treatment, green architecture, etc. Two other indicators are listed under “liveability and people’s happiness”, i.e. green mobility proportion, and the ratio of public transport to total motorised travel. Together there are 19 indicators related to green and ecology, accounting for half of the total in the Guidelines. That testifies the great importance given to ecological civilisation in the planning and development of Xiong’an New Area ^[13].

2 The evolution characteristics of urban ecological planning in modern China

The evolution features of urban ecological planning in modern China can be understood from the perspectives of theories and practices. The former represents the process that urban ecological planning gets sophisticated over time; while the latter illustrates the increasing role that urban ecological planning plays in improving urban-rural eco-environment in China. To some extent, the two demonstrate the achievements made along the evolution history of urban ecological planning in modern China.

2.1 The perspective of theories

2.1.1 From copying to creating “Chinese characteristics”

While China is a late comer in modern urban ecological planning, urban ecological studies started early in Western cities. The concepts, planning systems, and technical solutions of urban ecology were all born outside of China. They were already a mature system at the time when the People's Republic of China was founded, and therefore had been leading the trends. That is why urban ecological planning in modern China followed in the footprints of the West and introduced their theories and techniques. In general, China has been a follower of the trend in the international academic community in developing its urban ecological planning.

As for how the copied concepts and theories should be applied in China to fit the realities, urban ecological planning developed in a passive manner, being driven by practical demands that required new knowledge from other disciplines to solve problems. In that process, the knowledge and techniques of many other disciplines such as urban planning, landscape ecology, geography, sociology, economics, and management sciences were constantly assimilated into the theories and methodology of modern urban ecological planning. But in recent years, China realised the real needs and began to explore its own pathway for urban ecological planning. “Low-carbon ecological city” and “ecological civilisation construction” are essential aspects of China's unique ecological planning pathway and also show the close link between urban ecological planning and national development strategy. That, is not only the unique feature of China's urban ecological planning, but is exactly why it prospers.

2.1.2 From “setting up a separate system” to “integrating systems”

To a large extent, the creation and development of urban ecological planning in modern China is based on denial and criticism of the traditional urban planning

system^①. In the early stage, out of their dissatisfaction about the traditional urban planning approach, many ecology scholars “set up a separate kitchen (as in the Chinese saying)” and built an ecological planning system in parallel to urban planning with completely different contents and methods^[39]. However, because it is not integrated into the traditional urban planning system, urban ecological planning and its outcomes are a bit too “specialised” and do not have the policy power that is vital to a “planning”. That, to certain extent, has led to the ineffective implementation of urban ecological planning, owing to the lack of legislation. In fact, it is largely regarded as a mere reference to urban planning^[39]. In some current urban planning programmes, ecological planning is still regarded as just a part of the traditional urban planning system.

At the beginning of the 21st century, some scholars, taking notice of the importance of merging urban planning with ecological planning, proposed the idea of making urban planning an ecology-related science. They discussed the relationship between urban planning and urban ecological planning^[39-40]. Some scholars started to make efforts towards a merger. Traditional urban planning now undergoes changes in its values and functions. New analysis methods such as the concepts of ecological carrying capacity and ecological footprint are integrated into its methodology. Urban ecological planning is also shifting towards more policy-bound, statutory outcomes.

2.1.3 From “technical rationality” to “value integration”

In its germination period in the 1950s when urban planning in China followed the lead of USSR, considerations for the green systems were around “axis pattern” which later proved to be not scientific. In the 1980s and 1990s, Western urban ecological planning was introduced, especially technical methods such as landscape ecology, GIS, and remote sensing. Thereby raised a wave of technocracy, in which technical concepts and solutions were seen as the core for planning. Planners valued the suitability and accuracy of instruments and tools, wanted to build the “scientific basis” for urban planning through “computation” thus getting the problems in human-nature relations solved. In a sense, the “technocracy” facilitated the application of urban ecological planning instruments. But on the other hand, it did not recognize the due significance of ecological planning, and gave little weight to the “value of people”.

① When elaborating the “methods for eco-city planning and design”, Huang Guangyu pointed out “methods for eco-city planning and design is the new methodology and theory that is based on the reflection of traditional urban planning methods and the absorption of ecological values”; Yu Kongjian also argues against the use of the term “negative approach” to describe the new approach of landscape planning that he champions.

In recent years, as the thought on urban ecological planning evolved continuously, planners in China came to realise, albeit gradually, that mankind is an important part of the ecosystem, the value and role of people were underestimated by large in the de facto “nature-centric” theories of early urban ecological planning “technocracy”. Technocratic solutions should always be based on the sober awareness of values and should take the development needs of people as a key. Urban ecological planning must be built upon harmonious human-nature relations, so that “technocracy” and “value awareness” can be integrated into one.

2.2 The perspective of practices

2.2.1 From “monotonous form” to “diverse media”

The urban ecological planning practices in China actually developed from urban green system planning. From the 1980s onwards, “urban green system” has been a keyword that occurs frequently in research literature. As the only statutory planning based on ecological concepts, urban ecological planning plays an important role in configuring urban ecological space and improving urban ecological environment. More ecological planning types emerged in the 21st century, including the ecological planning for urban clusters, ecological regulatory lines, ecological belts, ecological networks, ecological functional areas, non-construction land, new towns, districts, and neighbourhoods, university towns, business districts, industrial parks, airport towns, etc. and ad hoc ecological planning on certain landscapes, e.g. urban forests, waters, wetlands, river valleys, green belts or barriers, etc. These new types may not be mature or systematic yet, still they represent good attempts in exploring urban ecological planning system from different angles, thus having profound influence on the evolution of urban ecological planning in China.

2.2.2 From the “macro-vision” to the “region-wide perspective”

In the early time, ecological targets for cities were set mostly at the regional or master planning levels as one of the general goals for urban planning. For long, ecological targets were superior (thus abstract) goals that could not be implemented in a practical and effective way as they lack concrete guidance. For instance, many cities take “sustainability” as the target for urban ecological planning but do not have indicators or performance evaluation systems that can be referred to in practice, so the target fails as a guidance for urban ecological conservation and development. As for urban-rural planning, master planning has been a contribution factor for the implementation of urban ecological planning, however its governance

power is far from sufficient. On the other hand, often times ecological planning was dictated by the master planning. In many cases, special ecological planning was just a complement to urban master planning for the sake of completeness^[41]. In recent studies and practices of ecological planning, the ecology concept is connected with regulatory planning, and concrete quantitative criteria are defined. Some studies and practices take eco-community, green infrastructure, and green architecture as the objects to examine methods of ecological planning from specific angles. The “region-wide” approach of urban planning also has contributed to the improvement of urban ecological environment.

2.2.3 From “rigid control” to “soft management”

In the early times, urban ecological planning in China was used as a tool for rigid control on the implementation of urban planning, i.e. the “red lines” must be defended and not an inch of land should be given up. As it relied on force, it created intense conflicts from time to time. For example, when Shenzhen first published its “basic ecological regulatory lines”, the city took a mandatory approach and carried out over 2,000 demolition operations over two years. The city also took stringent measures towards city inspectors: those who were not tough enough in removing illegal constructions would be publicly criticised, demoted, or fired; a tough accountability system was set up, in which any administrative negligence will be held liable for^[42]. Regardless, illegal constructions were still rampant. That caused disgruntlement among the local governments and officials, some of whom even stood against the “basic ecological regulatory lines”. By the 2010s, planning scholars and officials had to rethink the rigid governance approach like the “blanket ban”, as it failed to contain illegal construction but caused numerous governance issues. The academia started to explore a win-win pathway of coordinating conservation and economic growth. Soft management was therefore introduced, taking into account the community economic gains, wishes of local residents, and ecological compensation mechanisms. The new approach respects the development needs of communities; establishes a bottom-up feedback system; formulates local development plans for communities; and prioritises the resolution of livelihood concerns. Such a shift from rigid control to soft management shows that China’s understanding of the essence of urban planning has gone through a metamorphosis for the better.

3 Key issues in China’s urban ecological planning

While we acknowledge the achievements made on urban ecological planning over the past seven decades, it would be helpful also to look into the legacy issues in this area.

3.1 The hierarchical relations among planning programmes is not clearly defined

At present, urban ecological planning is not a statutory type of planning. As such, the connection and coordination with statutory and other planning at higher or lower levels is particularly important. If urban ecological planning is not connected with other planning systems but works as a stand-alone system, it would be unlikely to evolve into an independent type and play its due role. At present, the unclear relations between ecological planning and other planning systems involve the following: the scope and procedures for ecological planning do not match well with that of urban planning; the indicators and criteria in ecological planning and urban planning are not harmonised; the technical measures and data of the two need more interaction and integration, the support that urban ecological planning can offer other types of planning is not sufficient, etc.

3.2 Too much emphasis is placed on achieving targets

Urban ecological planning in China places too much emphasis on achieving targets. This is demonstrated in the following: too much attention is given to planning targets and the grand master planning blueprint; while performance is evaluated based on whether the management of ecological spaces complies to the master plan, whether various criteria are met, etc. But less attention is given to the “locality” of social, economic, and natural environment, and the “pathway” for implementing the planning. As the contents of urban ecological planning are being enriched, more practical projects have unveiled more research questions to be answered: how can ecological planning be integrated and coordinated with statutory planning systems? how can various administrative bodies join hands for delicate management of the planning? What legislation is required to consolidate the legal foundation for implementing urban ecological planning? What stakeholders are involved in urban ecological planning?... All these are questions awaiting a clear answer from the practice.

3.3 Formulation and implementation of the planning are not well linked

Urban ecological planning covers a wide scope. Apart from the special ecological planning, a comprehensive urban ecological planning seeks to cover as much elements as practical to make it a complete system, of course it becomes complicated with intertwined components. Some urban ecological planning programmes give too much weight to the

completeness and too little to practical implementation approaches, processes, and procedures. That to some degree has rendered urban ecological planning difficult to be put into practice. It may be addressed by: stressing on the coordination between planning, actions and programmes, linking planning criteria with performance assessment, assigning responsibilities of planning implementation management in a clear way, characterising the planning with project management features, etc.

3.4 Technical standards are not harmonised yet

In terms of the drafting agencies, scope and outcomes, urban ecological planning is quite “diversified”. That shows the penetration of the ecological planning concept in many urban systems and its active role in urban sustainable development. On the flip side, that also tells the lack of harmonised technical standards in urban ecological planning. Generally speaking, urban ecological planning should be done at three levels: macro, intermediate, and micro. The applicable technical standards should have a core that applies to all levels, as well as the systematic procedures operable for all levels of planning (e.g. master, regulatory, and site plans). Besides, technical codes that are pegged with ecological performance can be of particular significance. To summarise, China should improve its urban ecological planning in all the aspects above.

3.5 More human elements should be considered

The urban ecological planning in China stresses the physical environment too much, giving due emphasis on physical environment factors and ecology in the narrow sense. In comparison, the human elements and components of the environment have not been fairly identified and valued; the value of historic eco-environment should also be better understood in a more sensitive manner. As such, the traditional culture, folk customs, spirit and ethos that are attached to the physical urban spaces can hardly be promoted in urban ecological planning; the intrinsic and intangible features of urban ecology cannot be stimulated; the function of urban ecological planning in “nurturing people” is also underperformed. In addition, some artificial landscape projects for local official’s political benefits rather than for the people’s needs – such as the spree in building meadows, squares, or fountains – have caused tremendous ecological losses. Moreover, the public awareness of ecology and environment is not satisfactory; the public engagement in urban ecological planning and development is poor in quantity and quality; the ecology and environment

data is not transparent enough ^①... All these show that urban ecological planning and governance should and can have more human touch.

4 An outlook of urban ecological planning in China

Wang Jinnan et al. summarised the development trends of China's ecological and environmental planning as the following three, i.e. for ecological and environment protection planning: “the campaign of building a beautiful China lays out a new coordinate system.”; “the institutional reform demarcates the new boundary”; and “the construction of ecological civilisation system sets forth higher standards” ^[13]. The authors of this article reckon those three trends are valid for urban ecological planning. Building upon those trends and the research of this paper, the authors develop an outlook of urban ecological planning in China, explained as follows ^②.

4.1 Adapt to the reform of spatial planning system

The adoption of spatial planning system marks a strategically important move China made towards ecological civilisation and sustainable development. The reform to establish and implement spatial planning system will have all-round impacts in both short and long term on the old systems, including the studies of urban ecological planning and the policies, standards, procedures, and pathways in planning formulation. Chinese planners should take the initiative to adapt research and practices on urban ecological planning to the new changes brought by the institutional reforms. Efforts should be made to align ecological planning with all kinds of high-level planning so that proper relations can be established between various existing planning systems with the emerging planning systems under the spatial planning framework. In the meantime, the academic nature of urban ecological planning should be carried on so that professionalism can contribute to the sustainable development of living environment in both urban and rural areas.

4.2 Improve urban ecological planning to better meet various practical demands

For urban ecological planning, to best meet the practical demands

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- ① Starting from 2003, the website of Stockholm City Council runs a metrical feature to show the implementation status of environmental planning and some environment indicators. All data is available online for the general public to retrieve and offline from government sources. See: LI Hao. Ecological and environmental planning in the world and its implications: case study of Stockholm and Vancouver[J]. *Journal of Planners*, 2014(00): 77-86.
- ② Some contents of the outlook also bears the nature of “policy recommendations”.

means the functions and services it offers should meet the demands to the largest extent possible. This is called the “serviceability” of urban ecological planning^[43]: it should be applied to solve practical problems and should be well received by the society, thus taking a due and long-lasting position in the planning system; it should play an irreplaceable role in improving the eco-environment and facilitating harmonious city-nature relations. To that end, the social demands for urban ecological planning and what the ecological planning has to offer the city should be evaluated respectively and any gap should be identified. To improve the serviceability of urban ecological planning is first to prioritise ecological civilisation development, new urbanisation, and building a beautiful and charming China, and to better equip the society for global climate change with high-standard ecological security and quality. Second, urban ecological planning should provide other types of planning with inputs that embody the professionalism of ecological planning. Third, urban ecological planning should have more cohesion and penetration power so as to form a complete planning system with “ecology” at its core^[41].

4.3 Expand the niche of urban ecological planning on multiple fronts

In the 21st century, as the development visions of cities are diversifying, the vision of urban ecological planning is also merging with that of traditional and modern urban planning. Therefore, urban ecological planning is motivated from both within and outside to expand its scope, thus having more attributes and missions. That has essentially formed a good background for urban ecological planning to expand its niche. It is safe to predict that urban ecological planning will surely enlarge its niche and expand to the following fields in the future: building up city resilience to address climate change; planning aimed at healthy lifestyle, diversity, inclusiveness, and sharing; improving living quality and enriching human elements of cities; integrating ecological resources security and efficiency; and integrating planning with implementation, development, and governance. On top of those, integrated development of urban and rural areas; integrated planning for all natural resources “mountains, waters, forests, farmland, lakes, and grasslands”; and delicate, high-quality, shared governance are also important factors to be considered in expanding the niche of urban ecological planning. It is worth noting that a key element of the expanded niche is to make it a unique modern design culture^①, and an integral component of

① In his article “Reyner Banham and modern design culture”, Bagoes Wiryomartono discusses the modern design culture in the field of architecture design. See *Frontiers of Architectural Research* (2012)1: 272-279. However, this paper believes the scope of modern design culture can be wider.

productivity and social economic development. If urban ecological planning can bring lasting, irreplaceable benefits in practice, in the long run, ecological civilisation will be carried forward in all respects and ecological awareness will become part of the intuition and institution in all sectors. Therefore, urban ecological planning in China will certainly attract more attention and unlock more potential.

4.4 Explore the innovation on urban ecological planning system

In the West, ecological planning went through many stages, including enlightenment, forming, consolidation, recognition, and diversification ^[44]. Throughout those stages, innovation has been a key note. The long history, vast territory, and unique social economic institution determine that urban ecological planning in China should explore a path for innovation in the light of state policies and changing ecological environment. Areas for future innovation may include: integration of urban ecological planning, development, and governance; the harmonisation and integration of ecological planning in urban and rural areas; application of future-oriented concepts, techniques, and methods that go with future trends; aligning urban ecological planning with the state ecological environmental planning system ^①; facilitating the merger of “urban ecological environment planning” with “urban ecological planning”; changing the top-down model of urban planning into one that balances top-down and bottom-up; give full play to the role of citizens and other stakeholders of cities; improving the ecological culture attributes and quality of urban ecological planning; enriching its human and art elements; innovating on the institutions and mechanisms of urban ecological planning; etc.

4.5 Construct a system of urban ecological planning theories and practices with Chinese characteristics

The traditional Chinese wisdom on ecological thinking and practices is an important part of the ecological civilisation of mankind. Its value in academic

① Urban ecological planning is currently a non-institutionalised type of planning in China (not in the least that nationwide “ecological and environmental planning” was not started until “the Thirteenth Five-Year Plan Period”). Urban ecological planning should be aligned with the national ecological and environmental planning in all aspects, including the typology, guidance, etc. The latter contains strategic planning, target-oriented planning, spatial planning, constructive planning, planning for meeting environment quality criteria, and planning for pollution prevention and control ^[13]. One aspect of aligning the two is to harmonise the planning typology, i.e. “urban ecological planning” should be enriched to become “urban ecological and environmental planning”.

study and as guidance for practices should be duly acknowledged ^[45]. To construct a system of urban ecological planning theories and practices with Chinese characteristics is not only to meet the needs of building ecological civilisation, but also is important for carrying on and advancing the Chinese traditional wisdom on ecology, and enhancing Chinese people's confidence towards our own culture and values. In the evolutionary history of urban ecological planning over the past seven decades, there is experience of success as well as lessons learnt from failures. The economic achievements China made since the reform and opening-up, and the numerous innovations invented for ecological restoration and improvement, constitute solid basis for a system of urban ecological planning theories and practices with Chinese characteristics. It is worth noticing that, such a system would also require a global vision to keep up with the latest trends and advanced thoughts in the international community and to absorb the essence of advanced ecological and environmental thoughts for China's benefits ^①. The integration of China's rich culture and tradition with the global advanced trends will help to build a clearly-defined, modern, and scientific system of urban ecological planning theories and practices and to integrate China's urban ecological planning with that of the world.

5 Conclusions

Since the founding of the People's Republic of China in 1949, with the post-war social and economic development in the world alongside the industrialisation and modernisation in China, urban ecological planning in China was conceived, flourished, and matured in a progressive manner over seven decades. Its evolutionary history reflects the diversification and improvement of the understanding of nature, cities, and mankind by governments, academia, urban planners and officials as well as the general public. In a sense, urban ecological planning is a representation of mankind's understanding of the nature, of civilisations, and of their values. How urban ecological planning will evolve and how well it will improve depends on the depth and accuracy of mankind's interpretation of human-nature relations, as well as the advancing of human civilisation and ecological development. That said, development of urban ecological planning in China in the future is not only the responsibility of the professionals, but also requires the vision, thinking, and creativity of everybody. Therefore, it is a subject worthy of everyone's long term attention and in-depth exploration. **UPI**

① Despite the negative impact on eco-environment brought by vested interest groups, the auto culture, and private ownership of land in developed countries, their advantages are undeniable and should be drawn from, especially in terms of their global awareness, interdisciplinary coordination, green concept popularisation, and development philosophy, etc.

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Appendix A brief history of urban ecological planning in modern China: Its background and significant events

Period	Year	Background and significant events of urban ecological planning in China	Selected developments and practices of urban ecological planning in China	Some trends of international ecology and environment research and practice
Initial germination period(1949-1977)	1949	—	—	<i>A Sand County Almanac</i> was published
	1954	—	Lanzhou drew up its master plan with “clusters in belt shape” pattern; the transformation project of Zhaojiabang neighbourhood in Shanghai	—
	1956	“Provisional Sanitation Standards for Industrial Site Design”	—	“Clean Air Act” took effect in the UK
	1958	—	Hefei drafted a master plan with “three stretched wings with gardens wedging in” windmill-shaped pattern	“The Athenian Technical Organization” founded by Constantinos Apostolos Doxiadis; Study on “Human Settlement”
	1960	—	—	Kisho Kurokawa and “the Metabolism”; the birth of “Symbiocity”
	1961	—	—	<i>Landscape Architecture: the Shaping of Man's Natural Environment</i> by John Ormsbee Simonds; <i>The City in History: Its Origins, Its Transformations and Its Prospects</i> by Lewis Mumford
	1962	The First Urban Work Conference of the Central Government	—	<i>Silent Spring</i> by Rachel Carlson
	1963	The Second Urban Work Conference of the CPC Central Committee	—	<i>Design with Climate: Bioclimatic Approach to Architectural Regionalism</i> by Victor Olgay

Period	Year	Background and significant events of urban ecological planning in China	Selected developments and practices of urban ecological planning in China	Some trends of international ecology and environment research and practice
Initial germination period(1949-1977)	1965	—	The “clusters in belt shape” master planning of Panzhihua city	
	1969	—	—	<i>Design with Nature</i> by Ian McHarg; <i>From Eco-Cities to Living Machines; Principles of Ecological Design</i> by John Todd
	1970	—	—	US issues the Amendment to the Clean Air Act
	1971	—	—	UNESCO launches the “Man and the Biosphere” Programme
	1972	China signs up for the UN “Man and Biosphere Programme”	—	“The Limits to Growth” by the Club of Rome
	1973	“Regulations on Protecting and Improving Environment”	—	United Nations Environment Programme (UNEP) was established
	1974	—	—	Control of Pollution Act in the UK; <i>Energy and form: An ecological approach to urban growth</i> by Ralph Knowles
	1975	“Opinions on the Ten Year Plan for Environmental Protection”	—	“Environmental Planning” ecological organisation; “Rebuilding Cities in Balance with Nature” organisation
	1976	—	—	HABITAT I adopts the “Vancouver Action Plan” and “Vancouver Declaration”; <i>Design for A Limiting Planet</i> by Jon Naar and Norma Skurka
Slow growth period (1978-1989)	1978	The Third Urban Work Conference of the Central Government	—	US promotes distributed energy system; <i>Earthscape: A Manual of Environmental Planning and Design</i>
	1979	“Environmental Protection Law of the People’s Republic of China (trial)”	—	—
	1980	—	“The Landscape and Greening Planning for Xi’an”	—
	1981	“Resolution of the State Council on Enhancing Environmental Protection During the National Economic Transformation Period”	—	—
	1982	The Ministry of Urban-Rural Construction and Environmental Protection is established	—	—
	1983	The Second National Conference on Environmental Protection establishes environmental protection as a state policy	“The Landscape and Greening Planning for Shanghai”	—
	1984	The State Council sets up Environmental Protection Commission. Ma Shijun and Wang Rusong proposed the theory of “Social-Economic-Natural Complex Ecosystem”	—	<i>Cities and Natural Process: A Basis for Sustainability</i> by Michael Hough; An MAB report states the five principles on “urban ecological planning”
	1986	—	Yichun sets the goal of building an eco-city	—

Period	Year	Background and significant events of urban ecological planning in China	Selected developments and practices of urban ecological planning in China	Some trends of international ecology and environment research and practice
Slow growth period (1978-1989)	1987	—	“Research on the Master Planning and the New Model of Green Heart Loop-Shaped Ecological Urban Form of Leshan City” wins awards	“Our Common Future”
	1988	“Resolution on the quantitative Performance Assessment of Urban Environment Comprehensive Improvement”	Yichun is designated as a pilot city for ecocity development	<i>Planning: Clearer Strategies and Environmental Planning</i>
	1989	“Environmental Protection Law of the People’s Republic of China”	—	—
Framework setting period (1990-1999)	1990	—	—	“This common inheritance: Britain’s environmental strategy”
	1991	—	“Study on Urban Ecological Planning of Chengde City”	<i>Risk assessment and environmental crisis: Toward an integration of science and participation</i>
	1992	The “Ten Major Solutions to Environment and Development”; “Regulations on City Greening”	“Urban Comprehensive Improvement and Ecological Planning of Chengde City”	<i>Sustainable Development and Urban Form</i> ; the “ecological footprint” theory; “21st Century Agenda” and “Rio Declaration on Environment and Development”
	1993	“National Guidelines for Environmental Protection Work (1993-1998)”	—	The 12 principles on eco-city planning by Richard Register; TOD theory; <i>Planning for A Sustainable Environment</i>
	1995	—	“Planning of the Ecological Green System in Guilin City (1995-2015)”	Ryan’s five principles on ecological design; “Land mosaics”
	1996	“National Ninth Five-Year Plan and 2010 Vision on Environmental Protection”; “Outlines of Development Plan on National Ecological Demonstration Zone (1996-2050)”	—	<i>The Compact City: A Sustainable Urban Form?; Environmental Planning and Sustainability</i>
	1997	National Environmental Protection Administration decided to establish “Model Cities” of environmental protection	—	“Eco-City Dimensions: Healthy Communities, Healthy Planet”
	1998	“National Plan for Ecological Environment Development”	—	—
	1999	—	—	“Istanbul Declaration on Human Settlements”; “The Habitat Agenda”
	2000	“National Guidelines for Ecological and Environmental Protection”; China Human Settlement Environment Award is set up; “Seminar on Urban Ecological and Environmental Problems” is held	“Research on Urban Ecological Planning of Wenzhou City” wins awards	—
All-round development period (2000-)	2001	“National Tenth Five-Year Plan on Environmental Protection”	—	“A Guide to Green Infrastructure for Canadian Municipalities”
	2002	“Environment Impact Assessment Act”; “Provisional Regulations on Ecological Functional Areas”; “Shenzhen declaration”; “Circular on Strengthening Urban Biodiversity Conservation”	—	“Cradle to Cradle: Remaking the Way We Make Things”; European Commission launched “Eco-city Programme”

Period	Year	Background and significant events of urban ecological planning in China	Selected developments and practices of urban ecological planning in China	Some trends of international ecology and environment research and practice
All-round development period (2000-)	2003	"Criteria on Ecological Counties, Cities, and Provinces (trial)"	"Hangzhou Environment Co-Protection Plan"	—
	2004	"Planning Guidelines on the Development of Ecological Counties and Cities" and its "Implementation Recommendations"	"Eco-city Construction Planning for Ningbo City"	"The London Road Traffic Noise Map"
	2005	"National Eleventh Five-Year Plan on Environmental Protection"; "Law of Renewable Energy"	"Regulations on the Management of Basic Ecological Control Lines in Shenzhen"; "Guidelines for Master Planning of Eco-city Development in Shenyang"	"Smart Growth: an Ambitious Movement and Its Prospects for Success"
	2006	"Evaluation and Accreditation Procedures for Ecological Counties and Cities"; "National Planning on Ecological Functional Zones"	"Strategic EIA for the Guidelines on Master Planning in the Eleventh Five-Year Plan Period in Wuhan"; "Ecological Conservation Planning for Dongguan City"	"Sustainable Urban Forms: Their Typologies, Models, and Concepts"; "Tokyo Climate Change Strategy" released; the UK releases its identification of 100 fundamental ecological questions
	2007	"Circular on the Nomination of National Ecological Landscape Pilot Cities"; "Guidelines on the Planning of National Key Ecological Functional Areas"; "National Planning Guidelines on the Conservation and Utilisation of Biological Species Resources"	Beijing Publishes its Green GDP calculation result for the first time; "Construction Plan for Shenzhen Baoan Ecological District (2007-2020)"	The UN Climate Change Evaluation Report sends the most serious warning; the UN Assembly holds the first climate change themed conference in its history
	2008	"Urban and Rural Planning Law of the Peoples Republic of China"; "National Ecological Functional Area Planning"; "National Guidelines on the Planning of Ecological Fragile Area Protection"	"Planning for the Construction of the Ecological Functional Loop in Harbin"; "Research on the Evaluation Criteria and System for Living Environment in Scalable Urban Settlements"; "Planning for Post-quake Ecological Restoration in Wenchuan"; "Conceptual Planning of Ecological Belts in Hangzhou"; "Planning for the Development of Ecological City in Kunming"; "Ecological Master Plan for Tianjin Sino-Singapore Eco-city"	"Sustainable Urbanism: Urban Design With Nature" by Douglas Farr; "The Chicago Climate Action Plan"
	2009	Per capita CO ₂ emission in China is 5.1t, higher than the world average by 4.3t; Shenyang becomes the only UNEP eco-demonstration city in China	"China's low carbon eco-city development strategy"; "Master Plan for Caofeidian Eco-city"; "Eco-environment Protection Plan for Wuhan Metropolitan Area"; "Construction Plan of Huli Ecological Neighbourhood in Xiamen"	"Eco Master Planning" by Ken Yeang; "Sustainable Urban Design: An Environmental Approach" by Adam Ritchie; "Master Plan for Low-carbon and Green Growth" in Seoul; UN Climate Change Conference is held in Copenhagen
	2010	"National Twelfth Five-Year Plan on Environmental Protection"; "Report on the Development of Low-carbon Ecological Cities in China(2010)"; "National Planning of Main Functional Areas"; "Gazette on the First National Census of Pollution Sources"	"Guidelines on the Construction of Chongming Ecological Island"; Shenzhen starts an initiative to build an ecological low-carbon demonstration city; "Plan for Improving the Human Settlement System in Jiangyin City"; "Overall Planning of the Green Heart Area in Changsha-Zhuzhou-Xiangtan Urban Agglomeration"	<i>Ecological Urbanism</i> by Mohsen Mostafavi; New agreement is reached on conserving biodiversity of the planet: 17% of the land and 10% of the ocean will be designated as protected areas

Period	Year	Background and significant events of urban ecological planning in China	Selected developments and practices of urban ecological planning in China	Some trends of international ecology and environment research and practice
All-round development period (2000-)	2011	“China’s Policies and Actions for Addressing Climate Change 2011”; “National Twelfth Five-Year Plan on Environmental Protection”	“Guidelines on the Development of Low-carbon City in Beijing”; “Annual Report on the Planning and Construction of Green Corridor Network in the Pearl River Delta”; “Planning Guidelines for Green Human Settlements in Shenzhen”; “Protection and Construction Plan for Key Ecological Functional Areas in Chongqing”	Japan starts the “Green IT Strategy”
	2012	PM _{2.5} is regularly reported in key regions and cities, including Beijing-Tianjin-Hebei, the Yangtze River Delta, and the Pearl River Delta; “Implementation Recommendations on Accelerating Green Architecture Development in China”; “National Twelfth Five-Year Plan on Air Pollution Prevention and Control in Key Regions”; The “Five in One” concept; “Procedures of Application and Accreditation for National Ecological Landscape Cities”	“Ecological Master Planning for Yuelai Eco-city in Chongqing”; “Assessment Criteria System for Green and Low-carbon Urban Areas in Chongqing”; “Plan on Building National Ecological Civilisation Demonstration City in Guiyang”; “Basic Ecological Network Planning for Shanghai”	“The Future We Want”; “Green Cities of Europe - Global Lessons on Green Urbanism”; “Urban green-blue grids for sustainable and resilient cities”; “Toward Sustainable Communities: Solutions for Citizens and Their Governments”; “Urban Adaptation to Climate Change in Europe: Challenges and Opportunities Cities Together with Supportive National and European Policies”
	2013	“National Twelfth Five-Year Plan on Ecological Protection”; “Report on Environment Development of China”; “The Decision on Major Issues Concerning Comprehensively Deepening Reforms”; “National Plan for the Construction of Pioneer Ecological Civilisation Demonstration Areas”; “Criteria for National Ecological Civilisation Demonstration Areas”; “Plan on the Prevention and Control of Air Pollution”	“Provisions on the Protection of City Loop Ecological Zone in Chengdu City”; “The Twelfth Five-Year Plan for the Development of Green Architecture and Green Ecological Urban Areas”; “Regulations on Building Ecological Civilisation City in Guiyang”; The first batch of eight Green Ecological Demonstration Urban Areas are named	<i>Green Infrastructure: A Landscape Approach</i> by David Rouse et al.; “Act Governing the Mitigation of Climate Change in Baden-Württemberg” is promulgated
	2014	“China National New Urbanisation Planning”; “2013 Air Quality Report for Key Regions including Beijing-Tianjin-Hebei, Yangtze River Delta, Pearl River Delta, and Provincial Capitals”; “Gazette on National Census of Soil Contamination”; Fourteen cities start pilot programme of delineating the development boundary for cities; “Research on Ecological and Environment Quality Assessment in China”; “Technical Guidance on Urban Planning EIA”	“Provisions on Promoting Ecological Civilisation in Zhuhai Special Economic Zone”; “Development Plan for Pu'er City to Build National Green Economy Demonstration Zone”; “Low-Carbon Eco City Planning Method”; “Regulations on the Permanent Protected Ecological Areas of Tianjin”; “Master Plan of Cultural Ecological Reserve in South Fujian”; “Protection Plan of Ecological Red Line Areas in Nanjing”	—

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All-round development period (2000-)	2015	MoHURD names 16 pilot projects for "sponge city"; the "Ten-action Plan for Prevention and Control of Water Pollution"; Sanya is named the first pilot city for urban renewal and regeneration; "Act of Air Pollution Prevention and Control of the PRC"; "Integrated Reform Plan for Promoting Ecological Progress"; "Ecological Conservation for the Coordinated Development of Beijing-Tianjin-Hebei Region"; Urban Work Conference of the Central Government; "Guidelines on Performance Assessment for Urban Ecological Development Environment (trial)"; "Technical Codes for Assessing Ecosystem Status Evaluation"	The state government approves the Development Plan for nine Water Ecological Civilisation Cities in Jiangsu; "Construction Plan for Low-carbon Eco-city in Zhanjiang"; "Ecological Conservation and Development Plan in Xianning City"; "Ecological Civilisation Development Plan for Fenghua County"; "Ecological Civilisation Development Plan for Lianyungang City"	"UN Sustainable Development Summit"; "International guidelines for Urban and Regional Planning"; "Transforming our World: The 2030 Agenda for Sustainable Development" is adopted by 193 member countries of the UN; <i>Reducing Stormwater Runoff with Green Infrastructure</i> by Madeline Fisher; "UN Sustainable Development Goals"; "Paris Agreement on Climate Change"
	2016	The "Ten Articles on Soil"; "National Thirteenth Five-Year Plan on Ecological and Environmental Protection"; "Opinion Document on Improving the Compensation Mechanism for Ecological Conservation"; "Survey and Assessment Report on the Changes of Ecological Environment in China in Past Ten Years"; "Technical Guidance on Urban Planning EIA"; "2016 Annual Report of China's Policies and Actions for Addressing Climate Change"	"Ecological Development Plan for Zhengzhou to Build National Centre City"; "Ecological Civilisation Development Plan for Baoan District in Shenzhen"	HABITAT III adopts "New Urban Agenda"; "Advancing Urban Ecology toward a Science of Cities" by Timon McPhearson
	2017	"Life Community of Mountains, Rivers, Forests, Farmlands, Lakes, and Grassland"; "Two-Mountain theory"; "Green Mountains and Clear Waters are Gold and Silver Mountains"; "Law on the Prevention and Control of Water Pollution"; "Pilot Plan on Provincial Level Spatial Planning"; "Eco-environmental Protection Plan of the Yangtze River Economic Belt"; "Plan on Ecological and Environmental Protection Cooperation of Belt and Road Countries"; "National Thirteenth Five-Year Plan on Environmental Protection Standards"; "Standards on Green Ecological Urban District Assessment"; "Opinion Document on Accelerating Ecological Restoration and Urban Renewal by MOHURD"	"Biodiversity Conservation Plan of Nantong City"; "Planning of Ecological Network in Fuyang City"; "Ecological Civilisation Development Plan for Longgang District in Shenzhen"; "Ecological Spatial Planning of Shanghai"; "Planning of Ecological Network in Huangshan City"; "Ecological Conservation and Development Plan for Zibo City"	<i>Green Areas Management and Bioengineering Techniques for Improving Urban Ecological Sustainability</i> by Davide Astiaso Garcia; <i>Infrastructure Ecology: An Evolving Paradigm for Sustainable Urban Development</i> by Arka Pandit

Period	Year	Background and significant events of urban ecological planning in China	Selected developments and practices of urban ecological planning in China	Some trends of international ecology and environment research and practice
All-round development period (2000-)	2018	The new Ministry of Ecology and Environment and Ministry of Natural Resources are established; National Conference on Ecological and Environmental Protection is held; "Soil Pollution Prevention and Control Law"; "Criteria for National Model Counties and Cities in Ecological Civilisation Development (Revised)"; "Ecological civilisation" is enshrined in the Amendment to the Constitution	"Plan for Developing Ecological Civilisation in Nantong City (Revised)"; "Plan for Building Demonstration Project for Ecological Civilisation in Yichang City"; "Specialised Planning for Urban Ecological Restoration in Xuchang City"	"The Special Report on Global Warming of 1.5 °C"; "Design to Address Hollow Cities: How Counter-urbanisation Improves Urban Resilience"; "Methodological framework for urban sprawl control through sustainable planning of urban green infrastructure"

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