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China's Sustainable Urbanization: A Review of Progress Made and Challenges Ahead

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我的论文是关于城市化。城市化是现在世界上一个重要问题，因为城市的数量和大小越来越增长。

这种城市化进程在发展中国家尤其明显，例如在中国。中国是世界上最大的发展中国家，在那里人类活动对自然环境已经产生了巨大影响（Li, Zhang 2013）。

自 1978 年以来，中国政府开始中国经济的改革进程，所以中国经济经历了快速而持续的扩张，也就是说，中国经济模式开始由以农业为主向以工业为主转变。那些年中国的城市发展也同样迅速，尤其是自 20 世纪 90 年代以来，中国经历了一个历史上没有平行的城市化进程。这个进程产生了一个惊人的城市化水平：2011 年城市人口数量超过了农村的（Ru, Lu, Li 2011）。这还不够，因为中国的未来取决于城市化，因为它被认为是创新的关键驱动力（Brombal 2017）。

但是高速城市化、快速工业化、经济增长已经破坏了环境维持发展的能力（Brombal 2017）。它与很多环境、社会、经济和文化问题有关（Soini, Dessein 2016）。因此，我国的城市化过程已经成为政策制定者和学者关注的热点问题。

从 20 世纪 80 年代末开始环境问题越来越严重。因此，城市化仍然造成许多负面后果，比如说：a) 污染排放的增加；b) 更大的水、土地和能源消耗；c) 生态系统的损害或破坏（Cui, Shi 2012; Vaughan 2014; Brombal et al. 2015; Deng et al. 2016）。在这些问题中，气候变化是不可忘记的：尤其是中国东方和东南方沿海地区（人口最多的地区）很容易受到全球变暖的影响，例如平均海平面的提高，更加频繁密集的极端气候事件（Brombal 2016）。由于迅速城市化进程，环境问题在全国普遍存在，尤其是比较小的地区。这是因为中国的这些比较小的地区经历了前所未有的、不断加快的城市化进程，这在人类历史上是独一无二的，不太可能重复（Li et al. 2012）。

关于社会问题的主要问题是与人类健康有关的，因为更多污染排放以及更多集中在比较小地区的人对公共卫生造成消极影响（Gong et al. 2012）。尤其是在中国的频繁情况是农民工在获得教育、医疗、养老等福利服务时的困难。这主要是因为户籍制度，也就是说户口，因为户口必须城市的才能获得这些服务，但政府仅在少数情况下允许城市户口（Looney, Rithmire 2016）。这种情况可以造成对最贫困的社会阶层严重边缘化的现象。这些边缘化现象的原因还包括土地的征用和迁移，特别是居住在边缘地区农民的财产的征用，以便建设基础设施或者扩张城市空间。因此，1996 年至 2008 年中国的耕地面积减少了 830 万平方公里，城市化率从 30,5%上升到 45,7%

（中华人民共和国国土资源部，2009 年），每年有 250-300 万农民失去他们耕地，这样失业和社会稳定的问题性增加了（Tao, Cao 2008）。

关于经济问题，最明显的问题是与环境问题有关的。在污染环境之下暴露对健康和经济都有巨大的负担，因为很长时间为公共卫生保健的高支出可以削弱竞争力，经济增长和持续发展。其他成本包括对与技术、公司、商业模式、人力资源和资本有关的创新解决的投资。最后还有与工作可能性、政策和法规有关的投资，以便对所有人提供良好的工作机会。可是经济领域主要与城市化的原因有关，因为给行政的经济激励是城市化的主要原因之一（Brombal 2017）。由于 20 世纪 90 年代初开始实行的财政分权，地方政府主要以土地使用权和规划费作为收入来源。这种情况鼓励了土地消费和征用，并且促进房地产行业的投机过程（Grano 2008, ONG 2014）。

最后，文化问题主要与有形和非物质文化遗产的减少有关（Tian, Zhu 2015）。

由于城市化带来的所有问题，世界各国政府都同意在城市规划的时候需要实施有效的可持续发展原则。因此，它们致力于制定促进可持续城市化的政策和方法（Holden 2006; Palme, Tillman 2008）。可持续发展也在北京的城市规划开始，因为中国政府正在推动未来城市发展的可持续城市规划（Shen, Zhou 2014）。

我选择研究京津冀地区，因为京津冀地区是中国最重要和最发达的城市地区之一。中国政府在这个地区有一种规划，也就是说它想将北京与天津、河北地区连接起来，为的是成为一个单一的大城市、经济圈。这样可以整合这三个区域，更好地平衡资源，促进更可持续的增长。

这个规划 2013 年开始，然后 2014 年 3 月它被国家报纸《中国日报》介绍了。《中国日报》报道这个新的规划应该缓解空气、水、交通问题，增强地区的竞争力，安置不那么重要的产业，将人口转移到河北的邻近城市，以便缓解首都的人口压力（Lockett 2016）。2015 年 2 月下旬，习金品总统正式公布这个新的规划。

顾名思义这个规划包括三个截然不同的区域，也就是说北京、天津和河北。它们三个一起占地 13,47 万平方公里，也就是说中国面积的 1,9%。2016 年它的人口是 11 亿人。它们三个有自己的发展过程（Xiong, Yu de Jong, Wang, Cheng 2017）。在京津冀地区城市化过程较快，从 1980 年 38,86%的增长率上升到 2011 年 59,47%的，也就是说每年增长率是 1,38%。经济发展也比较快，它的增长率是 14.09%（Wang et al. 2014）。

京津冀地区已经成为中国第三个最大经济区，跟长三角经济区（在中国的中边，上海和南京的附近）和珠江三角经济区（在中国的南边，广州和深圳的附近）几乎一样（Wu, Xu, Zhang 2015）。京津冀这个规划是中国下个世纪经济发展计划的中心支柱，因为中国总统想把京津冀地区这个城市化例子作为中国未来城市化的模式。并且现在中国学者谈到这种协调发展如何产生城市规划的新模式，因为这个大区域将创造一个巨大的城市景观（Economist Corporate Network 2016）。因此京津冀规划是中国促进区域经济发展的最重要的国家规划之一。

为了建设交通便利和基础设施中国政府将花费千亿美元。这些交通便利和基础设施将北京、天津和河北 11 个城市的 1,3 亿人连在一起。据京津冀规划的一个重要的部分中国政府希望将天津城市成为一个先进制造业和国际航运业的基地，将河北省成为一个清洁制造业和批发贸易的区域，而北京将继续作为国家的首都和政治文化中心（Baculinao 2017）。

其它京津冀规划的一些措施被中国官方消息报道了。例如，2015 年 8 月 24 日中国国务院的网站报道《京津冀协同发展功能定位明确》；这个协同定位包括十个部分，其中的最重要是四个，也就是说：

- 京津冀规划的协调发展包括一个中心，也就是说北京。为首都的主要措施是缓解它的拥堵，比如说中国政府想取消对北京作为国家首都的不重要经济活动。
- 京津冀规划的协调发展包括两个城市，也就是说北京以及天津，因为中国政府当局认为这两个城市是京津冀地区发展的《双引擎》。
- 京津冀规划的协调发展包括三轴。为了发展工业和城市化有三个主要走廊，也就是说从东边向西边的京津轴，通过河北西南边的北京、保定、石家庄轴，通过河北东北边的北京、唐山、秦皇岛轴。
- 京津冀规划的协调发展包括四个主要区域，也就是说一个中心围绕北京以便提供协调功能，一个东边的地区围绕天津滨海港区以便支持发展，一个南边的地区开发绿色产业，最后一个西北边的地区保护生态环境（Economist Corporate Network 2016）。

由于京津冀地区正在加速增长，特别是它的人口、大小以及经济，历史数据和未来政策就确认这个地区的城市化和经济增长将继续增加（Wang et al. 2014）。

这种城市化和工业化的过程将明显要求很多和过去时一样的能源、土地、空间和自然资源。那个时候经济加速增长消耗能源和资源的广泛，这样带来了一系列环境问题，因为区域能源消耗超过环境承载能力。

不言而喻这种情况未来也可能发生，因为空间和资源大要求以便容纳日益增长的人口可能产生很多的负面后果，比如说可能对城市环境造成巨大的压力，还是可能威胁居民的安全。事实上空气污染、地下水污染等京津冀地区的环境问题已经对人民健康产生了巨大影响，同时经济发展也遭受了重大损失（Xiong, Yu de Jong, Wang, Cheng 2017）。

值得注意的是自 2012 年以来中国政府采取的重要措施，尤其是《国家新型城市化规划 2014-2020 年》以及《十三五生态环境保护规划 2016-2020 年》。《国家新型城市化规划 2014-2020 年》是关于中国城市化的优先事项和模式的第一个措施。

《十三五生态环境保护规划 2016-2020 年》报道中国政府《十三五》期间应该减少污染排放。

我的论文想解释中国以及京津冀地区的城市化进程，以便清楚地说明几乎所有对可持续发展的影响，而政府正式提出还是已经实现的解决方案。我们知道，中国在可持续性和环境保护方面起积极主导作用，因为中国在这两个领域的进步，被认为是对环境退化和气候变化的积极影响（Brombal 2017）。特别是关于《绿色技术》的大量投资以及在气候变化方面的更强有力地位。因此近年来中国从一个不发达、污染国家转变为一个世界上对可持续性的积极变量（Zhang, Barr 2013）。

所以我们可以说中国政府正在发展新视角来处理城市化和可持续性问题，以便更好规范这一复杂的过程。中国政府还正在发展可以促进国家开发，并且同时注重保护环境的方法。

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1. Introduction

The conversion of land from its natural state to human uses is generally the most permanent and often irreversible effect of human interaction with the natural environment; as a matter of fact, human history in the past centuries has shown how we use nature to meet our needs, and how the environment is affected by human activities (Jolly, Torrey 1993).

The most evident land transformation we have available nowadays are undoubtedly cities, although they actually become part of the environment both as ecosystems with complex social, economic, and natural parts; and as artificial ecosystems dominated by human activities, sustained by natural life support systems, and vitalized by ecological processes (Ma, Wang 1984; Wang, Ouyang 2003). The scientific logic behind these theories could work except the number of urban areas and their size have been growing very rapidly in recent years, thus this is why nowadays urbanization is an important issue as a global scale.

This urbanization process is especially evident in developing countries like the largest one in the world: China, where human activities have over-influenced the natural environment (Li, Zhang 2013).

Its economy has undergone rapid and continuous expansion since the Chinese economic reform in 1978, when its economic model started changing from agriculture-sector-based to industrial-sector-based. As a consequence, over the past three decades of rapid economic growth, China has witnessed equally fast urban development, and particularly since 1990s it has experienced an urbanization process with no parallel in history: the expansion of the urban area in major cities in China has grown 1.8 times during the period from 1997 to 2009 (Shen, Zhou 2014).

This China's gradual transition toward an urbanization-oriented development strategy has generated a spectacular level of urbanization: as a matter of fact, the urban population grew dramatically in recent years outnumbering that of rural areas in 2011 (Ru, Lu, Li 2011). And this is not enough: the country's future will be largely

shaped by urbanization, since it is considered a crucial driver for innovation (Brombal 2017).

However high-speed urbanization, coupled with rapid industrialization and economic growth, is stretching to the very limit the capacities of the environment to sustain development (Brombal 2017); indeed, it has been associated with a variety of problems, more precisely related to every dimension in which sustainability is conventionally divided, namely environmental, social, economic and cultural dimension (Soini, Dessein 2016). For this reason, urbanization in China has become a hot issue that attracts considerable attention from policy makers and scholars.

Environmental issues became more serious in the late 1980s, and although in recent years scholars in China have paid more attention to the coordination between urbanization and the sustainable use of environmental resources, there are still many negative consequences of urbanization, which can be summarized as follow: a) increase of polluting emissions; b) bigger consumption of water, land and energetic resources; c) damage or destruction of ecosystems (Cui, Shi 2012; Vaughan 2014; Brombal et al. 2015; Deng et al. 2016). Among these issues, climate change cannot be forgotten: Chinese east and south-east coastal zones (the most populated ones) are particularly vulnerable to global warming effects, in terms of rising average sea level and more numerous and intensive extreme climate events (Brombal 2016). With China's rapid urbanization, environmental problems exist throughout the country, but are especially evident in relatively small regions. This is because some regions in China have experienced urbanization at an unprecedented and increasing speed, unique in human history and unlikely to be repeated (Li et al. 2012).

When talking about social issues, major problems strictly related to human life concern human health: more polluting emissions together with more people concentrated in small defined areas cause a vicious cycle that has negative consequences in the public health (Gong et al. 2012). Particular in China are also the difficulties that has the urbanized population (migrant workers, *nongmingong* 农民工

) when accessing to welfare services, e.g. education, healthcare, pension. This is essentially because of the household registration system (*hukou* 户口), which must be urban to be possible to access these services, but it was allowed only in a limited number of cases (Looney, Rithmire 2016). In this context we can observe serious marginalization phenomena that damage the most underprivileged social classes. Reasons of these events are also the expropriations and related relocation of land, especially the properties of farmers living in border areas, in order to leave space for infrastructural projects or urban expansion. Indeed, the country experienced a decrease of 8.3 million square hectares of arable land from 1996 to 2008 as its urbanization rate rose from 30.5% to 45.7% (Ministry of Land and Resources of the People's Republic of China 2009), with 2.5-3.0 million farmers per year losing their farm lands, which adds to the problems of unemployment and social instability (Tao, Cao 2008).

With regard to economic matters, the most evident is linked to the environmental concerns: as a matter of fact, exposure to contaminated environment is an immense burden for health, and consequently for economy, because high expenditures for public health care, in a long period of time, can undermine competitiveness and economic growth, threatening sustainable development. Other costs include investments for innovative solutions in relation to technologies, companies, commercial models, human resources and capital; and, finally, the ones regarding job possibilities, policies and regulations in order to give the opportunity to all people for finding a good place of work. However, economic sphere is also mostly connected with the causes of urbanization, indeed economic incentives in the administrative field represent one of the major reason of this process (Brombal 2017). Because of the fiscal decentralization started in the early 1990s, local administrations mainly resorted to the concession of land rights of use and planning fees as source of income. This encouraged the consumption of land and the expropriations, so that facilitating speculative processes in the real estate industry (Grano 2008, Ong 2014).

Finally, cultural issues are mostly related to the decline of tangible and intangible cultural heritage (Tian, Zhu 2015).

Given this framework, it is evident that problems belonging to urbanization phenomenon have a multi-sectorial origin, involving different dimensions, and a multi-scalar character, since they are connected to several levels of legislative and administrative jurisdiction (Brombal 2017). Because of all the challenges brought by urbanization, governments all over the world recognized that there is the need for effectively implementing sustainable development principles in urbanization process, so they have dedicated efforts to develop policies and methods for promoting sustainable urbanization (Holden 2006; Palme, Tillman 2008). Sustainability has taken roots also in Beijing's approach to urbanization, because the Chinese government is promoting a sustainable urbanization process to develop future cities (Shen, Zhou 2014).

I chose to study the Beijing-Tianjin-Hebei case because the Beijing-Tianjin-Hebei (BTH) Region (*jingjingji* 京津冀) is one of the most important and developed urban areas in China.

The idea to link Beijing with Tianjin and the Hebei region into a single megalopolis, and one economic sphere, in order to integrate these three areas, better balance resources and foster more sustainable growth started in 2013, but it earned a crucial endorsement first in March 2014, when the State-run paper China Daily was reporting on a "new plan" for integration "expected to ease the air, water and transportation problems, to relocate less important industries, to divert population to neighbouring cities in Hebei, to ease population pressure in the capital and to beef up the competitiveness of its surrounding areas" (Lockett 2016); late in February 2015 when President Xi Jinping celebrated its merits.

As the name suggests, this megacity includes three distinct regions, namely Beijing, Tianjin and Hebei province, which have their own development trajectories, cover 134,735 square kilometers, occupying 1.9% of China's territory, and had a population

of nearly 0.11 billion people in 2016, accounting for 8% of China's total population (Xiong, Yu, de Jong, Wang, Cheng 2017).

It has recorded a rapid urbanization development, with an annual growth of 1.38%, from 38.86% in 1980 to 59.47% in 2011 and it also had rapid economic growth at 14.09% (Wang et al. 2014).

The area has become the third largest economic growth pole in China after the metropolitan regions of the Yangtze River Delta (around Shanghai and Nanjing in central China) and Pearl River Delta (around Guangzhou and Shenzhen in the south) (Wu, Xu, Zhang 2015), although rumours now circulate about the possibility for BTH to rival in scale and potential these other two economic poles, which guided China's impressive economic growth in the past 30 years and in recent times have become the world's largest testing ground for the study of creating wealth through urbanization (Economist Corporate Network 2016).

This project is a central plank of the country's economic development plan over the next century, indeed Chinese President held out the model as a template for China's urbanization in the future. Besides this, now Chinese academics speak about how the co-ordinated development could originate new models for urban planning, as this megaregion will create a massive urban landscape (Economist Corporate Network 2016).

The related Beijing-Tianjin-Hebei Region Integration Plan is one of the most important national strategies in China promoting regional economic development; moreover, having entered its second year as an official economic development programme, the "Beijing- Tianjin- Hebei Co-ordinated Development" (*jingjinji xietong fazhan* 京津冀协同发展) now boasts projects and policy initiatives that demonstrate genuine progress and deepened integration (Xiong, Yu, de Jong, Wang, Cheng 2017).

The government is expected to spend hundreds of billions of dollars on transportation and infrastructure activities that would connect 130 million people living in Beijing, Tianjin and eleven other cities in Hebei province. A crucial part of

the strategy is the revitalization of Tianjin as a base for advanced manufacturing and international shipping; Beijing would remain as the nation's capital and its political and cultural centre, while Hebei province would shift to clean manufacturing and wholesale trading (Baculinao 2017).

Official Chinese sources enthusiastically describe all variety of positive transformations in store with the implementation of BHT initiatives but noticeably skip over specifics about how these outcomes will be accomplished. A numerated outline describing 10 component elements appeared on August 24th 2015 when the State Council's website posted the "Confirmed Positioning for Jing-Jin-Ji Coordinated Development Functions" (*jingjinji xietong fazhan gongneng dingwei mingque* 京津冀协同发展功能定位明确). This entails:

- **One Core:** *Beijing*. The "first responsibility" of coordinated development will be to alleviate Beijing's congestion through removal of economic activities not crucial to its operations as the nation's capital.
- **Two Cities:** *Beijing-Tianjin*. The authorities deem these cities as the "twin engines" of region-wide development.
- **Three Axes:** three main corridors for industrial development and urbanization: the *Beijing-Tianjin* axis runs east-to-west, the *Beijing-Baoding-Shijiazhuang* axis runs through Hebei's south-west, and the *Beijing-Tangshan-Qinhuangdao* axis runs through Hebei's north-east.
- **Four Zones:** these comprise a central zone around Beijing to provide coordinating functions, an eastern zone around Tianjin's Binhai port area for development support, a southern zone for greenfield development, and a north-west zone for ecological conservation (Economist Corporate Network 2016).

According to the historical data and future policy, urbanization and economic growth of the BTH region will continue to increase, because the area is undergoing accelerated growth, especially in population, spatial scale and economic dimension (Wang et al. 2014).

However, this acceleration of urbanization and industrialization will clearly result in huge demand of energy, land, space and natural resources so that the interactive coercing relationship between urbanization and the environment will be intensified. As it happened in the past, when the high-speed economic growth could never have been realized without extensive consumption of energy and resources, leading to region's energy consumption exceeding its environmental carrying capacity, this way leaving space for an important high-tech and industrial base but bringing a series of environmental problems.

It goes without saying that this is likely to occur also in the future, when the need for space and resources to accommodate an increasing population may put great pressure on the urban environment and the resulting negative consequences already mentioned above may threaten the inhabitants' safety; indeed environmental problems in this region, regarding especially air pollution and contaminated groundwater, have already enormous influence on the people's health while also causing economic loss (Xiong, Yu, de Jong, Wang, Cheng 2017).

However, it is worth noticing how since 2012 Chinese government has been taking important measures; particularly relevant are the "China's New-Type Urbanization Plan" (2014-2020) (*guojia xinxing chengshihua guihua 2014-2020* 国家新型城市化规划 2014-2020 年) and "China's 13th Five-Year Plan for Ecological and Environmental Protection" (2016-2020) (*sanshiwu shengtai huanjing baohu guihua 2016-2020* "十三五" 生态环境保护规划 2016-2020 年). While the top provision is the first instrument for the Chinese macro-planning entirely dedicated to priorities and modalities for the urbanization, the second one states that the government shall comprehensively improve the emission standards and substantially reduce the discharge of pollutants during the "Thirteenth Five Year Plan" period.

This thesis aims at shedding light over China's urbanization process, with particular attention to the BTH area, in order to clearly illustrate all the impacts on

sustainability and the possible solutions officially proposed, or already realized, by the government.

We know that China has a leading role with respect to sustainability and environment because country's progresses in this field, especially the ones referring to "green technologies", are often mentioned as positive factors able to influence environment degradation and climate change (Brombal 2017). As a matter of fact, thanks to large investments in the sector of clean energy and a more strong position with regard to the mitigation of climate change, in recent years China has shift its position from an underdeveloped, polluted and polluting country to a positive variable for the sustainability as a global scale (Zhang, Barr 2013). In this situation, urbanization is both considered as a threat for the progresses made so far and as a window of opportunity for the introduction of innovation in the environmental, economic and social field (Bai, Shi, Liu 2014), because positive resources of urbanization are often considered for the adoption of green technologies and environmental rehabilitation, the transformation of the economy toward the tertiary sector and the extension of public and social services (UNDP 2016).

In this framework we can say that Chinese government is developing new perspectives to deal with urbanization and sustainability, in order to better regulate this complex process and to favour the growth of approaches that give importance to protecting environment without renouncing to fostering the country's development; the already mentioned "China's New-Type Urbanization Plan" and "China's 13th Five-Year Plan for Ecological and Environmental Protection" are an example of this new attitude. However, to what extent these guidelines can positively inform policy making still remains to be ascertained. Moreover, it is not clear whether they are able to bring about transformational change for sustainability or their objects are still anchored to the same conventional ideas of incremental development. For this reason this essay will finally try to understand whether these actual measures can be effectively hold a sustainable progress.

2. The urbanization process and its impacts

2.1 Land-use and human activities

Generally, land-use change is tightly related to human-environment interactions, that are the dynamic relations between human activities and the physical environment (Li, Zhang 2013).

Land use and land cover change (LUCC) represent an important research field in areas with important ecological problems, including global climate change, food security, soil degradation, and biodiversity (Vitousek et al. 1997; Xie et al. 2012, 2013). These studies mainly include modelling the spatial and temporal patterns of land conversion, and analysing the causes and consequences of land change.

Land-use morphology, which is the overall pattern of actual land cover in a certain area at a given time, varies with socioeconomic development. According to Grainger (1995), land-use transition indicates the changes in land-use morphology over time, and corresponds to a particular socioeconomic development phase; Mitsuda and Ito (2011) also point out that socioeconomic factors influence land-use change among different land-use types, although natural factors such as potential productivity and topographic relief help in determining the land-use types.

Therefore, we can surmise that human beings have been altering much of the world's environment land at varying rates and over vast different areas throughout the several million years they have inhabited the earth, but the evidence suggests that particular is the modern global combination of a very large population, relatively rapid rates of population growth, and very rapid rates of technological change which constitutes a unique assemblage in human history, an assemblage posing new hurdles to adaptation and enhancing the rate of change (Gordon Wolman 1993). For this reason, we can say that the capacity to alter the landscape has increased with technology, and land use change in many areas has accelerated, leading to the recent alteration, in one way or another, of roughly one-half of what might be referred to as the "usable" rural land (Gordon Wolman 1993).

Agriculture has been one of the first form of land alteration which had been associated with the most significant changes and keeps on having different impacts on the environment; due to farming, irrigation and the practice of floodwater farming, deforestation and grazing, agriculture impact has long been recognized (Gordon Wolman 1993).

By 1500 agriculture had spread throughout much of the world, including Asia, Latin America, Africa, and North America. In Europe, the landscape was completely transformed between 900 and 1900 AD: indeed, different styles of farming characterized over time portions of the landscape, this way increasing agricultural productivity. This object was reached also with the help of new plant varieties and large-scale application of fertilizers, herbicides, and pesticides groundwater, in the last fifty years, and, more recently, with the help of mechanical tillage. These significant transformations in the land have supported increasingly dense populations (Gordon Wolman 1993).

However, little evidence suggests that until recently most of the benefits of increased production associated with irrigation, the expansion of land, shortening of fallow, and the increase in labour, have been either over-whelmed by deterioration of the environment (Gordon Wolman 1993). For example, in the eighteenth and nineteenth centuries, continuous row cropping and monoculture in the major grain regions of eastern Europe, North America, and Australia seriously degraded the land, as someone suggested (Larson et al., 1983).

Summing up we can say that the conversion to agriculture has increasingly eroded the land surface on average roughly two times the natural background and much debate continues over the potential impact of machinery and modern technology on the long-term structure and character of the soils, if adequate and constant management will not be practiced (Gordon Wolman 1993).

Though the modern scene is not like the past mainly because of two points. The first one is the rate of production of new and particularly synthetic materials unknown in

nature, which places additional burdens on the environment because they may accumulate, degrade, or move from place to place, altering the quality of the landscape in new ways (Gordon Wolman 1993).

The second, and more important, factor regards the rate and the magnitude of the demographic change, which are larger and unprecedented in history, and the spatial distribution of population. World's population has grown exponentially in the twentieth century, from around 1.6 billion in 1900 to around 6.1 billion today, and over the next thirty years (2000–2030) it is projected to grow at an annual rate of 1.8 percent, or nearly double the expected rate (almost one percent per year) (Cohen 2006). At the same time, its spatial distribution is affected by enormously complex and numerous factors, including land tenure, poverty, conversion to cash crops, the performance of the market, and transportation, which interact with or influence the environment; and in addition they influence the distribution of people among rural village or urban metropolitan areas, with environmental effects having different spatial characteristics at local, regional, national, continental, and global scales (Gordon Wolman 1993).

2.2 The urbanization process

We know that for the last fifty years a “new” and very challenging phenomena has been taking place, that is urbanization, one of the most powerful and visible anthropogenic forces on Earth (Dawson et al. 2011). This process is closely related to industrialization, economic growth and spread with the innovations caused by the Industrial revolution, and therefore, it has played an important role in the development and modernization of underdeveloped and developing countries (Hope 1986; Zhang, Song 2003; Siciliano 2012).

In this sense, its consecutive phases can be seen as a diffusion waves, because rapid urbanization has greatly accelerated economic and social development, and global

cities have become engines of economic growth and centres of innovation for the global economy and the hinterlands of their respective nations (De Sherbinin et al., 2007).

Indeed cities can offer important opportunities for economic and social development, because they have always been focal points for economic growth, innovation, and employment; particularly capital cities, are where the vast majority of modern productive activities are concentrated in the developing world and where the vast majority of paid employment opportunities are located.

Virtually, all countries distinguish between urban and rural population, but there is not an international definition of what constitutes an urban area, thus it varies among countries and in some cases even within a single country, mainly because the size of a city's population is a function of how and where the city administrative boundaries are drawn, which can be quite arbitrary. In some cases, the size of the city would be considerably larger if people residing in the urban fringe were included in official statistics; while in other cases, official statistics undoubtedly overstate the true size of the city because city boundaries have been drawn up so generously. For example, in China, the world's most populous country, the definition of what constitutes an urban area has changed quite substantially over time: indeed, in the early 1980s, China significantly lowered the criteria for qualifying localities as urban, consequently official statistics show a massive increase in the number of towns and cities and in the size of the total urban population in the mid-1980s (Cohen 2006).

Another complication is that settlement systems have also increased their degree of complexity over the past twenty years: as a matter of fact, innovations in transportation and communication have nonetheless resulted in the spread of urban functions over wide geographic areas.

The history of urbanization dates back to centuries ago, but although small forms of urbanization occurred already in ancient history, the most important events are the ones of the eighteenth century related to the English industrialization, when people

moved to live near factories and other sites of industrial production; then the Industrial revolution moved to France, Germany, United States, Japan and finally to the whole western countries; at the end, in the twentieth century, it reached other areas in the world, firstly Asian ones.

Today urbanization and city growth are caused by a number of different factors, but the principal reasons for rising levels of urbanization are rural–urban migration, the transformation and reclassification of rural villages into small urban settlements, and the geographic expansion of urban areas through annexations, that can be caused both by the arrival of new migrants and by the sub-urbanization of the middle class out of the central city (Cohen 2006).

Therefore, no wonder that the level of world urbanization today and the number and size of the world’s largest cities are unprecedented; especially over the last two decades, globalization driven by advances in transportation and telecommunications, and a positive political climate has created a global economy characterized by unprecedented levels of urbanization and more and bigger cities than ever before.

Cities are currently home to nearly half of the world’s population, more specifically around 3 billion people: indeed, over the last twenty years, as a result of rapid population growth and of the world’s economy transformation by a combination of rapid technological and political change, many urban areas have experienced dramatic growth; we can say that at this rate of growth, the world’s urban population can be expected to double in almost forty years (Cohen 2006). Just thinking about the fact that, while at the beginning of the twentieth century only sixteen cities in the world – the clear majority in advanced industrial countries – contained a million people or more, today almost four hundred ones contain a million people or more, and about seventy per cent of them are located in the developing world. In other words, in 1950 just over one-half of the population of the developed world and just under one-third of the population of the entire world lived in urban areas; at that time, there were only around 733 million people living in

urban areas (Cohen 2006). Continued urbanization over the last fifty years has resulted in a situation whereby close to half of the world's population (47.1 percent) now lives in urban areas; thus, in absolute terms, the number of urban dwellers almost quadrupled between 1950 and 2000 from 733 million to 2.857 billion (Cohen 2006).

Compared against the rapid rise in the urban population, the growth of the world's rural population has been relatively slow: indeed, while the world's urban population increased four-fold between 1950 and 2003, the world's rural population less than doubled from 1.8 billion in 1950 to 3.2 billion in 2000; and while the world's urban population is expected to increase by almost 2 billion over the next 30 years, the world's rural population is actually expected to decline slightly falling from 3.3 billion in 2003 to 3.2 billion in 2030 (Cohen 2006). Thus, all population growth for the foreseeable future is expected to be absorbed in urban areas: demographers predict that around 61% of the world's population will be living in urban areas by 2030, at time which the world's urban population will be approaching 5 billion; nevertheless, as cities grow, managing them becomes increasingly complex, because the speed and sheer scale of the urban transformation of the developing world present formidable challenges (Cohen 2006).

And while cities command an increasingly dominant role in the global economy as centres of both production and consumption, rapid urban growth throughout the developing world is seriously outstripping the capacity of most cities to provide adequate services for their citizens, because over the next thirty years, virtually all of the world's population growth (two-billion-plus people) is expected to be concentrated in urban areas in the developing world, averaging 2.3 per cent per year during 2000–2030 (Cohen 2006).

This represents a significant departure from the spatial distribution of population growth in the developing world that occurred over the past thirty years, since in 2017 the developing world was likely to have become more urban in character than rural:

indeed, many cities, particularly those in East Asian countries, which have enjoyed robust economic growth, have grown spectacularly over the past twenty-five years, in some cases more than quadrupling in size (Cohen 2006).

By 2030, more than half of the urban population in the world will reside in Asia while Europe's share of the total urban population will have been reduced from 38% in 1950 to just 11% in 2030; and similarly, a majority of the world's large cities are now concentrated in Asia: thus, while in 1950 only seven of the world's thirty largest urban agglomerations were located in Asia, by 2000 these rose to sixteen.

In this scenario, it is important not to lose sight also of the fact that the pattern of urbanization has brought high growth rates and economic success, indeed in many cases world's largest cities are located in developing countries with the world's largest economies, for example China.

2.3 Urban development in China

Urbanization is a complex process of change of rural lifestyles into urban ones. Chinese experience in this way is not different from the ones undergone by the countries having a more ancient industrialization phase, where the change in their economic model (from agriculture-sector-based to industrial-sector-based and then service-sector-based) had been accompanied with a major concentration of people in urban areas (Brombal 2017).

However, the urbanization process occurred in mainland China during the last thirty years is the most massive ever in the world's history, this way creating a peculiar case in terms of size and speed and because of the coexisting of areas characterized by very different levels and phases of urbanization process (UNDP 2015): for example, if in Europe the process took a few hundred years and in the United States a century, in China the length of time for the average village varies a great deal, but on average it is shorter, we even talk about ten years (Woetzel, Devan, Jordan, Hu, Li

2009). For these and many other reasons, Chinese urbanization process has been one of the most studied and discussed by worldwide governance chiefs and scholars.

But the situation has not ever been like this because, while during the 1920s and 1930s the Nationalists pursued a policy of urban-oriented modernization, beginning in 1949 planning policies were influenced by socialist theories of Soviet origin; thus, at that time, the regime focused on the development of the countryside and limited the growth of urban spaces for more than three decades. This was aimed to encourage and support the development of industry, closing cities and limiting their role of production rather than consumption (Douay 2017). No wonder if in 1950, just after the formation of the People's Republic of China, the level of urbanization (measured as the number of people living in urban enclaves as a proportion of the total population) in the country was 11% (Woetzel, Devan, Jordan, Hu, Li 2009); and some years after, in the late 1970s, it was still quite low because only about 20% of the population lived in urban areas, therefore the country was widely viewed as an example of "underurbanization" – that is, a case of industrial growth without parallel urbanization (Peng 2011).

This scenario characterized the country until 1978-1979, when Deng Xiaoping returned to power, crafting its new development path: at the third plenum of the Eleventh Central Committee of the CCP (Chinese Communist Party) he promulgated a series of measures, whose purpose was said to be the development of a "socialism with Chinese characteristics" (Deng Xiaoping 1984), for Chinese economic system and opening up China to the outside world. Economic reforms included de-collectivization of agriculture and dismantling of Soviet-style central planning in industry; China's economy was not based on agriculture-sector anymore but transformed into a market-oriented one, that means when market forces play a major role. In the meanwhile, the process of opening up the country involved China's entry into the World Trade Organization (WTO) in 2001, reinforcing its role as a major

global recipient of foreign investments and allowing the increase of its trade and foreign exchange reserves.

It goes without saying that all these circumstances had the mainly effect of changing the balance between the urban and the rural, and this way the trend toward urbanization accelerated, from 36% in 2000 to 46% in 2007 (Woetzel, Devan, Jordan, Hu, Li 2009). Indeed, this reform era undoubtedly led to a rapid economic growth (by the official statistics, an average annual growth of real gross domestic product of 9.7 percent between 1980 and 2009), that in turn quickened the urbanization pace and encouraged the expansion of cities, bringing the country into an unprecedented urbanization level, because of the increasing share of the population residing in cities, mainly due to a unique rural-to-urban migration. This process also contributed greatly to the reshaping of Chinese population's geographic distribution (Peng 2011).

As in other eastern Asian countries, the demographic transition created a favourable impetus that contributed to the nation's rise, as millions of young peasants migrated into the cities to match the strong growth of labour demand in the manufacturing and service industries; this way China was able to have more investments and savings and a steadily rising gross domestic product (GDP), and to power its economic growth, in a vicious and endless cycle. As a matter of fact, the huge migration involved in the process of urbanization has always been regarded as one of the motive forces of China's economic growth and development (Peng 2011).

According to 2010 census data, the country has 193 metropolitan areas with a population of over one million inhabitants, and six metropolises that exceed the 10 millions: Shanghai, Beijing, Chongqing, Tianjin, Guangzhou, and Shenzhen. And in a context of economic growth that remains sustained, urbanization is expected to continue over the next decade (Douay 2017).

As a matter of fact, not only China's population will certainly keep on growing for at least another decade, as projections agree – although these differ in terms of the peak population, which is expected to range from 1.35 to 1.507 billion people – but also the

scale of urbanization promises to continue at an unprecedented rate (Peng 2011). Indeed, if current trends hold, the urban population will expand from about 665 million in 2010 to 926 million in 2025 and will hit the 1 billion marked by 2030 (Woetzel, Devan, Jordan, Hu, Li 2009). No wonder if between 2000 and 2010 urban areas absorbed more than 15 million newcomers each year, until nowadays when more than half of Chinese population lives in urban areas, that count for 655 cities and more than 20,000 towns (Zhonggong zhongyang, Guowuyuan 2014, part 1; Peng 2011).

And this is not enough because projections above show also that China's cities will add 335 million new urban residents in the next 20 years – more than the entire population of the United States today – and most of them (240 to 260 million) will be rural-urban migrants (Peng 2011). This growth will undoubtedly imply additional pressures for many cities, since there will be 221 cities with more than one million inhabitants by 2025 (compared with just 35 in Europe today) and 23 of these cities will have more than 5 million people (Woetzel, Devan, Jordan, Hu, Li 2009). Over the past 15 years, two Chinese megacities with population of more than 10 million have emerged; over the next 20 years, six more such cities will appear, and two of these – Beijing and Shanghai—will have their population exceeding 20 million (Woetzel, Devan, Jordan, Hu, Li 2009). Taking into account all these data, we can say that this way the urban economy will generate over 90% of China's GDP by 2025 (Woetzel, Devan, Jordan, Hu, Li 2009).

As we said before, the main cause of this phenomenon has been represented by the processes of urban drift (when people move from countryside areas to urban ones); moreover, among others, there are the urban development of smaller centres (especially township administrative centres) and the expansion of cities toward suburban edge areas (Brombal 2017).

But perhaps the major cause is the fact that Chinese leadership considers urbanization as a crucial driver for innovation, so incentivizing and supporting it.

Indeed, in the first section of the latest “China’s New-Type Urbanization Plan” (2014-2020) (*guojia xinxing chengshihua guihua 2014-2020* 国家新型城市化规划 2014-2020年) we read that processes of urban drift are described as “natural and historical processes” (*ziran lishi guocheng* 自然历史过程) (Zhongzhong zhongyang, Guowuyuan 2014, part 1, chapter 1), thus unavoidable, and also necessary as modernization drivers: “In order to successfully achieve the modernization, besides industrialization it is necessary to give importance to urbanization development” (*Yi guo yao chenggong shixian xiandaihua, zai gongyehua fazhan tongshi, bixu zhuzhong chengzhenhua fazhan* 一国要成功实现现代化，在工业化发展同时，必须注重城镇化发展) (Zhongzhong zhongyang, Guowuyuan 2014, part 1, chapter 1). Moreover, processes of urban drift are also considered as motivation for national economic development, and particular attention is given to the raise of internal consumptions: “The long-lasting raise of the urbanization level can allow a growing number of farmers to increase their income, thanks to a new job, and to enjoy better public services as they become city dwellers, this way also continuing to enlarge the group of urban consumers” (*Chengzhenhua shuiping chixu tigao, hui shi gengduo nongmin tongguo zhuanwei shimin xiangshou genghao de gonggong fuwu, cong'er shi chengzhen xiaofei qunti buduan kuoda* 城镇化水平持续提高，会使更多农民通过转移就业提高收入，通过转为市民享受更好的公共服务，从而使城镇消费群体不断扩大) (Zhongzhong zhongyang, Guowuyuan 2014, part 1, chapter 1). In order to reinforce the concepts, in other parts of the plan we can find references to principles of the CCP’s (Chinese Communist Party) ideology: for example, the idea of reaching a “relatively wealthy society” (*xiaokang shehui* 小康社会), the concept of “socialist modernization” (*shehuizhuyi xiandaihua* 社会主义现代化) and the “Chinese dream” (*zhongguo meng* 中国梦). The problems regarding “agriculture, countryside and farmers” (the so-called *sannong wenti* 三农问题) are mentioned to highlight the potentialities of the urbanization process for resolving them (Zhongzhong zhongyang, Guowuyuan 2014, part 1, chapter 1).

From the issues above, we can surmise that urbanization is 1) an unavoidable process, because enrolled in the “natural laws” of the development; 2) an essential part in the Chinese modernization phase; 3) bearer of economic and social benefits if well managed with respect to the principles of the CPP’s ideology (Brombal 2017). In this scenario, urbanization process should be considered as connected with the political pathway of Chinese governance since the post-reforms era, mainly because there is a strong relationship between urbanization and spatial planning, with urbanization being based on planning policies that attempt to regulate it and, conversely, policies favouring the pursuit of urbanization (Brombal 2017; Douay 2017). In this context, some authors, such as Fulong Wu, even put forward the idea that the production of plans has become a key element in the process of urbanization and economic growth (Wu 2015). In this sense, development would be at the interface between the state and the market and would provide the essential support for growth by developing the land, which would become the base of the economic expansion of the country (Douay 2017).

2.4 Effects of urbanization

As we have just seen, the massive urbanization process that witnessed China in these last thirty years should be considered also in this planning context aimed to favour it. But if current trends continue, as we can imagine, the pressures of rapid urbanization will intensify, adding “new” serious damages or worsening the existing ones. To better understand the great extent these issues are related to, we can divide all the problems brought by urbanization into the dimensions into which sustainability is conventionally divided, namely environmental, social, economic and cultural dimension (Soini, Dessein 2016). Each one is further deeply analysed.

2.4.1 Environmental issues

Environmental pressures encompass essentially four areas: 1) polluting emissions; 2) greater consumption of water, land and energetic resources; 3) damage or destruction of ecosystems; 4) climate change.

Pollution is mainly connected with the robust upward trajectory China's urban GDP has been on, that has turned into dramatic phenomena of environmental degradation, more precisely a significant deterioration of air and water qualities in different cities.

Indeed, enhanced urbanization, extensive industrial development, increased (mainly coal-dependent) energy consumption, and increasing number of vehicles have brought Chinese cities a variety of urban air pollution problems in recent decades, leading to a rise in emissions of air pollutants and carbon dioxide: starting in the 1970s, black smoke from stacks became the characteristic of Chinese industrial cities; later in the 1980s, many southern cities began to suffer serious acid rain pollution. In this sense, we can say that because of rapid urban expansion, China's air quality has degraded so significantly that in 2006, nearly 48% of urban residents lived in cities that failed to meet China's Level II standards for air quality – below which air quality is such that respiratory damage is likely (Woetzel, Devan, Jordan, Hu, Li 2009). As a matter of fact, although many think that the main concentration of contaminated air is in Beijing, in 2014 an analysis by Energy Data (a site published by Greenpeace and based on Chinese data of fine particulates of PM_{2.5}) showed that in the previous year pollution was widespread, affecting million people more who were living in cities with air pollution above the emergency level for a third of the year, while other urban areas have faced a whole 12-month period with hardly any days of good-quality air (Vaughan 2014). They found other nine cities suffering more days of severe smog than the capital: the worst example was Xingtai, a city of more than 7 million people south-west of Beijing, which was hit by 129 days of "unhealthy air" or worse – the threshold at which pollution is considered at the emergency level – that means more than twice as many days as the capital experienced (which were 60)

(Vaughan 2014). And they also discovered that most of the cities in the top 10, including Shijiazhuang, Baoding, and Langfang, are in the Hebei province south of Beijing, which is home to a large number of coal-fired power plants and industries including steel and cement that burn coal.

This is because coal is still the major source of energy in China, constituting about 75% of all energy sources: no wonder if air pollution in China predominantly consists of coal smoke, with suspended particulate matter (PM₁₀, PM_{2.5}) and sulfur dioxide (SO₂) as the principal air pollutants, although many analyses confirm that the country now produces the largest number of major pollutants in the world. As a matter of fact, among the other toxic substances that contribute to the deterioration of air quality (and that are constantly monitored and supervised by many institutions and associations), we can find NO_x/CO, SO₂, O₃ and CO₂. Each of these pollutants has a primary driver (for instance, industry generates 85% of SO₂) and a different level of impact; to give some examples, PM_{2.5} pollution in wintertime is worsening, especially in the Northern China, while the complex air pollution caused by PM and O₃ (the third frequent major pollutant) is a particular problem in Chinese mega-city clusters (Song et al. 2017).

Turning to issues concerning water, a by-product of rapid economic development and urbanization process has been also the contamination of water, which has deteriorated markedly in recent years against both international potable standards and the country's own benchmarks, essentially because of two reasons: 1) the increasing demand of water for industrial and domestic consumption that has depleted the natural water system and its capacity for self-purification (Deng et al. 2016); 2) the discharge of pollutants from both point and non-point sources that has caused widespread organic pollution, toxic pollution, and eutrophication, with severe ecological destruction (Miao et al. 2012).

According to the 2014 Report on the State of Environment in China, 19.8% of major rivers water is rated at grades IV and V – on a scale ranging from I to V – indicating

that it is utilizable for industrial and agricultural uses only, while 9% of water do not meet even grade V, thus it is unfit for any use and not suitable for human contact (Deng et al. 2016). As for coastal seawaters, where 18.6% do not meet grade IV, on a scale ranging from I to IV (MEP 2015). Groundwater quality is deteriorating: in 2013 almost 60% of subterranean water was reported to have a very bad quality, compared with 55% of 2011 (CWR 2014c); as a matter of fact, in 2014, industrial, domestic and agriculture sectors accounted respectively for 14%, 38%, and 48% of Chemical Oxygen Demand (COD) discharges, and 10%, 58%, and 32% of NH₃-N discharges (MEP 2015). Focusing on the industrial sector, the contamination is mainly due to the fragmented industrial structure, characterized by inefficient, small-scale industries in relatively underdeveloped, small cities with limited wastewater-treatment enforcement; this is why water pollution is worst in China's smaller urban centres (e.g. megacities) than in larger ones (e.g. "big towns") – in 2005 68% vs. 34% respectively – therefore it is also much more difficult for central enforcement agencies to track activities in these areas (Woetzel, Devan, Jordan, Hu, Li 2009). Another reason is the fact that the major sources of COD discharges are the pulp and paper (33% in 2004) and food-processing (21% in 2004) industries that tend to dominate in early urban industrial structure, growing strongly (Woetzel, Devan, Jordan, Hu, Li 2009).

In this scenario we must take into account also the fact that China does not have abundant water supplies and its condition is exacerbated because the country's water resources are unevenly distributed: as a matter of fact, on a per capita basis, population has access only to less than one-third of the country's annual available water supply (that is, renewable water that China can extract without compromising long-term supply) (Woetzel, Devan, Jordan, Hu, Li 2009), which represents, in other terms, only about 2,200 m³ per capita and about one-fourth of the world's average (Peng 2011) . At national level this is not a serious problem because China's per capita use is growing slowly at only 3% a year, but it becomes worse if we think that

the shortage of available water resources is a severe localized problem in the North, where, in per capita terms, they have four times less water than in the South: as a result, large parts of the North are at, or close to, the sustainable water-use level of 40% of available resources (Woetzel, Devan, Jordan, Hu, Li 2009). In this context we can imagine how, as China urbanizes – together with the population growing and the industries developing – fresh water demand will rise, especially in the North – and without taking into account climate change as a factor – causing the country not only water shortages but also limited and increasingly polluted water supplies (Woetzel, Devan, Jordan, Hu, Li 2009).

However, although migration from rural areas to cities is leading to significant increases in urban residential water use, because urban residents use three times more water per person per day for domestic purposes than rural citizens do (respectively 211 liters per day compared with 68 liters a day in 2005), urbanization has not far produced acceleration in national water usage, which still remains dominated by agriculture (Woetzel, Devan, Jordan, Hu, Li 2009). But for how much time China will still be able to hold this position is unknown because it is possible that cities' water use will grow due to continued urbanization and cities could become the primary source of pressure on water resources. As China continues to industrialize and urbanize, industrial and residential usage is rising; industry, in particular, has been driving growth in water demand, accounting for two-thirds of the rise in demand in recent years (just think about the fact that in urban areas, industrial and residential uses account for 76% of all water usage, while services account only for 14%): indeed, data show that overall urban demand for water will substantially dominate the growth by 2025, since the economy grows and urbanization pace continues rapidly, and there will be significant variations in regional patterns, as told above (Woetzel, Devan, Jordan, Hu, Li 2009). In this sense the real challenge will be the ability and possibility to get water to those areas that are already in water stress and where rising demand by rising urban centres will worsen current scarcity, particularly in the North, where they will face severe shortages

despite national water-supply projects that will alleviate some of the pressure.

Another issue that concerns the great usage of natural resources is connected with the arable land: as a matter of fact, significant changes in urban-rural land-use patterns and human-land relationships have taken place together with rapid industrialization and urbanization in the country. This question is mostly associated with the fact that, although China is one of the largest countries in the world by land mass, arable land – that is land cultivated for crops such as wheat, maize, corn and rice – ranks near the bottom of the global league in per capita terms, because available arable land is reducing as cities grow: indeed, rapid urbanization starting in 1979 “has stolen” 10% of arable land in the country, and the process has been continuing at a steady rate of some 0.4 hectares lost per new urban resident; other data show that the country lost about 12.4 million ha of arable land between 1980 and 2008 (Peng 2011). The ratio varies among regions: for example in the North and North-east there has been the largest lost despite a lower level of urbanization; this means that the speed of land conversion for non-agricultural use is faster than the pace of urbanization, and this difference finally caused the extensive and low-efficient use of land. Thus we can confirm that in this case the urban-rural dichotomy is true, because urbanization has brought prosperity to the cities while rural areas are decaying gradually.

Although industrial land and residential land remain generally the two major factors that drive the land conversion for non-agricultural use, among the main others we can find the infrastructure construction, development of township and rural enterprises, and industrial and commercial development (Liu et al. 2014). Therefore we can say that available land reduction can be attributed to three main factors, summarized as industrialization, construction of residential buildings and land degradation. In this sense we can affirm that due to the path undertaken by local governments, which paid more attention to land construction instead of arable land protection, mostly because of the huge gap of benefits between the two, the supply of

built land has effectively supported rapid economic growth, because land-use transformation has definitely bear the fast urbanization and industrialization in China. And authorities' attitude has kept on being like this, so that representing the main cause that has been aggravating this phenomenon; in addition, local governments nowadays are still keen to land requisition regardless of the requested legal procedures and of people's livelihood, this way affecting rural collectives' and peasants' interests (Liu et al. 2014). Given this framework, it goes without saying that we have been assisting to some related effects of this trend; an example could be the process that concerns a fast arable-land-reduction and land-use-inefficiency aggravating the contradiction of "large population with relatively little arable land", and that has consequently increased the risk of resources and food security in the country, namely "who will feed China" (Liu et al. 2014). We can add also the intensification of rural hollowing – that refers to the phenomenon of vacant and ruined residential buildings in the villages – intended as "unused and abandoned rural residential land" (Liu et al. 2010b). Finally, another issue involves the tendency for which rural management entities are only the left-behind old, women and children because many rural youths go to cities: as a consequence, there has been the abandonment of productive farmland and, again, the following affection on the agricultural output (Liu et al. 2014).

And what about the increase in the consumption and demand of energy? Energy is important as one of the major factor for achieving economic, social and technology progress: in this sense, energy demand increases as more economic sectors develop. Therefore, no wonder that since the 1978 reform, increasing use of energy has helped China to stimulate its economy and to improve living standards, for finally becoming the largest developing country in the world; and then, in 2001, also the country's accession to the World Trade Organization and the consequent exports contributed to the energy demand growth (Kahrl, Roland-Holst 2008; Guan et al. 2009). In this context, China came to hold the first position for energy production and

consumption worldwide in 2009; and nowadays, as a modern economy, it still relies heavily on energy consumption, so that energy demand will continue to increase at a rapid rate if the economy keeps on developing as in the past decades: indeed, the request is expected to reach 4.7 billion ton coal equivalents (tce) in 2020, this way placing significant pressures both on China's energy security and on the global energy market (Fan, Xia 2012; Zhang, Lahr 2014).

In the Chinese case, we can affirm that, as in other large economies, there are significant links among economic growth, changes in industry structure, energy mix and energy demand. But when talking about energy sector, we are aware also of the fact that not only demand is a crucial aspect, but also energy production and energy intensity play a key role, and these two are strictly related with each other. This is confirmed through an analysis by Fan and Xia (2012), which reveals that although energy intensity in the country was significantly reduced by changes in how to produce (energy input coefficient and technology coefficient), the energy mix for production is still dominated by coal, as already mentioned, thus low-carbon industries should be paid more efforts to improve. Given these premises, we can affirm that improving energy intensity without compromising economic development is still a critical component of China's energy policy, taking into account also the fact that the country has significant regional differences in energy efficiency, that is thus unbalanced because the more efficient regions are mainly located on the coast, while the least ones lie in the hinterland. The reason is that these first areas are plenty of some energy resources, which, in turn, lack in some other places: to give an example, Northwest and Central China have the major concentration of raw coal resources (on the top we can find Inner Mongolia, Shaanxi and Shanxi provinces); Northeast is rich in oil and natural gas resources (for instance, Heilongjiang province) (Zhang, Lahr 2014). Another regional issue about energy is also the fact that energy consumption is unequalled: indeed, while energy use per person is significantly high in Northwest and Northeast China, it is quite slower in East and South China (Zhang, Lahr 2014).

Taking into consideration these pollution threats (air and water) and natural resources mistreatments (water, land and energy), it goes without saying that ecosystems and climate are those that suffer the major damages, only next to human population. These two are also strictly interdependent, mainly because urban areas are responsible for their climate change in terms of urban heat island effect and precipitation patterns alteration, which together will have significant impacts on ecosystem health and biodiversity.

Ecosystems provide a wide range of environmental service functions and play an integral part in the earth's life-support system. China is a large country characterized by a diverse physical environment, rich biodiversity and complex forest types, because its early land formation has provided unusual favourable conditions for the survival and development of a great deal of plants, animal and vegetation types. However soil erosion and loss of biodiversity have been accelerating, due to the rapid growth of population, together with the development of urban construction and the improper land management; to give an example, at least 200 plant species have become extinct in China since the 1950s, and more than 61% of wildlife species have suffered severe habitat losses (Li, Xianying 1995). Severe ecological and environmental disasters have also occurred, such as insect infestations, which have damaged over 9.3 ha of forests annually (Li 2004). Finally, as a result of these changes, a series of natural hazards and disasters are occurring with increasing frequency: as a matter of fact, we can find China among the areas that are principally subjected to the impacts of climate change (areas which are also the ones that host the largest number of population), because its diversified environmental characteristics, its geography and its climatology make the country a region particularly vulnerable, giving rise to frequent extreme events, like the mountain glaciers melting in north-western China, the summer storms moving eastward along the river systems and dumping large amounts of rainfall that cause severe flooding, and the enhancement of the drying in half of the country's land area (this way reducing the agricultural output by 5% to 10% by 2030), to cite some (China Science Press 2007). Another

element to take care of, and linked with ecosystems, is the net primary productivity (NPP), which represents the production of gross photosynthesis minus autotrophic respiration; it is considered as a critical indicator for researchers who analyse the effects of climate change on terrestrial ecosystems: in this case, measuring the interannual variability in NPP would help to understand underlying mechanisms in response to climate change, because a great deal of studies have demonstrated that warming can stimulate plant growth, but it also encourages autotrophic respiration in plants (Gu et al. 2017). Moreover, the effects of warming on NPP will be either enhanced or weakened, depending on whether precipitation is decreasing or increasing correspondingly; and, in addition, the two phenomena (temperature growth and precipitation alteration) vary widely, highly depending on the ecosystem types and climate zones involved (Gu et al. 2017). For this reason, we can say that, although some studies have shown that China's terrestrial NPP has increased in response to increase in temperature, altered precipitation, and elevated CO₂ concentrations, it could be very differentiate because of the high level of land surface heterogeneity and the regional differences in climate change of the country: indeed, as already mentioned, the complex topography of China contributes to produce many diversified ecosystems, just thinking about the uplift of the Tibetan Plateau and the varied climate zones from the East Asian monsoons to the western arid.

Taking into account all these elements, we can say that China will be one of the worst-impacted regions in the world if climate changes as predicted (IPCC 2007). These projections include, for instance, a one-meter sea-level rise (which would inundate 92,000 km² of the regions including the Gulf of Bohai, the Yangtze River delta and the Pearl River delta) (China Science Press 2007); a temperature growth 3° to 6° in Tibet region by 2100 (IPCC 2007); the melting of the permafrost (which might threaten the newly completed Qinghai-Tibet Railway) (Peng et al. 2007); the changing water resources of several major Asian rivers originating from the Tibetan Plateau (which may lead to tension with the neighbouring countries) (Zeng et al. 2008). And, of course, consequences affect also ecosystems, with impacts like the loss

of tundra and mountain forests (China Science Press 2007). Therefore, we can affirm that analysis of climate change is consistent with responses to both natural and anthropogenic forces.

2.4.2 Social issues

Turning to the negative urbanization-caused effects included in the social dimension, we can find the major problem of public health: as a matter of fact, almost all the issues already encountered in the environmental sphere have many consequences in human beings, indeed they have been associated with increased risks of mortality (of all causes but particular of cardiopulmonary disease) and morbidity, emergency room visits, respiratory symptoms, lung functions and immune functions, to cite the main ones, not only in the country but also all over the world. As a matter of fact, the importance of these increased health risks is greater in China than in other parts of the world because environmental issues are at much higher levels in general and the country's population accounts for more than one-fourth of the world's total.

To give some specific data of air pollution, we can find that according to the Global Burden of Diseases (GBD) project, it was responsible for 1.6 million deaths in China in 2015, becoming the fourth biggest threat to the health of Chinese people; of these human losses, a recent study suggested that ambient fine particulate matter (PM_{2.5}) accounted for the 15.5% (Song et al., 2017): the reason is that long-term exposures to air pollution in general, and ambient particulate matter in particular, is often associated with mortality, as reported by a great deal of studies, that are especially interested on Asian countries because PM concentrations are relatively high and the exposed population is exceptionally large; on the other hand, the total and cause-specific mortality is, in turn, often considered the most important health end-point associated with air pollution, because this causes between 350,000 and 500,000 premature death each year (MOH 2009), as GBD found out in its research, where we can read that in 2010 about 1.2 million people in the country died prematurely

because of air pollution. Other studies reveal also that the death rate from lung cancer in China has soared since 1970, increasing by 464,8% in 2004-05 (MOH 2008), so that it is now the fourth cause of death from malignant tumours in the country, while chronic obstructive pulmonary diseases (COPD) are the third most common causes of mortality, accounting for 546,259 deaths and 910,809 respectively (Guan et al. 2016).

In the meanwhile, since China has experienced noticeable climate change over the past century, as already commented above, there is some evidence showing that it is an additional issue posing significant health risks to the population in the country, and affecting human health directly and indirectly, because of mortality from extreme weather events, and changes in the ecology of infectious disease, to cite some (Zhang et al. 2010). Another concern is connected with temperatures: in this case we can observe that low temperatures are responsible for fewer mortality risks than warmer ones do (Kan et al. 2012).

If we talk about public matter, we cannot omit all the questions related to the household registration system (*hukou* 户口), because in a global urbanism as in China, accessing to welfare services (such as healthcare, education and pension), is much more difficult for the urbanized population (the so called migrant workers, *nongmingong* 农民工).

This is because the indicated practice, established in 1958, identifies a person as a resident of a particular area, dividing the population between rural and urban, and this way attaching each person's citizenship to a specific territory: traditionally, those with urban *hukou* have been entitled to a suite of state-provided benefits, which in turn have been denied to rural *hukou* holders, including social insurance, housing, grain rations and public services. Before 1980 the system was inviolate, thus people were required to stay in the neighbourhood in which they were born and although they could travel, they were not allowed to move to seek employment, educational opportunities, better public services or treatments in a hospital or clinic, other than in

their designated *hukou*. After China initiated its program of economic reform and opening after 1980, urban labour markets gradually opened up to rural residents, therefore this system was enforced less strictly and the relaxation had a major impact on the country's subsequent rapid urbanization, because it allowed migration to take place despite the continuing limitation. However, urban public goods regime remained out of the reach, and people who left rural areas for cities have not been considered as genuine urban citizens; but still the lack of access to public goods has not stopped rural residents from migrating to urban centres by the hundreds of millions: as a matter of fact, the so called floating population is growing rapidly from about 130 million people in 2000 to 230 million (or 17% of the country population) in 2012 (Chan 2014). The gap between the urban population and the floating population – that includes these persons who live in cities but do not possess a local *hukou* – is a widening trend that continues, thus no wonder if floating population will reach as high as 300 million people in ten years (Chan 2014). Moreover, it is worth saying that China's current *hukou* system not only is completely incompatible with the market economy that China is establishing, because the practice hinders the free movement of labour and severely reduces economic efficiency, but it also divides people into different classes, causing social inequality, and for this reason the country government should do something in this sense.

Additional serious marginalization phenomena can be found in the expropriations and related relocation of land, which in recent years have become one of the major causes of social instability. The problem is serious because local authorities are often motivated by the desire to gain more: as a matter of fact, because of revenue shortfalls and economic growth, between 1990 and 2008 they expropriated more than 4.2 million ha of rural land for urban growth, whose profit and deed taxes were mainly captured by sub-provincial city, county and district-level governments (Sargeson 2013). Then, as levels of urbanization and industrialization grew, so did the percentage of local government revenue coming from land: in 2000, it was 10,5%;

in 2009 40,3%; in 2012 it reached 60%; therefore, land expropriation also propelled urban capital accumulation to finance urban infrastructure and renewal projects (Sargeson 2013). It goes without saying that this process created a great deal of landlessness: although there is no reliable data on the number of villagers made landless by expropriation, according to the rough formula used by the Ministry of Land and Resources, and Chinese academics, each hectare of rural land taken dispossesses about 21 villagers; on the basis of the above cited 4.2 million ha of expropriated land, some 88 million people became landless between 1990 and 2008; and between 2009 and 2030, the Ministry predicts that another 2.4 million ha of land will be used for urban development, this way potentially dispossessing 50.4 million more (Sargeson 2013).

Land-losers are now compensated through money and social insurance contributions, but although payments have increased over time, the amount of reimbursement is limited by law and by the revenue interests of local governments and businesses, thus wealthy jurisdictions pay much more than poorer ones; moreover, within villages individuals' compensation might differ according to their gender, age, kinship and length of residence, and according to the anticipated market demand for the site, if present (Sargeson 2013). For these reasons, there is no doubt that after expropriation many land-losers are "worse-off", also because low compensation payouts and reduced earnings combine with rising food prices so that food security is compromised; and because they frequently lose something that cannot be compensated for monetarily, such as the socialization and learning opportunities of being a community.

2.4.3 Economic issues

With regard to economic issues, we can find that the major consequence is linked (again) to the environmental sphere, because it is strictly related to public health care: as a matter of fact, there is some evidence showing that pollution in general, and

more specifically the contaminated air, is causing additional economic costs, generally summarized as additional medical expenses, work time loss (a work-loss day is defined as a day when a person aged 15-64 stays off work or school because of illness), and labour productivity loss, that are leading to macroeconomic impacts and finally seriously undermining the economic growth of the country.

This phenomenon is also underlined by different studies, at both the city and the province levels, which report the economic impact of air pollution accounting for 0,72-6,94% of regional GDP: thus, no wonder if outdoor air pollution cost \$1,4 trillion in welfare losses in China in 2010 (Xie et al. 2016). Other data show that, based on the OECD's CGE model ENV-Linkages, the global economic losses for outdoor air pollution are projected to increase to 1% of global GDP by 2060, and such losses would be especially large in China (-2,6%) (Xie et al. 2016). Matus et al. estimated that marginal welfare impact to the Chinese economy caused by air pollution increased 4-fold between 1975 and 2005 (Matus et al. 2012); Xie et al. further projected that PM_{2.5} pollution would lead to 2% GDP loss in China in 2030 (Xie et al. 2016).

In other terms, the additional morbidity and mortality caused by air pollution lead to heavier economic burdens on the residents: annual expenditure on PM_{2.5}-pollution-related diseases is projected to be 282 Yuan per capita or in total 5.2 billion Yuan in 2030 (Xie et al. 2016). The top diseases with the most expenditure are respiratory hospital admission, upper respiratory infection, cerebrovascular hospital admission, and cardiovascular hospital admission; in this sense, hospital admission expenditures would be the highest, and would increase significantly from 2020 to 2030.

In general, almost all the studies like the ones mentioned above quantified that adverse health effects and economic consequences of air pollution are a characteristic of labour-intensive sectors, such as agriculture, food, textile and service sectors, because they are the ones that suffer more output losses from PM_{2.5}, for instance.

On the other hand, it is obvious that, because greenhouse gases (GHG) and air

pollutants are emitted from common sources, GHG mitigation policies can bring co-benefits to the improvement of both air quality and human health, and as a consequence, to the reduction of the related economic expenditures: as an example, Matus also estimated an increase of \$2.4 billion in China's GDP in 2010 resulting from air quality improvement due to climate policies (Matus 2005). And also climate policies could help substantially in this objective, reducing macroeconomic loss caused by air pollution.

Notwithstanding the economic negative effects, we can affirm that this dimension is connected also with the causes that accelerated the pace of urbanization in China, and in this case we refer to the speculative expropriation of arable land fostered by local administrations: as already cited, this is a serious problem, because the few reliable data we have, show that at least 70 million farmers have already lost their land, and only in 2006 local authorities expropriated about 20,000 ha for the construction of streets, factories or building designated for residential and working uses (Grano 2008).

Although in 1986 Chinese government intensified controls for the conversion of lands, this was not enough to stop this process, because authorities in the different levels of power kept on expropriating land to increase their income revenues. As a matter of fact, if local administrations had appropriated of lands according with the Land Administration Law (1986), they would have given 30% of the related revenues to the central government: it goes without saying that this was a strong incentive for local authorities for escaping the law and illegally appropriate of lands, so that keeping the entire amount of money for themselves. This way they deprived Chinese State from something like \$2,5 billions of potential income, and in the meanwhile, farmers were literally robbed since the overall amount comprising the compensations peasants never were paid is something astonishing like \$1,200,000,000 (Xinhua 21/04/2004).

This speculative practice has become more frequent since the beginning of the fiscal

decentralization, in the 1980s, when central government deprived local authorities from its financial help so that forcing them to be independent in economic terms. In this context, it is obvious that in areas where land had a high value, illegal expropriations were an effortless and profitable way to get more revenues, accounting from 20% to 70% of the total administrative budget, in some cases (Ho, Lin 2005).

Besides, local officials were also individually incentivized because transforming arable land into commercial or industrial land helps them to attract investments, this way reaching more easily the objectives that bosses gave them and finally acquiring the established monetary bonus.

2.4.4 Cultural issues

Finally, when talking about cultural dimension in the urbanization process, we mainly refer to the loss of tangible and intangible heritage.

We know that intangible heritage is important because it encompasses several aspects, for example the great deal of knowledge, skills, process, know-how and abilities that is transmitted from one generation to the next ones, included also the one of minority groups and mainstream social groups: this way it ensures humanity a sense of identity and continuity (Tudorache 2016). Different sectors of the economy can benefit from this, for instance development, infrastructures, foreign exchange: for this purpose, safeguarding both intangible and tangible cultural heritage is a valuable source of the economy. Just imagine tourism: it is the most common economic resource linked to culture, because it combines the global wealth of traditions, arts, handcrafts, rituals and cuisines, which constitutes the major motivations for travel.

If we think about China, we realize that for many years its culture has been strictly connected with the rural areas, because until three decades ago the main part of the population lived in the countryside. In this sense, we can surmise how agricultural

life tend to locate the family in certain places, reserved its spatial coherence – accompanied by values encouraging and fostering children – and organized societies with extended families: this is why, for example, there has been an extreme concern for associating interpersonal relationships with family situation using, in everyday life, terms that specify the exact relationship in the family hierarchy. Today the possibilities for Chinese young people – who decide to migrate to urban centres – to “practice” their traditions connected with their lives in the countryside are still to be confirmed. Maybe these are intended to disappear, leaving a gap that could never be filled.

This is the reason why the country’s governance of heritage is full of tensions between requirements of protection and conservation and the opportunities for commercial and economic development: on the one hand, cultural endowment should be valorised also in order to facilitate tourism, as sometimes happened for rural revitalisation; on the other hand, it could be substituted and damaged by commercial activities, which means earning in a more easily way (Wang, Bramwell 2012).

To sum up, we can say that the urbanization process occurred in China is a continuing trend and a real big challenge, because it has been bringing several problems which, in turn, involve several spheres, thus a wide range of matters. In this sense, there is no doubt that all the issues mentioned in the chapter related to this phenomenon have a double origin, namely multi-sectorial and multi-scalar. The first one is so called because it includes many aspects, such as urban, infrastructural and environmental planning, energy policies, regulation, funding and supply of public services, labour measures, conservation of cultural heritage; and it is strictly related to the second one, which takes this name because all the above cited aspects need different degrees of legislative and administrative jurisdiction, more precisely at national, provincial, prefecture and county level (respectively *guoji* 国家级, *shengji* 省

级, *diji* 地级, *xianji* 县级) (Brombal 2017).

Therefore, considering the extent and the complexity of the urbanization impacts, no wonder if governments worldwide have been acknowledging to pay increasingly attention to both development of environmental management strategies and urban renewal processes, as a response to environmental and socio-economic matters affecting urban areas.

China is not different in this regard: as a matter of fact, over the last decade, also Chinese government has finally realized all the effects brought about by urbanization process, thus more recent developments in urban planning and development in the country refer to the global trend towards more sustainable development.

3. Sustainable development in Chinese urban planning

At the beginning of 2000s, the Chinese government recognized that the increasing pressures brought by urbanization were seriously compromising the quality of living conditions in the country for the medium and long term, and triggering major threats to the sustainable use of natural resources, to people's health and to economic well-being. Due to the urbanization potential to act as a positive driver for innovation – in promoting new visions for economic growth and sustainable development, fostering institutional integration, and attracting investment for technological innovation (Brombal, Moriggi 2017) – the Chinese leadership started promoting in its urban planning the pursue of a sustainable development model in tune with the need of urban expansion. The equation between accelerated development, urbanization, and protection of the environment became important.

The motivation behind this new approach, which has seen the integration of environment and development, was based on the recognition that a clean and healthy environment is a precondition to durable economic growth: this concept could be called “harmonious urbanization” in accordance with Hu Jintao's idea of a “harmonious society” (Douay 2017).

Before entering in the specifics of what has been happening in China in this regard, we should better understand what is the definition of “sustainable development”. In accordance with the United Nations' Bruntland Commission, a development process is sustainable if “it meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED 1987). At the beginning, its meaning was mostly associated to material growth and exploitation of natural resources; then it has gradually comprised the four dimensions in which it is nowadays still divided – namely environmental, social, economic and cultural – whose interrelation has long been subject to scientific, intellectual, and political debate (Brombal 2017).

In this context, two perspectives are of particular interest: the one concerning “weak” sustainability, whereas natural endowment and artificial one can be substituted and the other, called “strong” sustainability, according to which some natural functions can be neither compensated nor replaced (Pearce, Atkinson 1993).

Given this framework, we can ascertain that political and economic centres have always been encouraging a path which can be seen as in the middle of the two previous assumptions: this way they have been supporting such a development that gives more and more material wealth but protecting environment from human activities, guarantying social equity and promoting different cultures (Clifton 2013). We can surmise how this situation could be inappropriate for giving tangible and durable results. This is why recent years have seen a growing consensus over the need of a change in the policies and practices for fostering a bolder shift to a sustainable development, referring to an exemplary and systematic change, which can be possible undertaking a transformational approach, paying particular attention to the relationship between human beings and natural resources, and involving not only political and socioeconomic institutions but also stakeholders and laypeople (Brombal 2017).

Chinese authorities started having a more considerate approach toward urbanization in 2006 when, while keeping on considering it as a window of opportunity for the introduction of environmental, economic and social innovations – especially referring to the adoption of green technologies, environmental rehabilitation, the transformation toward a service-sector-based economy, and the extension of public and social services – they became also fully conscious of the serious challenges brought by this process. In those years they recommended a new and more balanced development model, which could give consideration to the environment, in the 11th Five-Year Plan (2006-2010); before this, there was only an official report of the environment, conducted by SEPA/NBS and published in 2005. The factors that help in explaining the increasing environmental awareness of the leadership are both

internal and external: internally, pressure was strengthening in civil society and community, scientific circles and the leaders of the CCP, who were increasingly concerned about the social tensions caused by environmental crises; externally, it was underlined by the gradual integration of China into international organizations, such as the UN and the WTO. In this context we can say that Chinese political framework can have a dual interpretation: as a “defensive” strategy to contain criticism from national and international community; and an “attacking” strategy to promote and to prove Chinese modernity, whereby environmental protection gave evidence of its advanced position on the development scale to the rest of the world (Curien 2014).

At that time, the government supported the establishment of a political, institutional, and legal framework for environmental matters within urban planning, including new concepts, laws, programmes and projects that encouraged greater consideration for the territory. In particular, it created two concepts: one concerning “sustainable city” (*yongxu chengshi* 永续城市) and the other one regarding “harmonious city” (*hexie chengshi* 和谐城市), focusing on the idea of seeking social, environmental, and temporal balance and stability.

Later in 2008 authorities approved a new urban planning law, the “Urban and Rural Planning Law” (*chengxiang guihua fa* 城乡规划法), and placed environmental questions at the heart of the aims and principles assigned to territorial planning: careful use of land, improvement of the ecological environment, promotion of the rational and sparing use of energy and natural resources, protection of land suitable for cultivation and natural resources, to cite some. Moreover, the environmental objectives started featuring prominently in urban planning documents at the municipal level, with the name of “urban planning guidelines” (*zongti guihua* 总体规划), in which the essential principles to follow were sparing use of land and resources, protection of the environment, high economic efficiency and social harmony.

Finally, it is worth noticing that among the current measures for solving issues concerning urbanization we can find not only laws and regulations but also national programmes launched to promote pilot sustainable development cities. A first “eco-city” platform was developed by the Ministry of Housing and Urban-Rural Development (MoHURD, the key urban planning ministry in China), and a second by the Ministry of Environmental Protection. A new concept of “low-carbon cities” emerged in 2011 (along with the 12th Five-Year Plan), coupled with a new national programme selecting eight pilot cities and five pilot provinces. Finally, in addition to these national programmes, since 2006 there has been a number of projects for new so-called “ecological” cities; the most ambitious of these (the eco-cities of Dongtan, Tianjin, Qingdao, Caofeidian, etc.) are the subject of international cooperation (with Singaporean consortiums and American and northern European companies and universities) and major communication (Curien 2014).

However, we will focus our attention mainly on two criteria in this regard: one group is strictly related with the regulation of sustainable development and urbanization in general encompassing two major recent plans; the other category includes instead the great deal of laws that Chinese governments promulgated to singly solve each one of the problems we cited in the previous chapter, and divided in four dimensions.

The two plans are namely the “China’s New-Type Urbanization Plan” (2014-2020) (*guojia xinxing chengshihua guihua 2014-2020* 国家新型城市化规划 2014-2020 年) and “China’s 13th Five-Year Plan for Ecological and Environmental Protection” (2016-2020) (*sanshiwu shengtai huanjing baohu guihua 2016-2020* “十三五”生态环境保护规划 2016-2020 年).

We start analysing the first one. Launched in March 2014, it is seen as the first official plan on urbanization as a national policy, initializing new approaches to this question in China: as a matter of fact, it has been proposing for the development of a scientific and reasonable urban development model by 2020, this way leading to the

beginning of a new era of urbanization process in the country, that emphasizes a “human-centred” (*yi ren wei ben* 以人为本) and “environmentally friendly” (*huanbaoxing* 环保型) pathway (Taylor 2015). In this context the Chinese leadership firstly acknowledge about the fact that land urbanization outpaced urban population growth. We can summarize the objectives in six reform tasks:

1. *Hukou* system improvement;
2. More efficient land use;
3. A sustainable funding system;
4. Better patterns of urbanization;
5. Holding construction to a higher standard;
6. Providing stronger management of urbanization as a whole.

In concrete terms, the purpose of the Plan is connecting four major plans of ecological progress, urbanization quality, increasing domestic demand, and rural-urban coordination, focusing on town level and small scale cities’ infrastructures development and investment, revision of *hukou* urban residency rules (in a sort of urban *hukou* expansion), environmentally-friendly approach and social development, among others.

The Plan took three years to be completed and involved intensive collaboration: the effort was headed by the National Development and Reform Commission (NDRC) and joined by twelve others major government ministries. The CCP (Chinese Communist Party) clearly believes that a national-level urbanization policy will help power the domestic consumption and this way reducing the economy’s dependence on investments and exports (Taylor 2015).

As we can imagine, the launch of the Plan is undoubtedly due to China’s already unprecedented urbanization rate, the continuing mass migration from rural to urban areas, and the consequently and increasing pollution and environmental pressures that make the progress unsustainable from various aspects, including challenges for ecological vulnerability, food securing, land availability and agricultural loss, to cite some. Nevertheless, as we have already seen, economic growth of China could only

continue through further urbanization, and for this reason the current pattern of China's city planning can be considered as both pro-developer and economic-oriented: indeed, presuming that the Plan is successfully brought into fruition, urbanization will drive China's domestic economic growth and consumption for the next decade, notwithstanding maintaining social harmony, preserving the primacy of the CCP and, fundamentally changing the face of the nation (Taylor 2015; Cheshmehzangi 2016). In this context we can affirm that as the level of urbanization gradually increases, the position and role of the country's urban economy will progressively play a crucial position in national economic development.

Going into some details of the Plan, we can observe how the CCP identified the *hukou* reform as a priority, devoting an important section of the document. As we said in the previous chapter, in the decades before the reforms and the opening-up of China, population who migrated into cities was strictly controlled: in this situation, almost all movements occurred as a result of the authorities' economic policies; after this period, was instead the market the one dictating urban population inflows. It goes without saying that creating a system that offers them an urban *hukou* is required and the Plan proposes a solution in this sense because rural migrants currently employed and living in towns and cities with populations less than 3 million people will accordingly have an opportunity to gain full residency rights by 2020, so that 20 million migrants per year will be settled into urban areas (Taylor 2015). We can surmise that if the Plan could effectively be able to phase out the *hukou* system over the next decade, rural migrants who have aspirations to stay in cities will be the ones most likely to benefit from it, and in addition reforming the *hukou* by linking public services to place of residency rather than to place of origin will increase labour productivity, reducing income inequality, opening up economic opportunities in the cities and accelerating urbanization (Taylor 2015).

If we further analyse the document, we can also notice that it has introduced measures to preserve rural and small towns in order to protect the clean air quality of such areas: as a matter of fact, one of the main pillars of the Plan, "ecological

progress”, is also regarded as the “transition to green social-economic development” of China. In this sense, the industrial production is expected to be kept closer to cities or at city outskirts, within a designated industrial zone; moreover, the Plan will accelerate China’s industrial restructuring and modernise the industries, this way hoping for a better urbanization quality.

Turning into “China’s 13th Five-Year Plan for Ecological and Environmental Protection” (2016-2020), it is first worth mentioning that this kind of plans have been one of the most significant national policy tools in the country, because they have been providing a clear national strategy and intention, so that being vital for motivating the improvement of the nation and being a key guideline in order to evaluate the management performance: in this sense, the constant practice has turned them into a unique driver for economic and social development in China (Hu 2016). The 13th edition of the Five-Year Plan was released on December 5th 2016 by the State Council and it pays mostly attention to environment and its improvement, focusing on its importance to achieve economic development in an era of expansion in industrialization, urbanization and agricultural modernization. Indeed, while the previous “China’s New-Type Urbanization Plan” (2014-2020) is mostly concerned with urbanization and urban planning, in order to better regulate the process and this way giving people a higher level of life quality, “China’s 13th Five-Year Plan for Ecological and Environmental Protection” (2016-2020) focuses instead on environment and pollution in general, trying to solve the major part of the problems related to this sphere we saw in the past chapter.

This is the reason why the Plan highlights the strategic role and the importance of China’s environmental protection during this five-year period and for this reason it can be considered as the leading document for this purpose, suggesting a green development as one of the key development concepts where technology innovation will play a principal role. As a matter of fact, the Plan promotes a cleaner and greener economy, saving considerable efforts for pollution reduction – this way preserving

water, air and soil – then also with strong commitments to environmental management and protection, clean energy and emissions controls, ecological protection and security, the development of green industries (KWM 2016). This could mean a focus on charting a sustainable course for the economy in the long-term, so that, in other words, when China will successfully make the transition to green development, in the meanwhile it will transform from the world's highest carbon emitter country into a leading green energy producer, this way changing its "black debts into green contributions" (Hu 2016). In this sense we can foresee that China will continue its energy saving efforts on the green development path, with greener quotas, a stricter implementation process, and more key projects.

From a general perspective, the relevant activities cited in the Plan can be summarized as controlling the efficiency of energy resource consumption, water usage, and carbon emissions, reducing pollution emissions, and establishing development priority zones and ecological security barriers; then, more precisely, it identifies four major tasks. The first one is mostly connected with environment issues because it encompasses, for example, the enforcement of source control measures through strict national ecological protection red lines, the improvement of the environmental standards and technology policy system, the stop of high pollution and high environmental risk processes and products, and the acceleration in the development of energy-saving environmental protection industry. The second one is mainly linked with pollution, since it includes the implementation of air, water and soil pollution prevention and control action plans, the improvement of environment control and the implementation of many ecological end environmental protection, like the emissions control on key regions, waterways and industries, the implementation of comprehensive emissions standards for industrial pollution sources, and pollution abatement in fifteen key industries – such as paper and building materials – and the promotion of ecosystem protection and restoration, and of biodiversity conservation. The third one covers risk control in heavy metals, hazardous waste, and toxic and hazardous chemicals. Finally, the fourth task regards

emissions, comprising the improvement of enterprise emissions permits, emissions trading and environmental damage compensation systems, focusing on diversified ecological compensation mechanisms and the strengthening of law enforcement – including environmental protection tax – by environmental protection inspectors, and this way being able to build a green financial system (Jingmao yanjiu, 2016).

Against this background, the Plan prioritize specific objectives of environmental protection:

- The reduction of water consumption by 35% by 2020;
- The improvement of surface water to Grade III or equivalent and the reduction of groundwater in the “very bad” category to around 15% by 2020;
- Total consumption of less than 5 billion tons of standard coal used for primary energy in 2020;
- The reduction of energy consumption per unit of GDP by 15% in 2020;
- The reduction of carbon dioxide emissions per unit of GDP by 40-45% by 2020

(KWM 2016).

If we now take into consideration the laws, we should better replicate the model dividing also the huge number of rules into the four dimensions of sustainability and analysing them one by one, this way we are able to clearly understand how Chinese authorities have been trying to give a solution to every single issue involved in each of the four categories. Before going into some details, it is important to observe that all the national regulations are enacted by the State Council – which is China’s chief administrative and executive body – that, in many cases, legislates also implementing rules in order to explain national laws in more detail. Moreover, for some matters, several ministries and commissions under the State Council are also authorized to issue regulations in this regard, but they occupy a less prominent place than the ones enacted by the State Council itself in China’s hierarchy of legal norms (Feng, Liao 2016). Therefore, we can ascertain how in nearly 60 years of legislation development, the country’s government has established a wide variety of pieces of

laws, but in this section only those most relevant with the process of urbanization are mentioned. In this regard it is important to clarify that not all the following provisions has been enacted in relation to sustainable development throughout the path that Chinese leadership has decided to undertake because of urbanization and industrialization: indeed, some of them are previous to 2006 or approved in some different contexts; nevertheless these can be applied for such kind of cases strictly related to this phenomenon.

Starting with a general perspective of environmental concerns, we can find the 2014 Environmental Protection Law, and in particular its article 42, which provides that companies, public institutions, and other producers that discharge pollutants should take measures to prevent and control the pollution and harm caused to the environment by waste gas, dust, odorous substances, etc. generated in production and consumption activities (Feng, Liao 2016). This regulation is considered as a legal base for guiding construction of the legal framework for the protection and control of air pollution (PCAP) – by stipulating, for instance, general environmental quality and pollutant emission standards and permission (Feng, Liao 2016). Other rules include the Environmental Impact Assessment Law, which aims at preventing (air) pollution through environmental impact assessment of plans and construction projects; and the Law on Evaluation of Environmental Effects, whose purpose is the implementation of the sustainable development strategy, in order to take precautions against possible adverse effects on the environment after execution of plans and construction projects. Finally, but having a more focused approach, is the Forest Law, which supports protection of forest that are obviously useful to maintain ambient air quality (NPC).

The Air Pollution Prevention and Control Law (APPCL) stipulates systems for total air pollutant load control (TAPLC) and permission, illegal excessive emissions of pollutants, and pollutant emission fees, and specifically regulates various sources of air pollution; although this nowadays is still the only specific national law for PCAP

(Pollution Control and Prevention), we can say that other national environmental laws are closely related to this matter (Feng, Liao 2016). To give an example, closely connected with the energy production and consumption there is the Cleaner Production Promotion Law, which, as the name suggests, encourages cleaner production and improving energy efficiency; and then the Energy Conservation Law, which establishes the energy conservation in Chinese development, asking for economic structural adjustment and energy-efficiency improvement in order to lower carbon dioxide intensity (NPC).

With regard to water, we can firstly find the Water Law, whose purposes mainly are of rationally and sustainably developing, using, conserving and protecting water resources, preventing and controlling water disasters, and meeting the need of national economic and social development; nevertheless the government encourages and supports research, and application of advanced science and technology in these objectives (NPC). The Water Pollution Prevention and Control Law is instead focused on preventing and controlling water pollution, protecting and improving the environment, safeguarding human health, guaranteeing drinking water safety, and promoting all-round, balanced, and sustainable development both of the economy and society and of the socialist modernization drive (NPC). Finally, the Water and Soil Conservation Law is aimed at preventing and controlling soil erosion, protecting and rationalizing the use of water and soil resources, mitigating the disasters of flood, drought and sandstorm, and improving ecological environment (NPC). In this regard, it is worth mentioning that currently there is no dedicated law only on soil pollution, but just some provisions scattered across other rules; linked to the use of land is instead worth mentioning the Land Administration Law, whose purpose is not only to affirm the socialist public ownership, but also to protect and develop land resources, making rational use of them, this way promoting a sustainable development of the society and the economy. Moreover, it classifies land resources in land for agriculture, land for construction and unused land and rigidly restricts

conversion of cultivated land into land for construction, giving special protection to the first one and keeping the second under control (NPC).

Talking about climate change, we can find two laws: one is the Meteorology Law, which in addition to regulate and promote meteorological services and forecasts as a basic public welfare service, it regulates the prevention of meteorological disasters, the proper exploitation and effective protection of climate resources, the exploitation of research in meteorological science and technology, and the supply of meteorological services for economic development, national defence, social development and people's well-being. The Law on Prevention and Control of Desertification is instead focused on this specific extreme climate event – with particular attention to land that has been already desertified and areas that markedly tend toward this phenomenon – identified as the process of expansion of natural deserts and of shifting sand development, accompanied with soil exposure and damage to vegetation on this zones due to climatic variations and irrational human activities (NPC).

To conclude the environmental sphere, we have to cite the Food Safety Law, whose purpose is of ensuring food safety and safeguarding public health and safety; it shall be applicable to any of the activities within the country such as food production, processing and distribution, food additives and food-related commodities production and operation, and packaging materials and containers production and operation, to cite some (NPC).

Turning to social matters, we know that for public health concerns the government significantly legislated in the middle 90s through the reforms in the public health services: at that time authorities decided their budgetary support to not be 100% of the costs of public health institutions (Liu, Mills 2002). For instance, urban citizens and rural population have two different kinds of medical insurance systems: while urban residents have a coverage which is half financed by them and half by the local government authorities, rural dwellers enjoy a cooperative medical system which in

the western and middle regions of China is expected to be paid by central and local governments (40 Yuan) and by participants (20 Yuan); finally, urban workers have a medical insurance financed by employers and employees (Hu et al. 2008). Then, after the 2010s any significant regulation strictly related to urbanization issues has not been enacted, thus we can say that in this regard Chinese leadership has not taken any special provision yet. However, we can find something related to climate change – and more specifically to natural disasters – which is a related result of urbanization, because the government approved the Emergency Response Law for the purpose of preventing and reducing emergent hazards, which include exactly natural disasters, among others (Zhang 2015).

Other rules in this sphere are directly linked to urban planning. The Law on Urban and Rural Planning aims at improving administration of urban and rural planning, balance the organization of urban and rural spaces, improving people's living environment and promoting the sustainable development of the entire environment – economy and society included. On the other hand, having a more specific approach, we can find the City Planning Law, whose purpose is determining the size of a city, defining the orientation of its development, realizing the goals of its economic and social development, and carrying out its construction on a rational basis, this way meeting the needs of “socialist modernization” (NPC). On its part, the Construction Law aims at reinforcing supervision and administration of construction activities, so that maintaining order, ensuring quality and safety and promoting development of this industry (NPC).

Finally, thinking about *hukou* system we can say that the major regulations in this regard are included in the “China's New-Type Urbanization Plan” (2014-2020) we cited above: as a matter of fact, the reform of the registered permanent residence structure is arguably the most important goal in this document, because it is the first time Chinese authorities take provisions in this direction.

When taking into account economic concerns, we can say that the most important rules are related to the employment sphere: indeed, as we mentioned in the introduction, the urbanized population who will migrate into cities will need job positions and chances for working. Therefore, although the government did not enact them as strictly related to the fast urbanization process, we can draw attention to the Law on Promotion of Employment, whose purpose is to coordinate economic development and employment, employment increase, and harmony and stability of society; and to the Law on Prevention and Control of Occupational Diseases, which aims at protecting the health and related rights and interests of workers, trying to eliminate occupational disease hazards (NPC).

Finally, strictly linked to cultural issues, we have the Law on Protection of Cultural Relics, which states not only the strengthening in the protection of the splendid Chinese cultural heritage, but also the coordination of education toward patriotism and the revolutionary tradition, in order to build a socialist society with cultural, ideological and material progress. It identifies, as cultural legacy, ancient, modern and contemporary sites, inheritances of famous personalities and historical events, valuable handcrafts works, documents and manuscripts, and typical items of the social system and ideology (NPC).

3.1 The coordination between national provisions

It is clear that, in such a context where numerous ministries and commissions under the State Council can legislate about the same matter, some integration and coordination are needed.

This happened also for Chinese urban planning, which for this reason began an institutional innovation in order to integrate plans drawn up by various government departments and to give more coherence to public action: on August 2014 the National Development and Reform Commission (NDRC) published on its website

the “Information note on the launching of *duoguiheyi* (多规合一) pilot projects in town and districts” (Tzou, Shu, Lidan 2017). Literally meaning “the integration of several plans into one”, it is a directive of the central leadership – more specifically promulgated by four major ministries, that are the NDRC, the Ministry of Land and Resources (MLR), the Ministry of Environmental Protection (MEP) and the Ministry of Housing and Urban-Rural Development (MoHURD) – consisting of three articles, short, clear and synthetic, which marks a major change of paradigm in Chinese planning – if not a revolution – because it tries to change the current situation of compartmentalized planning that creates conflicts in content and lack of cooperation between plans. Indeed, the catchphrase characterizing the action of *duoguiheyi* is “harmonizing” four aspects of organizing, namely durations, objectives, missions, and the coordinating governance of spatial projects, this way creating a system for arranging the various programmes and put an end to what has become a chaotic situation (Tzou, Shu, Lidan 2017).

This is because since the launch of the reforms in 1978 the Chinese planning system put in place a compartmentalization of administrations and technical specialities, leading to an increase of planning functions, which have been developed and implemented independently of one another. Over time, inconsistencies have arisen and intensified, and they have been accompanied by a growth in the number of actors, whose competition for resources reinforced the administrative chaos. This is the main reason why a serious lack of coordination have marked various ministries’ planning processes, as well as urban planning, which did not escape this phenomenon, but actually resulting in major contradictions and restrictions in the growth processes of cities.

Indeed, despite being a prerogative of the Ministry of Construction – which became MoHURD in 2008 – at various levels of government appeared a new series of urban planning schemes, such as planning network of cities and towns, strategic urban planning, planning the integration of the rural into the urban, land-use planning – by the Ministry of Territory and Resources (MLR) – and planning for environmentally

sustainable development – by MEP – to cite some (Tzou, Shu, Lidan 2017). Therefore, we can surmise how various ministries and competent administrative authorities developed their own sectorial plans in a compartmentalized and separated way, leading spatial planning no longer the prerogative of urban planning, and more and more players have been involved in it through different types of arrangement. This situation resulted in administrative fragmentation, overlapping and contradictions between the plans and the administrative levels intervening in the production of urban space.

Thus, at the end of the 90s local administrations started a long process, essentially intersectorial – aiming at a transversal integration of plans – and necessarily vertical-reforming, because the vertical nature of Chinese administrative institutions have made each level of each administration responsible for the development, approval, and implementation of plans, this way multiplying the deal of projects and actors – different in nature and prerogatives – in so many ministries, provinces and cities in the country: the result has been a counterproductive planning apparatus. This movement was the origin of *duoguiheyi*, and can be considered as a rejection of the “overflow” of planning on the part of the planning apparatus, because it has called for a serious coordination between plans, on the basis of rational and scientific arguments, the need of rivalries transcendence among groups, and the rejection of administrative protectionism (Tzou, Shu, Lidan 2017). However it took some time for these initial calls for coherence to be heard by the central government.

In urban planning, the awareness of a necessity for coherence between plans started when rose an attempt to integrate “two plans into one” (*liangguiheyi* 两规合一); the approach anyway emerged in academic circles and in an exploratory way, without any conclusive results. The succeeding step was the development in the paradigm of “three-in-one integration” (*sanguiheyi* 三规合一), which has been adopted using a more experimental path, via pilot campaigns, first in Qinzhou and then in Chongqing, where followed the next pace too: as a matter of fact, the new plan proposed an integrated vision of four projects, inaugurating a new stage in the

integration of “several plans into one” (Tzou, Shu, Lidan 2017). In this regard we can say that this new vision of urban planning has now a number of tasks that includes considering the countryside, and adopting greater coordination between economic and social development plans, town planning, and land use, especially under certain conditions and in some pilot areas of the country.

It is not by chance that Chinese *duoguiheyi* won recognition in 2014: in that year the construction of cities and economic growth started encountering structural difficulties, thus finally leading Chinese government to undertake a reform of the institutional planning system; they began to speak about “New urbanization” and “New Normality” by granting wider prerogatives and higher ranking in order to maintain and even reinforce its control of development at the local level.

Nowadays although *duoguiheyi* does not have force of law in the country yet, because it is still only a measure at the beginning of its experimentation, however its promulgation remains a paradigm shift in the planning system which reflects a process of struggle and the sharing of the power and planning expertise between the various administration concerned (Tzou, Shu, Lidan 2017).

3.2 The assessment in goal achievement

Monitoring and evaluation of a sustainable growth in the urbanization process is not an easy task. To measure progress towards sustainable urbanization and support decision-making, various indicator systems have been introduced.

Although there is no consensus on what is the best combination, it is important to remember that these indicators are profitable only if they are powerful for application: thus it is important to examine their effectiveness and keeping on improving their quality in order to achieve better results. Furthermore it is essential to apply the appropriate number of indexes, otherwise the difficulty in using them will increase if the number is too large, because the requirement for effective data

will become complicated; on the other hand, if they are in an insufficient amount, they cannot effectively present the whole situation we are analysing (Shen, Zhou 2014).

In an international perspective, different organizations have established their own assessment systems: the United Nations produced its set of measures arranged hierarchically in four dimensions, namely social, economic, environmental and institutional, with various themes in them; focusing on policy-orientated topics to better serve policy decision-making needs, it monitors progress on the goals and acquires corresponding targets. This way the UN have been engaging in building national and local capacities for the collection and dissemination of indexes in order to improve urban living conditions and their performance in key areas. The World Bank initiated instead a program to help cities in maximizing their performance, and for this reason it provided a framework for facilitating the collection on city indicators organized into two broad categories, specifically city services and quality of life aspects.

Within national borders, the promotion of sustainable urbanization has lead several institutions and researchers to develop other sets of measures with the aim of understanding the state of urban areas in relation to better urban sustainability performance, and, in recent times, additionally guiding and implementing the practice of new urbanization according with the undertaken green path. For instance, we can cite Zhang, Wu e Shen (2011), who presented an indicator system to evaluate the sustainability of urban land use by using key indicators including per capita cultivated land, total land area, population density, and GDP per unit area of land. MEP rather introduced a set of indexes for piloting the execution of eco-towns and eco-cities projects.

We can find a small number of such measures also in “China’s New-Type Urbanization Plan” (2014-2020) (*guojia xinxing chengshihua guihua 2014-2020* 国家新型城市化规划 2014-2020 年) because the State Council compares some urban

infrastructures and service facilities, tracking their development within 2000 and 2012:

Indicators(<i>zhibiao</i> 指标) :	2000	2012
Drinking water penetration rate (<i>yongshui pujilü</i> 用水普及率) in %	63,9	97,2
Heat penetration rate (<i>reqi pujilü</i> 热气普及率) in %	44,6	93,2
Sewage treatment rate (<i>wushui chulilü</i> 污水处理率) in %	34,3	87,3
Per capita road area (<i>renjun daolu mianji</i> 人均道路面积) in m ²	6,1	14,4
Per capita residential building area (<i>renjun zhuzhai jianzhu mianji</i> 人均住宅建筑面积) in m ²	20,3	32,9
Per capita green park area (<i>renjun gongyuan lüdi mianji</i> 人均公园绿地面积) in m ²	3,7	12,3
Number of ordinary secondary school (<i>putong zhongxue</i> 普通中学)	14,473	17,333
Number (in million) of hospital beds (<i>bingchuang shu</i> 病床数)	1.426	2.733

(Zhongzhong zhongyang, Guowuyuan 2014, part 1, chapter 2)

It is not by chance that the leadership called this chapter “Current development status” (*fazhan xianzhuang* 发展现状), this way pointing out how the progress in the urbanization process has been undertaking.

In the first sentences we can read that “Urban infrastructures such as water, electricity, roads, gas and information networks has improved significantly. The level of public services such as education, medical care, culture and sports, and social security has notably boosted. The rapid advancement of urbanization attracted a large number of rural labour transfer employment, improved the efficiency for allocation of urban and rural production factors, promoted the sustained rapid development of the national economy, brought about profound changes in the social structure, and fostered the overall improvement of the living standards of urban and rural residents. The achieved goals have attracted worldwide attention.”

(*Chengshi shui, dian, lu, qi, xinxi wangluo deng jichu sheshi xianzhu gaishan, jiaoyu, yiliao,*

wenhua tiyu, shehui baozhang deng gonggong fuwu shuiping mingxian tigao, renjun zhuzhai, gongyuan lüdi mianji dafu zengjia. Chengzhenhua de kuaisu tuijin, xina le daliang nongcun laodongli zhuanyi jiuye, tigao le chengxiang shengchan yaosu peizhi xiaolü, tuidong le guomin jingji chixu kuaisu fazhan, dailai le shehui jiegou shenke biange, cujin le chengxiang jumin shenghuo shuiping quanmian tisheng, qude de chengjiu jushi zhumu. 城市水、电、路、气、信息网络等基础设施显著改善，教育、医疗、文化体育、社会保障等公共服务水平明显提高，人均住宅、公园绿地面积大幅增加。城镇化的快速推进，吸纳了大量农村劳动力转移就业，提高了城乡生产要素配置效率，推动了国民经济持续快速发展，带来了社会结构深刻变革，促进了城乡居民生活水平全面提升，取得的成就举世瞩目。)

Given this framework we can surmise that such kind of indicators are considered important for the urban development, thus it is most likely the government will keep on supervising them in order to able to have a feedback back, whether the infrastructures have been improved or not, reaching the goals it fixed at the beginning.

3.3 The current situation of sustainable development

As we have seen up to now, the massive pace of urbanization combined with industrialization process led Chinese economy to a prosperity unprecedented in history: for this reason the country's leadership has not been stopping such kind of phenomenon, triggering for more and more innovation and population wealth. Nevertheless we cannot omit the most pressing issues China has been facing in these last years: environmental degradation and climate change, social equality, essential services for all population, to cite some.

In this context, we know that a new approach to achieve a sustainable urbanization has obtained popularity in the last decade, both as progressive steps undertaken by

the authorities in the legislative sphere – planning models and provisions encompassing laws and plans – and partially resulting from increased public awareness and activism – when cities started to play a central role in the restructuring of the country’s political economy towards a post-industrial, service based, consumer-oriented society (Brombal, Moriggi 2018). In this sense, we can see how efforts for sustainability have started to be consistent with objectives of reforms and opening up, in the way of increasing the nation’s prosperity through an efficient use of natural and human resources, assisted by technological and institutional innovation (Brombal, Moriggi 2018).

So far, evidence shows that these endeavours have produced diversified results, because if we take into analysis the recent study by Huang, Yan and Wu, their sample of megacities, namely Beijing, Shanghai, Tianjin, Chongqing, Chengdu and Guangzhou – home to about the 10% of Chinese population – reveals the presence of a greener and cleaner environment, thanks to improvements in reducing pollutants emissions and resource consumption, and of a bit more wealthy population, through the decrease in income gaps and the better provision of welfare services (Huang, Yan, Wu 2016). This is partly a consequence of the country’s government’s emphasis on improving urban liveability and building “eco-cities” or “green cities” (Huang, Yan, Wu 2016). In this regard, we can cite also the 2012 EPI Report – the Environmental Performance Index evaluates the state of protection of human health from environmental damage and protection of ecosystems – which seems to support the progress Chinese cities have made in drinking water supply, gas supply, waste treatment system, and sanitation support, as authorities did in “China’s New-Type Urbanization Plan” (2014-2020) (*guojia xinxing chengshihua guihua 2014-2020* 国家新型城市化规划 2014-2020 年) we saw in the previous section.

However cities ecologically sound or “green” are not necessarily sustainably environmentally, economically and socially (Wu 2013). We experienced that from agricultural activities up to the latter urban development, human population has

profoundly transformed the landscape, according to the more and more diversified and evolved needs and wants: this is the reason why the meaning of well-being has changed over time and continues to change, thus we can consider it more as a journey than as a destination (Wu 2013). Then, we know also that sustainability is aimed at providing long-term and specific ecosystem services for maintaining and improving human well-being, therefore we can affirm that its interpretation has matured during years, too, this way leading such a process – not a state – to be a constantly evolving goal, which cannot be precisely predicted and permanently fixed, but on the contrary we must, and we can, make our landscapes sustainable by continuously improving the human-environment relationships based on what we know and what we are learning (Wu 2013).

This is why, for example, the analysis by Huang, Yan and Wu we mentioned above shows that in four of the ten Chinese megacities, social inequality and the urban-rural income ratio has increased, spreading the phenomenon that “the rich gets richer and the poor gets poorer” (Huang, Yan, Wu 2016).

In its entirety, this debate reveals that two of the ten major Chinese megacities – Chengdu and Chongqing – have quite lower development pressures on the environment and better performance in economic sustainability, but a higher degree of social inequality; on the other hand, the remaining four cities all perform inadequately in regard to economic sustainability (Huang, Yan, Wu 2016). In addition, they confirm that the recent urban development policy tries to abandon production and consumption maximization in order to improve the whole urban sustainability using more emphasis on environmental quality (Huang, Yan, Wu 2016).

In this context, we should mention also “China sustainable cities report 2016” by the United Nations – more specifically it is a United Nations Development Programme (UNDP) – which evaluates 35 Chinese cities using some indicators we cited in the previous section, as to compare its sustainable development stage in regard to some important issues.

If we keep on considering the previous sample of megacities, we can discover that according to Urban Ecological Input Index (UEII) – which they found as an average rate between Urban Resource Consumption Index (URCI) and Urban Pollution Discharge Index (UPDI) – three of these megalopolises – namely Chongqing, Chengdu and Beijing – rank among the top ten, meaning that they have a lower score because they are characterized by less resource consumption and less pollutant discharge. Remaining three megacities are aligned in the 18th, 23rd and 27th position – respectively Tianjin, Shanghai and Guangzhou – and it is worth noticing that last two are located in the wealthy major industrial areas of the Yangtze River Delta and the Pearl River Delta. This undoubtedly indicates that better areas have taken active provisions to control consumption and pollution, although in some situations low ecological input may simply reflect lower levels of development (UNDP 2016).

Now we focus on one of the two sub-indicators, more specifically on the Urban Resource Consumption Index, which consists of three different sub-indicators, namely Urban Water Consumption Index (UWCI), Land Resources Consumption Index (ULRI), and Urban Energy Consumption Index (UECI). In this case we can observe that only one of the megalopolises – Chongqing – ranks among the top ten, while the others are listed between the 12th and the 32nd position, properly Chengdu, Tianjin, Beijing, Shanghai and Guangzhou. Since there are three measures to take care for, it is useful to understand how some of them count in the final result. To give an example, if we link Chongqing and water consumption together, we can realize that its area faces water shortage issues firstly due to high population rate; if we add lack of water facilities, aging facilities and seasonal water shortages – mainly caused by the climatic conditions and environmental pollution – we can explain how this megacity has such a low score in Water Consumption Index. In the meanwhile, if we take into account Shanghai and Guangzhou, we can observe that they are wealthy cities in warm areas experiencing government policy focused on reducing water pollution rather than water use (UNDP 2016). Turning on land consumption, we can affirm that nearly all land in the south-eastern coastal cities is built up, together with

very high land use intensity. For instance, although Guangzhou is realizing the importance of land use efficiency making policies to improve this concern through urban planning, it continues to expand, while Beijing and Shanghai have been restricting land supply especially for residential land use (UNDP 2016). Chongqing, Chengdu and Tianjin are instead consuming land but below the national average, thus this is why they have a lower score.

If we look at the other sub-indicator, that is Urban Pollution Discharge Index, we can see that it is made up of three distinct sub-indicators too, namely Urban Water Pollution Index (UWPI), Urban Air Pollution Index (UAPI) and Urban Solid Waste Index (USWI). In this context the scene seems a bit better than the one for the Urban Resource Consumption Index, because we can find two megacities among the top ten – Beijing and Chengdu – while remaining four of the previous sample are between 16th and 23rd position – respectively Guangzhou, Tianjin, Chongqing and Shanghai (UNDP 2016). It is important to remember that these indicators show emissions produced by the city, not necessarily how heavily the city is impacted by emissions which may originate elsewhere (UNDP 2016). Less polluted fresh water is located in Beijing and Chengdu, which rank among the top ten in this concern and where, together with Guangzhou, there is also cleaner air. We can affirm that Beijing ranks fifth in the air pollutant indicator – whereas nearby city Tianjin ranks in the bottom fifteen – due to the implementation of recent policies under the Jing-Jin-Ji Air Pollution Control Plan where factories were moved out of Beijing to Hebei and Tianjin. Other policies implemented in Beijing include increasing pollution discharge charges, improving oil quality and rural subsidies for replacing coal. In the meanwhile, although Shanghai is listed on the 16th position, we know that it is implementing new penalties for emission violations and controlling the consumption of coal, which has dropped to 40% of its primary energy source, with increases in natural gas, renewables and nuclear power (UNDP 2016). The least amount of per capita solid waste discharge can be finally encountered in Tianjin; Guangzhou, although is recorded on the 17th rank as its solid waste continues to increase, has

instituted a comprehensive waste management system that includes waste separation, recycling, composting and waste-to-energy incineration (UNDP 2016).

Another classification in the report uses the Human Development Index that assesses the human welfare aspect of sustainable development, collecting data from per capita life expectancy (LEI), per capita education years (EI) and per capita GDP, and averaging the scores. In this case top ten include Guangzhou, Beijing – with all the three indicators performing highly – Shanghai and Tianjin; Chengdu and Chongqing are instead in the second half of the list.

Focusing on the first index, namely life expectancy, we can find Shanghai on the first position, with an average per capita life expectancy of 82.29 years, followed by Beijing at 81.81; Guangzhou and Tianjin are other two urban centres where life expectancy is above 80 years. The gap of about ten years between the highest ranked city, Shanghai, and the lowest, Urumqi – which we do not consider – demonstrates the considerable differences between the developed eastern coastal side and the still-developing north-west, just because this point is influenced by factors such as the level of economic development, medical conditions, quality of education, and environmental quality, to cite some (UNPD 2016). We know that the level of economic development is highly connected with life expectancy; if we take into consideration the medical issues, we can affirm that rural areas and smaller cities hardly have high-quality medical personnel available, and China's medical insurance system, which requires up-front payments that are later reimbursed, can limit access to medical services for lower income individuals.

With regard to education, there are as well as four megacities in the top ten – Beijing, Guangzhou, Shanghai and Tianjin – which all score highly both on mean years of schooling and expected years of schooling. Chongqing instead perform badly, reaching only the last place, with its population receiving an average of 7.89 years of schooling; this likely reflects the fact that it still incorporates a large rural population and a great number of migrants, who still have poorer education outcomes (UNDP 2016). Nevertheless we cannot omit that the State Council has made rural education

reform a priority in its circular of July 2016. If we take into consideration higher education, we can say that eastern cities, Beijing in particular, have more higher education institutes than central or western cities, due to very rich educational resources; especially the capital city has nearly a hundred colleges and universities, highlighting longer per capita years of education as a political and cultural centre. However, other high performing urban centres, including for instance Guangzhou, are outpacing Beijing in terms of expected years of schooling.

Finally, looking at income matters, top ten include Guangzhou, Tianjin and Beijing, with the first two having a per capita GDP that exceeds 100,000 Yuan; it is worth mentioning that gap between scores of the 35 cities in the sample of this report are larger in this indicators than in others and important reasons for such differences in per capita output level can be found in the industrial structure of these zones (UNDP 2016). As a matter of fact, this indicates that the ones with higher results are the administrative and economic centres of the developed coastal provinces or regions, which have been the focus of the first wave of economic reform, including the establishment of special economic zones and favourable tax regimes, to cite some; this way they could benefit from investments and industrial transfers, which in turn have attracted human capital and talent that gave them educational resources back. After years and years of development, these cities have begun to adjust their industrial structure, focusing on the progress of higher economic value-added tertiary sector, culminating in higher per capita GDP (UNDP 2016).

To sum up, results from both studies shows that good urban sustainability practices have been taking place in Chinese megacities, at diversified grades and stages, so that it cannot be considered as an homogeneous step; nonetheless this is a valuable starting point to cultivate and expand to the neighbourhood, so that production and consumption in the future can be resource-conservative and environmentally-friendly in a more widespread territory, and the quality of life more and more higher, with a controlled economic growth and a stable per capital stock.

It goes without saying that Chinese leadership must keep on well implementing provisions to achieve such a goal, always verifying whether they are enough and in line along this extended path towards sustainability, even better a “strong” one.

4. The case-study: *Jingjinji* area

In a context like the Chinese one, where cities are increasingly playing a greater role in the development and economic growth of the country, leading the authorities to face the new era of urban sustainability, I chose to analyse the Beijing-Tianjin-Hebei (*jingjinji* 京津冀) case because this area has been growing in importance, turning into one of the most economically vibrant together with the other two major economic poles, that are the Yangtze River Delta – around Shanghai and Nanjing in central China – and the Pearl River Delta – around Guangzhou and Shenzhen in the south. Therefore we can affirm that it has become one of the most developed urban area in the country.

As the name suggests, this territory includes three distinct regions in the north-eastern coast of mainland China, namely Beijing Municipality, Tianjin Municipality and Hebei Province, that cover 216,000 square kilometres – 2.3% of the national surface – and count a population of nearly 0.11 billion people in 2016 – 8% of Chinese total population (Xiong, Yu, de Jong, Wang, Cheng 2017). Since the post-reform era in 1980 this area has experienced a quick socioeconomic change, recording a rapid urbanization development with an annual growth of 1.38% up to 59.47% in 2011, as well as an accelerated economic growth, generating over 10% of the total national GDP in 2010 (Wang et al. 2014). These figures have allowed the new megalopolis to surpass the just mentioned Pearl River Delta in terms of productivity and will soon pass the Yangtze River cluster (Zadro 2016). And there is more: according to the historical data and future trends urbanization and economic growth of *Jingjinji* will keep on increasing.

Beijing (*jing* 京) is China's political, educational, and media capital, enjoying leading positions in the influential sectors of IT, finance, healthcare, tourism and transportation. No wonder if the Economist Corporate asserts that if it were its own country, Beijing's GDP would rank it among the top 30 economies in the world

(Economist Corporate Network 2016). In the *Jingjinji* area it is by far the most important and dominant city in all aspects (Zadro 2016).

Push and pull factors in the local economy are promoting an advanced industrialization and a balanced growth led by consumption and services – inclusive of strategically and increasingly improving sectors like financial services and healthcare, which should be added to the range of development project structures that Beijing authorities are broadening. These covers public-private partnership (PPP) projects – including water supply, waste disposal and transportation; technopreneurship – that is collaboration between cloud computing and public services such as transportation, healthcare and education; and cultural industries – for which the government has announced policy measures to encourage land use in order to develop such kind of sectors (Economist Corporate Network 2016).

High-income consumers will grow in number, and this means that consumption habits will change, towards, for example, wealth management and insurance services; in the meanwhile, upper middle-income consumers will most likely upgrade their spending in branded and premium products, and lower middle-income consumers will instead have more money for goods and services in general (Economist Corporate Network 2016).

The port city of Tianjin (*jin* 津), which borders Beijing on its eastern edges, ranks first in the nation in terms of its per capita gross product; this success is partially due to its outward-looking, trade-oriented ability at attracting FDI from world-leading firms since 1992.

Although Tianjin generally has a lower profile than the internationally well-known cities of Beijing and Shanghai, however yet it can outperform them thanks to a local economy which is expanding at a continuous pace as China during its glory days of high-charged growth and saving efforts to develop its service sector as well as to rebalance towards higher level economic activities (Economist Corporate Network 2016). As a matter of fact, major part of the city's industrial base comprises relatively

sophisticated manufacturers such as aerospace, equipment manufacturing, pharmaceuticals, new energy, new materials, and defence companies, to cite some; in the tertiary industry we can instead mostly find financial services – for instance the Bank of Tianjin and other financial leasing companies – high technology research and development – especially for the production of new-energy vehicles – and logistics facilities – which tries to combine the project of making Tianjin the logistic centre of north China together with the one of developing a logistic and storage centre for cross border business (Economist Corporate Network 2016).

The province of Hebei (*ji* 冀) surrounds both Metropolitan areas with a mixed urban-rural population and two largest cities, that are Baoding and the provincial capital of Shijiazhuang. Thanks to a more numerous population and a higher GDP we can surmise how it would economically benefit from the *Jingjinji* Project.

Hebei province is best known as China's largest steel producer, with its output accounting for about one-quarter of the national total, although it has shaved capacity in order to improve environmental conditions and reduce excess production; moreover the government plans to boost remaining steel production facilities with cleaner and more fuel-efficient equipment (Economist Corporate Network 2016). In addition to the just mentioned steel reduction target, other signs which indicate that this resource-consuming and capital-intensive heavy industrial sector is making progresses in the right direction can be summarized as follow: *Jingjinji* as a driver for accelerated industrial transfer to Caofeidian, an experimental green industry-focused sea port in Hebei province; a helping hand from Beijing in order to make Caofeidian a pilot zone for modern industrial development; a plan by the provincial government to produce more environmentally friendly vehicles together with electric-charging stations, especially in motorway service areas, airports and public-service locations; the growth of the pharmaceutical industry as a new economic force for the province, including pharmaceutical manufacturing, the

traditional Chinese medicine industry, health tourism and medical care services (Economist Corporate Network 2016).

4.1 The project

On the current logic “bigger is better”, the idea to link the facilities of Beijing with Tianjin and the Hebei province into a single megalopolis and one economic sphere, in order to integrate these three areas, better balance resources and foster more sustainable growth started in 2013 and next announced in February 2014 by Chinese President Xi Jinping. However it earned a decisive affirmation later in two different occasions. First in March 2014, when the State-run paper China Daily reported about a “new plan” for integration “expected to ease the air, water and transportation problems, to relocate less important industries, to divert population to neighbouring cities in Hebei, to ease population pressure in the capital and to beef up the competitiveness of its surrounding areas” (Lockett 2016). Then in February 2015 when President Xi Jinping celebrated its merits and State Council issued some guidelines for the combined development of the region, grouped into a governmental program that delineates the main objectives for the *Jingjinji* area; more specifically Beijing will remain the political, cultural and innovative centre, while Tianjin will continue to be the heart of the manufactured goods and luxury technologies business – thanks to its strategic position – and Hebei province will have – at least at the beginning – the role of national site for the implementation of manufacturing industries through the use of new production technologies, this way creating new jobs and investments in this territory as another goal aims to.

The central issue of the plan is concerning the transportation system, indeed the leadership is expected to spend hundreds of billions of dollars on infrastructures projects that will connect about 130 million people living in the three regions, allowing them for quick travels – the basis of any attempt at economic integration.

The goal is a “one-hour commuting circle” across the area. Communication will get easier, too, with roaming or long-distance fees being removed for all intercity cellphone calls (Baculiano 2017).

We can surmise how such a connection between Beijing, Tianjin and the Hebei province in one metropolitan region will create a massive urban landscape (Zadro 2016).

We can sum up the reasons that have been leading to such a giant project in this way. First of all, development throughout this area is seriously unbalanced: indeed, while Beijing is the cosmopolitan capital and Tianjin is the channel to the international market, Hebei province remains a poor and quite undeveloped region, and more in general other cities in this area are mostly unknown and insignificant on an economic level. To give an example, in 2015 the GDP per capita of Beijing was 106 thousand Yuan, while the one of nearby Shijiazhuang, capital of Hebei, was 50 thousand Yuan; the divergence originates in part from the economic structure: as we saw in the previous section, almost the whole Beijing’s growth comes from the service sector, while Hebei province relies on manufacturing – primary sector – for more than half of its growth, of which heavy industry occupies the largest part (Lockett 2016). For this purpose in 2005 was introduced the concept of a “Poverty Belt”; in this regard, the Asian Development Bank empowered some researchers to study the level of development in the northern provinces of China (Zadro 2016). Then, later in 2012 President Xi Jinping visited some territories of the Hebei province in order to personally see the living conditions there, setting off a national debate centred on how to solve such a situation of poverty where streets were muddy and houses collapsing. In this sense we can affirm that the more Beijing develops, the more the divide between the centre and the suburbs increases, thus this means that the longer it goes on, the more the capital will need to spend in terms of time and money in order to bridge such disparities, sharing its economic wealth and popularity (Zadro 2016). In this framework it is worth mentioning that the underdevelopment

comprises also talents and labour skills in this province, a situation that the plan is hoped to help, boosting their movement and the following redistribution (Baculiano 2017). As a matter of fact, we know that Beijing instead not only offers a huge variety of jobs, including in the government apparatus and in the many company corporate headquarters, but also it is an intellectual centre with a great deal of China's top universities, thus of talents especially in engineering and the sciences. In this sense the three territories will have to coordinate together in order to favour a better circulation of technical knowledge and experts and, why not, in the meanwhile exploit best comparative advantages that each of them enjoys (Zadro 2016).

Moreover, Hebei province is also extremely polluted mainly because of, as we cited above, the heavy industry of steel and coal production which generates economic growth together with PM_{2.5}; but also contaminated air and water in Beijing are a severe issue for the central government because people are more and more concerned (Zadro 2016). Therefore, we can presume that to deal with these questions the leadership has the opportunity to establish two sets of incentives: firstly for non-steel producing industries and secondly for relocation to Hebei province, which has pieces of land available.

In the meanwhile, Chinese authorities have been trying for years to limit the number of residents in the capital Beijing, issuing in the past several years severe residency permits, children birth limits and much more (Zadro 2016). Thanks to this plan, it is hoped that the central districts will see their population reduced by 15% (Bailey 2015). Finally, although not always mentioned, some experts see this project also as part of President Xi Jinping's anti-corruption campaign mainly because for many years local officials have operated independently from central leadership and often they had the opportunity to engage in corruption with a certain level of impunity. As a result of this integration, higher level of regional administration would have greater authority which in turn can be easier controlled by the central government of the Chinese Communist Party (Bailey 2015).

In a context where pollution must be reduced and a new economy is taking place – the one not solely driven by industrial production but mostly by internal consumption – it goes without saying that Chinese leadership can improve the Hebei region and at the same time reduce congestion in Beijing, connecting research and development centres and creative culture in the capital with the port of Tianjin and the inland province of Hebei and spreading economic wealth throughout the entire *Jingjinji* region. This is partly because integrating different urban zones is seen as a catalyst for economic growth. Basically, we can surmise that authorities want to move the non-core industries out of Beijing and there focus more on political, cultural and high-tech industries – the high end functions – giving particular attention to energy-saving and environmental sectors. Tianjin would put efforts into its trade zone and Hebei would expand its clean manufacturing and wholesale trading industries.

Following this logic, the leadership hopes to build a more fluid labour market and to encourage growth in strategic, forward-thinking sectors, this way making cooperation among the three areas ever simpler. Nevertheless we cannot forget that their integration will require an alignment of the level of services offered, especially in education and health care (Zadro 2016).

To sum up, *Jingjinji* project is a development strategy which aims to strategically cluster cities together by interlinking them infrastructurally, economically, and, to a certain extent, politically; this way such integration is thought to allow entire regions of cities to function as a singular urban organisms that can be better administered, planned, and economically developed (Shepard 2016). In a broader extent, its purpose can also comprise the expansion of Chinese economy in general, and most likely even over the next 100 years along, supposing to become a motor for innovation and growth not only within the country but it could also become a model of sustainable development for the whole world, as some experts think (Zadro 2016). Notwithstanding the success, we should keep in mind that Chinese leadership is

largely involved on systematic and meticulous planning and execution of numerous initiatives, in order to involve every single area of the megalopolis. And finally, forward looking, checking whether it can be advisable for other situations, since there are now several cities with a population of at least one million in the country.

4.2 Some data about the current situation of the region

Connecting Beijing Municipality together with Tianjin Municipality and Hebei Province seems complex but easy and very useful for many aspects.

Lots of studies and analysis have already been carried out to show the current situation of the region or what it will like to be, and now we try to cite the most important and recent ones, this way giving information about some issues of this project we mentioned above.

Most crucial matters are strictly connected with environmental degradation: as a matter of fact, we know that the rapid economic development in this area came with high ecological costs, involving for instance air and water pollution, water resource pressure, soil erosion, and loss of ecological and environmental carrying capacities, which have been burdening sustainable economic development and future human wellbeing. In this sense development has been coupled with a conflicting relationship between ecological wellness and socioeconomic prosperity.

For this reason, Li et al. (2018) in an up-to-date research of *Jingjinji* region decided to show the evolution of the monetary value of ecosystem services – instead of merely report the trend of pollution data – because the critical role of such ecosystems in providing food and services that contribute to human welfare has grown in importance, becoming an intuitive and comparable way to realize how relevant is the integration of ecology and economics together, in an ecological economics approach to sustainability. To give an example, in 1999 Ouyang et al. gave some primary data about such a matter, estimating the total national Ecosystem Service Value (ESV) to

be 34 trillion Yuan/year (approximately US\$ 4.4 trillion using 2007 exchange rate); later in 2015 Xie et al. found out that Chinese national ESV in 2010 was 38.1 trillion Yuan/year (approximately US\$ 4.96 trillion using 2007 exchange rate) from eleven types of ecosystem services provided by fourteen biomes (Ouyang et al. 1999; Xie et al. 2015).

Going into details, Li et al. tried to draft the transformation path over time in different ESVs and in the relationship between them and economic development (identified through Gross Domestic Product – GDP), concentrating on the dynamic link between the two in response to land use changes through the use of Elasticity Indicator (EI) and Ecosystem Service Load (ESL). They did such an analysis focusing on the regional level because they affirm that such a localized approach is necessary to pursue a more balanced and sustainable development course in a context where some studies have already been conducted from the national perspective (Li et al. 2018). They took into consideration eleven ecosystems belonging to six major land use types, based on available governmental statistics, namely cropland – including dry cropland and paddy land – woodland – inclusive of coniferous, broadleaf forest and shrub – grassland – including both dense and sparse grass – water areas – inclusive of water bodies and wetlands – built-up areas; and bare land. Because of statistical gaps and inconsistencies for some land types, some land areas were not included in the official classification and consequently the total area studied in Liu et al.'s paper is smaller than the whole regional territory.

It goes without saying that the time frame they referred to for performing their investigation includes China's development during the past three decades, which they divided into three phases: the first one before 2000 – the economy supreme phase – in which the government was focused on ensuring Gross Domestic Product (GDP) increase at the expense of natural resources; the time between 2000 and 2012 has been the ecological awakening phase because Chinese leadership released policies and increased investments for ecosystem protection along with economic development; finally in 2012 began the ecological civilization phase, featured by the

alignment of economic growth with ecological protection (Li et al. 2018). Although, as we just mentioned above, extensive economic development over the past decades has placed enormous pressures on the ecological environment also in this region, nevertheless it entered a new era of ecological conservation, thanks to the implementation of the “Jing-Jin-Ji coordinated development” strategy in 2012; and the establishment of ecologically friendly policies, such as the forest protection projects “grain for green”, “the key shelter belt construction”, “Beijing-Tianjin sandstorm control”, and a wetland conservation system (Li et al. 2018).

Results are summarized as follow: from 1990 to 2015 the ESV of woodland in *Jingjinji* constantly increased thanks to forest protection projects that favour the growth of the woodland area; on the contrary, over the same period the ESV of cropland, grassland, and water areas decreased due to their conversion to built-up areas. If we take now into consideration EI, we can observe that diversified developmental patterns under the three phases in China mentioned above had significant impacts on the regional ESVs and their interactions with GDP: to cite some data, for the period 1990-2000 there was a great mismatch between development speed of ESVs and GDP, because the ecosystem was neglected in terms of GDP growth; later during 2000-2015 we can find large disparities within the region because in Beijing and Hebei EI increased because the growth rates of ESVs and GDP were increasingly matched and ecosystem efficiency greatly improved – although in Hebei province ecological efficiency was still far behind that of Beijing – while in Tianjin EI decreased meaning that ESV growth lagged far behind economic growth (Li et al. 2018). Authors affirm that the differences in ecological wellbeing and efficiency are mainly induced by local ecological resources, population size, technology levels and, most important, industrial structures, and these are particular evident when looking at the ESL. As a matter of fact, the ESL decreases thanks to ecological efficiency per GDP increase and vice versa, this way we can surmise that ESL of industry is usually the highest, followed by agriculture and finally the service sector: this is the reason why the ESL of Hebei was the highest, Tianjin was second and the one of Beijing was

the lowest (Li et al. 2018). Moreover, it is worth noticing that the same data is decreasing during the period 1990 to 2015 for the three administrative entities and this illustrates the reduced ecological wellbeing of the region with the enlarging population, especially for Beijing Municipality (Li et al. 2018).

Trying to give a general valuation to the whole situation from this study, we can assert that pollution has been slowly reducing in the entire megalopolis, although there are still some differences between the three different areas, mainly depending on the economic structure. We can suppose that thanks to *Jingjinji* project the trend will keep on decreasing thanks to relocation and improvement of existing industries. In the meanwhile, economic wealth will continue to spread and this is confirmed by the fact that EI has not been declining quickly, meaning that the relationship between ESV and GDP is balanced and they are gradually growing together. Maybe if Chinese leadership will be able to maintain this current relationship between ecosystems and economic development, and in the meanwhile rebalancing resources more optimally within the whole region, economic prosperity will increase without largely burdening environment and society, in a equalized sustainable development, and accomplishing Chinese president Xi Jinping's development plan, through which he stresses the importance of more inclusive growth rather than focusing only on GDP growth targets. In this sense, he underlines in *Jingjinji* project the need for a more equitable income distribution, and highlights economic concerns that belong to many Chinese people's minds, such as home ownership affordability, education quality, and access to medical services (Chipman Koty 2017).

It is worth noticing that this transfer of some capital from a territory where it does not enjoy a comparative advantage is also part of authorities' decision for alleviating the "urban diseases" Beijing is facing, most importantly connected with congestion issues. Indeed, reducing population and controlling the total amount of land available for construction have been declared as primary answers to "big city disease" (*chengshi bing* 城市病), a way used to identify the issues many Chinese overcrowded and polluted metropolises are facing, and which arise when an urban

area becomes afflicted by environmental diseases, traffic jam, shortage of public services including education and medical care, and rise in house prices (Goh 2017). Therefore, as part of the project, the government has already taken two measures for the capital. Firstly it has been seeking to limit its permanent population to 23 million people by 2020, and as He Lifeng – Chairman of China’s National Development and Reform Commission – said on March 2017, *Jingjinji* project would help to redistribute population and wealth that had been attracted into Beijing causing air pollution, water shortages, traffic congestion and other urban disorders (Preen 2018; Roxburgh 2017). In this regard, more in general the government wishes to integrate major cities with the neighbourhoods around them creating mega-regions, rather than simply focusing efforts and investments on large mono-centric megalopolises. This way it hopes that such a development of cities’ clusters will alleviate pressure on overcrowded and overstretched urban areas, like Beijing, whose population, as already seen previously, has risen by two thirds since 1998, while energy consumption has more than doubled and the number of vehicles tripled (Roxburgh 2017). No wonder if numbers kept on raising: according to the 2010 census, citizens in that year were more than 19.61 million people; and later in 2016 Xinhua news agency reported permanent residents in the capital to be more than 21.72 million, as official data stated (Stanway 2018). Estimations seemed confirming this increasing trend, however same Reuters declared dwellers to be 21.69 million in 2017, that means about 22,000 people – counting for 3% – less than the past year (Stanway 2018). We can recognize such a decline not only as a possible effect of urban planning policies to control the inflows of people, but also as a result of authorities’ efforts in working on integration with the neighbouring Hebei province and Tianjin Municipality in order to curb population growth in Beijing for easing traffic congestion, resource shortages and house price inflation. And, of course, it goes without saying that reducing the number of people and cars in the capital will also largely help environmental sustainability, since vehicles are one of the three major source of pollution.

Through the second measure Chinese leadership has been beginning to relocate Beijing non-capital functions – for example manufacture factories, logistic companies, wholesale markets and some services of the tertiary sector – to Tianjin and Hebei, which have been benefitting of technology transfer and industrial upgrading counting for 15.4 billion Yuan (USD\$2.39 billion) in 2016. In the same year the government, through an investment of 60 billion Yuan (USD\$ 8.7 billion), also began the construction of a new market in Yongqing county – located in Hebei province, one hour drive south of the capital – to provide new work and houses to those displaced from the capital, more precisely from Beijing Zoo (Xinhua 2016). Data shows that in the period between 2013 and 2016 over 300 wholesale markets have closed or relocated in an effort to reduce traffic congestion and curtain population density; among others, most popular destination is Baigou, Baoding City in Hebei (Xinhua 2016). For this reason it is important to underline that such provisions for reducing the number of people in Beijing are valid not only for urban *hukou* holders in the capital, but also to migrant workers having a job in the area. As a matter of fact, Chinese authorities' efforts are not focused only on retail shops, as we have just seen, but also on industries because they adopted a differentiated water and electricity price policy depending on whether such factories dump pollution or reduce emissions: in this sense, charges are higher for the first ones and lower for the second group. No wonder if official statistics demonstrate that about 2,500 manufactories have already shut down, started to transform or have been relocated, in order to give Beijing the possibility to concentrate on dynamic and high-tech industries (Stanway 2018). Of particular interest are the cases of Beijing No.7 Paper Mill and Shougang Jingtang Iron & Steel. First company is one of the key enterprises in the paper industry, which opened in 1955; then, in the years 2013-2016 it was initially shut down because of soaring costs – mainly related to charges for water and electricity – and consequent intense competition, later rebuilt as an innovation park aiming to nurture high-tech talents (Xinhua 2016). Second enterprise was born in 1919 and had been one of the most important contributors to the increase of national

industrial capacity. In the period 2007-2010 it faced unprecedented pressures in regard of sustainability, thus it started looking across the country for another base location to solve the problem. They opted for Caofeidian, an economic development zone in the district of Tangshan – Hebei province – and focused on upgrading the variety and quality of its products, using high-value and hi-tech product development; moreover, waste residue, water and gas are recycled to a great extent (Xinhua 2016).

Conclusions

Urbanization represents the most visible process of land conversion from its natural state to human uses. Due to the fact that the number of urban areas and their size have been growing very rapidly in last years, this phenomenon has become an important issue and for this reason it has attracted the attention of decision makers and scholars worldwide.

Today urbanization processes are mostly evident in developing countries. China makes no exception: indeed it has experienced a fast and widespread city development since the economic reforms and the opening up policies were introduced in 1978 (Shen, Zhou 2014). As a consequence, the urban population grew dramatically and eventually outnumbered that of rural areas in 2011 (Ru, Lu, Li 2011). However, urbanization coupled with industrialization and economic growth has caused a great deal of problems with regard to every dimension of sustainability, namely environmental, social, economic and cultural (Soini, Dessein 2016).

Because of such challenges and concerns for human safety Chinese authorities, in line with governments all over the world, have recognized that urbanization is useful as a driver for innovation, but it needs to abide to principles of sustainability. This is why sustainability has taken root also in Beijing's urban planning, through the development of policies and methods for promoting sustainable urbanization (Shen, Zhou 2014).

Among these efforts we can find not only laws and regulations that try to provide solutions to specific issues relevant to the different spheres of sustainability, but also two plans having a wider scope, namely the "China's New-Type Urbanization Plan" (2014-2020) (*guojia xinxing chengshihua guihua 2014-2020* 国家新型城市化规划 2014-2020 年) and "China's 13th Five-Year Plan for Ecological and Environmental Protection" (2016-2020) (*sanshiwu shengtai huanjing baohu guihua 2016-2020* "三十五" 生态环境保护规划 2016-2020 年). The first identifies priorities and modalities for the

development of urban planning norms and practice. The second one is focused on setting standards and objectives relevant to the reduction of pollutants and greenhouse gas emissions.

Challenges ahead look even more daunting by looking at China's chief urbanization projects, for instance the new Beijing-Tianjin-Hebei mega-region (*jingjinji* 京津冀). Through this plan the leadership aims at linking Beijing with Tianjin and Hebei province into a single megalopolis, in order to boost socioeconomic development, reach a more efficient use of resources and achieve a more sustainable growth. Chinese authorities are devoting considerable efforts in planning and implementing the project, which is bound for – at least in the leadership intentions – to represent a future model for China's sustainable urbanization and an important economic development platform for the next century. As a matter of fact, among the main causes that have been driving the project we can find the environment, with regard to pollution reduction and residents limitation in Beijing, and economy, with particular reference to unbalanced development in the region, which so far has overlooked Hebei Province.

If we focus our attention on these elements, we can ascertain that the planning for *Jingjinji* seems indeed to be informed by objectives of sustainable urbanization.

However, the issue remains on whether such policies for urban development can effectively bring about transformational change for sustainability or their objects are still anchored to the same conventional ideas of incremental growth¹.

¹ There are two main differences between transformational and incremental innovation: (a) With regard to power framing, while incremental adaptation seeks to operate within the status quo to maintain and/or increase efficiency of existing systems, transformational adaptation addresses power imbalance and the causes of social injustice to induce a step change/radical shift to the operation of the existing system; (b) On the side of management framing, while incremental development is focused on finding ways to keep the present system in operation, transformational change includes questioning the effectiveness of existing systems and processes (Feola 2015).

To attempt a transformational change, the leadership should first inquire whether the existing system and processes are really effective and, if not, radically modify its objectives in order to make them able to solve problems such as of power imbalance and social injustice.

So far the Chinese government's ambitions have been consistently focused on economic growth to be reached through urbanization, which is considered to be able to generate innovation and to improve people living conditions. Even though some concern has been dedicated to the environmental sphere and some results have been achieved in the improvement of air, water and land quality, we cannot find evidence of a radical reconsideration of the development objectives by Chinese leadership. As a matter of fact, the latter keeps on considering urban development as a priority for the country growth and for more efficient innovations in the energetic, production and human resources fields.

In other words, the status quo – with some little variants – is favoured and promoted by the Chinese power. For the time being, we can expect that urban development will remain anchored to the norms that have been inspiring it in the last decade or so, thus any transformational change is not likely to take place at least during the few years along from now.

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