

# To what extent can technology compensate for institutional failure in an urban environmental management setting: The case of China

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## Abstract

The sustainability of the urban environment has been on the minds of policymakers around the globe for decades as megacities continue to grow and thrive contrary to expectation. The common wisdom is that environmental stress will severely curtail any future potential. China is in some respect at the forefront of this debate with cities such as Beijing and Shanghai, which seem to have made reasonable accommodation with their limited natural resources. This is the result of a unique combination of institutional reform and judiciously applied technologies borrowed from elsewhere. This continues to be a great dynamic whereby urban environmental management is continually one step behind economic progress. China's environmental path bears watching since much can be learned and it has become very clear that the rest of the globe will either suffer or benefit as a result.

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## 1. Introduction

Rapid urbanization highlights the stress that dense populations place on the environment. Increasingly, there is concern about the ‘ecological footprint’ created by cities, that is, the impact the urban population has on the natural environment and the long term degradation that often ensues. And since public health, and to a lesser degree, economic growth, are closely related to environmental conditions, governments must increasingly take these issues into account. However, there are issues facing today's developing megacities that separate them from

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the Londons and Tokyos of decades ago, which successfully combated rampant pollution problems. Mexico City, Manila, Beijing, and other megacities in the developing world are simply growing too fast for environmental protection measures to keep up. What is more, environmental laws have been difficult to enforce in developing countries, and perhaps most importantly, rapid development has created social pathologies that tend to exacerbate and concentrate pollution problems [1, p. 83]. This will be explained in more detail later.

Twenty years ago China did not figure into many discussions of urbanization. Its urban population, although considerable at the time, was less than a quarter of its total population, and the effects of its ‘reform and opening’ had just begun to take hold. In 2005 though, China’s urban population has surpassed 40 percent and by 2020 will have eclipsed the rural population [2]. This rapid urbanization is too often overshadowed by China’s blistering economic growth. In both cases, the sustainability of current trends is questionable at best. And while the government maintains relatively tight control over the economy, the influx of people into the cities has created a host of new issues that the government is ill-equipped to address, further stressing urban infrastructure. Urban China’s operational priorities include reducing coal-based air pollution, improving water supply systems, increasing sanitary drainage systems and associated wastewater treatment, reducing all types of industrial pollution, and improving solid waste management.

The simple solution is that technological advances will provide cities with means to cleaner air, cleaner water, more efficient energy production, and a suite of other services not available in years past. And in certain niches, this may be the case. Ubiquitous cell phone use in China and the rest of the developing world is the shining example of technology bypassing government and institutional failures. Individuals who have waited in vain for a hard-wired landline now only need to walk to a local store to purchase a personal mobile phone, and instantly they are connected. However, in the urban environmental context, we continue to rely on the most basic services such as water, wastewater, airshed and solid waste management. These are the same services we have had for decades and will continue to require in the future. The need for services and operational organizations has not diminished through the use of new technologies, although new layers of people have been added to manage them. In the case of China, the question then becomes, what types of new technologies can be applied and more importantly, will these make up for institutional failure or scarce resources?

## 2. Addressing urban environmental pathologies

Several years ago an article appeared in *Environmental Science and Technology* [3, p. 238] which portrayed a dire future for developing country megacities as constrained by dysfunctional institutions, rife with corruption, a dearth of suitable financial resources and instruments, credit, lack of modern technology, crumbling infrastructure and growing masses of poor. The problem of inequity is at the heart of the challenge, which city managers must address. Table 1 lists the salient pathologies associated with typical large cities from the perspective of rich versus poor and the impacts on the urban environment. Viewed as a pyramid with large numbers of poor at the base, a modest middle class and even smaller wealthy class at the top, this is essentially how the economic and social structures are organized. At the bottom, large numbers of the poor are subject to environmental insults due to neighborhood density, proximity to drainage, transport corridors and long distances to employment and a lack of social services. They typically inhabit areas that are considered marginal for other uses. Aside from poor living conditions there is a lack of opportunity to fully participate in the greater economy.

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