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BALANCING ENVIRONMENT, HEALTH AND DEVELOPMENT
Evolving policy interactions
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Introduction
The majority of articles in this volume are concerned with the making and implementation of various aspects of environmental law and policy in China. This chapter is somewhat different in considering the way in which environmental policy intersects with two other crucial policy domains: health and development. It first lays out the rationale for this integrated approach and then analyses the way in which these three policy sectors have interacted over time, highlighting shifting patterns of intersection and dislocation.

Although the social environment is also important for health, in keeping with the focus of this volume, the emphasis here is on risks stemming from the degradation of the physical environment, and in particular from pollution associated with industrialization, urbanization and the intensification of agriculture.

Background: environment and health as a policy domain
Interactions between economic development, environment and health are extremely complex. There is no linear relationship between increases in GDP and health outcomes, and relative as well as absolute wealth has an effect on health. However, especially for poor countries, economic growth, usually pursued through increases in productivity from industrialization and the intensification of agriculture, can bring important benefits for health through increased incomes, better nutrition, improved living conditions and more funding for health and other public services (Biggs et al. 2010). It can also provide more resources for environmental protection. Urbanization is also usually associated with improvements in public health because it facilitates the development of infrastructure and the provision of health and other public services (Brady et al. 2007). Yet at the same time, processes of industrialization and urbanization, as well as the higher levels of consumption that generally accompany rising living standards, also generate pollution that is harmful to health in the short term and can cause long-term damage to ecosystems, as well as depleting the natural resources essential for sustaining human life. It is therefore increasingly recognized that environmental protection is crucial to human health and well-being (for example, Forget and Lebel 2001; WHO 2005; Prüss-Ustün and Corvalán 2006).
Nowhere are these tensions starker than in China, where extremely rapid economic growth has gone hand in hand with mounting levels of pollution and rising carbon emissions. However, before turning to China, it is important to highlight some of the generic difficulties of environmental health as a policy domain, which include the high level of scientific complexity and uncertainty; the need for cross-sectoral engagement; and conflicts of interests between different actors and jurisdictions (OECD 2007).

**Scientific complexity and uncertainty**

Pollution-related health impacts have complex causality and different pollutants have different effects on health, individually and in combination, over different time frames and geographies. For example, air pollution can be composed of numerous different chemicals emitted by a variety of sources from vehicles, power stations and industries to the burning of agricultural stubble. These chemicals have different individual health effects and also interact in the atmosphere to form new compounds that may be more (or less) damaging to health than the individual components. This means that reductions in emissions of individual pollutants also do not always result in linear reductions in health effects. Emissions that are not directly damaging to human health may also have long term indirect effects through climate change or other impacts on the ecosystem: greenhouse gases are the obvious example. Topology, wind patterns and population concentrations will also affect who is exposed to emissions and at what level of intensity (Nielsen and Ho 2013).

Similarly, risks to health through food can result from pollution of the agricultural environment by industrial and household waste as well as agricultural practices including the use of chemical fertilizers and pesticides, veterinary drugs and animal feed containing heavy metals and other chemicals harmful to health. However, it is not always easy to extrapolate simply from pollution levels to specific health impacts. For example, whether or not heavy metals present in soil are absorbed by food crops depends on a combination of factors such as soil acidity and moisture levels; and certain crops and even different crop varietals have a much higher propensity to absorb heavy metals than others. As a result, crops can sometimes be unsafe even when soil meets environmental standards, and, equally, safe food can sometimes be grown in soil that does not (FORHEAD 2014).

Over the long term, general improvements in environmental quality will certainly have benefits for human health, but reducing the health impacts of pollution quickly in specific places requires an understanding of the particular pollutants involved and their interactions with each other and with other relevant characteristics of the physical and social environment. This scientific complexity makes environmental health a very challenging issue for both policymakers and the public.

**The need for cross-sectoral engagement**

The fact that pollution often stems from many sources also means that addressing it usually requires a high level of policy coordination. For example, the engagement of the Agriculture and Land Resources ministries is crucial in dealing with heavy metals in food, while air pollution reduction strategies must often involve agencies responsible for transportation, energy, industry and commerce, and agriculture. These different policy streams all have different mandates and goals. In particular, there is a strong tension between agencies responsible for the drivers of environmental health problems (energy, industry, agriculture and transportation) – whose primary goals are usually to increase the supply or added-value of goods and services – and
environmental protection and health agencies that play a regulatory role. The scientific complexity of environment and health as an issue domain is an added barrier to coordination, because few officials have cross-disciplinary training and the data-collection systems of different agencies are also often established with different units of analysis and sampling rationales. This makes it hard to conduct integrated monitoring and analysis.

This situation is not unique to China. A 2007 OECD review of environment and health governance noted that policy coordination was extremely hard to achieve, with individual departments working in policy ‘silos’ and no one agency having overall responsibility (OECD 2007).

**Conflicts of interest**

Even when there is a strong political commitment at the national level, implementing environment and health policy often involves dealing with deep conflicts of interest between different actors which can occur at multiple scales, have complex geographies and centre on different issues over time. Many conflicts are over responsibility for the health and economic costs caused by pollution and take place between industries and affected individuals or communities, or between different jurisdictions. As environmental protection policies are more strongly enforced, conflict can also occur over the distribution of the costs of reducing pollution, which may not only affect industry profits but also lead to unemployment and loss of government revenue. The relationship between Hebei Province and Beijing, discussed below, illustrates this problem with regard to air pollution.

This tension between improving environmental quality and maintaining the benefits for health of economic growth is evident in the history of many other countries in the world. However, most early industrializing countries did not attempt to implement strict environmental protection or environmental health measures when they were at China’s current level of development and urbanization. For example, serious concern with the health impacts of pollution in the US is often dated to the publication of Rachel Carson’s *Silent Spring* in 1962, and it was not until the 1970s that environmental protection got into full swing. By this time, the US was a rich country (per-capita GDP in 1970 was US$15,030 (Maddison Project 2013)) that was already de-industrializing. China’s per-capita GDP in 2014 was US$7,400 (World Bank 2015), and industry still contributes a significant proportion of GDP: 42.8 per cent in 2014 (ADB 2015). The process is therefore likely to be considerably more difficult.

**China’s particular environmental health challenges**

In considering what is special about China’s situation with regard to environment and health, a number of factors stand out. The first is the population to resources ratio. China has a fifth of the world’s population but only 7 per cent of its arable land. Water resources are also tight, at only about a third of the global average of 6,200 cubic metres per person (World Bank 2012). This situation encourages intensive agriculture and creates competition for land and water between agricultural, industrial and residential uses (Holdaway 2015). Of course, China’s sheer size also matters because even small changes in the production and consumption patterns of such a massive population have global impacts on the climate and on ecosystems.

Second, China is a country of continental scale and as a result there is enormous diversity in its natural environment and in the distribution of natural resources. Eighty per cent of water resources are located in the south; deposits of coal and heavy metals are regionally concentrated; and the topology and climate of the country lend themselves to the cultivation of different crops...
in different regions (Gale et al. 2002). In interaction, these factors have led different regions to follow very different development pathways (Bramall 2003) which have in turn generated different constellations of environmental health challenges (Holdaway 2013, 2014; Wang et al. 2014). For example, air pollution is generally worse in the north, and acid rain is concentrated in the south, while heavy metal contamination of rice occurs mostly – although not exclusively – in southern provinces where rice cultivation takes place alongside the exploitation of heavy metals (Wu and Li 2015).

Lastly, the rapidity of change in production and consumption activities means that policies, regulatory mechanisms, institutional infrastructure and human resources almost inevitably lag behind what is needed. At the same time, internal diversity and uneven development also mean that China faces environmental health problems associated with different levels and types of development at the same time. These problems often overlap across space and populations, and are in constant flux, as the environmental determinants of health change along with livelihoods and lifestyles. Dealing with this differentiated and shifting landscape of risks is a very significant challenge for policy (Holdaway 2013).

The evolution of environmental health problems and policy responses

Overall, China has seen the evolution of its environmental health problems from those of a poor, largely agricultural and rural society to those associated with industrialization and urbanization. In many ways this represents a classic environmental health risk transition as described by Smith and Ezzati (2005), which in turn is part of a broader health transition from infectious to non-communicable diseases (Cook and Dummer 2004; IHME 2010). However, the factors discussed above mean that China faces a more regionally differentiated and rapidly changing landscape of environmental health risks than most other countries.

Legacies of the Mao era

In 1949, when the Chinese Communist Party came to power, China was a very poor country, with an annual per-capita GDP of only US$60 in 1990 dollars – less than half the average for Asia (Du et al. 2014). Median life expectancy for 1950–1955 was only 44.6 years (UN Population Division 2012). The focus of policy was therefore on meeting basic needs for food and shelter. Health policy prioritized bacteriological and animal-borne diseases through aggressive sanitation and pest-eradication policies referred to as environmental hygiene (huanjing weisheng). The positive impact of these policies was bolstered by general improvements in living standards and, later, investment in basic but quite comprehensive medical services provided by state-owned enterprises and rural collectives. Any evaluation of China’s performance on health during this period must also consider the tragic policy failures of the Great Leap Forward, which resulted in the deaths of more than 30 million people from hunger. However, overall, long-term public investment led to significant improvements in public health, and by 1978 China had impressive health indicators for a country of its level of development: median life expectancy from 1980–1985 was 67.7 years (UNDP 2013), compared with only 56.3 in India (UN Population Division 2012).

Until the late 1970s, environmental impacts on disease could be fairly easily predicted. In general, rural people were more likely than urban residents to be affected by problems related to poverty, including bacterial diseases resulting from the lack of sanitary facilities and access to clean water, endemic diseases caused by the absence or excess of certain elements in the soil or water and respiratory diseases from burning solid fuels for cooking and heating. Zoonoses such
as malaria, schistosomiasis and plague were also rife in some areas. These problems were exacerbated by poorer nutrition and inferior access to health services. Urban populations were more likely to be exposed to air pollution from industry and coal burning and to occupational diseases related to industrial work, but they generally had much better sanitation and access to water and health services than people in rural areas (Banister 1998).

In terms of pollution, the main risks were from mining and from industry, which was concentrated around Shanghai and in the North East, as well as in rural areas in which industries were located as part of the Third Front (sanxian) policies. The period of the Great Leap Forward led to a sudden, but relatively short-lived, increase in pollution as countless factories, smelters and power stations and cement factories were hastily constructed in both cities and rural areas. Major infrastructure projects such as dams also exacerbated risks by concentrating pollution in some areas due to reduced water flow and increasing the risk of accidents in the case of infrastructure collapse, for example in the Huai River Basin (Economy 2004). However, pollution from the transportation and agriculture sectors, which would later become major problems, was not yet serious. Private cars were extremely rare, and increases in agricultural output were largely due to the intensification of traditional practices rather than high levels of inputs, although chemical fertilizers and pesticides were coming into wider use.

This period saw some general guidelines on the conservation of soil and water. A number of environmental incidents in 1972 prompted the formation of a small leading group on the protection of water resources (Economy 2004) and in 1974 an inter-ministerial Environmental Protection Leading Group was set up within the State Council, which acknowledged that pollution ‘jeopardizes people’s health and industrial and agricultural development’ and that China should not ‘follow a zigzag path of construction first, control second’ (Qu 1999: 219 cited in Economy 2004). But it was not until 1979 that the National People’s Congress passed the draft Environmental Protection Law and health impacts were not salient in this legislation. However, although environmental protection policies were limited, overall development and health policies were quite effective in reducing the poverty-related environmental health risks that China faced during this period.

**Reform and rapid growth 1978–2002**

With reform and opening up, China’s economy underwent dramatic structural changes that transformed people’s livelihoods and lifestyles. In rural areas, collective agriculture was dismantled and land contracted out to farmers who were permitted to sell their surplus produce on the market. Agricultural output increased and rural incomes rose as the result of greater economic incentives, mechanization, new high-yield seeds, and the greater use of chemical fertilizers and pesticides. Improved productivity also freed up large numbers of rural workers and policy encouraged the establishment of Township and Village Enterprises to absorb them. Other rural people began to migrate to cities as the establishment of Special Economic Zones in coastal areas and the marketization of the urban economy provided work in manufacturing, construction and service industries that brought far higher incomes than farming (Cai and Wang 2010). From 1982 to 2002, agriculture’s share of GDP fell by 20 per cent (ADB 2003) and by 2001 the level of urbanization was 37.7 per cent (ADB 2003), up from 19 per cent in 1979 (Yeh et al. 2011).

The number of people living in poverty fell dramatically and life expectancy rose, from 66 years in 1978 to 73 in 2002 (World Bank 2015). But rapid industrialization also created serious pollution. The first Report on the State of the Environment issued by the State Environmental Protection Administration (SEPA 1997) stated that in 1996, ‘the water of rivers, lakes and
reservoirs in China was universally polluted to varying degrees’. By 2002, SEPA reported that only 29 per cent of water in China’s seven main river basins was suitable for human use (Grades 1–111) and that particulate concentrations in 66 per cent of cities, home to nearly three-quarters of the population, exceeded the national Grade II standard (SEPA 2003). The rapid growth of cities put pressure on urban infrastructure and services; in 2002, the treatment rate for domestic solid waste was only 54 per cent (SEPA 2003).

This period saw growing attention to environmental issues but progress was slow and uneven. It was not until 1988 that environmental protection became an independent policy stream with the formation of the National Environmental Protection Agency, and in 1989 the first Environmental Protection Law was formally promulgated. At this point there was still little attention to reducing the health impacts of pollution. Nor, indeed, was there much knowledge about them, although scattered evidence was beginning to appear and was reported by the Deputy Director of the Ministry of Health at the Second National Conference on Environmental Protection in 1983–1984 (Otsuka 2016).

The health sector, which has been a champion of environmental health in many other countries, was in no position to push the agenda forward at this time. The focus of health policy during this period continued to be on diseases of poverty and had not yet begun to respond to the rise in non-communicable diseases (Holdaway 2010; Su and Duan 2010). The health system was also in a state of internal crisis. The shift from a planned to a more market-based economy resulted in the dismantling of the collective fiscal base for the provision of healthcare and investment in public health. By 1992 only 10 per cent of rural residents nationally had health insurance, compared with 90 per cent in the 1970s, and in 2001, the percentage of health costs paid out of pocket was 60 per cent (World Bank 2015). In this context, traditional preventive health care was more or less discontinued and the new problems presented by pollution were neglected.

By the 1990s, however, evidence of the health effects of pollution was beginning to mount and concern was growing. Reports of cancer clusters, especially in the Huai River Basin, prompted a large-scale government investigation (Yang and Zhuang 2013). In 1997 a study by the World Bank and SEPA estimated that 178,000 people in major cities suffered premature deaths each year because of pollution, and that indoor air pollution caused 111,000 premature deaths annually, mainly in rural areas (World Bank 1997).

**2002–2007: Growing concern and early environmental health policies**

In retrospect, the period from 2002–2007 was a transitional one in which addressing the negative side effects of China’s extremely rapid economic growth emerged as a policy priority. Concern about mounting inequality, and the growing numbers of people falling into or back into poverty due to the cost of healthcare, was accompanied by growing awareness of the health effects of environmental degradation. Although most policies to address these problems were not rolled out until the 11th Five-Year Plan, many of them were incubated during this 2002–2007 period.

An important first step was the **National Action Plan for Environment and Health 2007–2015**, which was signed by 18 ministries (MOH 2007). This plan for the first time indicated the government’s commitment to address environmental health problems, using the term environment and health (huajing yu jiankang) rather than the traditional environmental hygiene (huajing weisheng). It enabled a preliminary review of the state of knowledge on environment and health and of existing management capacity. It also provided for the establishment of parallel offices in the Ministry of Health (MOH) and Ministry of Environmental Protection.
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(MEP) to provide an organizational structure for coordinating environment and health work (Holdaway 2010).

Environment and health had emerged as a discrete policy domain. But despite this initiative at the central level, during the 11th Five-Year Plan (2006–2007), actual policy activities continued to operate mostly on parallel tracks. Environmental protection policies became more comprehensive in scope and were more strictly enforced, but they still focused on reducing aggregate emissions, and did not prioritize pollutants particularly damaging to health or protecting potentially vulnerable populations. Meanwhile, health-sector policies were undergoing a transition towards a greater focus on non-communicable diseases but appeared to be largely ignoring the contribution to these of pollution, with little targeted monitoring of or responses to pollution-related diseases, especially in rural areas (Fang and Bloom 2010). Coordination of environment and health policy with ministries responsible for industrial development and land use was almost entirely absent, and there was no integrated action at the local level (see Holdaway 2010 for a summary).

2007–present: environment and health to centre stage

Since 2007, the trade-offs between the benefits of economic growth and its negative effects in terms of environmental degradation and related health impacts have become even more painfully apparent. On the one hand, 35 years of rapid growth has raised incomes more than sixfold (UNDP 2010) and brought China to middle-income status. This has had enormous benefits for health. By 2010 life expectancy had risen to an average of 75.5 years and China had seen impressive reductions in infectious diseases and improvements in maternal and child health (IHME 2010).

However, the environmental cost has been high. In 2014, only 16 of 161 Chinese cities monitored met national standards for air quality (MEP 2015) and 29 per cent of water monitored in the major river systems and 39 per cent of that in major lakes was Grade IV or below (unfit for human consumption or most agricultural purposes). More than 60 per cent of groundwater was reported to be of either ‘quite bad’ or ‘extremely bad’ quality (MEP 2015). A national soil survey conducted from 2005 to 2013 found that 19 per cent of agricultural land was polluted to some degree, mostly with heavy metal and pesticides (MEP and MOLR 2014). Furthermore, acid rain, over-intensive farming and the heavy use of chemical fertilizers means that soil quality is also degraded in many parts of the country, making heavy metals more mobile. Meanwhile, agriculture itself has also become an important source of greenhouse gases (Garnett and Wilkes 2014) as well as of pollution from chemical fertilizers, pesticides and livestock waste containing heavy metals and other chemicals (FORHEAD 2014). In urban areas, emissions from 154 million cars have become a major new source of pollution (China Daily 2015).

Assessing the environmental burden of disease

Although the health effects of pollution are notoriously hard to measure, a growing number of studies have attempted to capture their extent. A study published in 2007 by the World Bank and SEPA estimated, conservatively, that the economic burden of premature mortality and morbidity associated with air pollution was 157.3 billion RMB in 2003, or 1.16 per cent of GDP, and that about 11 per cent of digestive tract cancers might be attributable to polluted drinking water (World Bank and SEPA, 2007). More recently, the Global Burden of Disease study listed outdoor air pollution and indoor air pollution as the fourth and fifth most significant risk factors contributing to the loss of disability-adjusted life years (DALYs) in China (Yang et
A major study conducted by the Chinese Centre for Disease Control and Prevention (CDC) found a clear association between water pollution and deaths from digestive tract cancers in the Huai River Valley (Yang and Zhuang 2014). Nutrition and diet studies, which provide the best data on exposure to toxic levels of chemicals through food, show that cadmium, lead and a range of persistent organic pollutants are above safe levels in certain parts of the country (Wu and Li 2015).

The importance of understanding demographic and regional variation in risks is discussed below but clearly environmental degradation is taking a serious toll on health in China. In its Environment and Health Work Plan for the 12th Five-Year Plan, the MEP reported that first, complex pollution is serious and widespread, and the population exposed is large; second, the period of exposure is long, exposure levels are high, and it will be difficult to eliminate the health impacts of historically accumulated pollution in a short period of time … at the same time that traditional environment and health problems caused by inadequate basic sanitation facilities have not been entirely dealt with, risks stemming from rapid industrialization and urbanization are gradually increasing … it will be hard to resolve these four problems within a short period of time.

(MEP 2011, author’s translation)

Environment and health policy

Since 2011 there has been a marked increase in the intensity of efforts to address environmental impacts on health. The overarching Outline of the 12th Five-Year Plan for National Economic and Social Development referred explicitly to the threat that pollution presents to health and to social stability, and the Environment and Health Work Plan for the 12th Five-Year-Plan Period 2011–2015 (MEP 2011) stepped up investment in integrated monitoring and risk assessment in key regions, the development of standards and legal statutes, and public education. The MEP introduced location- and sector-specific goals for pollution control and remediation, and heavy-metal pollution received explicit attention for the first time in the State Council’s 12th Five-Year Plan for the Comprehensive Control of Heavy Metal Pollution, which stipulated target regions and industries. Other initiatives included the Program for Comprehensive Control of the Rural Environment and the plans of the Land Resources, Agriculture and Transport ministries. Many of these statements remained on a general level, but it was clear that the health impacts of pollution were now on the policy agenda (see Holdaway 2013).

2013 was something of a watershed year for environment and health policy in China, prompted partly by a number of serious incidents. These included the prolonged and very severe air pollution that settled over Beijing in January of that year and the discovery of high levels of cadmium in rice from Hunan on sale in markets in Guangdong. This precipitated a surge of media attention and public concern about the impacts of pollution and health – in particular air pollution and food safety – and has in turn prompted a series of government initiatives that have been dubbed a ‘War on Pollution’. This has included national, regional and provincial-level action plans to tackle air pollution and the establishment of a new China Food and Drug Administration (CFDA).

Although the MEP continues to be the most active agency in the sphere of environment and health, the health sector has become more involved, particularly in the area of food safety, where, after a number of reorganizations, it has emerged as the lead agency (FORHEAD 2014). Other policy streams are also now showing signs of a more integrated approach to development. For example, the National Plan for Sustainable Agriculture (2015–2030) addresses overuse of
pesticides and fertilizers, dealing with waste from livestock and soil pollution (MOA 2015); a new soil pollution law is also being drafted and expected to be passed in 2017. It is also increasingly recognized that addressing environment and health problems – particularly those that involve cross-jurisdictional flows of pollution – requires coordinated regional policies. The integrated plan to address air pollution in the Beijing–Tianjin–Hebei region is an example of this (MEP 2013).

The ‘new normal’ and its challenges

Since 2007, China has entered a new phase in which both market forces and government policies are changing the nature and distribution of economic activities and associated pollution and health impacts. Several factors have contributed to this ‘new normal’ (xin changtai) (Xinhuanet 2014). They include the global financial crisis, slowing growth and China’s desire to reduce its dependence on exports and increase domestic consumption; the government’s commitment to reducing rural–urban and interregional inequalities; and mounting public concern about pollution, particularly in affluent parts of the country. The ‘new normal’ has complex and somewhat contradictory implications for environment and health.

Prior to the international financial crisis, China saw annual growth in GDP that averaged around 10 per cent for more than 30 years. This is no longer the case. In 2014, official statistics put the rate of growth at 7.4 per cent and many international analysts estimate it to be far lower (World Economics 2015). China’s economy is not just cooling down, it is also restructuring as the result of government policies that seek to promote a shift to cleaner, higher value production and services; and also to reduce inequalities between rural and urban and coastal and hinterland/western provinces.

In absolute terms, slower growth – in combination with stricter environmental protection – has potential benefits for environment and health. As demand for energy and other inputs, such as steel and cement, slows and production facilities are upgraded, pollution and carbon emissions should also fall. To the extent that China can make a structural transition to cleaner industries and services, this, too, should contribute to reductions in pollution with benefits for health. However, the ‘new normal’ also brings new challenges.

Inter/intra-regional tensions

Different parts of the country are very differently positioned in terms of their ability to make this transition. For example, there is a fourfold difference between the per capita GDP of the richest provincial-level city of Tianjin, at 99,607 RMB, and the poorest province of Guizhou at 22,922 RMB (NBS 2014). Their economic structures and levels of human capital are also very different: in 2013, 65 per cent of Guizhou’s population was still employed in agriculture, and in 2011, only 12 per cent of the province’s population had a high school education or more (NBS 2014). Although China is committed in principle to a ‘leapfrog’ development strategy, it will be difficult for poor provinces to transition quickly to high value industry and services, and it is not surprising that the expansion of polluting industries such as steel, cement, chemicals and ferrous metals is strong in western China. Avoiding rising emissions and health effects in those areas will be hard.

China’s uneven development is generating tensions over environmental regulation even within relatively affluent coastal areas. Depending on wind patterns, as much as a quarter of Beijing’s air pollution is estimated to come from outside the city, and recent policy has therefore shifted towards regional planning. But Beijing’s per capita GDP in 2013 was more than twice
that of the surrounding province of Hebei (NBS 2014), and, while services already account for 80 per cent of Beijing’s GDP, industry still accounted for 52 per cent of Hebei’s economy in 2013 and services for only 35 per cent (Hebei Bureau of Statistics 2014). Within industry, high-energy and polluting industries including steel and cement contribute a substantial part, while the service industry is dominated by transport, retail, household and other relatively low-value traditional services (HBS 2014). Compared with Beijing, Hebei’s human capital base is also much less ready for a transition to a high-value economy: only 15 per cent of the population has a secondary school education and 7.4 per cent has attended university (HBS 2014).

If these interregional and inter-jurisdictional tensions cannot be addressed effectively, there is a risk either that environment and health policies will be impossible to implement or that their economic and social costs will fall disproportionately on poor areas and populations. For this reason, greater consideration is needed not only of the impacts of development policies on the environment and on health, but also of the distributional effects of environmental policies. This is not an argument against stronger environmental regulation, which is clearly essential, but a package of integrated environmental, development and social protection policies will be needed to ensure that it does not place an excessive burden on less developed areas (Holdaway and Wang 2014).

**Scientific and administrative capacity gaps**

Effective measures to address environment and health problems are further hindered by differences in scientific and administrative capacity gaps; many provinces and lower tier cities have inadequate scientific and enforcement capacity that cannot be rapidly increased. For example, Johnson (chapter 22 this volume) discusses the fact that less-developed cities do not have the capacity to test for dioxin emissions from solid waste disposal and that in 2006 the city of Dalian was able to spend 4.5 times the national average on waste treatment (Chen et al. 2010 cited in Johnson this volume). Similar differences exist between rural and urban jurisdictions. In the area of food safety, for example, Liu and McGuire (2015) found significant differences in investment between rural and urban areas even within the same county.

**Managing public expectations, building trust and ‘co-governance’**

Public opinion has played a major role in driving forward the development of environment and health policies, especially with regard to air pollution and food safety. Government documents regularly cite the growing number of protests related to environmental problems as a reason for taking action (for example, MEP 2011). China’s environmental NGOs have also used health concerns as a way to push for stronger environmental protection (see Shapiro chapter 4 this volume and Fürst and Holdaway 2015).

However, there are also risks associated with policy being too heavily influenced by public opinion. The scientific complexity of environment and health means that it is quite difficult for the public, or the media and NGOs, to have a good understanding of the nature and level of risks from different sources, or the costs and benefits associated with different policy options (Fürst and Holdaway 2015). Furthermore, in any policy sphere, privileged social groups – in China, wealthy east-coast urbanites – usually have the strongest voice, which can create pressure for policies biased in their favour (Yang 2010; Liu and McGuire 2015). For example, Beijing’s air pollution is indeed bad, but it is far from being the worst in the country. It receives a disproportionate amount of attention and resources because it affects the most privileged city in China (Holdaway and Wang 2014).
Of course these problems are not unique to China, but they are exacerbated here by the lack of good public information as well as evidence of cover-ups and official corruption in relation to some environmental health problems, which have produced a kind of free-floating anxiety. Government can, and is beginning, to play a bigger role in the communication of environmental health risks and new laws allow a greater role for public supervision, for example in the joint governance provisions of the *Food Safety Law* (Wang forthcoming). However, too little reliable information about environmental health risks is available, and as a result, public trust remains low. This is a problem not only for the legitimacy of the government, but also in terms of gaining public support for policy.

**Conclusion**

Over the last 35 years, China has gone from being a country in which the burden of environment-related disease was largely associated with poverty – inadequate sanitation, indoor air pollution and endemic diseases – to one in which pollution from energy generation, industry, intensive agriculture, transportation and household waste are the major problems. After a slow start, environment and health policy has also shifted its focus, driven at least partly by strong public demand for a healthier environment. Environment and health has moved rapidly up the government’s agenda over the last ten years, and now occupies a prominent place not only in the environmental protection stream but also in health, agriculture and other agencies. As part of its larger programme of transitioning to a cleaner economic development pathway, the government has vowed to ensure cleaner air and water, and safer food.

But although progress is already evident on some fronts, particularly in China’s wealthier coastal cities, delivering on this promise will not be easy. Environmental impacts on health are complex and addressing them requires the coordination of many policy systems. Both scientific and administrative capacity for this is extremely varied across the country.

More fundamentally, and as the government recognizes, tackling pollution will entail deep changes in China’s development strategy in the direction of cleaner industry and more compact and less resource-intensive urbanization. While an industrial transition is already under way in many wealthy coastal areas, it will be more of a challenge for hinterland areas which do not have similar levels of resources or human capital and will find it difficult to shift quickly to cleaner economic development pathways. If conflicts over the cost of pollution are not to be replaced with conflicts over the cost of reducing it, the government will have to walk a careful path in balancing environment, health and development policies in the years to come.

**Notes**

1. The author is also Co-Director of the Beijing-based interdisciplinary Forum on Health, Environment and Development (www.forhead.org). While the opinions expressed are the author’s own, the work and insights of many FORHEAD members have informed the analysis presented here. For more detail, see the notes in the text.

2. An urban area is defined in China’s 2000 census as one with more than 1,500 people per km². Since 2000 China has adopted the standard definition of six months’ residence (Yeh et al. 2011).

**References**


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