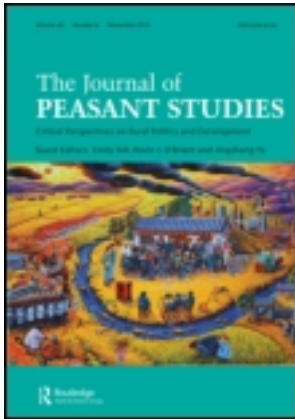


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The politics of industrial pollution in rural China

Bryan Tilt

After more than three decades of extremely rapid industrial growth, China faces an environmental crisis. The rural industrial sector, which includes millions of loosely regulated factories and employs hundreds of millions of workers, is a major focal point of this crisis. This paper provides a critical review of scholarship on industrial pollution in rural China and advances a new framework for thinking about the topic as a political domain with three inter-related parts:

- The politics of knowledge: What do rural citizens know about environmental contamination, and how do they know they know it? What sources of information are available to the public regarding pollution incidents? How does uncertainty about pollution sources and severity, as well as the potential links to health risks, shape rural peoples' experience of pollution?
- The politics of action: What strategies do individuals, communities and civil society organizations use to combat pollution? What outcomes are associated with such strategies?
- The politics of regulation: How are national laws and policies regarding pollution control implemented in rural areas? How do agencies and enforcement officials balance the competing objectives of environmental protection and economic growth?

The paper concludes by considering the implications of this framework for how scholars understand industrial pollution in rural China and briefly discussing a future research agenda for this field.

Keywords: industrial pollution; rural industry; knowledge politics; environmental civil society; regulation; China

Introduction

After more than three decades of extremely rapid industrial growth, China faces an environmental crisis. News headlines such as 'Pollution turns China village into cancer cluster' and 'Choking on growth' have become routine in recent times. The rural industrial sector, which sounds paradoxical to many Western ears, includes millions of loosely regulated factories and employs hundreds of millions of workers in the countryside; it is also a major focal point of this environmental crisis. For China's 800 million villagers, the rural

I would like to thank the organizers of this collection on politics in rural China, as well as the anonymous reviewers whose comments helped to focus and refine my analysis. Many colleagues recommended important research to include in the paper or provided critical feedback on earlier drafts, including Chen Ajiang, Jennifer Holdaway, Rachel Stern, Anna Lora-Wainwright, Benjamin Van Rooij and Zhang Lei.

industrial sector represents some of the most far-reaching social, economic and environmental changes in human history.

As natural and social scientists try to make sense of these dramatic changes, their efforts have produced a large and wide-ranging body of knowledge about the problem of rural industrial pollution and its effects on individuals, communities and livelihoods. My aim in this paper is to provide a critical review of scholarship on industrial pollution in rural China and advance a new framework for thinking about the topic as a political domain with three inter-related parts:

- *The politics of knowledge:* What do rural citizens know about environmental contamination, and how do they know they know it? What sources of information are available to the public regarding pollution incidents? How does uncertainty about pollution sources and severity, as well as the potential links to health risks, shape rural peoples' experience of pollution?
- *The politics of action:* What strategies do individuals, communities and civil society organizations use to combat pollution? What outcomes are associated with such strategies?
- *The politics of regulation:* How are national laws and policies regarding pollution control implemented in rural areas? How do agencies and enforcement officials balance the competing objectives of environmental protection and economic growth?

In the process, I survey the breadth and depth of this topic, which includes major contributions from both Western and Chinese scholars, and features interdisciplinary collaboration between disparate fields such as environmental science, public health, anthropology, geography, political science, law and sociology. This new analytical framework encourages us to consider all aspects related to rural industrial pollution as a political domain, from the uneven distribution of environmental hazards, to the ways that individuals and groups perceive these hazards and mobilize themselves against them, to the attempts of state agencies and non-governmental organizations to regulate, mitigate or otherwise address pollution.

Pollution in rural China

Two related processes must be understood in order to grasp the current situation of industrial development in China: the transformation of the Chinese countryside into an industrial space, and the emergence of industrial pollution as a topic of personal and political concern. Since its founding in 1949, the People's Republic of China (PRC) has pursued a strategy of rapid industrial development. In the early years, China followed the Soviet model of development, with industrial production in the hands of the central government and agricultural production controlled by a network of rural collectives. The seeds of rural industry were planted during the Great Leap Forward (1958–1961), a tumultuous period in which China's economic planners, at the behest of Mao Zedong, funneled expertise and resources away from agriculture and into key national industries such as steel production. The results of the Great Leap Forward were catastrophic: rural areas produced steel of such poor quality that it proved useless for most military and industrial purposes, and millions of people starved to death (Becker 1996). Following the Great Leap, the central government continued to advocate for industrial growth in rural areas, albeit on a more modest scale. The so-called 'five small industries' – which produced key inputs for agriculture such as iron and steel, chemical fertilizers, farm machinery, cement and electrical power – were the result.

The era of Reform and Opening (*Gaige Kaifang*), which began in 1978, has ushered in sweeping social and economic changes and altered the lives and livelihoods of one-fifth of humanity (more than 1.3 billion people), as China has seen a return of smallholder agriculture under the Household Responsibility System, the privatization of industry, greater integration into the global economy and the rise of an urban consumer class. The expansion of the rural industrial sector, spurred by central policy, is one of the most important components of the economic reforms and represents arguably the greatest employment shift in human history. At the beginning of the reform era, more than 90 percent of China's massive rural labor force worked in agriculture. By the 1990s, approximately one-third of the nation's 500 million rural laborers had taken up factory jobs (China TVE Yearbook Editorial Committee 2004), heeding the exhortation of economic planners to 'leave the land, but not the countryside' (*li tu, bu li xiang*). These so-called 'township and village enterprises' served two important purposes: they absorbed some of the surplus labor in the countryside, which had been created by more efficient agricultural practices under the Household Responsibility System, and they provided township and village governments with much-needed revenue to carry out local development tasks such as infrastructural improvement and the provision of education.

Today, millions of rural factories remain an important part of the national economy, but their ownership structures and operations have changed quite dramatically in recent years. Over the past two decades, local governments have sold communal factories to private investors, a trend that is in line with economic liberalization throughout China (Oi 2005). In many cases, government officials sold factories to insiders with connections to local government or industry or both, a phenomenon called 'insider privatization' (Li and Rozelle 2003). In other cases, factories have attracted outside investors and workers, reducing the financial benefits to local people (Tilt 2010, Lora-Wainwright *et al.* 2012).

The rise of rural factories has caused environmental degradation on an unprecedented scale; air and water quality ratings in some areas of the countryside rival any city. For example, during field research in Sichuan more than a decade ago, I collected air quality samples and had them analyzed by an organic chemistry laboratory that specializes in atmospheric polycyclic aromatic hydrocarbons (PAHs), a class of chemicals with known carcinogenic effects. As it happened, another scientist was collecting air samples in the city of Guangzhou at roughly the same time, and the laboratory examined both batches of samples at the same time. The laboratory technicians were surprised to learn that the rural samples from Futian showed considerably higher levels of PAHs than the urban samples, suggesting greater health risks from air pollution in this small township of 4000 residents than in the megalopolis of Guangzhou (Murray *et al.* 2007).

Air pollution, water pollution and soil contamination are daily facts of life for most rural villagers. Current estimates suggest that rural factories are responsible for as much as two-thirds of the nation's total air and water pollution burden, and that that pollution-related economic losses drag down the country's overall gross domestic product (GDP) (World Bank 2007). In fact, pollution-related damages – in the form of health-care costs, lost worker productivity, infrastructural damage, threats to food safety and lost agricultural productivity – may well be one of the most intractable 'limits to growth' currently faced by China (Ho and Vermeer 2006).

A number of factors contribute to this grim assessment. Coal, because of its abundance and its state-regulated pricing structure, remains the fuel of choice in rural industry. Small-scale factories often lack access to significant capital, which means they typically employ outdated technology and take few environmental mitigation measures. Institutional factors

also play a key role. While national air and water quality standards are set by the Ministry of Environmental Protection (MEP), monitoring and enforcement are the responsibility of county-level Environmental Protection Bureaus (EPBs), which typically lack the funding, expertise and other resources necessary to effectively carry out their jobs.

China's environmental regulation bureaucracy has grown from a fledgling agency at its inception in the 1970s to a ministry-level entity with a broad mandate to draft environmental laws, monitor environmental performance and enforce compliance. Speaking before the Sixth National Congress on Environmental Protection sponsored by the State Council, Premier Wen Jiabao in 2006 stressed what he called the 'three transformations':

- (1) From an economy-centered model of development to equal attention on both environmental protection and economic development;
- (2) From a mindset of 'develop first, then clean up', to a simultaneous emphasis on environmental protection and economic development, and
- (3) From a sole emphasis on administrative measures to control environmental problems (e.g. hierarchical, institutional measures) to a more comprehensive system involving the state, the business sector, and civil society (SEPA 2006, Xue *et al.* 2007).

China's institutional capacity for preventing and controlling pollution is clearly gaining momentum. But Wen's rhetoric about the 'three transformations' highlights the gap between the policy goals and aspirations of political leaders and the current reality in rural China. In what follows, I examine current debates related to the three themes of current scholarship on pollution as a political domain: the politics of knowledge, the politics of action and the politics of regulation.

The politics of knowledge

What do rural citizens know about environmental contamination, and how do they know they know it? What sources of information are available to the public regarding pollution incidents? How does uncertainty about pollution sources and severity, as well as the potential links to health risks, shape rural peoples' experience of pollution? Very little is known about the air and water pollution levels to which most villagers are exposed. Environmental monitoring data related to both air and water quality are extremely difficult to obtain, both for scholars and for the general public. Moreover, the data that are available tend to be aggregated at the county level or above, which makes it difficult to assess pollution exposures at the community and individual levels.

Scholars who study pollution in rural China are making considerable efforts to understand what types of information are available to the public about both major pollution incidents and day-to-day pollution levels. Zhang Lei, for example, undertook a study of information disclosures (*xinxi gongkai*) about pollution incidents from EPBs to their constituents (L. Zhang 2010). Tilt and Xiao (2010) examined a range of media reports on the 2005 benzene spill in the Songhua River, including state-sponsored media outlets such as Xinhua News and China Central Television. Government authorities failed to notify the public for more than a week, shutting down the municipal water system of Harbin for several days under the guise of conducting routine repairs. In that case, however, China Central Television, which is state-owned but enjoys some editorial autonomy, conducted investigative journalism into the cover-up, which ultimately resulted in

MEP Minister Xie Zhenhua's dismissal.¹ But this work is unfortunately still extremely modest in scope, which leaves us with an incomplete understanding of how the Chinese public receives information about pollution-related health risks, and how this information shapes their perceptions and attitudes.

In regards to villagers' perceptions of environmental contamination, one of the major areas of progress in this field over the past several decades is the dispelling of common assumptions about how poor, marginalized people perceive the threat of pollution. Much of the cross-national research on environmental perceptions and values makes the 'postmaterialist' assumption that environmental consciousness is only made possible by the satisfaction of material needs through economic development (Inglehart 1997). While wealthier nations and individuals, having met their basic economic needs, have the 'luxury' of worrying about air and water pollution, people in developing nations or in poor communities remain so mired in the daily struggle for livelihood that environmental quality is nothing more than an afterthought at best (Inglehart 1995, 1997, Dunlap and Mertig 1997).

This conclusion, however, is supported by tenuous data that suffers from several methodological shortcomings. First, approaching the study of environmental perceptions from the global scale requires the aggregation of data at macro-scales such as the nation or region, while most human-environment interactions occur on a local scale. This ultimately masks a great deal of the nuance and variation in how people perceive pollution in their daily lives. Second, cross-national surveys often frame the questions and issues in ways that are not culturally or politically salient for study participants, asking rural villagers in China and elsewhere in the developing world, for example, whether they would be willing to pay more for 'environmentally friendly' cleaning products, an option that simply doesn't exist.

These problematic conclusions have been questioned, and in many cases directly controverted, through a research approach that should have been obvious much earlier: undertaking in-depth field research in rural villages and townships. After a decade or so of careful research in communities facing environmental contamination, we now have a much fuller understanding of how people perceive, experience and cope with pollution on a day-to-day basis (Tilt 2006, Weller 2006, Chen 2009, Lora-Wainwright 2010, Tilt 2010, Van Rooij *et al.* 2012).

Nevertheless, people's perceptions of pollution are often marked by uncertainty and ambiguity as they struggle to make sense of their changing environments. One obvious source of such uncertainty relates to the availability and quality of environmental monitoring data. These macro-level figures on pollution emissions are easy to find in databases such as the China Statistical Yearbook and the China Environmental Statistical Yearbook (Managi and Kaneko 2009). But data are collected by different agencies with different jurisdictions and different policy mandates. Responsibility for monitoring surface water quality, for example, is divided among the MEP, the Ministry of Water Resources and the Centers for Disease Control (Holdaway 2010, 8), each of which employs different data collection methods and reports to different constituents.

Moreover, when researchers attempt to drill down beyond nationally aggregated figures, information about local environmental quality in rural areas is extremely hard to come by. Although the rural industrial sector is a major contributor to the national pollution burden, systematic air- and water-quality monitoring in the countryside is infrequent,

¹Xie has the dubious distinction of being the highest-ranking political official ever to lose his post over an environmental issue.

sporadic and incomplete. What little monitoring data can be collected at the local level suggests that, in rural areas with high concentrations of factories, residents may be exposed to key pollutants that exceed World Health Organization guidelines by a factor of 10. Ambient air-quality monitoring in rural Sichuan, for example, found levels of respirable particulate matter (PM¹⁰) that far exceeded Chinese national standards and World Health Organization standards (Tilt 2010). The MEP sets primary, secondary and tertiary air-quality standards based on geographic zoning. In 2012, this agency initiated a national program for monitoring PM^{2.5}, ultra-fine particles that are more closely linked to adverse health outcomes. In some cases, data monitoring and disclosure can become the subjects of international politics. For the past several years, the US Embassy has been releasing its own data on the concentration of PM^{2.5} in Beijing, which officials have collected from monitoring equipment within the embassy compound. These figures have often been at odds with those released by the MEP, and the controversy has received considerable coverage in the press, prompting public discussion and concern (Moore 2011).

Another source of uncertainty relates to a disjuncture between scientific monitoring and people's ways of knowing and experiencing the world around them. People often use sensory details – the sight of effluents discoloring a river, or the smell of coal smoke and noxious gases coming from a factory smokestack – to assess the severity of pollution. For example, when a toxic algal bloom occurred on Lake Tai in 2007, due largely to untreated industrial effluents, local residents could see and smell the problem; many people also lost access to drinking water until alternative sources could be provided (Chen 2009).

How pollution exposure may be linked to adverse health outcomes is another area of significant uncertainty (Holdaway 2010). The sociologist Phil Brown (2007, 1) has defined environmental health problems as 'health effects caused by toxic substances in people's immediate or proximate surroundings (soil, air, water, food, household goods)'. Environmental health problems are often characterized by uncertainty because many environmental health hazards are difficult to detect and because it remains extremely difficult to demonstrate a causal link between environmental contamination and human health outcomes. People often focus on local sources of pollution that are easily detectable to the senses, remaining unaware of less apparent problems.

Researchers, too, struggle to understand causation in the midst of conflicting evidence. One basic challenge is how to deal with different etiologies and lexicons in the lay understanding of environmental health problems. As Lora-Wainwright found in northeast Sichuan, stomach and esophageal cancers can be caused by chronic exposure to farm chemicals, but for villagers, these cancers are often conflated with myriad folk maladies such as 'spitting illness' and 'vomiting illness' (Lora-Wainwright 2010). Similarly, Tilt's research (2010) describes the myriad ways in which rural people perceive the linkages between pollution exposure and adverse health outcomes: a teenage girl with cognitive disabilities and slurred speech, a developmentally delayed toddler, and a new water distribution system that brought piped water into the homes of several villages but also brought the fear of arsenic and mercury contamination, since the well and pump were located just downhill from the local factory compound. Such cases highlight the methodological difficulties scholars face in this arena: linking adverse health outcomes with pollution exposure is an epidemiological task requiring large amounts of data. Meanwhile, the perceptions of people most harmed by pollution are often discounted by scientists and public officials as merely 'anecdotal'.

Furthermore, people may feel ambivalent about pollution sources because of their position in the political economy; they may blame farm chemicals for cancer rates, for example,

but they also rely heavily on chemical inputs to produce market-quality vegetables and earn a cash income (Lora-Wainwright 2009). Or they may be migrant workers who have traveled hundreds of kilometers from home in search of employment; disconnected from their home towns and extended family networks, and highly dependent upon wage labor in industry, they may overlook the health risks involved in their jobs (Tilt 2010). Or they may have a sense of fatalism, viewing pollution as an inevitable consequence of modernization, something they must 'learn to live with' (Lora-Wainwright *et al.* 2012). As a consequence, many rural villagers experience what Brown *et al.* (2000) have called 'ontological insecurity', a state of uncertainty about the future and about how to weigh the various risks they face in their day-to-day lives. In such a state of uncertainty, high-profile hazard events play an important role in raising villagers' consciousness of environmental problems. Recent case study research in southwest China found that, after a period of relative quiescence over local pollution, an explosion at a sulfuric acid factory, which killed several people and sickened others, resulted in a spike of environmental consciousness and activism from villagers, who demanded to be relocated, to have access to health monitoring and to be compensated (Van Rooij *et al.* 2012).

Perhaps no single phenomenon better illustrates the uncertainty surrounding environmental illness than the rise of so-called 'cancer villages' (*aizheng cun*), a problem with both sociological and epidemiological dimensions.² The sociologist Chen Ajiang has reported monitoring data for heavy metals (including lead, zinc, cadmium and copper) on soil, well water, grain and vegetables in villages near industrial factories and mines in Jiangsu, Jiangxi and Guangdong Provinces. The results of this research show levels of harmful pollutants that exceed national standards by a factor of 10. Moreover, mortality and morbidity rates from cancer in the study areas were far higher than expected. But making the link between pollution emissions, human exposure and adverse health outcomes is exceedingly difficult, requiring consistent monitoring, epidemiological data from large numbers of study participants and a great deal of time and resources (Chen and Cheng 2011).

In this, China and the West are facing similar difficulties. Many recent studies on environmental perceptions have noted the prominent, if polemical, role of science in public debates about causation in environmental health. Such works, grounded in a critical science studies approach, rightly point out the fallacy of looking to science to provide rational, indisputable data to override the 'irrational' fears of the lay public, who are most affected by contamination (Fischer 2003, Jasanoff 2004, Brown 2007, Leach and Scoones 2007).

In a study focused on the Lake Tai area, sociologist Chen Ajiang (2009) found that villagers exposed to pollution, and in some cases the industrial firms emitting pollution, increasingly possess what has been termed 'ecological consciousness' (*shengtai yishi*). As we gain more knowledge about peoples' perceptions and experiences of industrial pollution through community-level research, we are learning that villagers are acutely aware of, and concerned about, the threats they face from pollution – to their health, their families and their livelihoods. Moreover, as we study environmental perceptions, we cannot decontextualize them from other components of social, culture and economic life. For example, in a study in rural Anhui province on local people's perceptions of water quality following emissions from paper mills on the Huai River, anthropologist Robert Weller pointed out

²Cancer is the leading cause of death in both urban and rural China. See MOH (2008) and Holdaway (2010).

that his research participants ‘lack environmental consciousness only in the sense that they are not concerned with the same issues as national and global elites, or as people who write questionnaires about values’ (Weller 2006, 157).

The politics of action

If rural villagers do in fact possess ‘ecological consciousness’ and a general concern about the effects of pollution on their health and well-being, what can they do to address the problems they face? What strategies do individuals, communities and civil society organizations use to combat pollution? What outcomes are associated with such strategies? Recent scholarship shows that collective action aimed at addressing environmental problems is on the rise in China, but that understanding this action requires a set of conceptual tools that differ from those commonly employed in the West.

As the Chinese Communist Party has liberalized the nation’s economy over the past three decades, it has also gradually reduced the scope of its administrative power, increasing the space within which nongovernmental organizations (NGOs) and civil society organizations may operate (Weller 2005, O’Brien and Li 2006, Chan 2005). This trend is especially important in the environmental arena, where a new Environmental Impact Assessment (EIA) Law, promulgated in 2002, mandates public hearings for major development projects. Scholars now point out that environmental lawsuits are increasingly common, as are environmental NGOs, which number in the thousands (Yang 2005). Yet little is currently known about how these organizations actually affect environmental decision-making processes. In my field research site in rural Sichuan, villagers’ concerns about their health and livelihoods motivated them to get involved in collective acts of environmental advocacy, including petitioning the EPB and alerting the provincial media to the infractions of local factories (Tilt 2010). A coalition of farmers, for example, contacted a news crew at the Sichuan Television Station, who traveled to the township to film an exposé on local factories. This media scrutiny had a powerful effect on officials in the EPB, who acted swiftly to close down factories that violated emissions standards (Tilt 2007).

Other recent studies based primarily in urban China have suggested that the country is experiencing dynamic environmentalism but no coherent ‘environmental movement’ (Stalley and Yang 2006, 333). But such conclusions rest on a definition of ‘movement’ espoused by Western scholars that may overlook the subtle, spontaneous, ad hoc actions of people who share common interests regarding environmental problems. While it is difficult to estimate the frequency of environmental protests, or ‘mass incidents’ (*dazhong shijian*), the term preferred by the central government, data published by the government show a marked increase in citizen complaints to EPBs beginning in the late 1990s and culminating in more than 600,000 per year by the mid-2000s (Mol and Carter 2006, see also French 2005, Van Rooij 2012).³ Such incidents – which may include a diverse range of tactics such as conducting independent sampling of drinking water from wells, filing public petitions and even blockading factory compounds (Jing 2010, Van Rooij 2012) – undoubtedly exert pressure on environmental regulators and policy-makers.

In this regard, scholarship on environmental action in China is linked to a growing body of literature in political science and related fields dealing with the rise of non-state actors in politics, including both formal organizations such as NGOs and informal popular

³Article 35 of the Constitution of the PRC guarantees citizens ‘freedom of speech, of the press, of assembly, of association, of procession and of demonstration’.

movements. Throughout rural China, popular protests on a range of issues from pollution to land annexation tend to be most successful when people work together toward shared goals, and when they invoke the policies and rhetoric of the state itself (O'Brien 2002, O'Brien and Li 2006, Cai 2010). A case in point is the scholarship of sociologist Chen Ajiang, who draws upon the concept of a 'harmonious society' (*hexie shehui*), a rhetorical line currently in vogue within the central government, to argue that such harmony also requires a balance between humans and the biophysical environment. He suggests that 'harmony between people and water' (*ren shui hexie*) is a focal point of this struggle (Chen 2009). Similarly, Pan Yue, Vice Minister of Environmental Protection, has argued that environmental balance is a fundamental part of a 'harmonious society' (Pan 2006). These self-conscious deployments of state-sanctioned terminology are attempts to frame environmental issues in ways that are more palatable to the government.

Referencing a wide range of mass movements and public protests, Ho and Edmonds (2008) have termed this phenomenon 'embedded activism', since it works within existing power structures and political channels rather than directly challenging them (see also Ho 2001). As public consciousness grows about the rule of law and the reciprocal obligations between citizens and the state, anti-pollution campaigns enjoy a wider discursive space in which to operate. Political scientists Kevin O'Brien and Lianjiang Li have described this phenomenon as 'rightful resistance', which they define as:

A form of popular contention that operates near the boundary of authorized channels, employs the rhetoric and commitments of the powerful to curb the exercise of power, hinges on locating and exploiting divisions within the state, and relies on mobilizing support from the wider public. In particular, rightful resistance entails the innovative use of laws, policies, and other officially promoted values to defy disloyal political and economic elites. (2006, 2)

What does environmental activism look like, and what tactics does it employ? Michelson (2007), adapting the concept of a dispute pyramid from legal scholarship, outlines what he has termed the Chinese 'dispute pagoda'. Using a dataset of roughly 3000 households collected from surveys in rural areas of six provinces, he finds that, for a wide variety of grievances, a sizeable proportion of villagers take no action at all. For those who do, the most common tactic is bilateral negotiation with the responsible party. Only a very small fraction of villagers with grievances actually file formal complaints with public officials or seek legal redress.

This pattern appears to hold true for environmental grievances. When villagers do take action against polluters, disputes are typically resolved through bilateral negotiation and compensation, rather than actual increases in pollution control and regulation, a process that Van Rooij *et al.* (2012) have called the 'compensation trap'. Compensation may be monetary in nature, or it may consist of land contracts or increased access to various resources. Van Rooij *et al.*'s research, based primarily on case studies in southwest China, documented compensation to village collectives and individuals from factories and mines, most of which consisted of 'agricultural compensation' (*nongye buchang*) for crop damages from pollution. One obvious reason why compensation may constitute a 'trap' is that it routinizes pollution as a problem to be dealt with through redress rather than through improved regulation, oversight and enforcement. In the process, it perpetuates a system of environmental governance that is reactive rather than precautionary.

Outside of official government circles, the proliferation of NGOs and other civil society organizations represents a major part of the anti-pollution movement; as Economy (2004, 131) has noted, 'environmental NGOs in China are at the vanguard of nongovernmental

activity'. Yang (2005) categorized environmental NGOs into seven groups on the basis of their formal registration status with the government, including: (1) registered NGOs, (2) non-profit enterprises, (3) unregistered voluntary groups, (4) Internet-based groups, (5) student environmental associations, (6) university-affiliated research centers, and, most paradoxically, (7) government-organized NGOs, or GONGOs.

While environmental NGOs represent the vanguard of non-state activity, they also face a range of problems in China, including the requirement to register and receive sponsorship from a government agency, a limited political and legal framework that requires them to tread carefully or risk being closed down, and, like environmental NGOs everywhere, a critical shortage of funding for their operations (S.Y. Tang and Zhan 2008). NGO representatives deal with these constraints in a variety of ways. One tactic is to seek official state sponsorship, as was done by China's earliest and most well-known environmental NGO, Friends of Nature. But this approach comes with the risk of having one's agenda watered down or co-opted by the state. Another tactic is to operate covertly, concealing the true agenda of the organization and distorting membership roles (see Ho 2001).

Scholars differ in their assessments of the efficacy and significance of environmental NGOs, which have admittedly shown limited success in influencing policy outcomes (S.Y. Tang and Zhan 2008) but have proved to be useful tools for pooling information and resources among activists (Yang 2005). One high-profile success story is the Center for Legal Assistance to Pollution Victims (CLAPV), which is headquartered at Beijing Legal University and sponsored in part by a Spanish government agency. CLAPV brings together scholars, lawyers and scientific experts to support citizens in taking legal action against polluters (see J.J. Zhang 2010).

As grassroots movements, online communities and other forms of social networks play a larger role in anti-pollution campaigns, there is a scholarly push to use the tools of network analysis to understand activism. The study of social networks, particularly in the form of reciprocal exchange relationships (referred to in Chinese as *guanxi*), is fundamental to social science research in China. Social networks, through which people maintain interdependence, trust and reciprocity with one another, provide a means to adapt to change, cooperate and produce mutual advantage (Field 2003, 12). A great deal of environmental activism, including anti-pollution campaigns, now takes place on the Internet through social media sites (Sullivan and Xie 2009), but this type of activism is largely limited to urban, educated people (Yang 2005, 2010). Online environmental activism will likely become increasingly important in the countryside as Internet access is expanded to rural users.

The politics of regulation

The final dimension of pollution politics in rural China relates to regulation, oversight and decision-making within the official organs of state power. How are national laws and policies regarding pollution control implemented in rural areas? How do agencies and enforcement officials balance the competing objectives of environmental protection and economic growth? China's environmental protection bureaucracy has grown from a fledgling agency in the 1970s to a ministry-level entity as of 2008, with a broad mandate to draft environmental laws, monitor environmental performance and enforce compliance. The MEP is responsible for overseeing science and policy on such disparate topics as water pollution, atmospheric pollution, solid waste disposal, nuclear safety and radiation, soil and water conservation, biodiversity and wildlife conservation, ecosystem degradation and desertification. China's Environmental Protection Law, the foundation upon which all other

environmental laws and regulations rest, was passed on the eve of economic reforms in 1979 and amended significantly in 1989 (see NPC 1989). Since that time, the legal framework for environmental protection has expanded to include at least 20 major statutes, in addition to lesser regulations passed by the State Council.

Moreover, the MEP and other relevant agencies increasingly take a precautionary view of environmental problems. The EIA Law, passed by the National People's Congress (NPC) in 2002 and implemented in 2003, requires environmental assessment for all new development projects, including industrial factories, likely to have significant environmental impacts. It mandates that government entities base their decisions to approve or reject projects in part on the EIA report (B.S. Tang *et al.* 2008).⁴ However, the EIA law itself lacks specificity about who should conduct EIAs and exactly which government agencies should exercise which oversight capacities. This makes the EIA review process subject to influence from a range of parties, including local government agencies that may be dependent upon revenue generated from a given project. Moreover, Article 5 of the law states that 'The government encourages relevant entities, experts and the general public to participate in appropriate ways in the environmental impact assessment process', but meaningful public participation seldom takes place (Beach *et al.* 2006).

The MEP has established air quality standards for key pollutants based on a three-tiered system of 'classes' corresponding to geographic zoning. Water pollution is monitored and regulated on a five-tiered system. Establishing standards for pollutants means that the MEP or another relevant agency has determined, based on varying degrees of scientific evidence, how much of a given pollutant is 'safe' to be exposed to on an ongoing basis. For example, particulate matter standards are based on the lowest levels at which total mortality, and mortality specifically linked to cardiopulmonary problems and lung cancer, have been shown to increase in response to long-term exposure to particulate matter.

Despite clear advancements in environmental law and policy, enforcement remains the weakest link in the environmental oversight chain (Ma and Ortolano 2000). It is clear that many rural counties, townships and villages undergo limited and sporadic environmental monitoring at best. Shortages in financial resources, technology and institutional capacity limit the ability of even the most dedicated professionals to carry out their jobs (Tilt 2007). Moreover, officials in EPBs must prioritize the areas and industries to carry out their sampling. This problem has aptly been described as incomplete enforcement; faced with limited resources and capabilities, EPB officials exercise considerable discretion over which polluters to monitor, and how to enforce compliance (H. Wang *et al.* 2003). In many cases, EPB officials are charged with monitoring emissions and enforcing compliance for a huge number of factories in their jurisdictions.

Pollution enforcement occurs at the confluence of multiple factors, including the fiscal situation in the enforcement area, the institutional capacity of regulators, and even pressure from civil society organizations and the media (Tilt 2007). Pollution enforcement can have serious impacts, both real and perceived, on the financial viability of townships and villages. In a recent case study in rural Sichuan, a former township mayor, reflecting on the closure of local factories for non-compliance with pollution regulations, stated that 'over

⁴The EIA law has the potential to dramatically change environmental decision-making in China. One example of the EIA law's potential was the halting of more than 30 major infrastructure projects by Premier Wen Jiabao in 2004. In taking this action, Wen invoked the EIA law and criticized various government organizations and publicly traded corporations for failing to conduct thorough environmental reviews. Like other laws and regulations, however, it is subject to the political considerations, financial constraints, and institutional limits of enforcement and oversight. See Hu *et al.* (2012).

the past few years, there has been more economic development, and more opportunities than ever before. But now our factories are shut down, so we've stopped developing' (Tilt 2010, 127). His fears were validated by township government budgetary records, which showed a debt of millions of yuan and a catastrophic decline in revenue from local factories. This interdependence between industry and development, despite the obvious pollution problems, is echoed in Van Rooij *et al.*'s research, in which a village leader noted that 'if there is no pollution, where will development come from?' (2012, 36–7). Fiscal constraints at the township and village levels appear to play a key role in the decision about how strictly to enforce pollution standards. As one local political official complained about the growing severity of pollution enforcement, 'the upper level of government invites you to dinner, but the local government pays the bill' (Tilt 2007, 972). Within this political economy of enforcement, the stakeholders include regional and local government entities, farmers and other rural citizens, and industrial firms; moreover, the enforcement process can result in clear financial winners and losers (Chen 2008).

The pollution-levy system is a key instrument through which EPB officials enforce emissions standards. Article 18 of the Environmental Protection Law states that 'in cases where the discharge of pollutants exceeds the limit set by the state, a compensation fee shall be charged according to the quantities and concentration of the pollution released' (NPC 1989). The levy system, which is often enforced with the assistance of local courts (X.H. Zhang *et al.* 2010), requires polluting factories to register with their respective EPBs and to disclose their strategies for mitigating the so-called 'three emissions' (*san fei*): air pollution, water pollution and solid waste (H. Wang and Wheeler 2005). However, in most cases, the actual amounts levied against polluting firms are low, which means that the most cost-effective decision for factory managers may be to simply pay the fines and keep polluting. Moreover, since 2003, a new administrative rule has required that pollution fees go directly to the local finance bureau, and firms are no longer guaranteed a partial remission of the fees (Chinese State Council 2003, Lo and Tang 2006).

Attempts have been made to tie the performance evaluations of local government officials more closely to environmental protection through a system known as the 'environmental quality administrative leadership responsibility system'. However, environmental protection counts for only a small fraction of the overall evaluation of political leaders, and evidence suggests that the implementation of this system is lax (Lo and Tang 2006).

China's judiciary constitutes another important channel through which pollution enforcement takes place, although currently less than 1 percent of environmental disputes make their way to the courts (Caijing 2012). Access to the judicial system, like many aspects of political life in contemporary China, is a complex issue. As legal experts point out, litigation is difficult, for a variety of reasons. First, only individuals directly harmed by a given project have standing, the legal right to sue. This means that domestic and international environmental organizations, while they can provide moral, logistical and even financial support, cannot be plaintiffs in a lawsuit. In 2012, the Civil Procedure Law was amended to allow 'government departments and concerned organizations as designed by law' to engage in public interest litigation, and this may result in an increased volume of environmental lawsuits in the near future (Ng 2012, see also A. Wang 2007).

Second, in the case of collective lawsuits involving many parties, each individual party must opt into the lawsuit and provide a copy of his or her national identification card (*shenfen zheng*), which can make collective lawsuits logistically complicated and politically risky. Furthermore, Chinese courts are notoriously difficult to access for those who lack political clout. While lower-level courts are easier for plaintiffs to access, they are particularly vulnerable to the political influence of big players such as state-owned firms or private and

shareholder corporations (Stern 2011). As legal scholar Rachel Stern concludes following an analysis of environmental litigation related to pollution damages, 'Despite occasional successes, civil environmental litigation remains a weak tool for environmental protection' (2011, 310).

Because of a general lack of transparency in the court system, it is difficult to track the volume and efficacy of environmental litigation in China. Lü *et al.* (2011) collected longitudinal data on a sample of judicial judgments and orders related to environmental suits in all provincial-level administrative units over a 10-year period. The vast majority were cases within the domain of civil law, with some administrative cases and some criminal cases. Their work highlights the relative differences in political and economic power between polluting firms and the victims of pollution:

Most plaintiffs in civil environmental cases belong to vulnerable groups that lack the economic capacity to hire attorneys; they tend to rely on themselves, relatives or friends for representation. By contrast, defendants are in generally in a strong position, which undoubtedly increases inequality (Lü *et al.* 2011, 89).

In environmental cases within the civil court system, plaintiffs must demonstrate two things: that they sustained damage to person or property from pollution, and that the damage was caused by a given party. Reliance on scientific evidence from expert witnesses is a key tactic for both plaintiffs and defendants (Lü *et al.* 2011). Once engaged in a civil environmental case, the courts' decisions appear split relatively evenly between plaintiff and defendant, although a 'victory' for the plaintiff may result in a settlement that is only a fraction of the amount requested (Lü *et al.* 2011). In administrative cases, where the defendant is most often a government agency, the courts' judgments are overwhelmingly in favor of the defendant. This is undoubtedly related to the close political ties between the judiciary and the regional government: in line with recent trends toward political and fiscal decentralization (O'Brien 2009), courts rely on local governments for budgetary support. Judicial decisions often represent a balancing act between legal formality (i.e., adherence to law) and individual autonomy (i.e., the power and authority to reach an independent decision) (Stern 2010). This trend is also related to different standards for 'burden of proof' that must be applied in different legal contexts. Based on an analysis of several cases handled by Beijing's CLAPV, Zhang Jingjing (2010) finds that many judges struggle to make distinctions, for example, between 'direct causality' and a 'causal relationship' between pollution exposure and actual harm.

Significantly, recent revisions to China's Water Pollution Law (NPC 2008) place the burden of proof on defendants, who must demonstrate, for example, that pollution emissions from their factory *did not* cause harm (Stern 2010). This represents further steps toward a precautionary approach to pollution management, but it still too early to assess the impact that such statutory changes will have on pollution-related lawsuits.

One growing mechanism for combating pollution is community-based pollution regulation, which involves rural citizens in monitoring pollution levels, alerting EPB officials to violations, and advocating for stricter enforcement. Local government cadres play an important role in environmental management, sometimes acting on behalf of local interests and other times lining their pockets with compensation funds intended for villagers (Van Rooij *et al.* 2012).

On an encouraging note, the central government is actively building institutional capacity to better assess and regulate pollution-related hazards. The central government is currently increasing its efforts to establish a risk management system that would help

to predict, address and mitigate environmental hazards through inter-agency collaboration (L. Zhang and Zhong 2010). Within key agencies such as the Ministry of Health (MOH), environmental health issues tend to receive fewer resources and attention than problems such as insurance provision, or maternal and child health; moreover, the emphasis in MOH continues to be on curative, rather than preventive, measures (Fang and Bloom 2010).⁵ In 2006, the Ministry of Health and the State Environmental Protection Administration (the predecessor of MEP) established the Combined Offices for Environment and Health, which monitor environmental illness, exchange information, issue public warnings and information, and provide expert advising on pollution standards and anti-pollution legislation (Holdaway 2010, 11). These two ministries jointly drafted the *National Environmental Health Action Plan (2007–2015)* calling for more systematic collaboration between the two agencies (MOH 2006), although a lack of financing, data-sharing and collaboration has made the plan difficult to implement for many local governments (Su 2010).

Conclusions and implications

In this paper, I have attempted to synthesize the growing body of research on industrial pollution in rural China and fashion a framework through which we can think about the topic as a political domain. In regards to the politics of knowledge, an overwhelming majority of recent studies confirm that rural villagers, despite barriers such as poverty and political marginalization, are concerned about the effects of pollution on their health, their families, their communities and their livelihoods. However, the environmental perceptions and values of local people are often embedded in specific cultural, economic and political realities. They tend to be grounded in practical concerns about health and livelihood, rather than in abstract notions of environmental protection. Furthermore, concerns about pollution cannot be separated from political and economic questions about who wins and who loses from industrial development. These findings bring with them an important methodological consideration: while natural and social scientists should rely on macro-level data sets on pollution exposure, where available, they should also roll up their sleeves and engage in community-level field research that allows them to understand villagers' perceptions and experiences in context.

In regards to the politics of action within anti-pollution movements, we have learned a great deal about what motivates rural people to get involved in such movements and what tactics are commonly used. There is widening political space in China today for both formal environmental civil society (such as NGOs or other advocacy organizations) and informal protests and other 'mass incidents'. Anti-pollution lawsuits are also on the rise, although plaintiffs face difficulty in accessing the courts and successfully obtaining redress. The consensus among social scientists is that victories will come slowly and incrementally, and will be achieved by working within, rather than overturning, existing power structures.

In terms of the politics of regulation, central and provincial governments have made tremendous improvements in their institutional capacity in recent years, with the promotion of the MEP to full ministerial status and a steady increase in state funding for pollution control and prevention. However, enforcement of pollution standards remains a key problem, due

⁵The New Rural Cooperative Medical Care System (NRCMCS), initiated in 2003, was designed to improve healthcare access among the rural poor. It is a tiered system that allows patients to access local village and township clinics and county hospitals, with heavy subsidies from the central and provincial governments (see Meessen and Bloom 2007).

to lack of resources and a high degree of fiscal dependence on revenues from polluting firms. Recent advancements such as the pollution levy system and an evaluation system that ties political leaders' compensation to environmental enforcement represent steps in the right direction, but the implementation of these policies remains uneven.

Looking to the future, where is this field heading, and what are the most pressing research needs? I have already suggested a methodological approach that combines macro-level analyses of pollution data with community-based fieldwork to understand the perspectives of local people. But what topics should we as researchers prioritize in our work? Although the scope of this paper does not allow for a full exposition of a research agenda, I would like to suggest several areas of critical importance. First, there is a greater need to understand the dynamics of civil society organizations and anti-pollution movements. Such movements increasingly use information technology and social media to disseminate information about environmental contamination, to organize citizen action, and to draw financial and moral support from national and international organizations. Their scope of action, and their influence, will only grow in the years to come. Second, researchers increasingly acknowledge that environmental problems in rural China are part and parcel of the global environmental crisis. As environmental problems – such as transnational pollution, climate change and electronic waste – become more complicated and more difficult to regulate, we will need to broaden our analytical lenses to consider the global ties between producers and consumers and the environmental hazards they co-create. Ideally, such research would involve multi-sited fieldwork in locations as disparate as factories, distribution networks and consumer markets. Finally, researchers will continue to face the challenge of understanding China's environmental governance amidst rapid social, economic and political change. The 18th National People's Congress, held in 2012, ushered in a new generation of political leaders. In a political culture where social stability is the paramount concern, but where the public increasingly calls for fairness and transparency, how will these leaders prioritize environmental concerns relative to other national goals?

As the PRC continues its transformation from an agrarian nation to an industrial powerhouse, rural industry will continue to play a key role in industrial output. Because of its massive scale, geographic dispersion, limited environmental mitigation technology and poor institutional oversight, it is also likely to remain a major contributor to air and water pollution, damaging the health and livelihoods of the nation's 800 million rural residents. However, as this paper has outlined, rural industrial pollution has become a major topic of concern for citizens, a focal point of political and social movements, and a target of increased regulation and enforcement for government agencies. It remains to be seen whether this struggle to balance economic growth with the imperative to protect the environment and human health will be successful.

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