

# Essay

## Water Pollution and Regulatory Cooperation in China

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## Abstract

Government authority in China, while constitutionally organized as a unitary sovereign, is, in practice, a complex system of informal and formal divisions of authority between national, provincial, and local political actors. In the context of water pollution control, an issue of considerable interest in China, both central and subnational authorities have key roles. The incentives faced by some officials, however, are ill-aligned with environmental protection, predictably leading to inefficiently high levels of pollution.

Recent changes in China's water pollution regime have the potential to create a more successful cooperative arrangement between the national and subnational governments. These reforms impose stronger economic and bureaucratic discipline on subnational authorities for environmental outcomes, yet preserve large degrees of discretion for achieving central targets. This approach maintains a largely decentralized system while helping to counteract some of the problems that have undermined China's water pollution efforts in the past. Although these reforms have strong potential, they can be improved with stronger environmental incentives for national officials, less intra-bureaucratic tension, expanded river basin planning, and experimentation with compensation mechanisms and trading to reduce regional disparities. In addition, information collection, the creation of more proportional penalties for non-compliant subnational actors, and an expanded role for cost-benefit analysis can help alleviate some of the shortfalls of the existing law.

## Introduction

China's expansive geography, complexity, heterogeneity, and economic dynamism frustrate attempts at forming a complete and accurate model of Chinese economic and governmental systems. Constitutionally, China has a unitary central government, but authority within that system is divided between several actors with overlapping jurisdictions, and informal as well as formal relationships play an important role in structuring state decision making.<sup>1</sup> Economically, the marketplace has a vast role in allocating social resources. Government at various levels, however, maintains a firm hand in many economic matters, setting industrial policies, controlling (directly or indirectly) a large set of capital decisions, and participating directly in the management of major firms.<sup>2</sup> Over the past several decades, these governmental and economic structures have been evolving quickly in an incredibly dynamic environment.

Although China has its critics, there can be little doubt that recent evolutions in its approach to governmental and economic questions have met with staggering successes, fostering economic growth and lifting millions of Chinese people out of dire poverty. At the same time, however, the

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1. See generally THE NATURE OF CHINESE POLITICS: FROM MAO TO JIANG (Jonathan Unger ed., 2002); see also CHENG LI, CHINA'S LEADERS: THE NEW GENERATION (2001).

2. See generally THE NATURE OF CHINESE POLITICS, *supra* note 1.

costs of this record growth—including a continuing pollution problem—threaten to undercut this progress if left unchecked.

There is an extensive body of literature, both within the United States and globally, arguing that a stronger role for local governments can facilitate economic development.<sup>3</sup> There is a wide range of justifications for devolving authority to local entities: different local needs and tastes, inter-jurisdictional competition, experimentation at the local level, and perverse incentives faced by policymakers.<sup>4</sup> There are also well-established concerns with devolution, including inter-jurisdictional externalities and the potential for a race-to-the-bottom between localities.<sup>5</sup>

Decentralization in China has provided an important case study on these questions, with some economists and political scientists lauding decentralization's role in helping generate economic growth<sup>6</sup> while others

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3. Professor Wallace Oates has provided a foundational analysis, examining the tension between benefits (such as better tailored policies) and costs (such as under-provision of public goods with spillovers) of local control. WALLACE E. OATES, *FISCAL FEDERALISM* 46-47 (1972). Oft cited benefits of decentralization and local control are inter-jurisdictional competition; see generally Charles M. Tiebout, *A Pure Theory of Local Expenditures*, 64 J. POL. ECON. 416 (1956), and greater ability to take advantage of local information, cf. Friedrich A. Hayek, *The Use of Knowledge in Society*, 25 AM. ECON. REV. 519 (1945). All of these arguments continue to have currency. See, e.g., Robert P. Inman & Daniel L. Rubinfeld, *Rethinking Federalism*, 11 J. ECON. PERSP. 43, 45 (1997) (advocating "economic federalism"); Anwar Shah, *The Reform of Intergovernmental Fiscal Relations in Developing and Emerging Market Economies* 7 (World Bank, Policy and Research Series 23, 1994) ("Unless a convincing case can be made for centralization of a specific responsibility, decentralization of authority should be the rule.").

4. Professor Barry R. Weingast divides the federalism literature, roughly, into "first generation" and "second generation" theorists. The first generation focused on the incentives faced by rational policymakers who were perfect agents for local political communities; the second generation expands on the insights from the first by including principle-agent and public choice insights into their work. Barry R. Weingast, *Second Generation Fiscal Federalism: Implications for Decentralized Democratic Governance and Economic Development* (June 2006) (unpublished manuscript, on file with the Hoover Institution, Stanford University); see also Giampaolo Garzarelli, *Cognition, Incentives, and Public Governance: Laboratory Federalism from the Organizational Viewpoint*, 34 PUB. FIN. REV. 235 (2006) (criticizing second-generation theory for focusing only on "negative benefits" of decentralization and failing to take account of "positive benefits" associated with local autonomy including the facilitation of learning); Timothy Besley & Stephen Coate, *Centralized Versus Decentralized Provision of Local Public Goods: A Political Economy Approach*, 87 J. PUB. ECON. 2611 (2003) (deriving similar conclusions as first generation scholars—that spillovers and differences in taste determine performance of centralized versus local control—on basis of second generation public choice concerns).

5. One of the primary drivers for the original Oates model was the possibility of positive spillovers between jurisdictions, leading to underinvestment in public goods. OATES, *supra* note 3. For a discussion and criticism of the race-to-the-bottom concern, see Richard L. Revesz, *Federalism and Environmental Regulation: A Normative Critique*, in *THE NEW FEDERALISM: CAN THE STATES BE TRUSTED?* 97 (John A. Ferejohn & Barry R. Weingast eds., 1997).

6. See, e.g., Shaoguang Wang, *China's 1994 Fiscal Reform: An Initial Assessment*, 37 ASIAN SURV. 801 (1997); JEAN C. OI, *RURAL CHINA TAKES OFF: INSTITUTIONAL FOUNDATIONS OF ECONOMIC REFORM* 2 (1999).

remain skeptical of decentralization's putative benefits.<sup>7</sup> Looking specifically at fiscal reforms undertaken in the 1990s, some scholars have attributed China's rise in part to choices made by newly empowered local governments to support industrialization. Particularly influential has been a set of articles by Professors Barry R. Weingast and Yingyi Qian who, along with co-authors, have examined the relationship between decentralization and economic growth in China, finding that the tendency toward local autonomy in China helped contribute to its recent rapid economic development.<sup>8</sup> At the same time, other scholars have emphasized the importance of the Chinese bureaucratic structure in creating incentives for local leaders to pursue economic growth.<sup>9</sup>

Whatever the benefits of autonomy for subnational governments may be, a devolution of power from the center will tend to create or exacerbate problems where local officials face skewed incentives.<sup>10</sup> Inter-jurisdictional externalities provide a classic example of where local decision making can lead to inefficient outcomes. Jurisdictions have little incentive to pursue policies that generate external benefits or to avoid policies that generate external costs. The resulting decisions might make sense from a local perspective but can be disastrous from the point of view of national well-being.<sup>11</sup>

Water pollution provides a case in point. The water pollution regime in China involves significant cooperation between national and subnational actors—both are essential to its successful functioning.<sup>12</sup> Local actors, however, have faced distorted incentives, leading to low levels of environmental protection. The national government, recognizing that current practices are unsustainable, has experimented in recent years with new approaches to stemming water pollution.<sup>13</sup>

7. See, e.g., Jing Jin & Heng-fu Zou, *Fiscal Decentralization, Revenue and Expenditure Assignments, and Growth in China*, 16 J. ASIAN ECON. 1047 (2005) (citing criticisms of decentralization and conducting empirical analysis). See generally R my Prud'homme, *The Dangers of Decentralization*, 10 WORLD BANK OBSERVER 201 (1995).

8. Hehui Jin, Yingyi Qian & Barry R. Weingast, *Regional Decentralization and Fiscal Incentives: Federalism, Chinese Style*, 89 J. PUB. ECON. 1719, 1723 (2005) [hereinafter *Regional Decentralization*]; Yuanzheng Cao, Yingyi Qian & Barry R. Weingast, *From Federalism, Chinese Style to Privatization, Chinese Style*, 7 ECON. TRANSITION 103 (1999) [hereinafter *Privatization, Chinese Style*]; Gabriella Montinola, Yingyi Qian & Barry R. Weingast, *Federalism, Chinese Style: The Political Basis for Economic Success in China*, 48 WORLD POL. 50, 60-63 (1995) [hereinafter *Federalism, Chinese Style*]; Yingyi Qian & Barry R. Weingast, *China's Transition to Markets: Market-Preserving Federalism, Chinese Style* 1 J. POL'Y REFORM 149 (1996) [hereinafter *China's Transition to Markets*]; see also Yingyi Qian & Barry R. Weingast, *Federalism as a Commitment to Preserving Market Incentives*, 11 J. ECON. PERSP. 83, 85-86 (1997).

9. See *infra* Part I.C.

10. Kai-yuen Tsui & Youqiang Wang, *Between Separate Stoves and a Single Menu: Fiscal Decentralization in China*, 177 CHINA Q. 71, 75-79 (2004).

11. See *infra* Part II.C.

12. U.N. Environment Programme, 8th Special Session of the Governing Council/Global Ministerial Environment Forum, Jeju, Rep. of Korea, March 29-31, 2004, *Water Pollution Prevention and Control: China's Policies and Successful Experiences*, ¶ 1, available at <http://www.unep.org/gc/gcss-viii/china%20iwr.m.pdf>.

13. See *infra* Part IV.

Several measures have been put in place to harmonize the incentives of these decision makers with national interests. Most clearly illustrated by amendments in 2008 to the water pollution law, Chinese national authorities have sought to establish better fiscal and bureaucratic discipline on the basis of water pollution objectives while preserving decentralized control over how national targets are met.<sup>14</sup> These new mechanisms mirror the structures that many academics believe were essential in facilitating sounder economic decision making by subnational authorities.<sup>15</sup>

There are several significant issues that will need to be addressed as the new law is implemented, and additional legal reforms may be necessary to attend to important potential shortcomings. Central to the success of the new regime will be the development of a system of information collection and management that can be better monitored at the central level, the creation of a more flexible penalty regime, and an expanded role for cost-benefit analysis. In addition, stronger environmental incentives for national officials, less intra-bureaucratic tension, expanded river basin planning, and experimentation with compensation mechanisms and trading to reduce regional disparities can facilitate more effective pollution control.

The new water pollution law represents an important step in the continuing evolution of political control over environmental decision making in China. Without a constitutional structure of federalism, as in the United States, or a system of subsidiarity, as embodied in the governing documents of the European Union, China has achieved its cooperative arrangement through an ongoing process of evaluation and by re-shifting fiscal, legal, and political/informal authority.<sup>16</sup> Despite their differences, the same underlying constraints that influence how other multi-tier governance systems operate can be found in China as well. The new water pollution law represents an important contribution to the continuing global experiment in allocating authority in cooperative environmental governance regimes. While the new law is no panacea, the system put in place can improve water pollution outcomes in China by better aligning the incentives of subnational actors with national environmental goals.

Part I will discuss the role of decentralized authority in China's recent economic expansion and the theories of how the political structure in China promoted that growth. Part II discusses the dynamics of decentralization in the water pollution context. Part III provides context for China's 2008 efforts to reform its water pollution law with examples of environmental governance regimes in the United States and the European Union. Part IV discusses those reforms, how well they address the challenges that have hampered water pollution control in the past, and key future chal-

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14. See Dawn Winalski, Note, *Cleaner Water in China? The Implications of the Amendments to China's Law on the Prevention and Control of Water Pollution*, 24 J. ENVTL. L. & LITIG. 181, 196-98 (2009).

15. See Hongbin Li & Li-An Zhou, *Political Turnover and Economic Performance: The Incentive Role of Personnel Control in China*, 89 J. PUB. ECON. 1743, 1744 (2005).

16. See *infra* Part IV.C.

lenges that must be addressed during the implementation of the new law and future reforms. Part V provides recommendations.

## I. Subnational Autonomy and the Post-Reform Economic Expansion

Part I briefly discusses the reforms of the past several decades that devolved authority to subnational actors, with an emphasis on decentralization and its role in promoting economic growth.

### A. Decentralization

The constitutional structure of China establishes a strong unitary central government. The legislative authority is vested in the National People's Congress (NPC), while the State Council, headed by the Premier, leads the executive branch. The country is divided into twenty-two provinces, five autonomous regions, and four municipalities. Legal authority is divided hierarchically, with the NPC and State Council at the top, and the various central ministries and subnational authorities below, all of which have some law making role either through legislative or administrative processes.<sup>17</sup>

"Finding the proper balance between central control and local autonomy is a perennial problem in the Chinese economy,"<sup>18</sup> and the balance between national and subnational authority in China has been continually changing and evolving for hundreds of years.<sup>19</sup>

The country's recent transformation to a major global economic player has focused attention on the policies that facilitated China's staggering growth.<sup>20</sup> An important trend in the period prior to China's recent economic expansion was the devolution of authority from the national level to the provinces. A particular emphasis has been placed on fiscal decentralization. Scholars have identified "[a] long-term trend since 1949 . . . toward an expansion of the fiscal powers of provincial governments."<sup>21</sup> Over the course of this trend, "provinces acquired increased autonomy through

17. See generally RANDALL PEERENBOOM, CHINA'S LONG MARCH TOWARD RULE OF LAW 241 (2002); Hal Blanchard, *Constitutional Revisionism in the PRC: "Seeking Truth from Facts"*, 17 FLA. J. INT'L L. 365, 390 (2005); John Ohnesorge, *Chinese Administrative Law in the Northeast Asian Mirror*, 16 TRANSNAT'L L. & CONTEMP. PROBS. 103, 137, 152 (2006); Randall Peerenboom, *A Government of Laws: Democracy, Rule of Law and Administrative Law Reform in the PRC*, 12 J. CONTEMP. CHINA 45, 54, 59 (2003).

18. Christine P. W. Wong, *Central-Local Relations in an Era of Fiscal Decline: The Paradox of Fiscal Decentralization in Post-Mao China*, 128 CHINA Q. 691, 691 (1991); see also Michel Oksenberg & James Tong, *The Evolution of Central-Provincial Fiscal Relations in China, 1971-1984: The Formal System*, 125 CHINA Q. 1, 5 (1991) ("The major challenge which has confronted Beijing since 1949 has been to identify administrative arrangements which balance the needs for central control and provincial autonomy.").

19. See generally Ronald A. Edwards, *Federalism and the Balance of Power: China's Han and Tang Dynasties and the Roman Empire*, 14 PACIFIC ECON. REV. 1 (2009) (discussing relationship of central government to local governments in Imperial China).

20. See, e.g., Frank K. Upham, *From Demsetz to Deng: Speculations on the Implications of Chinese Growth for Law and Development Theory*, 41 N.Y.U. J. INT'L L. & POL. 551, 576-80 (2009).

21. Oksenberg & Tong, *supra* note 18, at 5.

greater budgetary authority, longer contractual periods, and greater responsibility for managing budgetary surpluses and deficits.”<sup>22</sup>

In the period prior to 1979, China experimented with a variety of fiscal structures but, in general, maintained a relatively large degree of central control.<sup>23</sup> Although some arrangements allowed for greater provincial authority, the central government was quick to reassert itself when it saw “excessive fiscal decentralization.”<sup>24</sup> Beginning in 1980, China shifted towards a more decentralized scheme. For example, revenue sharing was introduced: a process by which localities were permitted to keep some portion of the revenue they collected.<sup>25</sup> Contracting agreements between provincial and central governments, in which “a basic amount (quota) of shared revenues [were] transferred to the central government while revenues collected over and above this quota [were] kept in full by the province or city,” were used to “give . . . provinces greater incentives to collect more taxes.”<sup>26</sup>

The growth of extra-budgetary revenue, which was largely controlled by subnational governments, also facilitated decentralization. Extra-budgetary funds included “the retained earnings of local state-owned enterprises (SOEs), public utilities surcharges, transportation fees, rental income on public housing, and various social funds, as well as ad hoc fees and charges.”<sup>27</sup> As extra-budgetary funds made up a greater portion of the total tax revenue collected, greater fiscal authority was vested in subnational authorities.<sup>28</sup>

In 1994, China instituted a set of reforms to create a tax assignment system for inter-governmental fiscal relations. Under the new rules, the “complex” negotiated system “was replaced by the transparent delineation of revenue sources for the central and local governments” which were “explicit” and “not subject to bargaining.”<sup>29</sup> The new system apportioned the revenue from certain taxes, such as the sales tax, to the central government, while subnational governments received the revenue from other types of taxes, such as house and property taxes.<sup>30</sup> The system assigned other taxes, most importantly the value added tax, according to specified

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22. *Id.* at 8.

23. *See id.* at 9–17 (discussing fiscal policy in the 1970s).

24. *Id.* at 12 (discussing move to reassert central control in 1976 after experiments with greater local fiscal autonomy contributed to range of social problems).

25. Vivek B. Arora & John Norregaard, *Intergovernmental Fiscal Relations: The Chinese System in Perspective*, 11–12 (Int'l Monetary Fund, Working Paper No. 97/129, 1997).

26. Roy Bahl & Christine Wallich, *Intergovernmental Fiscal Relations in China* 12–13 (World Bank, Dev. Research Group, Research Working Paper No. 863, 1992).

27. Arora & Norregaard, *supra* note 25, at 14 (citation omitted). After 1993, the retained earnings of state owned enterprises were not to be subject to government control, although the transition may not have been perfectly smooth. *Id.* at 14 n.24.

28. *Id.* at 14–15.

29. *Id.* at 18.

30. Elliott Parker & Judith Thornton, *Fiscal Centralization and Decentralization in Russia and China* 9 (Univ. of Nev., Reno Working Paper Series, Paper No. 06-013, 2006).

ratios.<sup>31</sup> Nevertheless, the degree of fiscal decentralization after the 1994 reforms is subject to debate. Although the percentage of expenditures controlled by local governments is large compared to other countries, the central government collects most of the revenue;<sup>32</sup> local governments therefore rely on the central government for support, some of which takes the form of specific grants rather than unrestricted funds.<sup>33</sup>

## B. The “Market-Preserving Federalism” Hypothesis

The role of fiscal decentralization in contributing to China’s economic success is an area of active scholarly discussion. A significant number of policies potentially contributed to China’s economic growth.<sup>34</sup> The many social, political, and economic changes in the years since market-based reforms began in 1978 make it difficult to draw direct causal lines from particular policies to outcomes—especially for broad based choices such as the degree of autonomy subnational officials enjoy.

Nevertheless, there is a growing literature concerning the role of fiscal decentralization in spurring economic growth in China.<sup>35</sup> In an influential set of articles, Professors Weingast and Qian argue that decentralization in China, as a form of “market-preserving federalism,” did help promote economic growth.<sup>36</sup> Weingast and Qian focus on the incentives facing local governments and attempt to determine which inter-governmental structures best incentivize local governments to act as a “helping hand” rather than a “grabbing hand” vis-à-vis local businesses.<sup>37</sup> Local governments help by supporting the most productive local businesses but hinder economic growth when they have parasitic relationships with the most productive local firms.

31. *Id.*

32. *Id.* at 11.

33. *Id.*

34. For example, reform of the agricultural system has been broadly lauded as an essential ingredient in China’s economic success. Zhu Keliang et al., *The Rural Land Question in China: Analysis and Recommendations Based on a Seventeen-Province Survey*, 38 N.Y.U. J. INT’L L. & POL. 761, 770 (2006); Yingyi Qian, *How Reform Worked in China*, in IN SEARCH OF PROSPERITY: ANALYTIC NARRATIVES ON ECONOMIC GROWTH 306 (Dani Rodrik ed., 2003); see also Chung-Tong Wu, *China’s Special Economic Zones: Five Years After*, 6 ASIAN J. PUB. ADMIN. 127, 127–38 (1984) (discussing history of China’s special economic zones); see generally Martin Ravallion & Shaohua Chen, *China’s (Uneven) Progress Against Poverty*, 82 J. DEV. ECON. 1 (2007) (contrasting urban and rural economic growth over time and across provinces).

35. See Justin Yifu Lin & Zhiqiang Liu, *Fiscal Decentralization and Economic Growth in China*, 49 ECON. DEV. & CULTURAL CHANGE 1, 3 (2000) (noting the numerous studies on China’s economic growth).

36. *Regional Decentralization*, *supra* note 8, at 1720 n.1. Market-preserving federalism has several key features: subnational governments have autonomy and “primary regulatory responsibility over the economy;” there is a common market; and lower-level governments “face a hard budget constraint.” Barry R. Weingast, *The Economic Role of Political Institutions: Market-Preserving Federalism and Economic Development*, 11 J. L. ECON. & ORG. 1, 4 (1995) (emphasis omitted).

37. *Regional Decentralization*, *supra* note 8, at 1720.



Although inter-jurisdictional competition is one mechanism through which devolution of authority can promote economically optimal policies,<sup>38</sup> Weingast and Qian have focused on the more fundamental question of:

[W]hether the local government is able to keep a significant portion of the increased tax revenue that results from their policy decisions. If so, they have strong fiscal incentives to support market development. On the other hand, if a local government's fiscal reward is unrelated to, or even worse, negatively related to its policy effort, it has no fiscal incentives to support local business.<sup>39</sup>

Without a basic relationship between policies and a fiscal reward, local governments lack the incentive to promote better policies, thus the existence of this incentive is a necessary precursor to inter-jurisdictional competition.

Weingast and Qian argue that the post-reform era fiscal arrangements, including both fiscal contracting and tax assignment, gave "provincial governments in China . . . much stronger ex post fiscal incentives" because revenues were correlated with expenditures.<sup>40</sup> Comparing certain economic development indicators across provinces, Weingast and Qian find that "fiscal incentives are associated with [both] faster development of non-state enterprises . . . [and] greater reform in state-owned enterprises."<sup>41</sup> According to their analysis, China devolved authority to subnational governments in a way that promoted economic development because these subnational governments had both the incentive to enact better policies and the power to do so.

### C. The Bureaucratic Incentive Hypothesis

Some scholars have argued that the notion of broadly decentralized authority in China is undercut by its strong mechanisms for bureaucratic control, which ensure that local officials "allocate their fiscal resources in ways commensurate with the preferences" of the central government.<sup>42</sup>

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38. ZHENG YONGNIAN, *DE FACTO FEDERALISM IN CHINA: REFORMS AND DYNAMICS OF CENTRAL-LOCAL RELATIONS* 83-84 (2007) (arguing that most important implication of fiscal decentralization is induced competition among local governments); see also Yu Zheng, *Fiscal Federalism and Provincial Foreign Tax Policies in China*, 15 J. CONTEMP. CHINA 479, 480 (2006) (discussing how fiscal decentralization affects provincial variation in taxation on foreign investors).

39. *Regional Decentralization*, *supra* note 8, at 1721.

40. *Id.*

41. *Id.* at 1721-22. Some scholars have criticized the central empirical conclusions arrived at by Weingast and Qian. For example, Professors Jin and Zou disaggregate fiscal decentralization into revenues and expenditures and find that relative centralization of both is correlated with higher growth. Jin & Zou, *supra* note 7, at 1050.

42. Tsui & Wang, *supra* note 10, at 75; see also PIERRE F. LANDRY, *DECENTRALIZED AUTHORITARIANISM IN CHINA: THE COMMUNIST PARTY'S CONTROL OF LOCAL ELITES IN THE POST-MAO ERA* 14-15 (2008) (arguing that central government's control over local politics has remained strong despite decentralization); Maria Edin, *State Capacity and Local Agent Control in China: CCP Cadre Management from a Township Perspective*, 173 CHINA Q. 35, 44 (2003) (discussing mechanisms of central control).

Central authorities use a variety of mechanisms, both formal and informal, to influence the decisions of local actors.<sup>43</sup> Norms of centralization can also trump institutional reforms, so that even if subnational officials enjoy formal autonomy, they may still be primarily responsive to central mandates.<sup>44</sup>

Like market-preserving federalism, bureaucratic control can potentially create strong incentives for local officials. Some scholars have emphasized the structure of the Chinese bureaucracy, which is based on a regional or “multi-divisional” structure. Included in this structure are “self-contained units” capable of implementing policy within a defined space without the need for coordination of the entire national bureaucracy.<sup>45</sup> This structure can be contrasted with more “unitary” bureaucratic structures, such as Russia’s, where top-level coordination is more often needed.<sup>46</sup> China’s “M-form” bureaucracy, which includes both autonomy for sub-national authorities and a “readiness of the Chinese central government to reward and punish local officials on the basis of their economic performance,”<sup>47</sup> can generate results very similar to those predicted by a market-preserving federalism model especially when (as has been confirmed by empirical assessment) bureaucratic advancement is tied to economic performance.<sup>48</sup>

Under these conditions, fiscal decentralization could operate side-by-side with bureaucratic systems of control, such as the target responsibility system used to evaluate subnational officials, in a mutually reinforcing way. Fiscal decentralization could directly incentivize subnational governments to promote growth, in a manner discrete from but linked to systems of bureaucratic control. Fiscal decentralization can also facilitate the bureaucratic system both by creating clearer criteria for evaluation and by reinforcing the autonomy necessary for accurate comparison and successful competition between jurisdictions.

There can be little doubt that the market-based reforms since 1978 have had a profound effect on the Chinese economy and way of life. While it can be difficult to disaggregate the effects of multiple policies, many commentators agree that subnational authorities helped create conditions more conducive to economic growth. Through overlapping systems of decentralization and control, Chinese decentralization—in which subnational authorities possess relatively large degrees of latitude but remained embedded within multiple systems (fiscal and bureaucratic) with incentives to

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43. See, e.g., JAE HO CHUNG, *CENTRAL CONTROL AND LOCAL DISCRETION IN CHINA* 59 (2000) (discussing how relatively informal means, such as visits from party leaders, stories in key newspapers, and speeches from government officials, were used to promote provincial compliance with agricultural reform).

44. *Id.* at 5.

45. See, e.g., Yingyi Qian, Gérard Roland & Chenggang Xu, *Coordination and Experimentation in M-Form and U-Form Organizations*, 114 J. POL. ECON. 355, 369–70 (2006).

46. *Id.*

47. Hongbin Li & Li-An Zhou, *Political Turnover and Economic Performance: The Incentive Role of Personnel Control in China*, 89 J. PUB. ECON. 1743, 1744 (2005).

48. See generally *id.*

promote growth<sup>49</sup>—helped facilitate pro-market reforms and enable subnational governments to play a productive economic role.<sup>50</sup>

## II. Center-Local Dynamics in the Chinese Water Pollution Context

Part II discusses the role of subnational authorities and their incentives under the water pollution law.

### A. Decentralization of Water Pollution Authority

In 1984, China enacted its first water pollution control statute, the Law on Prevention and Control of Water Pollution (LPCWP), which established a set of national wastewater emissions standards.<sup>51</sup> The law was revised in 1996<sup>52</sup> and again in 2008.<sup>53</sup> Under the LPCWP, the environmental department of the State Council is responsible for establishing both national water quality standards and national pollutant discharge standards.<sup>54</sup> Enterprises that discharge water pollutants must report their emissions to the local environmental protection bureau (EPB)<sup>55</sup> and pay a discharge fee, and if their emissions exceeded the relevant standards, an excess discharge fee.<sup>56</sup> The 1996 amendments to the LPCWP included provisions for unified plans for controlling pollution on the basis of river basins.<sup>57</sup>

Rulemaking under the LPCWP has proven to be a lengthy process.<sup>58</sup>

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49. Compare Tsui & Wang, *supra* note 10, at 90 (“[L]ocal governments are given more responsibilities and a freer rein to tap local resources[,] and yet they are, owing to career concerns, more accountable to upper-level governments . . . .”), with *Regional Decentralization*, *supra* note 8, at 1740 (“[T]here exists a positive relationship between the strength of fiscal incentives faced by lower-level governments and local economic performance . . . .”).

50. A particularly interesting contrast is the different roles played by local governments in the market transitions of China and Russia. Parker & Thornton, *supra* note 30, at 4; *Regional Decentralization*, *supra* note 8. While China’s system of decentralization may not be optimal, see Jin & Zou, *supra* note 7, at 1051 (discussing China’s tendency to impose inefficient taxes on subnational authorities), the incentive structure for subnational authorities is ultimately better aligned with economic growth than in many developing countries.

51. Law of the People’s Republic of China on Prevention and Control of Water Pollution (1984) (promulgated by the Standing Comm. Nat’l People’s Cong., May 11, 1984) [hereinafter 1984 LPCWP].

52. Law of the People’s Republic of China on Prevention and Control of Water Pollution (promulgated by the Standing Comm. Nat’l People’s Cong., May 11, 1984, revised May 15, 1996) [hereinafter 1996 LPCWP].

53. Law of the People’s Republic of China on Prevention and Control of Water Pollution (promulgated by the Standing Comm. Nat’l People’s Cong., May 11, 1984, revised May 15, 1996, revised Feb. 28, 2008) [hereinafter 2008 LPCWP].

54. *Id.* arts. 11–13; see also 1996 LPCWP, *supra* note 52, arts. 6 & 7.

55. 2008 LPCWP, *supra* note 53, art. 21; see also 1996 LPCWP, *supra* note 52, art. 14.

56. 2008 LPCWP, *supra* note 53, arts. 24; see also 1996 LPCWP, *supra* note 52, art. 15.

57. 2008 LPCWP, *supra* note 53, arts. 15; see also 1996 LPCWP, *supra* note 52, art. 10.

58. See Wang Mingyuan, *China’s Pollutant Discharge Permit System Evolves Behind Its Economic Expansion*, 19 VILL. ENVTL. L.J. 95, 103–05 (2008).

Significant experimentation occurred at the regional level before a set of final standards establishing a permitting system was adopted in 2000.<sup>59</sup>

Subnational authorities were integral to the structure of the LPCWP. The primary environmental enforcement agency at the national level, the State Environmental Protection Administration (SEPA),<sup>60</sup> had a relatively low status and a modest staff,<sup>61</sup> and it was not seen as the first line of implementers and enforcers of the LPCWP. Instead, that charge fell on the EPBs: reporting of discharges was made to the EPBs, and the EPBs collected the associated fees. By virtue of their job as information gatherers and statute enforcers, then, the EPBs were central to the functioning of the law.

While SEPA “ha[d] formal authority over lower-level agencies, this national agency [did] not have much leverage in ensuring that national regulations and standards [were] enforced at the local level.”<sup>62</sup> EPBs “rel[ie]d on local governments] for virtually all their support, including their budgets, career advancement, number of personnel, and resources such as cars, office buildings, and employee housing.”<sup>63</sup> While EPBs had some separate sources of funding, such as discharge fees, they remained

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59. *Id.* (describing development of permitting system) (citing The Rules for the Implementation of the Law on Prevention and Control of Water Pollution (promulgated by the Standing Comm. Nat’l People’s Cong., Mar. 20, 2000, effective Mar. 20, 2000)). *Id.* at 104 n.54.

60. The national body governing environmental protection has gone through significant evolution over the years. In 1974, the government established the National Environmental Protection Office (NEPO); provincial-level EPOs were also created. Over the next several years, some provinces elevated their EPOs to environmental protection *bureaus*, giving them greater bureaucratic power, even though the central authority remained weak. In 1984, NEPO was elevated to the level of a bureau, creating the National Environmental Protection Bureau (NEPB) which had greater authority over provincial EPBs as well as other powers; four years later, NEPB was made into an agency, NEPA, giving it even greater autonomy and placing it directly under the State Council. In 1998, NEPA was elevated again in administrative ranking to become the State Environmental Protection Administration (SEPA). Michael T. Rock, with Fei Yu & Chonghua Zhang, *Improving the Environmental Performance of China’s Cities*, in *POLLUTION CONTROL IN EAST ASIA: LESSONS FROM THE NEWLY INDUSTRIALIZING ECONOMIES* 82, 85 (2002). At the March 2008 National People’s Congress, the Ministry of Environmental Protection (MEP) was created, replacing SEPA and giving the agency a vote in the State Council’s decision making process. See Xin Qiu & Honglin Li, *China’s Environmental Super Ministry Reform: Background, Challenges, and the Future*, 39 *ENVTL. L. REP.* 10152 (2009). For the sake of convenience, “SEPA” will be used for all pre-MEP incarnations of the national environmental authority and “EPB” for subnational authorities.

61. Alex Wang, *The Role of Law in Environmental Protection in China: Recent Developments*, 8 *VT. J. ENVTL. L.* 195, 199 & n.11 (2007).

62. Stefanie Beyer, *Environmental Law and Policy in the People’s Republic of China*, 5 *CHINESE J. INT’L L.* 185, 207 (2006). The relationship between EPBs and the central government has been described by experts on Chinese environmental policy as *yewu*, which implies some degree of central authority, but less than the total control exercised by the national government over military or other similar types of decisions. Email from Deborah Seligsohn, Principal Advisor, China Climate and Energy Program, World Resource Institute to authors (May 21, 2010) (on file with authors).

63. ELIZABETH C. ECONOMY, *THE RIVER RUNS BLACK: THE ENVIRONMENTAL CHALLENGE TO CHINA’S FUTURE* 113 (2d ed. 2010); see also Benjamin van Rooij, *Implementing Chinese Environmental Law through Enforcement*, in *IMPLEMENTATION OF LAW IN THE PEOPLE’S REPUBLIC OF CHINA* 149, 162–64 (Jianfu Chen et al eds., 2002) (discussing reasons that “EPBs are heavily dependent on their local governments”).

embedded within subnational governmental structures, with municipal leaders playing key roles in appointing EPB management and determining staffing levels.<sup>64</sup> Predictably, subnational governments and non-environmental officials exerted significant influence.<sup>65</sup>

## B. Local Incentives

Given their control over important components of water-pollution governance, the incentives of subnational actors became paramount. Just as decentralization can create either a “grabbing hand” or a “helping hand” for market development, greater autonomy for subnational governments can facilitate or slow environmental progress, depending on whether officials benefit from environmental gains.

Classically, environmental externalities between jurisdictions are problematic for achieving efficient levels of pollution control. In the face of inter-jurisdictional externalities, one can expect a race-to-the-bottom in which jurisdictions compete to deliver a friendly business environment by offering lower environmental standards.<sup>66</sup> Officials have an incentive to adopt sub-optimal controls when other jurisdictions feel the costs of weaker protections, but the benefits are still experienced locally. This race-to-the-bottom can play a particularly important role in environmental decision making where capital can move freely between jurisdictions.<sup>67</sup>

Another important factor that influences the incentives of subnational officials is that, unlike capital, residents cannot move relatively freely between jurisdictions. The household registration system (*hukou*) limits the ability of residents to relocate. The *hukou* system officially identifies a person as a resident of a particular area and plays an important role in the everyday lives of Chinese households.<sup>68</sup> A person who is officially regis-

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64. XIAOYING MA & LEONARD ORTOLANO, ENVIRONMENTAL REGULATION IN CHINA: INSTITUTIONS, ENFORCEMENT, AND COMPLIANCE 60–63 (2000) (explaining structure of EPBs and their relationships to subnational governments); see also Carlos Wing-Hung Lo & Shui-Yan Tang, *Institutional Contexts of Environmental Management: Water Pollution Control in Guangzhou, China*, 14 PUB. ADMIN. & DEV. 53, 61 (1994) (arguing reliance on discharge fees incentivized EPBs to focus on certain types of pollution reduction).

65. See Wing-Hung Lo & Tang, *supra* note 64, at 60 (giving examples of EPBs being unable to conduct site inspections of facilities run by officials with higher administrative or party ranks).

66. Richard L. Revesz, *Rehabilitating Interstate Competition: Rethinking the “Race-to-the-Bottom” Rationale for Federal Environmental Regulation*, 67 N.Y.U. L. REV. 1210, 1212 (1992).

67. See Arik Levinson & M. Scott Taylor, *Unmasking The Pollution Haven Effect*, 49 INT’L ECON. REV. 223, 224 (2008).

68. See Cong.-Exec. Comm’n on China, *China’s Household Registration System: Sustained Reform Needed to Protect China’s Rural Migrants* (Oct. 7, 2005) (Issue Paper), available at <http://www.cecc.gov/pages/news/hukou.pdf>. While enforcement may have relaxed during the recent period of economic reform, the *hukou* system remains an obstacle to permanent migration of peasants to cities and is a major divide between the rural and urban population. See generally Kam Wing Chan and Will Buckingham, *Is China Abolishing the Hukou System?*, 195 CHINA Q. 582 (2008) (arguing that devolution of enforcement from central to local governments has caused *hukou* system to remain “potent and intact”). *Id.* at 582.

tered for an area enjoys a host of benefits, such as medical insurance, employment opportunities, and access to education. At the same time, however, capital is less constrained, so localities must compete for capital, while the movement of residents is restricted.<sup>69</sup>

Within the bureaucratic evaluation system, if economic concerns are weighed too heavily, as some have argued,<sup>70</sup> then other goals, such as environmental protection, will suffer. Furthermore, a sophisticated monitoring apparatus is necessary to evaluate environmental performance. If economic performance is easier to evaluate, officials will shift their attentions to those areas.

Finally, a range of additional factors can separate the incentives of governmental authorities from the public interest. Although there may be many informal mechanisms for residents to pressure local officials, elections as a form of direct accountability to the population are a relatively new practice with often spotty implementation.<sup>71</sup> Organizations with concentrated special interests may be in a better position to influence or reward key authorities than unorganized residents with diffuse concern for the environment.<sup>72</sup> Any or all of these factors can interfere with a strong link between enhanced environmental performance within a jurisdiction and tangible benefits for the relevant authorities.

### C. Outcomes and Challenges

Neither the decentralized system of autonomy for subnational governments nor the bureaucratic system of control created effective and clear

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69. Additionally, businesses make up the lion's share of government revenue, with income taxes for residents contributing relatively little to government coffers. See, e.g., CHINA STAT. Y.B. 2005, at ch. 8-12, available at <http://www.stats.gov.cn/tjsj/ndsj/2005/indexeh.htm>. In 2004, 85.5 percent of all local revenue was derived from the local tax base. And 63.9 percent of the total revenue was generated solely from taxes on local businesses (VAT, Business, and Company Income Taxes), representing 75 percent of the available tax base. Revenue raised from individual income taxes, at 5.9 percent of the total budget, represented only 7 percent of the local tax base. *Id.*; see also CHINA STAT. Y.B. 2010, at ch. 8-5, available at <http://www.stats.gov.cn/tjsj/ndsj/2010/indexeh.htm> (reporting local taxes on businesses and individual income as 66 percent and 6 percent of available tax base, respectively).

70. See, e.g., Wang, *supra* note 61, at 199 (“[E]conomic growth is one of the primary metrics of performance and environmental performance measures are virtually non-existent.”); see also Edin, *supra* note 42, at 38 (noting that “official guidelines for the annual evaluation . . . of local Party and government leading cadres . . . contain very specific performance criteria, such as industrial output, output of township- and village-run enterprises, taxes and profits remitted”). *But see* Rock, Yu & Zhang, *supra* note 60, at 97 (discussing Urban Environmental Quality Examination System and arguing that it has been effective tool in incentivizing local officials to prioritize environmental protection).

71. See Renfu Luo, Linxiu Zhang, Jikun Huang & Scott Rozelle, *Elections, Fiscal Reform, and Public Goods Provision in Rural China*, 35 J. COMP. ECON. 583 (2007).

72. See generally MANCUR OLSON, JR., *THE LOGIC OF COLLECTIVE ACTION: PUBLIC GOODS AND THE THEORY OF GROUPS* (2d. ed. 1971). There are competing theories about the role of decentralization in promoting or reducing corruption. See Raymond Fisman & Roberta Gatti, *Decentralization and Corruption: Evidence Across Countries*, 83 J. PUB. ECON. 325 (2002).

incentives for subnational actors to aggressively pursue environmental protection. As a consequence, in many of the areas where subnational governments exercised discretion over water pollution, results were disappointing.<sup>73</sup>

Scholars have found that “it is common for local officials to ignore administrative orders from higher levels of government without any consequences” and “pollution laws are all too frequently ignored by local officials whose main concern is for local economic growth and employment.”<sup>74</sup> Pollution passing through cross-boundary waterways has led to “many transjurisdictional disputes . . . [,] most of which are never resolved.”<sup>75</sup>

Part of the difficulties associated with decentralized control can be attributed to problems of capacity. Enforcement sometimes involves the coordination of multiple agencies, making “enforcement extremely complex” with time-intensive bargaining processes.<sup>76</sup> EPBs also “lack both financial and human resources” and their staffs often have little or no legal training.<sup>77</sup> These capacity problems likely contribute to difficulties with enforcement, but they are also deeply connected to incentives. Spending to build the capacity of EPBs is likely to correlate closely with the benefits enjoyed by subnational authorities through successful environmental performance. On the other hand, if the rewards of subnational authorities are unconnected (or negatively related) to environmental performance, then “an EPB that has a weakly educated staff is easier to control and gives rise to fewer problems.”<sup>78</sup>

As a consequence, water pollution remains a significant concern in China. Pan Yue, a Vice Minister of China’s Ministry of Environmental Protection (MEP), has stated that water pollution is approaching a tipping

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73. See, e.g., Ma Zhong, *Evaluation of the Implementation of Water Pollution Prevention and Control Plans in China: The Case of Huai River Basin* 36–46 (World Bank, Working Paper No. 46915, 2006), available at <http://go.worldbank.org/SJHL9T0DHO> (evaluating water pollution control planning and implementation in Huai River basin and finding variety of shortcomings that led to failure to attain water quality goals). See generally ECONOMY, *supra* note 63 (discussing water pollution problems).

74. See Edwin D. Ongley & Xuejun Wang, *Transjurisdictional Water Pollution Management in China: The Legal and Institutional Framework*, 29 WATER INT’L 270, 277 (2004); see also Susmita Dasgupta, Hua Wang & David Wheeler, *Surviving Success: Policy Reform and the Future of Industrial Pollution in China*, at 1 (World Bank, Working Paper No. 1856, 1997), available at <http://www.p2pays.org/ref/22/21740.pdf> (describing community reluctance in imposing regulatory costs on township-village enterprises). Stories by the Xinhua News Agency, the official press agency of the PRC, have also publicized local failures. See, e.g., *SEPA Criticizes Half-Hearted Local Governments*, XINHUA NEWS AGENCY, Nov. 22, 2006, <http://www1.china.org.cn/english/environment/189848.htm>.

75. Ongley & Wang, *supra* note 74, at 273.

76. The problem of coordination of enforcement bodies is another manifestation of fragmented authority. See van Rooij, *supra* note 63, at 164.

77. *Id.* at 164–65 (“While most of the legal staff of EPBs at both provincial and county levels have had some sort of middle-level education, few have had legal training. At county level or below, the educational level of the legal staff is even less.”).

78. *Id.* at 165.

point,<sup>79</sup> and there have been numerous reported incidences of major environmental problems.<sup>80</sup> In 2006, the World Bank commented that “[i]n the almost 500 sections of China’s main river systems that are monitored for water quality, about one-third have water quality with very limited or no functional use, and only 28 percent have water suitable for drinking.”<sup>81</sup> And in the North, “40 to 60 percent of the region’s water is continuously in the non-functional water classification categories.”<sup>82</sup>

### III. Multi-tier Environmental Regimes

Part III provides some context for understanding the recent reforms in China’s water pollution control law by examining how the relationship between levels of authority are handled in environmental regimes in other complex and large economies.

#### A. Cooperative Governance

Tensions between multiple tiers of government are not unique to China. Decentralized systems of governance are used in many countries, either through formal mechanisms, like federalism in the United States or subsidiarity in Europe, or through informal discretion at the local level. Environmental protection, however, poses special problems for allocating responsibility in multiple-level governance arrangements.<sup>83</sup> Pollution can travel beyond jurisdictional lines, causing externalities.<sup>84</sup> Preferences concerning environmental issues can also differ substantially on the basis of economic development, cultural norms, or historical patterns of development.<sup>85</sup> Pollution control and natural resource management touch on disparate elements of economic life, from production to consumption.<sup>86</sup> Furthermore, environmental issues are often cross-media in nature and involve interaction with profoundly unpredictable natural systems.<sup>87</sup> All of

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79. Alexa Olesen, *China Heading for Water Pollution Crisis, Official Warns*, THE CHINA POST, March 17, 2006.

80. See, e.g., Wenjing Fu, Huijin Fu, Karen Skøtt & Min Yang, *Modeling the Spill in the Songhua River After the Explosion in the Petrochemical Plant in Jilin*, 15 ENVTL. SCI. & POLLUTION RES. 178 (2008) (discussing major benzene spill); *City Combats Algae Outbreak at Reservoir*, USA TODAY, July 16, 2007, [http://www.usatoday.com/tech/science/2007-07-16-2642943983\\_x.htm](http://www.usatoday.com/tech/science/2007-07-16-2642943983_x.htm) (discussing fouling of Lake Tai reservoir).

81. WORLD BANK, ENV’T AND SOC. DEV. – E. ASIA AND PAC. REGION, CHINA WATER QUALITY MANAGEMENT: POLICY AND INSTITUTIONAL CONSIDERATIONS, at xiii (2006).

82. *Id.*

83. See Daniel C. Esty, *Toward Optimal Environmental Governance*, 74 N.Y.U. L. REV. 1495, 1554 (1999).

84. See Steven M. Siros, Comment, *Borders, Barriers, and Other Obstacles to a Holistic Environment*, 13 N. ILL. U. L. REV. 633, 643 (1993); see also Douglas R. Williams, *Cooperative Federalism and the Clean Air Act: A Defense of Minimum Federal Standards*, 20 ST. LOUIS U. PUB. L. REV. 67, 98 (2001).

85. See Joel Richard Paul, *Cultural Resistance to Global Governance*, 22 MICH. J. INT’L L. 1, 55 (2000); see also Erica Gorga, *Culture and Corporate Law Reform: A Case Study of Brazil*, 27 U. PA. J. INT’L ECON. L. 803, 812 (2006).

86. E.g., Kurt A. Strasser, *Preventing Pollution*, 8 FORDHAM ENVTL. L.J. 1, 4–5 (1996).

87. See Siros, *supra* note 84, at 643.



these factors complicate decisions about how to allocate authority over environmental matters.

Countries and supranational bodies have adopted a range of instruments and institutional arrangements to achieve desired environmental outcomes, from simple dispute resolution mechanisms to complex multi-level regulatory schemes. China's 2008 Amendments to its water law, and the institutional changes they made, are part of an ongoing global experiment in which governments allocate and re-allocate authority in different regimes with the hope of generating greater environmental benefits at lower economic costs. Understanding how other systems have responded to the same challenges, as well as their successes and failures, can help contextualize China's new approach to water-pollution governance.

In the United States and Europe, a certain degree of devolution of authority is protected through constitutional structure; their pollution control regimes could not be fully centralized, even if that was desirable. At the same time, there has not been a tendency to centralize control as much as is legally possible.<sup>88</sup> An important role for autonomous decision making at the state-level and Member-level exists beyond that which would be required purely on the basis of legal considerations. These regimes have sought to take advantage of the benefits of both central institutions and local autonomy.

In the United States, the term "cooperative federalism" has been used to describe the tendency for the federal and state governments to share authority over environmental law.<sup>89</sup> The appropriate balance between state and national authority over environmental questions has been the subject of significant scholarly discussion.<sup>90</sup> There is only limited substantive consensus in these debates. Regardless of their position on particular issues, however, scholars tend to agree that the criteria for successful cooperative regimes are how well poised (usually as a matter of incentives or capacity) levels of government are for carrying out their respective obligations and how well the interface between authorities is managed.

A number of different mechanisms are used to achieve cooperation between central and local authorities. In the European Union, central institutions have the authority to require Member states to directly implement,

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88. E.g., Robert L. Fischman, *Cooperative Federalism and Natural Resources Law*, 14 N.Y.U. ENVTL. L.J. 179, 192-93 (2005).

89. *Id.* at 187 (stating that cooperative federalism has "emerged . . . to become an enduring, organizing concept in [U.S.] environmental law."). Similar concepts have been applied in the European Union. See, e.g., Cliona J.M. Kimber, *A Comparison of Environmental Federalism in the United States and the European Union*, 54 MD. L. REV. 1658 (1995).

90. See, e.g., Daniel C. Esty, *Revitalizing Environmental Federalism*, 95 MICH. L. REV. 570 (1996); Alice Kaswan, *A Cooperative Federalism Proposal for Climate Change Legislation: The Value of State Autonomy in a Federal System*, 85 DENV. U. L. REV. 791 (2008); Richard L. Revesz, *The Race to the Bottom and Federal Environmental Regulation: A Response to Critics*, 82 MINN. L. REV. 535 (1997); Richard B. Stewart, *Pyramids of Sacrifice? Problems of Federalism in Mandating State Implementation of National Environmental Policy*, 86 YALE L.J. 1196 (1977).

by law, central directives<sup>91</sup>—a power that the U.S. federal government does not share.<sup>92</sup> The structure of “comitology” in the European Union, in which representatives from Member State administrative agencies help comprise central institutions, may facilitate diffusion and serve as an additional informal accountability mechanism.<sup>93</sup> Conversely, pollution control law in the United States places significant power directly in central institutions, with the federal government holding substantial power over setting and enforcing standards.<sup>94</sup> Nevertheless, all of these regimes feature important roles for both central institutions and local officials.

Many of the difficulties that hamper successful cooperation in China also exist in the United States and Europe: inter-jurisdictional externalities reduce incentives to control pollution, officials are subject to capture by well-organized special interests, and lower-tier governments often face capacity issues when dealing with complex environmental problems, to name a few.<sup>95</sup> Competing interests, and the demands of the electoral process, can often skew decision making away from long-term threats and can cause oscillation and inconsistency between administrations.<sup>96</sup> As they have created and implemented their water pollution laws over the past several decades, the United States and Europe have struggled with many of the challenges of institutional design faced by China.

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91. See generally STEPHEN WEATHERILL, *CASES AND MATERIALS ON EU LAW* 95-107 (Oxford University Press 8th ed. 2007) (2003) (discussing legal alternatives for remedying Member State's breach of European community laws).

92. See generally Neil S. Siegel, *Commandeering and its Alternatives: A Federalism Perspective*, 59 VAND. L. REV. 1629, 1630-35 (2006) (discussing the disadvantages of U.S. anticommandeering doctrine, which prohibits federal government from requiring states to implement federal regulatory programs).

93. See generally Christian Joerges & Jürgen Neyer, *From Intergovernmental Bargaining to Deliberative Political Processes: The Constitutionalization of Comitology*, 3 EUR. L.J. 273, 275-80 (1997) (describing origins and historical development of European comitology); Carol Harlow & Richard Rawlings, *Promoting Accountability in Multi-Level Governance: A Network Approach*, EUR. GOVERNANCE PAPERS, Apr. 7, 2006, No. C-06-02, at 28, available at <http://www.connex-network.org/eurogov/pdf/egp-connex-C-06-02.pdf> (analyzing emergence of accountability networks in multi-level EU governance systems). But see Mark A. Pollack, *Control Mechanism or Deliberative Democracy?: Two Images of Comitology*, 36 COMP. POL. STUD. 125, 152 (2003) (arguing that rational choice rather than deliberative model better fits actual comitology process).

94. See Stewart *supra* note 90, at 1196 (“Over the past decade, responsibility for setting environmental policy has increasingly shifted from state and local authorities to the federal government. Reacting to the perceived inability of the states to check or reverse environmental degradation, Congress has enacted comprehensive statutes establishing environmental standards and control strategies.”).

95. See *id.* at 1201-04 (detailing obstacles to implementation of federal pollution control efforts on state and local levels).

96. See, e.g., Neil King, Jr. & Keith Johnson, *Obama Decried, Then Used, Some Bush Drilling Policies*, WALL ST. J., July 6, 2010, at A1 (discussing role of “political and fiscal realities” in causing Obama administration’s energy policy to shift from a critical stance on the Bush administration’s softness toward the oil industry to one supportive of off-shore drilling).

## B. Traditional Pollution Control Tools

The U.S. Federal Water Pollution Control Act Amendments of 1972, commonly referred to as the Clean Water Act (CWA), “embodies a philosophy of federal-state partnership”:<sup>97</sup> its centerpiece is a system of technology-based emission standards, set at the national level and issued and enforced primarily by the states.<sup>98</sup> The permit program is supplemented by a regime based on water quality standards.<sup>99</sup> Under the regime, states establish standards and define “total maximum daily loads” (TMDLs) for impaired water bodies, which are eventually incorporated into emission limits.<sup>100</sup>

The U.S. Clean Air Act Amendments of 1970 (CAA) includes both emissions limits and quality standards in the air pollution context.<sup>101</sup> The technology-based emissions limits generally apply only to new or substantially modified sources. Typically, states administer this program, as long as state requirements are at least as strict as federal standards.<sup>102</sup> The EPA sets National Ambient Air Quality Standards (NAAQS).<sup>103</sup> States are then required by law to submit state implementation plans (SIPs) that describe how the NAAQS will be met; SIPs must be approved by the EPA. Localities that fail to attain the national standards must implement a series of mandated controls designed to provide substantial improvements in air quality, such as requirements that new sources offset pollution with reductions elsewhere.<sup>104</sup>

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97. SUSAN R. FLETCHER ET AL., U.S. CONG. RESEARCH SERV., *Environmental Laws: Summaries of Major Statutes Administered by the Environmental Protection Agency* (EPA 30 (RL30798; 2008)).

98. U.S. ENVTL. PROT. AGENCY, OFFICE OF ENFORCEMENT & COMPLIANCE ASSURANCE (OECA), *CLEAN WATER ACT ACTION PLAN* (2009). EPA must approve a state’s authority to run a permitting program and has concurrent authority to enforce violations. Enforcement can also be carried out through citizen suits. Kristi M. Smith, *Who’s Suing Whom?: A Comparison of Government and Citizen Suit Environmental Enforcement Actions Brought Under EPA-Administered Statutes*, 29 COLUM. J. ENVTL. L. 359, 360 (2004) (discussing how citizen suit provision has played out in practice).

99. See generally Karen M. McGaffey, *Water Pollution Control Under the National Pollutant Discharge Elimination System*, in *THE CLEAN WATER ACT HANDBOOK* 9, 26-40 (Mark A. Ryan ed., 2d ed. 2003).

100. States were initially hesitant to engage in the TMDL process, and environmental groups ultimately went to court to force implementation of these provisions. U.S. ENVTL. PROT. AGENCY, OFFICE OF WETLANDS, *DRAFT HANDBOOK FOR DEVELOPING WATERSHED TMDLS* 1, 5 (2008) [hereinafter *TMDL HANDBOOK*].

101. See Robert A. Wyman, Jr., Dean M. Kato & Jeffrey S. Alexander, *Meeting Ambient Air Standards: Development of the State Implementation Plans*, in *The Clean Air Act Handbook* 41, 47 (Robert J. Martineau, Jr. & David P. Novello eds., 2d ed. 2004) [hereinafter *CLEAN AIR ACT HANDBOOK*].

102. See U.S. ENVTL. PROT. AGENCY, *New Source Review: Where You Live*, <http://www.epa.gov/NSR/where.html> (last visited March 11, 2011).

103. See generally *CLEAN AIR ACT HANDBOOK*, *supra* note 101, at 5.

104. The quality standards and emissions levels also interact: in non-attainment areas, different emissions limit regimes apply. New sources face stricter emissions limits—“lowest achievable emissions rate”—and existing sources face limits where they otherwise would not—“reasonably available control technology.” *Id.* at 47.

Similarly, water pollution-control governance in the European Union is shared between European-level institutions and the Member states. E.U.-level institutions set priorities, establish procedures, and collect and publish information, while Member states are charged with carrying out and implementing E.U. policy.<sup>105</sup>

The European Union has a number of directives and initiatives that target water pollution control. In 2000, the European Union adopted the Water Framework Directive (WFD),<sup>106</sup> which will be discussed in greater detail below. The WFD expands on and incorporates previous efforts at the European level to control water pollution, including both emissions limits and quality objectives.<sup>107</sup> These efforts include directives on surface and drinking water adopted thirty years ago,<sup>108</sup> as well more recent directives concerning wastewater management<sup>109</sup> and nitrates.<sup>110</sup>

Under the Integrated Pollution Prevention and Control (IPPC) Directive, adopted in 1996,<sup>111</sup> Member states are required to develop emissions limits on the basis of best available technology.<sup>112</sup> These emissions limits are to be enforced through a permitting system, with discharge limits that are set at the facility level.<sup>113</sup> While European-level institutions, like the Directorate-General for the Environment and the European Environmental Agency (EEA), provide guidance and aggregate information, Member states retain the discretion to set their own discharge levels, and there is signifi-

105. The E.U. water pollution control regimes are “profoundly open-ended” leaving “substantial freedom [to Member States] to interpret it as they see fit.” William Howarth, *Aspirations and Realities Under the Water Framework Directive: Proceduralisation, Participation and Practicalities*, 21 J. ENVTL. L. 391, 397-98 (2009). The Commission has broad discretion to carry out infringement proceedings for Member States that are not fulfilling their obligations but prefers “quicker and more effective ways of resolving the issues” and a “systematic approach” over formal proceedings. Report from the Commission, *26th Annual Report on Monitoring the Application of Community Law (2008)*, at 8-9, COM (2009) 675 final (Dec. 15, 2009).

106. Council Directive 2000/60/EC, *Establishing a Framework for Community Action in the Field of Water Policy*, 2000 O.J. (L 327) 1(EU) [hereinafter WFD].

107. See, e.g., Maria Kaika, *The Water Framework Directive: A New Directive for a Changing Social, Political and Economic European Framework*, 11 EUR. PLAN. STUD. 299, 301 (2003) (chronicling the progression of E.U. water directives).

108. Council Directive 76/160, *Concerning the Quality of Bathing Water*, 1976 O.J. (L 31) 37 (EC), *amended by* Directive 2006/7, *Concerning the Management of Bathing Water Quality*, 2006 O.J. (L 64) 37 (EU); Directive 80/778, *Related to the Quality of Water Intended for Human Consumption*, 1980 O.J. (L 229) 11 (EC), *superseded by* Directive 98/83, *On the Quality of Water Intended for Human Consumption*, 1998 O.J. (L 330) 32 (EU).

109. Council Directive 91/271, *Concerning Urban Waste Water Treatment*, 1991 O.J. (L 135) 40 (EC), *amended by* Council Directive 98/15, 1998 O.J. (L 67) 29 (EU).

110. Council Directive 91/676, *Concerning the Protection of Waters Against Pollution Caused by Nitrates from Agricultural Sources*, 1991 O.J. (L 375) 1 (EC), *amended by* Regulation 1137/2008, 2008 O.J. (L 311) 1 (EU).

111. Council Directive 96/61, *Concerning Integrated Pollution Prevention and Control*, 1996 O.J. (L 257) 26 (EU), *codified with amendments in* Council Directive 2008/1, *Concerning Integrated Pollution Prevention and Control*, 2008 O.J. (L 24) 8 (EU).

112. *Id.* art. 9(4).

113. *Id.* arts. 4, 5 & 9(3).

cant variance between the Member states.<sup>114</sup>

### C. Newer Approaches

Responding to criticisms<sup>115</sup> and shortfalls<sup>116</sup> in traditional approaches to water pollution control, the United States and European Union have taken a number of steps in recent years to update their regimes. One important tendency has been a move towards more integrated coordination. The most sophisticated example was created by the European Water Framework Directive (WFD), which came into force in December 2000.<sup>117</sup> The WFD creates the procedures for bringing together disparate national and E.U. efforts into a single coherent approach to water pollution control.

The WFD has been praised for its “holistic approach”<sup>118</sup> to water pollution control, as the Directive integrates existing water pollution measures into a set of management plans based on river basins. Each member country is required to designate river basin districts for all water bodies.<sup>119</sup>

114. EUR. COMM’N, DIRECTORATE GEN. ENV’T, ANALYSIS OF MEMBER STATES’ FIRST IMPLEMENTATION REPORTS ON THE IPPC DIRECTIVE 118 (2004) (noting that because tradeoff decisions are made by Member States “variations in [emission limit values] may be significant”); see also *id.* at Annex III, Comparison of Aggregated Tables of ELV at Pollutant Level (making cross country comparisons of emissions limits).

115. For example, there have been recent high profile criticisms of state enforcement, with EPA Administrator Lisa Jackson stating that enforcement is “falling short of . . . expectations.” *The Clean Water Act After 37 Years: Recommitting to the Protection of the Nation’s Waters: Hearing Before the H. Comm. on Transportation and Infrastructure*, 111th Cong. 2–3 (2009) (statement of Lisa P. Jackson, Administrator, U.S. Environmental Protection Agency), available at <http://republicans.transportation.house.gov/Media/file/TestimonyFull/2009-10-15-Jackson.pdf>. There has also been broad criticism of over-intrusive E.U. institutions and the proliferation of norms that create unnecessary bureaucratic confusion and administrative costs. These concerns have been raised in a number of contexts, causing the E.U. to make substantial reforms in some of its processes, including focusing on simplification of norms and improved decision making. See, e.g., *Commission White Paper on European Governance*, COM (2001) 428 final (July 25, 2001) (discussing problem and recommending reforms). See generally Jonathan B. Wiener, *Better Regulation in Europe*, 59 CURRENT LEGAL PROBS. 447 (2006) (discussing steps that European Union has taken to improve and simplify its decision making).

116. A high percentage of the bodies of water in the United States remain impaired, due in large part to diffuse sources that are not well addressed by the CWA. U.S. Environmental Protection Agency, *Watershed Assessment, Tracking and Environmental Results, National Summary of State Information*, [http://iaspub.epa.gov/waters10/attains\\_nation\\_cy.control#status\\_of\\_data](http://iaspub.epa.gov/waters10/attains_nation_cy.control#status_of_data) (last visited March 11, 2011). There has been variability in implementation of E.U. water directives. Eur. Comm’n, Directorate Gen. Env’t, *Monitoring of Permitting Progress for Existing IPPC Installations*, at iii–iv, (Mar. 2009) (finding “wide disparity of progress in the Member States” in implementing the IPPC Directive).

117. WATER INFO. SYS. FOR EUR., PLUNGE INTO THE DEBATE: CONFERENCE REPORT, 2ND EUROPEAN WATER CONFERENCE 14 (2009), available at [http://circa.europa.eu/Public/irc/env/wfd/library?l=/framework\\_directive/implementation\\_conventio/2009\\_conference/d\\_-\\_final\\_report/ewc2009-conf\\_proceedings/\\_EN\\_1.0\\_&a=d](http://circa.europa.eu/Public/irc/env/wfd/library?l=/framework_directive/implementation_conventio/2009_conference/d_-_final_report/ewc2009-conf_proceedings/_EN_1.0_&a=d). [hereinafter PLUNGE INTO THE DEBATE].

118. Howarth, *supra* note 105, at 392.

119. A large number of river basins cross national boundaries, creating the need for cross-country negotiation and the allocation of pollution reduction burdens between jurisdictions. See S. Nilsson, S. Langaas & F. Hannerz, *International River Basin Dis-*

These districts form the basis for a set of analytic steps that Members are required to undertake, including the characterization of conditions of the river basin and the effects of “human activity” on water quality.<sup>120</sup> For each river basin district, the member states are required to develop a “river basin management plan”<sup>121</sup> that details the results of the characterization of the basin, discusses existing pollution measures that are in place, and develops a “programme of measures”<sup>122</sup> of cost-effective pollution controls, including new “supplementary” measures where necessary, to achieve the “good status” water quality objectives stated in the WFD.<sup>123</sup> The good status objective is subject to a variety of caveats and exceptions under which Member states can extend deadlines, designate lower water quality objectives, and excuse failure to achieve standards.<sup>124</sup> The WFD is primarily a procedural mechanism, and it heavily relies upon public participation and information disclosure to generate compliance.<sup>125</sup>

In the United States, there has been some movement towards watershed-level planning to integrate pollution control. In particular, the EPA has promoted the development of TMDLs on a watershed basis through the creation of guidance documents and through technical assistance and support.<sup>126</sup>

Another form of cooperation involves the collection and dissemination of best practices by central authorities. One example in the United States is a CWA section, added in the late 1980s, on nonpoint source pollution that requires states to propose and implement “management programs” for the control of nonpoint source pollution, including identification of “best management practices.”<sup>127</sup> EPA plays a role as “funder of nonpoint source best practices, as well as, in a limited way, endorser of them,”<sup>128</sup> and, through “copying and coordination of approach,” states have largely tended to coalesce around similar programs.<sup>129</sup>

Using best practices as a governmental strategy is widespread throughout European-level institutions. Two examples are the “Open Method of Coordination,” used in a number of economic areas, and the concept of “Environmental Policy Integration.” Under both, the goal is to

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*tricts under the EU Water Framework Directive: Identification and Planned Cooperation*, EUR. WATER MGMT. ONLINE, 2004, at 2, [http://www.ewaonline.de/journal/2004\\_02h.pdf](http://www.ewaonline.de/journal/2004_02h.pdf). Because of the complexity of the requirements, enforcement by central institutions would be extremely difficult. While some Members have moved forward rapidly with implementation, others have failed to meet deadlines. See PLUNGE INTO THE DEBATE, *supra* note 117.

120. WFD, *supra* note 106, art. 5.1.

121. *Id.* art. 13.

122. *Id.* art. 11.

123. *Id.* Annex VII 7.10.

124. *Id.* art. 4.4-4.7.

125. See generally Howarth, *supra* note 105.

126. See, e.g., TMDL HANDBOOK, *supra* note 100, at 6-8.

127. 33 U.S.C. § 1329 (2006).

128. David Zaring, *Best Practices*, 81 N.Y.U. L. REV. 294, 327 (2006).

129. *Id.* (arguing that regime encourages “copying and coordination of approach” but not necessarily convergence on *superior* practices).

achieve “horizontal integration” and “some degree of voluntary policy convergence” through tools such as guidelines, benchmarking, peer review, indicators, and reporting and monitoring.<sup>130</sup> These have been used extensively in the water pollution context, both as part of the WFD and under the substantive water pollution directives.<sup>131</sup>

Another important approach is the introduction of trading into environmental regimes. Familiar from the context of conventional air pollution (where there have been notable successes in the United States in achieving reductions at low costs)<sup>132</sup> and in the climate change context (where the European Union Emission Trading System has been operational since 2005), trading has also been encouraged in the context of water pollution.<sup>133</sup>

There are, however, several difficulties faced in the creation of trading mechanisms similar to the cap-and-trade approaches that have been developed for air pollution. There are fewer sources, making market development more difficult. The fungibility of allowances may be reduced by important differences in the location and/or timing of emissions and the presence of multiple pollutants that are not equivalent.<sup>134</sup> These and other factors have led some stakeholders to conclude that “trading is a tool that requires specialized conditions in order to be effective” and “the need to satisfy these conditions significantly limits the applicability of trading.”<sup>135</sup> As a consequence, experience with large-scale trading programs is limited.<sup>136</sup>

#### IV. Cooperation and Environmental Policy in China

Part IV discusses steps taken by China in recent years to improve the incentive structure faced by subnational authorities, culminating in several important reforms to the water pollution control law.

##### A. Legal and Administrative Responses

Prior to revising the water pollution law, the central government had undertaken some important efforts to bring subnational authorities into

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130. Joanne Scott & David M. Trubek, *Mind the Gap: Law and New Approaches to Governance in the European Union*, 8 EUR. L.J. 1, 4-5 (2008).

131. See, e.g., EUR. COMM'N, BATHING WATER PROFILES: BEST PRACTICES AND GUIDANCE (Dec. 2009).

132. See generally Lauraine G. Chestnut & David M. Mills, *A Fresh Look at the Benefits and Costs of the U.S. Acid Rain Program*, 77 J. ENVTL. MGMT. 252 (2005).

133. See, e.g., U.S. ENVTL. PROT. AGENCY, FINAL WATER QUALITY TRADING POLICY (2003) (establishing policy “to encourage states, interstate agencies and tribes to develop and implement water quality trading programs for nutrients, sediments and other pollutants where opportunities exist to achieve water quality improvements at reduced costs”).

134. See generally U.S. ENVTL. PROT. AGENCY, WATER QUALITY TRADING ASSESSMENT HANDBOOK (2004) (discussing financial, environmental, and political determinants of successful trading programs); U.S. ENVTL. PROT. AGENCY, WATER QUALITY TRADING TOOL-KIT FOR PERMIT WRITERS (2d ed. 2009).

135. U.S. ENVTL. PROT. AGENCY, WATER QUALITY TRADING EVALUATION 3-2 (2008) (surveying stakeholders for views on success of water quality trading programs).

136. *Id.* at 3-10.

greater compliance. One common tool that is used in China to project central authority is “law enforcement campaigns” in which central authorities, through both formal and informal means, “defin[e] a particular, targeted, stricter and swifter form of law enforcement.”<sup>137</sup> These campaigns have been used in a variety of contexts, from pirated music to the “operation of illegal internet cafés.”<sup>138</sup> They have also been used to curtail water pollution, leading to impressive results, at least in the short term; one such campaign targeted small facilities (such as tanneries) for closure.<sup>139</sup>

In 2007, SEPA implemented a “regional permit restriction” policy that “suspends or restricts” new construction projects within areas where there are severe environmental violations.<sup>140</sup> SEPA initiated the program by targeting four cities and four power generating companies.<sup>141</sup> Through this mechanism, SEPA attempted to leverage its authority over environmental impact statements to pressure subnational authorities to monitor more closely pollution activities in several key industries.

Through a variety of planning processes, Chinese central authorities also incorporated water quality goals into local decision making.<sup>142</sup> These plans, including the national Five-Year Programs as well as implementation plans carried out at the provincial and local levels, place detailed water quality attainment goals within the broader set of national social and economic development objectives.<sup>143</sup>

The “green GDP” was a final administrative step at the central level to increase awareness of the threat posed by pollution. It was a nationwide accounting project meant to “deduct[ ] natural resources depletion costs and environmental degradation costs” from economic growth estimates.<sup>144</sup> A 2006 report found that the costs associated with pollution amounted to more than 3% of the GDP. Although not a direct enforcement measure, the green GDP project provided a mechanism to integrate environmental and economic measures.

Building on these initial steps, and recognizing the need for more aggressive action to stem water pollution, China began to make substantial reforms to its water pollution control law, in part by better incentivizing subnational officials.

The 2008 Amendments to the LPCWP make substantial changes to the

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137. Benjamin van Rooij, *The Politics of Law in China: Enforcement Campaigns in the Post-Mao PRC* 6 (Mar. 25, 2009) (working paper, available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1368181](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1368181)).

138. *Id.*

139. *See id.* at 33.

140. Lie Yang, *Environmental Crackdown Targets China's Most Powerful Polluters*, WORLDWATCH INST., Jan. 18, 2007, <http://www.worldwatch.org/node/4863>.

141. Ling Li, *China Suspends “Dirty” Projects for Violating Environmental Rules*, WORLDWATCH INST., Jan. 16, 2007, <http://www.worldwatch.org/node/4857>.

142. *See, e.g.*, Zhong *supra* note 73.

143. *Id.* at 7.

144. Press Release, China State Environmental Protection Administration, Green GDP Accounting Study Report 2004 Issued (Sept. 11, 2006), [http://english.gov.cn/2006-09/11/content\\_384596.htm](http://english.gov.cn/2006-09/11/content_384596.htm) (last visited March 11, 2011).



law, adding thirty articles and altering many existing provisions.<sup>145</sup> At the same time, however, much of the fundamental architecture of the original law remains in place. These revisions can be understood as an attempt to improve the existing regime, rather than offer a wholesale replacement.<sup>146</sup>

Several provisions of the updated law are important but do not significantly affect the balance of authority between the national and subnational levels (see, for example, the provisions which heighten penalties). EPBs and subnational governments continue to be critical to water pollution control—they remain the primary bodies for information collection and enforcement that is at the heart of the regime. The 2008 Amendments take some steps to help EPBs carry out these roles, such as clarifying their authority to conduct on-site inspections,<sup>147</sup> and establishing clear obligations for firms to collect and report their emissions<sup>148</sup> and to discharge pollutants through technologies that are more readily monitored.<sup>149</sup> Even with its new status as the Ministry of Environmental Protection, the central state environmental authority still must rely heavily on subnational and local actors to carry out key responsibilities.

## B. Total Emission Control System

Article 18 of the 2008 LPCWP, which establishes the Total Emission Control (TEC) system, creates an important mechanism to shift the incentives of subnational authorities. Under this provision, MEP is charged with creating maximum authorized levels of total emissions of regulated pollutants at the regional level.<sup>150</sup> After the national government sets the total emissions budget, the highest levels of subnational governments are charged with allocating responsibilities within lower tiers of government, which in turn allocate targets to firms within their respective jurisdictions.<sup>151</sup>

The TEC system, which institutionalizes the regional permitting restrictions created by SEPA,<sup>152</sup> authorizes the imposition of significant penalties to discipline authorities who fail to meet their obligations under the law. Article 18 stipulates that for those regions that have “exceeded the target” of the TEC system, the “relevant environmental protection authorities . . . shall suspend examination and approval of environmental impact assessment documents for new constructions projects” that would increase

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145. For example, a small but important change in the new version of the law includes a new goal of “maintaining the safety of drinking water,” which underlines the severity of China’s water pollution problem. Compare 2008 LPCWP, *supra* note 53, art. 1, with 1996 LPCWP, *supra* note 52, art. 1. Some provisions that had proven irrelevant or difficult to enforce were struck. See, e.g., 1996 LPCWP, *supra* note 52, art. 11 (industrial planning); *id.* art. 16 (pre-cursor of Total Emissions System).

146. See Winalski, *supra* note 14, at 188.

147. 1996 LPCWP, *supra* note 52, art. 27.

148. *Id.* art. 20.

149. *Id.* arts. 22, 23.

150. *Id.* art. 18.

151. 2008 LPCWP, *supra* note 53, art. 18.

152. See *supra* notes 140–141 and accompanying text.

total emissions levels.<sup>153</sup> This section works with article 17 and other Chinese environmental laws that prevent “new construction, expansion or reconstruction projects” without a completed environmental impact statement. In addition, the law instructs MEP to publish a list of those areas that have failed to meet their obligations under the TEC system.<sup>154</sup>

The TEC system has the potential to align the incentives of subnational actors more closely with environmental performance. Proponents of decentralization have identified “hard budget constraint[s]” as a key element of the market-preserving federalism that can help facilitate economic development.<sup>155</sup> Without these constraints, governments have less incentive to manage resources wisely or to support the economic development that can generate increased revenue. The TEC system creates a set of environmental constraints that encourage local actors to manage discharges more efficiently. Specifically, it creates a scare resource (total discharges) that local actors should allocate to the firms with the highest productivity, maximizing the economic return per unit of pollution. The set of incentives faced by subnational actors to achieve economic development underlies the potential effectiveness of the TEC system.

There are some similarities between the TEC system and mechanisms used elsewhere. The total maximum daily load (TMDL) provisions of the U.S. Clean Water Act have a similar focus on total emissions. But an important difference from the TEC system is that discharge limits are set on the basis of administrative regions, rather than natural hydrological units such as water bodies. Instead of attempting to develop a fine-grained tool for attaining water quality standards for specific areas, the TEC system attempts to reduce aggregate emissions at the jurisdictional level.<sup>156</sup> In this way, there are also similarities with the U.S. Clean Air Act National Ambient Air Quality Standard provisions for State Implementation Plans (SIPs). In both the TEC system and SIP process, the national government identifies goals to be achieved at the jurisdictional level and then gives the subnational authorities great discretion for achieving those goals.<sup>157</sup>

The TEC system can be thought of as a middle path between a broad permitting mechanism and an individualized water body approach. The administrative and information processing requirements of the TEC system, for both central and subnational actors, are significantly less than those of the TMDL; characterization of water bodies and the establishment of individualized discharge limits—which represent a vast analytic under-

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153. *Id.*

154. *Id.* art. 19.

155. Barry R. Weingast, *The Economic Role of Political Institutions: Market-Preserving Federalism and Economic Development*, 11 J. L. ECON. & ORG. 1, 4 (1995).

156. Cf. A. Denny Ellerman, *Designing a Tradable Permit System to Control SO<sub>2</sub> Emissions in China: Principles and Practice*, 23 ENERGY J., No. 2, at 1, 7-8 (2002) (noting that under TEC system national limit for air pollutant SO<sub>2</sub> was allocated among regions).

157. *Id.* at 3.

taking<sup>158</sup>—are not necessary. The TEC system, however, allows for a significant degree of tailoring to achieve lower-cost emissions reductions.<sup>159</sup> The central government could achieve the same environmental effect (in terms of total emission reductions) by lowering the allowable emissions for all facilities. Under the TEC system, on the other hand, local actors can allocate emissions reduction expenses to the lowest cost facilities, attaining the same environmental benefit with fewer negative economic impacts.<sup>160</sup>

Although the TEC system represents an important innovation, there are several gaps and vulnerabilities that could undermine its effectiveness. The most important potential vulnerability involves the information collection responsibilities of EPBs. The new limits on total discharges are ultimately limits on reported discharges. Given the potential penalties for failing to meet the TEC targets, EPBs will have substantial incentives to underreport emissions or fail to aggressively pursue additional reports from recalcitrant facilities.

Another important potential vulnerability involves the criteria that will be used for setting TEC targets. Under water quality-based systems, the current impairment and water quality goals provide sufficient information to set discharge standards. Without some analogous criteria, the targets set by the TEC run the risk of being arbitrary.<sup>161</sup> Although the penalties for failure to attain the targets may be enough to incentivize subnational authorities to meet their goals, if the TEC targets are viewed as arbitrary, the normative pull of the standards and their usefulness for public disclosure pressure and in informal bargaining situations may be reduced.

A final important potential vulnerability of the TEC system is that it does not create additional incentives for subnational authorities to go beyond the TEC targets. Once the targets are met, the threat of the penalty is removed, and there is no system of rewards that would encourage further progress. This puts a greater burden on central authorities to set optimal TEC targets. In the absence of inter-jurisdictional trading, water pollution

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158. As discussed above, the U.S. EPA estimates that governments will spend roughly \$2 billion in administrative costs to develop TMDL standards. TMDL HANDBOOK, *supra* note 100.

159. Cf. Jintian Yang & Jeremy Schreifels, *Implementing SO<sub>2</sub> Emissions in China*, OECD GLOBAL FORUM ON SUSTAINABLE DEVELOPMENT: EMISSIONS TRADING, CONCERTED ACTION ON TRADEABLE EMISSIONS PERMITS COUNTRY FORUM, OECD Headquarters, Paris (Mar. 17-18, 2003) (discussing SEPA-era experiments in regional trading schemes under the TEC system).

160. For example, MEP has sanctioned experiments in setting regional water quality standards and Jiangsu province has begun experimenting in trading emissions rights along the Taihu Lake basin. See PEI-YU TAI & LINDEN ELLIS, CHINA ENVTL. HEALTH PROJECT, TAIHU: GREEN WASH OR GREEN CLEAN? (2008), [http://www.wilsoncenter.org/topics/docs/taihu\\_oct08.pdf](http://www.wilsoncenter.org/topics/docs/taihu_oct08.pdf); *China Overhauls Emission Rights in Lake Taihu Basin*, CHINACSR.COM, Aug. 18, 2008, <http://www.chinacsr.com/en/2008/08/18/2858-china-overhauls-emission-rights-in-lake-taihu-basin/>.

161. Cf. Canfa Wang & Edwin D. Ongley, *Transjurisdictional Water Pollution Management: The Huai River Example*, 29 WATER INT'L 290, 297 (2004) (discussing past instances where SEPA has set “[u]nrealistic pollution control targets that are often established as a bureaucratic exercise without consideration of actual conditions or of water quality/quantity considerations”).

abatement costs are likely to differ, unless the central government can perfectly predict abatement costs when setting TEC targets. In these cases, there will be lower-cost abatement opportunities that will lie fallow while higher-cost abatement is undertaken elsewhere. To achieve the greatest pollution reduction at the lowest costs, marginal abatement costs must be equalized across regions, a condition that the TEC system is not well suited to achieve.<sup>162</sup>

### C. Bureaucratic Evaluation

A second important reform in the 2008 Amendments is contained in articles 4 and 5, which create more robust responsibility for environmental outcomes under the bureaucratic evaluation system. Article 4 states that “[l]ocal people’s governments at or above the county level shall take approaches and measures for preventing and controlling water pollution, and shall be responsible for the quality of the water environment within their respective administrative regions.”<sup>163</sup> Article 5 requires that the national government “implement[ ] an accountability and evaluation system for the target of water environmental protection whereby the fulfillment of water environmental protection targets constitutes a part of the performance evaluation of local people’s governments or their responsible persons.”<sup>164</sup>

As discussed above, there is controversy over whether the main driver of the “helping-hand” role for local governments during the Chinese economic expansion was due to market-preserving federalism and inter-jurisdictional competition, or whether the centralized system of bureaucratic control was the mechanism that provided the rewards and punishments that spurred subnational governments to pursue market development. To the extent that the bureaucratic evaluation system is effective at providing rewards and punishments for government authorities, an expanded role for environmental criteria leverages this system to align the incentives of officials with environmental outcomes.

The evaluation system could prove to be a particularly important supplement to the river basin planning mechanism within the LPCWP. As under the E.U. Water Framework Directive, article 15 of the LPCWP (which was added to the law as part of the 1996 revisions) creates a procedure for the development of systematic plans at the river basin level to achieve water quality goals through “pollution prevention and treatment.”<sup>165</sup> For major water bodies, the central environmental authority is charged with creating a plan; for other rivers with cross-jurisdictional char-

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162. Cf. Chad Stone, *Addressing the Impact of Climate Change Legislation on Low-Income Households*, 40 ENVTL. L. REP. NEWS & ANALYSIS 10555, 10557 n.9 (2010) (contrasting effect of rulemaking and market-based approaches on marginal abatement costs).

163. 2008 LPCWP, *supra* note 53, art. 4.

164. *Id.* art. 5. Also noteworthy are the increased penalties for polluters. See, e.g., *id.* art. 83 (holding enterprise heads directly liable for causing serious water pollution incidents and fining them up to half of their income from previous year).

165. *Id.* art. 15.

acteristics, higher level authorities as well as the relevant jurisdictions create the plans jointly. These plans, “once approved, shall constitute the fundamental basis” for water pollution control.<sup>166</sup>

The E.U. WFD has been criticized for an overly broad delegation of discretion to the Member states, a problem that may be exacerbated in inter-jurisdictional contexts where costs for pollution abatement must be allocated between parties. For the planning process to operate smoothly, mechanisms must be in place both to ensure the good faith cooperation of the relevant parties and to resolve the inevitable disputes.<sup>167</sup> The participation of the central and higher level authorities in the article 15 planning process, with the carrot and stick generated by the evaluation system, has the potential to facilitate dispute resolution and create incentives for officials at least to appear to be engaged in good-faith planning.<sup>168</sup> Whereas the WFD primarily creates a procedure for planning and relies on public participation and norms to generate compliance, the evaluation system could give authorities additional tools to provide bureaucratic incentives for participation.

Some of the same challenges faced by the TEC may also apply to the bureaucratic evaluation system. Most importantly, if officials face sanctions for failing to meet water quality targets, there will be fewer incentives to collect fully accurate information on discharges and water quality performance. As government officials face increasing scrutiny on the basis of water pollution criteria, there will be increasing risk that the reliance on EPBs for information gathering will undermine the system.<sup>169</sup>

An additional problem arises when some elements of bureaucratic evaluation, such as market development, conflict with others, such as environmental protection.<sup>170</sup> In these cases, officials must make trade-offs between various goods. In the absence of official guidance on how to balance environmental protection with economic development, subnational authorities are forced to operate in a condition of uncertainty not only about the best policies to achieve the stated goals, but also about the relative priority of the goals.

This problem is compounded if the central government does not always speak with one voice with respect to environmental issues. Scholars have introduced the “fragmented authoritarian model” to describe how

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166. *Id.*

167. See Xuejun Wang & Edwin D. Ongley, *Transjurisdictional Water Pollution Disputes and Measures of Resolution: Examples from the Yellow River Basin, China*, 29 *WATER INT'L* 282, 287-88 (2004) (noting, in the context of transjurisdictional pollution resolution, the essentiality of dispute mechanisms that resolve irreconcilable differences and facilitate coordination).

168. This is assuming the evaluation system accounts for activities undertaken during the planning process as well as the achievement of the resulting objectives.

169. See Yongqin Wang et. al., *The Costs and Benefits of Federalism, Chinese Style, in ECONOMIC TRANSITIONS WITH CHINESE CHARACTERISTICS: THIRTY YEARS OF REFORM AND OPENING UP*, 141, 145-46 (Arthur Sweetman & Jun Zhang eds., 2009) (noting how acquiring absolute data to evaluate officials is difficult to acquire and that incentive-based system can lead to sabotaging competition among agents).

170. *Id.* at 146.

“China’s bureaucratic ranking system combines with the functional division of authority among various bureaucracies to produce a situation in which it is often necessary to achieve agreement among an array of bodies, where no single body has authority over the others.”<sup>171</sup> Where agreement is difficult to achieve, or different ministries have competing priorities, the result can be persistent ambiguity.<sup>172</sup> In the water pollution context, scholars have found that a lack of coordination between ministries has caused “profound problems of legal, institutional, and operational overlaps, ambiguities, and confrontation.”<sup>173</sup> In these cases, it can be especially hard for subnational authorities to identify the correct balance between competing priorities or for these authorities, or even outside observers, to know when such balance has been struck.

## V. Recommendations for Implementation and Future Reforms

Part V discusses additional steps that can be taken to address shortfalls and challenges in China’s water pollution control regime.

### A. National Level Implementation

When evaluating the 2008 Amendments, it is important to remember that they do not exist in a vacuum, but rather are only part of the complex system of political control that exists in China. For example, the five-year planning process provides key guidance to both central and subnational authorities, and the two important reforms discussed above have precursors either in those plans or in other administrative or legal actions.<sup>174</sup> The media plays an important role in rewarding and disciplining officials. Other informal systems of sanctions are no doubt significant in shaping the behavior of subnational authorities. The two reforms discussed above, then, tend to represent a legalistic means of allocating authority, which are not necessarily the most relevant or important.

Nevertheless, these reforms represent significant advances. They activate the two most broadly recognized mechanisms for incentivizing subnational authorities in China: budget constraints, and bureaucratic evaluation and advancement.<sup>175</sup> Although it is far too early to know

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171. Kenneth G. Lieberthal, *Introduction: The ‘Fragmented Authoritarianism’ Model and Its Limitations*, in BUREAUCRACY, POLITICS, AND DECISION MAKING IN POST-MAO CHINA 1, 8 (Kenneth G. Lieberthal & David M. Lampton eds., 1992); see also Andrew Mertha, *‘Fragmented Authoritarianism 2.0’: Political Pluralization in the Chinese Policy Process*, 200 CHINA Q. 995, 996 (2009) (arguing that bureaucratic decision making has become “increasingly pluralized” and involves more diverse set of actors).

172. See Wang & Ongley, *supra* note 161, at 293–97 (noting that conflicting interests of provincial governments and agencies, along with transjurisdictional hurdles and lack of clear standards for water quality, frustrate basin-wide planning efforts).

173. See Ongley & Wang, *supra* note 74, at 272.

174. See generally Zhong, *supra* note 73 (discussing planning process); see also *supra* Part II.C.

175. See Wang & Ongley, *supra* note 167, at 284 (noting that Chinese environmental protection agencies are “are highly susceptible to pressure from protectionist local gov-

whether these mechanisms will be successful, they have worked in the past to facilitate a “helping hand” in the context of economic development.

There are several steps that can be taken at the central level to facilitate the success of these new measures. Clarity within the national ministries about the importance of environmental issues would send fewer mixed signals to subnational authorities. To the extent that national political and bureaucratic actors benefit from positive environmental outcomes, they will have incentives to ensure that subnational authorities appropriately consider the environmental effects of their decisions. If ministries with seemingly opposed goals, like economic development and environmental protection, are at odds when dealing with subnational officials, it complicates bargaining and causes confusion.<sup>176</sup> On the other hand, if environmental and non-environmental ministries share responsibility for, and benefit from, achieving environmental outcomes, this kind of inter-ministry fragmentation can be eased.

The river basin planning process, which is central to the ability of law to address complex water pollution threats such as agricultural run-off, must also ultimately be led from the national level. Especially for inter-jurisdictional water bodies, the participation of national level officials can help break logjams between parties and facilitate negotiation over the allocation of pollution reduction responsibilities.<sup>177</sup>

These plans also provide an opportunity for national officials to address some of the regional disparities that hamper water pollution control. For several of the major Chinese rivers, upriver provinces in the Western portion of the country have higher levels of poverty and lower levels of development.<sup>178</sup> Moreover, their geographic location prevents them from receiving all (or even most) of the benefits associated with pollution control.<sup>179</sup> River basin planning can also include compensatory mechanisms for upriver districts, or trading mechanisms to allocate pollution reduction at the lowest cost, while allowing allocation of rights to less-developed provinces. These types of mechanisms to incentivize inter-jurisdictional cooperation are far more likely to be undertaken if facilitated at the

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ernments through existing administrative and budgetary mechanisms and is one of the causes of transjurisdictional water pollution disputes”).

176. See *supra* note 167 and accompanying text.

177. See David M. Lampton, *A Plum for a Peach: Bargaining, Interest, and Bureaucratic Politics in China*, in *BUREAUCRACY, POLITICS, AND DECISION MAKING IN POST-MAO CHINA* 33, 34–35 (Kenneth G. Lieberthal & David M. Lampton eds., 1992) (noting that when senior authoritative leaders do not intervene, bargaining persists between proximate persons of equal rank).

178. See Information Office of the State Council, *The Development-oriented Poverty Reduction Program for Rural China* (Oct. 15, 2001), [http://www.gov.cn/english/official/2005-07/27/content\\_17712.htm](http://www.gov.cn/english/official/2005-07/27/content_17712.htm) (last visited Sept. 4, 2010) (“Of the 592 poverty-stricken counties named by the Chinese Government on its priority poverty relief list in 1994, 82 percent are situated in the central and western regions.”).

179. See generally Carly Taylor Mercer, *The Regional Outsourcing of Pollution: Investigating Urban and Rural Discrepancies in Industrialization and Environmental Degradation in China* (June, 2010) (unpublished B.A. thesis, Ohio University) (on file with the Ohio University Library system).

national level.<sup>180</sup>

## B. Information and Penalties

Both of the new reforms—what we have categorized as legal and bureaucratic incentives to prioritize environmental objectives—rely heavily on information generated at the local level. If that information is inaccurate, the effectiveness of the reforms will be severely undermined.<sup>181</sup> This concern is exacerbated because of known flaws in the information collection system<sup>182</sup> and the fact that, if anything, these reforms reduce incentives to collect accurate information. Without additional steps to shore up information collection, these reforms may ultimately be unable to create a significant improvement in water pollution control.

The most straightforward way to close this gap would be to increase the role of central authorities in information collection and aggregation. Unfortunately, MEP faces serious budget constraints and is unlikely to be able to significantly expand its operations to make up for serious failings of EPBs.<sup>183</sup> There are, however, relatively low cost administrative options that are available. Through an expanded use of information technology, disclosures (of at least major emitters) can be made to both EPBs and MEP simultaneously. This information can be held in a central database, allowing both EPBs and MEP to establish randomized monitoring routines. Furthermore, failure to report disclosures should be accompanied by significant penalties in order to give facilities sufficient incentive to comply. This information could also be released to the public, and residents (and even employees) could be given a financial incentive to report discharges that have not been disclosed—or at least be protected from reprisal.<sup>184</sup> All of these mechanisms mirror programs that are in place elsewhere—such as the toxics release inventory in the United States—all of which have proven effective.<sup>185</sup>

The penalty structure in the TEC is also an important area for reform. In its current form, there are draconian penalties for failure to comply with

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180. See Bhajan Grewal, *Intergovernmental Fiscal Transfers for China's Harmonious Society*, 8 PUB. FIN. & MGMT. 602, 604 (2008).

181. Cf. Daniel Hering et al., *The European Water Framework Directive at the Age of 10: A Critical Review of the Achievements with Recommendations for the Future*, 408 SCI. TOTAL ENV'T 4007 (2010) (stressing importance of comprehensive monitoring in order to fulfill WFD objectives).

182. See, e.g., Zhong *supra* note 73, at 29 (finding in assessment of implementation of water pollution prevention and control plan from Huai river basin that “under the pressures of responsibility assessment for different departments, different self-assessing bodies sometimes provided equivocal and false information”).

183. See Grzegorz Peszko, *Innovative Mechanisms to Manage Public Environmental Expenditure in the Countries Undergoing Transition to Market Economy (CEE, NIS, China)* (OECD Environment Directorate Working Paper, 2002), available at <http://www.oecd.org/dataoecd/18/15/2080937.pdf>.

184. Cf. 33 U.S.C. § 1367 (2006) (providing whistleblower protection under Clean Water Act).

185. Tom Tietenberg, *Disclosure Strategies for Pollution Control*, 11 ENVTL. RESOURCE ECON. 587, 593 (1998).



TEC targets and no incentive to go further. Although very strong penalties should have very strong deterrent effects, officials at the national level may be hesitant to impose such penalties.<sup>186</sup> Imposing a costly penalty on a province because of failure to meet water quality standards is sure to generate political opposition, both from local actors and from national institutions charged with promoting economic growth.

A variety of mechanism can be used to create a more proportional system. Systems of grants and other rewards—such as expedited EIS approval—can be established for authorities that exceed their TEC. There can also be a range of interim measures, short of full suspension of EIS approval, which can be implemented. Although this is likely to occur informally, there may be a benefit to establishing formal increasing penalties for non-compliance, including reductions in future TECs, greater central control over EPBs in recalcitrant regions, or the imposition of stricter discharge limits at the central level. In addition, an “offset” provision, which would require new projects in non-compliant areas to achieve emissions reductions elsewhere before EIS approval, could help mitigate some of the negative political impacts of the regime, while still achieving water pollution improvements. Full suspension of EIS approval is likely to be reserved for only the most extreme situations, and a regime of proportionally increasing penalties, supplemented by grants and other fiscal rewards, could provide a more complete set of incentives.

### C. Cost-Benefit Analysis

An important additional step to consider is greater integration of cost-benefit analysis into administrative decision making. As a preliminary step, MEP can use cost-benefit analysis as a tool to help set TECs and discharge limits at the national level. Cost-benefit analysis as a tool for environmental decision making is firmly entrenched in the United States and Europe and is taking on an expanded role in developing countries.<sup>187</sup> The goal of cost-benefit analysis is to help officials balance competing demands by estimating the effects of regulatory choices and comparing them along a common dimension, usually monetary.<sup>188</sup> There are several advantages to using cost-benefit analysis to help set TECs, including added transparency, explicit accounting for the range of environmental and economic values implicated by the standards, and the collection and presentation of available relevant information.<sup>189</sup> Use of cost-benefit analysis can also help legitimize the new standards by demonstrating that they were developed through a systematic and neutral process that weighed a variety of competing considerations.

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186. See Gary S. Becker, *Crime and Punishment: An Economic Approach*, 76 J. POL. ECON. 169, 183–84 (1968).

187. Michael A. Livermore, *Can Cost-Benefit Analysis Go Global?*, N.Y.U. ENVTL. L.J. (forthcoming 2011).

188. See generally, U.S. ENVTL. PROT. AGENCY, GUIDELINES FOR PREPARING ECONOMIC ANALYSES (2010) [hereinafter ECONOMIC ANALYSES].

189. Livermore, *supra* note 187.

Cost-benefit analysis can also be used to help overcome challenges in the bureaucratic evaluation process. Cost-benefit analysis is well suited to help address the problem of “multi-dimensionality,” where officials face competing interests and concerns. The standard cost-benefit goal is to select policies that maximize net benefits, where both benefits and costs are determined by willingness-to-pay criteria.<sup>190</sup> In these cases, willingness-to-pay for clean water would be compared to abatement costs, and the goal would be to equalize the marginal costs and benefits of pollution control.

There are several ways that China can integrate cost-benefit analysis into its decision making structures. For example, the policies of subnational authorities could be evaluated on the basis of cost-benefit criteria. Alternatively, subnational authorities could be encouraged to adopt decision making mechanisms that incorporate cost-benefit analysis where appropriate and could be evaluated based on how well subnational authorities carry out that mandate. In both the United States and Europe, there are central mechanisms to review the analyses that administrative agencies conduct.<sup>191</sup> These central reviewers play the role of encouraging rigorous analysis, establishing analytic norms and practices, and working closely with agencies to identify and disseminate best practices. Central authorities could play a similar role in China, taking the additional step of establishing more directly the methodologies and default values that should be used—for example, by identifying the appropriate discount rates or values of environmental risks that local governments should use. Incorporation of cost-benefit analysis in these ways could help facilitate balancing between different values within the bureaucratic evaluation process.

China also has a history of regulatory experimentation,<sup>192</sup> which could be augmented by the use of cost-benefit analysis as a way of evaluating the success or failure of regulatory steps. In both the environmental and economic context, new reforms are often carried out at the provincial level on a pilot basis to determine whether they should be expanded to the national level.<sup>193</sup> Expanded use of cost-benefit analysis could facilitate a more formal and systematic way of evaluating these experimental steps, to determine if they should be continued or if new approaches are needed.

## Conclusion

As China’s approach to water pollution evolves, striking the right balance between discretion for subnational authorities and control by the

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190. See ECONOMIC ANALYSES, *supra* note 188 at A-7-A-9.

191. Livermore, *supra* note 187.

192. Cf. Michael Greenstone, *Toward a Culture of Persistent Regulatory Experimentation and Evaluation*, in NEW PERSPECTIVES ON REGULATION 111 (David Moss & John Cisternino eds., 2009) (arguing for increased regulatory experimentation in the United States); Daniel A. Farber, *Environmental Protection as a Learning Experience*, 27 LOY. L.A. L. REV. 791, 801 (1994) (discussing state experimentation in environmental regulation in United States).

193. See Qian, Roland & Xu, *supra* note 45.

national government will continue to constitute a significant challenge. This Essay has focused in particular on mechanisms capable of creating appropriate incentives for subnational actors to pursue environmental goals. Scholars who have examined the productive role that subnational governments played in China's economic expansion have identified two important incentive structures that facilitated a "helping-hand" role for local governments: market-preserving federalism and the role of economic development as a criterion of bureaucratic evaluation. In light of recent changes in its water pollution control law, China has institutionalized analogs of these mechanisms in the environmental context—their measure of success will be whether, and how much, subnational officials change their behavior in light of these new incentive structures.

Although these reforms are important developments, there remain significant challenges that should be addressed during implementation of the new law or through future reforms. Important to the success of the new law will be ensuring the productive participation of national officials (by tying their fortunes to environmental performance and reducing intra-bureaucratic tensions), expanding river basin planning, and experimenting with compensation mechanisms and trading to reduce regional disparities. In addition, information collection, the creation of more proportional penalties for non-compliant subnational actors, and an expanded role for cost-benefit analysis can help alleviate some of the shortfalls of the existing law.

