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Insight, part of a Special Feature on Deeper Water: Exploring Barriers and Opportunities for the Emergence of Adaptive Water Governance

The role of the Yangtze River Protection Law in the emergence of adaptive water governance in China

Ruoying Li[1] *and Wang Jin*[1]

ABSTRACT. The Yangtze River Basin faces unprecedented challenges in harmonizing competing interests in its ecological and social systems. The central government of China, in response to the need for change in governance arrangements and cooperation, passed the Yangtze River Protection Law. It is China's first legislation at the basin scale and for a specific river basin. Ecological disturbances caused by industrial and other human activity, followed by political support for environmental protection, catalyzed the passage of this law. As the first tentative effort to regulate a complex and changing social-ecological system, it has incorporated multiple legal and institutional design principles identified in the adaptive governance and law scholarship: scaled approaches to social-ecological systems, cooperation to address geographical and sectoral fragmentation, and participatory capacity. These commonalities show that designs are fundamental to tackle geographic and sectoral fragmentation of complex systems and catalyze the emergence of adaptive water governance.

Key Words: *adaptive governance; China; river basin law; water governance; Yangtze River Protection Law*

INTRODUCTION

The Yangtze River of China is the third-largest river in the world. People have lived in, adapted to, and modified the Yangtze River basin (YRB) for millennia, transforming it into a unique social-ecological system (SES) that is irreplaceable for its role in the economic and social development of China (Yan and Qian 2004, Lü and You 2020). The relationship between society and ecology in the YRB is, however, undergoing unprecedented and profound changes as years of excessive exploitation and pollution have accelerated unsustainable natural resource use patterns and eroded ecological resilience. Damming, sluice construction, legal overfishing and illegal fishing, water pollution, water resources diverted for agricultural irrigation and human consumption, and vessel navigation are only some examples of ecosystem functions modified for the service of humans (Zhang et al. 2008). Unsurprisingly, human activities, including rapid economic change, have caused large perturbations, such as widespread decline in fisheries, severe overall stress, and interruption of ecological rhythms and functions of the YRB (Qiu 2012, World Wildlife Fund (WWF) 2020). Changes in the ecological system, in turn, have had major impacts on the social aspects of the YRB, such as conflicts over water supply and water quality for agricultural, industrial, and domestic purposes (Jiang 2009, Liu et al. 2012), and conflict over resource use and allocation between upper, middle, and lower reaches (Chen 2020). Fisheries sustainability and biodiversity conservation in the Yangtze are also facing greater climatic challenges, in common with most major rivers worldwide (Vörösmarty et al. 2010, Zhang et al. 2008). There is, therefore, a need to confront problems with a broader perspective, namely at the basin scale, reduce the mismatches between ecological and social boundaries, and champion new approaches to water governance capable of adapting to the uncertainty and complexity of SESs.

Adaptive governance has been suggested as a suitable approach for managing uncertainty and complexity in SESs (Dietz et al. 2003, Schultz et al. 2015). Adaptive governance scholarship and theory building attempt to: (1) address landscape-scale problems as impacting SESs rather than ecosystems alone; (2) respond to these challenges in a flexible, dynamic, and responsive manner to adjust to complexity and unpredictability between system components and interactions; and (3) identify principles common to SESs to better understand (and promote when appropriate) the emergence and institutionalization of adaptive governance (Folke et al. 2005, Chaffin et al. 2014a, Chaffin and Gunderson 2016). Adaptive governance may emerge through formal and informal networks, and law can support the emergence of adaptive governance and serve as a bridge toward the institutionalization of adaptive governance (Cosens et al. 2018, Gunderson et al. 2018).

In the context of the YRB, long-standing pollution, loss of biodiversity, environmental degradation, and other disturbances, followed by political support for river protection of Chinese leaders, catalyzed the passage of the Yangtze River Protection Law (hereinafter the YRPL). This is China's first legislation at the basin scale and for a specific river basin. It offers a concrete "model" law for analysis in the literature of adaptive governance and law. This article takes a preliminary look at the YRPL and confirms the presence of several attributes in the literature of adaptive governance on law: (1) it is a law congruent to biophysical boundaries that vests legal authorities and imposes legal responsibilities on agencies and local governments within defined biophysical boundaries; (2) it establishes an interagency mechanism to address geographical and sectoral fragmentation; and (3) it enhances participatory capacity. This article aims to advance understanding of the dynamic between law and adaptive governance in the Chinese contexts and lays the foundation for further research into the implications of legal designs on SES governance.

ADAPTIVE GOVERNANCE, CHINA, AND LAW

Social and ecological systems do not exist in isolation, but instead are mutually dependent and nested across scales (Berkes and Folke 1998). Traditional governance arrangements often suffer from coordination problems across complex geographies, e.g., large river basins. Their response to environmental degradation and expansion of human activities has often been insufficient,

[1]Peking University Law School

flawed, or not adapted to match the speed of change in SESs (Chaffin et al. 2014*a*). As a result, aligning adaptability of governance with feedbacks from SESs is of paramount importance to manage resilience of SESs and establish sustainable patterns of natural resource use (Allen et al. 2019). Adaptive governance arose as an alternative type of environmental governance as it recognizes uncertainty and complexity in policy design and implementation of SESs and can better meet societal goals of maintaining larger-scale system dynamics (Dietz et al. 2003, Folke et al. 2005, Olsson et al. 2006, 2008). Theoretical and empirical exploration of adaptive governance emerged from multiple strains of research and disciplines (Chaffin et al. 2014*a*, 2016, Chaffin and Gunderson 2016). Adaptive governance theories in two disciplines are of specific relevance for this work, namely in political science in the context of China (Heilmann and Perry 2011) and law (Ebbesson and Hey 2013, Garmestani et al. 2013, Cosens et al. 2014, 2017, DeCaro et al. 2017).

Adaptive Governance and China

In the Chinese political context, a growing body of literature has examined the adaptive capacities of China's state governance system, with many concluding that China's resilience, particularly the resilience of the Chinese Communist regime, has helped China persist when other regimes have fallen (Perry and Heilmann 2011). China's rapid economic and social development (Xue et al. 2018) and its environmental cadre evaluation system (Wang 2013) are case studies illustrating this adaptive governance approach, which is marked by continual pilot experimentation, feedback loops for problem identification, and flexible adjustment of priorities and responses for managing sudden change and uncertainty. When faced with myriad economic and social challenges that threaten state legitimacy, Chinese leaders were adept in adjusting to the perceived crises instead of relying on rigid top-down directives (Nathan 2003, Heilmann and Perry 2011). For the first three decades of the "reform and opening" period that began in the 1970s, important bottom-up input and local knowledge, facilitated by open-ended experimentation (Wang 2009) led to sustained economic growth and social stability, which in turn ensured the Chinese Party-state's performance legitimacy (Heilmann and Perry 2011). With the increasing threat of environmental quality problems to state legitimacy, the China Communist Party has continued to apply its adaptive capacities on environmental issues to sustain resilience and legitimacy to the Chinese people.

The positive results of China's environmental governance in recent years are often traced to state-led environmentalism, that is, environmental policy and plans advanced by the national leaders have had more effects on improving environmental protection than environmental laws (Eaton and Kostka 2014, Li et al. 2019). They become prevalent after the Second Plenary Session of the 18th Central Committee of the China Communist Party and with the elevation of ecological civilization to the position of a paramount objective of the country in 2012. For instance, China's system for top-down bureaucratic personnel evaluation and environmental targets have worked well to rapidly mobilize state and social actors for environmental protection (Gilley 2012, Wang 2013). However, excessive reliance on environmental politics unchecked by legal authorization and regulation also risks producing weak institutionalization and arbitrary "rule of man." For example, local officials, who typically have short terms in office, are not incentivized to pursue costly and long-term governance approaches; tying environmental targets to political accomplishments has led to short-sighted environmental policies and policy implementation and can inhibit long-term sustainable development (Eaton and Kostka 2014). Striving to deliver political accomplishments has also contributed to negative and unintended consequences, such as local authorities overcomplying with centrally mandated targets of switching from coal to gas, to the detriment of ordinary citizens left without heat in winter (Li and Shapiro 2020) As a result, Chinese leaders seek to legalize and institutionalize Party activities and the operation of state institutions for the purpose of harnessing the organizational and legitimizing capacities of the law (Zhang and Ginsburg 2019).

The increasing commitment to legality in the Xi era is reflected in the China Communist Party congresses, meetings, and documents (Creemers and Trevaskes 2021) and in several core legal institutions, including the judiciary and the constitution (Zhang and Ginsburg 2019). For the Party leadership, imposing legality upon governmental behavior is one of the most effective ways to ensure that their commands will be faithfully carried out in local administration (Zhang and Ginsburg 2019), but at the same time, the Party values flexibility for its leadership. Part of this flexibility is reflected in the experimental policy-making process conducted by local officials that has allowed China to adapt to new challenges. In the past, legislation was the result of this long process of trial, error, and adaptation, but experiments without a reliable legal basis are also heavily criticized (Heilmann 2008). Thus, the role of the law for institutionalizing the adaptive capacities and processes in a way that enhances legitimacy and accountability is itself under constant evolution in China.

Adaptive Governance and Law

The emergence and potential institutionalization of adaptive governance is becoming more frequently recognized (Chaffin and Gunderson 2016). Among other triggers, legal and institutional oversight or built-in mechanisms in law are argued to facilitate or improve adaptive governance (Ruhl 2011, Arnold and Gunderson 2013). The importance of law is summarized by Gunderson and Cosens (2018) as establishing boundaries and signaling approaching thresholds, creating conditions for new and possibly collaborative approaches to governance, and providing development avenues for new process tools. According to Cosens et al. (2018), law also plays a different role in three stages through which adaptive governance emerges: (1) when windows of opportunity for change open, (2) when adaptive governance emerges, and (3) when change is institutionalized.

A few attributes of governance in theory have been identified as likely to lead to the emergence and acceptance of adaptive governance, and some of them may be facilitated by legislation. First, the emergence of adaptive governance could be initiated by a crisis, collapse, or release event in an SES (Chaffin and Gunderson 2016). Existing environmental governance regimes that are too rigid lose resilience to disturbances. Adaptive governance, with an emphasis on a flexible governance system to shift and change with feedbacks from both the social and biophysical parts of the system (Chaffin et al. 2016), provides the capacity to confront rapid ecological change (Chaffin and Gunderson 2016). Thus, first, legislation should be congruent with ecological conditions and boundaries (Dietz et al. 2003), and in the water governance context, with hydrologic boundaries

(Huitema et al. 2009). Second, legislation has a role to play in recognizing affected stakeholders with authority to make decisions and carry out plans (DeCaro et al. 2017). Third, "[p]olycentric and multilayered institutions improve the fit between knowledge, action, and socio-ecological contexts in ways that allow societies to respond more adaptively at appropriate levels" (Lebel et al. 2006, Huitema et al. 2009). Legislation can motivate these multiple stakeholders to help resolve an environmental dilemma by formally vesting in them legally binding responsibilities (DeCaro et al. 2017) and by providing mandatory or enforceable timelines in administrative processes and the capacity for stakeholders to participate and influence outcomes. Fourth, interagency coordination and cooperation measures with cross-agency and cross-scale dimensions can facilitate adaptive governance (Keshitalo 2010, Gosnell et al. 2017). Fifth, participatory capacity increases capacity for adaptive decision making and cooperation (Ostrom 2014, as cited in DeCaro et al. 2017). DeCaro et al. (2017) outlined a preliminary and nonexhaustive list of candidate legal and institutional design principles as features of law that may further facilitate adaptive governance within complex SESs.

However, adaptive governance is also confronted with the paradox of balancing the need for increased flexibility with governance stability, such as unchanging rules (Craig et al. 2018). Current laws generally lack flexibility for managing resilience (Garmestani et al. 2014, 2019), and they rarely match the larger scale of environmental challenges, for example, cross-boundary water governance and climate change (Chaffin et al. 2014*b*). The question then is how to reconcile the robustness of the law with managing complex and transformative SESs. Given the uncertainties associated with global environmental change, including climate change and massive shifts in land use, environmental governance systems going forward must be highly adaptive. If possible, then law should promote and not reduce "persistence in the face of change so as to buffer capacity and withstand shocks", foster and not bar "adaptability and the capacity of people to manage resilience through collective action", enhance and not block "transformability, i.e., the capacity of people in a social-ecological system to create new ecological, political, social, or economic conditions and thereby override existing systems" (Ebbesson and Hey 2013).

The adaptive governance literature in both the political context of China and the law generally indicates the need to search for common principles and elements, in theory and practice, that can better support adaptation while enhancing governance legitimacy and accountability (Cosens 2013). In the context of water governance, this includes the seeking to discover the principles common to water systems as well as common elements of adaptive water governance. In this article, we argue that adaptive governance scholarship and theory building could greatly benefit the needs of China, and the Chinese experiences can advance and enrich adaptive governance theory building.

WHY ENACT LEGISLATION FOR THE YANGTZE RIVER BASIN?

Situated in the heart of China, the Yangtze River is the longest river in both China and Asia and an icon of the Chinese civilization. It flows for over 6300 km (3915 miles) from the glaciers in the Tibet Plateau eastward across southwest, central, and eastern China to the East China Sea (Wen et al. 2014). It is the water source for one-third of China's total population and accounts for half of China's GDP (WWF 2018). It is also rich in resources and biodiversity, and home to more than 300 freshwater fish species and subspecies (Fu et al. 2003). It is also of strategic importance to China's economic and social development as the key shipping artery connecting the eastern, central, and western parts of China (Chen et al. 2017). The YRB is thus one of the world's most ecologically and socioeconomically critical and complex river basins, but it is facing unprecedented challenges in harmonizing competing interests. The threat of the YRB environmental collapse and political support are shown to have led to the passage of the YRPL.

Inadequate Legislation to Solve Ecological Problems

Anthropogenic activities and intensive economic development have led to large environmental perturbations and severe overall stress in the YRB (Qiu 2012). The number of fish species has decreased by 30–50% (Chen et al. 2020, as cited in WWF 2020). The endangerment and decline of aquatic species, more than 30% of Yangtze fish species at the brink of extinction, and the decline of vertebrate biodiversity are all consequences attributable to factors such as illegal and excessive fishing and water pollution from industry (Mei et al. 2020). Reclamation of land, hunting, damming, and extensive aquaculture are threatening wintering waterbirds and their diversity (Wang et al. 2016). Eutrophication and algae blooms are becoming common in lakes and reservoirs along the river and they contribute to poor water quality and carbon emissions flux (Xiao et al. 2020). Forest loss, soil erosion, increased flooding, riverbed rises, serious urban waterlogging, longer heavy rainfall periods, and extreme weather events are only some of the possible climate change impacts (Ren 2019).

The reasons underlying these pollution, environmental degradation, and biodiversity issues are excessive human activities in the YRB. In 2014, more than 400,000 chemical companies, 5 major steel bases, 7 oil refineries, and 6000 sewage outlets of significant size were found along the river; wastewater disposal reached 300 billion tons, totaling almost half of the national quantity (Shi 2014). Due to unreasonable industrial structures, high pollution discharge per GDP, and pollution discharge from point and nonpoint sources exceeding the basin's environmental carrying capacity, the water quality of key lakes has greatly deteriorated (Zhang et al. 2008). Urbanization has been identified as the primary driver for 48% of the system changes (Kong et al. 2018), and along with industrialization, has reduced the living space of aquatic organisms (Duan et al. 2020).

The failure of the central and local governments to prevent pollution and environmental degradation in the YRB is the result of geographic, legal, and administrative fragmentation, which has created conflicts of power and rights between local governments as well as central and local agencies (Lü and You 2020). More than 30 laws and 10 administrative departments regulate different aspects of the YRB that relate to environmental protection, natural resources use, disasters prevention, infrastructure, etc. (Wei and Wang 2019). However, the implementation of this large body of laws and regulations is assigned to many agencies that are on the same power level with each other and with local governments. Hence, mismatches between biophysical and administrative levels have stifled water governance in the YRB because agencies on the same power level (such as the Ministry of Water Resources and the Ministry of Ecology and

Environment) do not have leverage over each other, nor over local governments. As a result, upstream and downstream agencies and governments face severe conflicts over water resources for drinking, irrigation, industrial and agricultural production, power generation, and shipping (Huang and Xu 2017). The existing laws and regulations are neither sufficiently specific or clear on how the central and local governments and administrative units at the same or different levels should interact and collaborate to better protect the YRB (Lü and You 2020), nor able to resolve the conflicts between economic development and environmental protection in the YRB (Wei and Wang 2019).

Window of Opportunity

The need to legislate for the YRB was proposed in the "Outline of Yangtze River Economic Belt Development Plan," published in March 2016 upon the approval of the Communist Party of China Central Committee Political Bureau. This was preceded by Chinese President Xi Jinping's speech at the symposium on promoting the development of the Yangtze River Economic Belt on 5 January 2016, where he stressed ecology, growth, and green development along the river. In 2018, Xi called again for putting the restoration of the river's ecological and environmental protection high on the agenda. In 2020, the YRPL was approved by the Standing Committee of the National People's Congress (NPC). According to the Legislation Law, the NPC and its Standing Committee exercise the Chinese state's legislative power. Although the YRB does not geographically affect all the administrative units of China, its importance for the Chinese nation, as stated in Article 1 of the YRPL, compels that a national law be passed for it. It is also the first law established at the basin scale in China, delimiting its scope of application to 19 jurisdictions that include parts of the basin. The YRPL "is formulated in order to strengthen ecological and environmental protection and restoration in the Yangtze River basin, facilitate the rational and effective use of resources, safeguard ecological security, ensure harmony between humans and nature, and achieve the sustainable development of the Chinese nation" (Article 1).

Olsson et al. (2006) refer to the need for a window of opportunity" for governance transition and regime shift toward adaptive governance. Ecological crises or political will can provide windows of opportunity that trigger new forms of governance (Olsson et al. 2006). Lack of political will and difficulties in coordinating institutions can become major obstacles for operationalizing adaptive governance (Schmidt et al. 2013). Scholars have explored examples of potential windows of opportunity in water governance, e.g., the U.S. Federal Energy Regulatory Commission relicensing process and the application of a fragmented set of laws that opened to transition in natural resource governance priorities (Chaffin and Gosnell 2017, Gosnell et al. 2017). In the YRB, the ecological changes already discussed above led to the political will of protecting the YRB, which further facilitated the passage of the YRPL.

Unlike other environmental laws, the YRPL is strongly related to the China Communist Party and arguably plays a symbolic role —i.e., to show the priority of the Party—and sets aspirational norms that should be followed by the entire country. Previous environmental movements led or encouraged by the Party were expressed in policies and action plans. Although they could rapidly mobilize state and social actors for environmental protection, they were temporarily focused on what the Party cared about at a certain moment. These experiences have generalized lessons that cadres have the capacity and resources to lead ecological and environmental protection, and for environmental issues that require long-term investment of capacity and resources, stronger institutionalization is needed to avoid arbitrary decision making. The passage of the YRPL ensures a reliable legal basis for new experiments and policies. For example, the "Plan to Support a Horizontal Ecological Protection Compensation Mechanism in the Yangtze River Basin," which was released after the YRPL and implements the YRPL, is more legitimate than it would be without the legal basis provided by the YRPL and faces less danger of temporality and instability. In the 2021, in the "Report of the State Council on the Ecological and Environmental Protection of the Yangtze River Basin," local experiments on green development are specifically encouraged. These experiments can involve carbon emissions reduction, clean production, energy conservation, etc. The YRPL incentivizes these experiments by requiring the State Council and local governments to adjust the industry structure and advance green development according to state planning (Article 64). Heilmann (2008) has advanced the Chinese pattern of "experimentation under hierarchy," which focuses on finding innovative solutions at local levels. These solutions are social learning for the central and other local governments. Ultimately, higher-level governments will spread successful experiments around the country. The above examples of ecological protection compensation and green development illustrate this pattern.

LEGAL AND INSTITUTIONAL DESIGN PRINCIPLES IN THE YANGTZE RIVER PROTECTION LAW

There are 96 articles in the YRPL that are further divided into nine chapters: (1) general provisions, (2) plans and control, (3) resources protection, (4) prevention and control of water pollution, (5) ecological and environmental restoration, (6) green development, (7) guarantee and supervision, (8) legal liability, and (9) supplemental provisions. Sixty-two articles of the YRPL regulate the responsibilities of the central and local governments and agencies. The provisions can be broadly divided into two categories: substantive rules and rules on structure and capacity. This section focuses on the latter category, which resembles the legal and institutional principles identified in the literature (DeCaro et al. 2017): well-defined boundaries, legally binding authorities, legally binding responsibilities, interagency coordination and cooperation, participatory capacity that supports adaptive governance.

Defining Boundaries, Authorities, and Responsibilities

A common problem in water management is fragmentation across geographic and sectoral boundaries, often caused by the mismatch of political and ecological boundaries (Cosens and Williams 2012, Cosens 2013). To address fragmentation, the ability to coordinate at the basin scale is often sought in adaptive water governance. The YRPL has tried to resolve scale mismatches by creating the proper scale for the institutions and resources of the YRB to interact. The Chinese administrative structure below the national level (hereinafter referred as "local

government") is based on a multitiered system: provinces, autonomous regions, and provincial-level municipalities on the first tier; prefectural-level regions on the second tier; and county-level regions on the third tier. Unlike conventional laws, which generally cover the Chinese jurisdiction in its entirety, the YRPL delimits its scope of application to 19 provinces, autonomous regions, and municipalities in China (Article 2). More specifically, it refers to the YRB as a combination of 11 provinces, autonomous regions, and municipalities directly related to the basin catchment areas (formed by mainstem, tributaries, and lakes) and county-level administrative areas within eight provinces, autonomous regions, and municipalities (see Fig. 1). These manmade frontiers ignore ecosystem and hydrologic boundaries, but increasing coordination needs at the basin scale pressed for a new legal framework in which all relevant subnational governmental and nongovernmental stakeholders can cooperate. This is similar to Huitema et al.'s (2009) concept of bioregional scale and Rijke et al.'s (2012) idea of "fitting" governance organizations to the ecological problem. The YRPL eliminates legal fragmentation across geographical boundaries and reduces mismatches between institutional and ecological scales, which cause delayed and unfit responses to changes in ecosystems. It makes it possible for collaborative processes and integrated solutions to emerge.

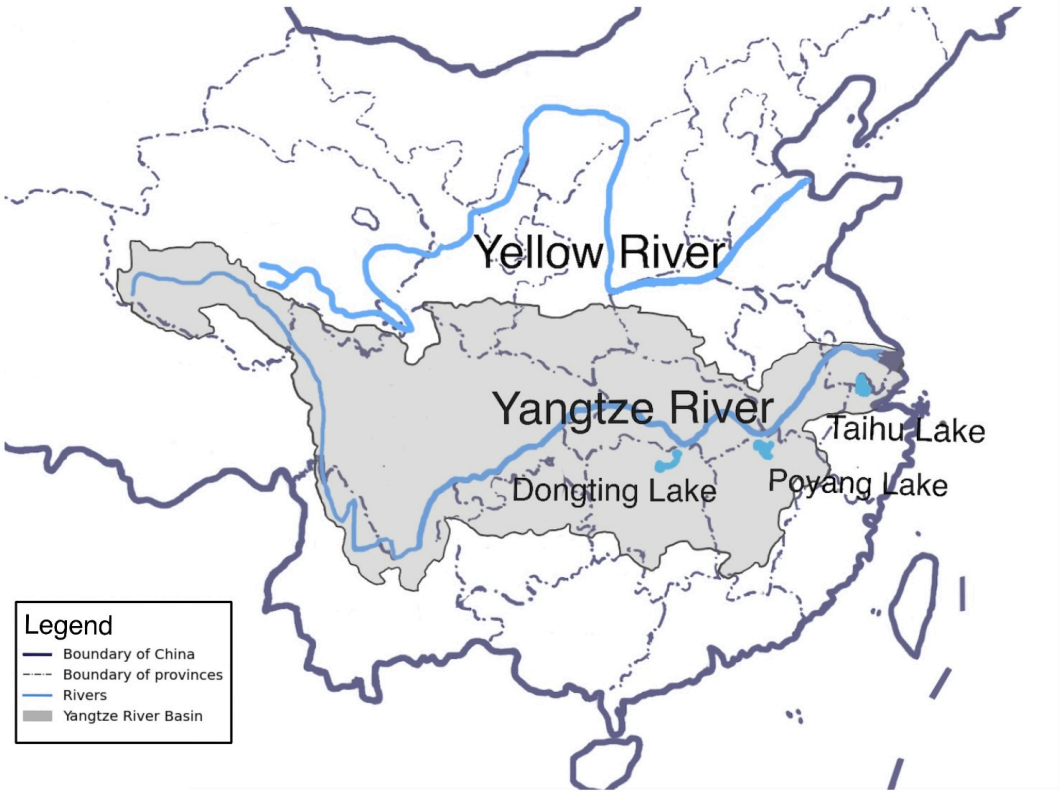
Other than well-defined boundaries, legally binding authority and responsibility are also candidate legal design principles of adaptive governance (DeCaro et al. 2017). The YRPL holds the State Council and local governments responsible for coordinating protection of the basin (Article 5). Local governments must also fulfill their responsibilities in their respective administrative areas. The State Council and the provincial governments have the authority to supervise the subprovincial governments if protection of the YRB is ineffective, the problems are prominent, or public complaints accumulate (Article 81). The State Council has to regularly report to the NPC, and the local governments have to regularly report to their respective people's congresses on progress in their protection work in the YRB (Article 82). Local authorities are also allowed to formulate regulations, rules, plans, and programs to jointly protect the YRB (Article 6). The YRPL is specific about holding first-tier down to third-tier authorities responsible while allowing flexibility in formulating norms fitted to the local conditions.

Unique to the Chinese context, the China Communist Party cadre evaluation mechanism—China's system for top-down bureaucratic personnel evaluation—applied in the environmental governance context, has reflected adaptive processes, which include goal specification (use of targets), attaching accountability to the leading cadres at multiple levels of governance, feedback loops for problems identification, and willingness to experiment, adjust priorities, and adapt governance mechanisms (Wang 2013). Cadres are party-state bureaucrats, which in the Chinese system include bureaucrats in state agencies and bureaus, state-owned enterprises, and other state institutions. This system is believed to have the potential to incentivize water resource protection and the exchange of necessary data and information among government authorities and agencies (da Silvera and Richards 2013). The cadre evaluation mechanism emerged in environmental governance in China only in recent years to counter traditional environmental governance problems such as overlapping competencies and responsibilities and lack of cooperation in ministerial relationships. For example, all information held by the water administration authorities will only be exchanged within the water administration authorities. More specifically, the Yangtze River Water Resources Commission, subordinate to the Ministry of Water Resources, is responsible only to the Ministry of Water Resources, and its information will not be shared with other authorities unless clearly authorized. Similarly, information on water pollution prevention and control is mainly held within the system of the ecology and environment departments and generally. The cadre evaluation mechanism is itself a work in progress and has different implementation successes and failures in different contexts. The YRPL institutionalizes this mechanism by holding local governments accountable for targets and subject to assessment and evaluation (Article 78). The YRPL also institutionalizes another Party mechanism: river and lake chiefs in the YRB are responsible for protecting the YRB. Initially created by the Party to manage rivers, "river chiefs" are high-ranking Party cadres who have to meet water quality targets assigned to their respective river (Chien and Hong 2018). This mechanism slowly spread to other areas; there are now lake, forest, and other types of chiefs to enhance environmental governance in China.

Interagency Coordination and Cooperation

As noted by Lee when referring to the Columbia river basin, "[e]ach of the major uses of the basin's resources is managed by a different constellation of human prerogatives, and none is sufficiently powerful to bring the others to heel. Multiple management of multiple uses produces a tragedy of the commons" (Lee 1993: 28). The YRB faced similar problems as its management has historically been deep rooted in a compartmentalized approach due to the absence of a formal structure for integrated water management. Two types of fragmentation exist in the YRB: geographical fragmentation and sectoral fragmentation. Geographical fragmentation is reflected by the jurisdictional boundaries that fail to factor in the overall conditions of the YRB (Wei and Wang 2019) and create a mismatch of biophysical and administrative scales (Lü 2020). Sectoral fragmentation results from multiple agencies that are all responsible for some aspects of the YRB. The Chinese idiom "nine dragons rule the water" is often used to capture how these different agencies, often equal in power, compete to regulate water issues. For example, the Ministry of Water Resources is responsible of water quantity issues, such as water resources allocation, hydraulic planning, project construction, and water use supervision in rivers, lakes, reservoirs etc. Water quality issues, on the other hand, are dealt by the Ministry of Ecology and Environment (previously known as the Ministry of Environmental Protection). Other governmental agencies like the Ministry of Agriculture, the Ministry of Communications and Transports, the Ministry of Housing and Urban–Rural Development, and the Ministry of Health are also responsible for other aspects of water governance, such as urban water supply, safe drinking water, etc. However, their rulings could be inconsistent. For example, Article 32 of the Water Law provides for a water function zoning system, which establishes the basic requirements for establishing different uses and functions of water and serves as the primary basis for the work of the water administrative departments. It also stipulates that the competent

Fig. 1. Yangtze River Basin.



water administrative departments and river basin management agencies (such as the Yangtze River Water Resources Commission) must comply with the zoning requirements on water quality and the natural purification capacity of the water, and determine the pollutant-carrying capacity, in order to provide the ecological environment department with a limit on the amount of sewage discharged into the water. However, Article 20 of the Water Pollution Prevention and Control Law of China provides that only the total discharge of some major water pollutants is controlled. The State Council's ecological environment department reports the control targets to the State Council for approval and implementation. Local governments shall then reduce and control the total discharge of major water pollutants accordingly.

One way law can facilitate adaptive governance is through interagency coordination and cooperation with cross-agency and cross-scale dimensions (Gosnell et al. 2017). The YRPL establishes such a coordination mechanism, the YRB Coordination Mechanism, to guide protection work, deliberate on major policies and plans, coordinate cross-regional and interagency matters, supervise the implementation of the YRPL (Article 4), coordinate ministries in establishing monitoring networks and platforms for information sharing about the environment, natural resources, hydrology, meteorology, navigation, and natural disasters (Article 9). Among other duties, it is responsible for establishing an expert advisory committee and soliciting scientific, technological, and other professional advice from experts and professional institutes (Article 12). It must also coordinate with different agencies and local governments to delineate the scope of protection for river and lake shorelines, formulate protection plans, strictly control development and construction projects, and promote reasonable and efficient use of shorelines (Article 26).

The Coordination Mechanism is critical for overseeing the protection of the YRB, a complex SES, and promoting cross- and within-scale information flow and communication. An important caveat, however, remains as long as the legal status of the mechanism is unclarified. Scholars have been concerned with the effectiveness of the mechanism as it is not vested with concrete law enforcement power (Wei and Wang 2019). Previous experiences with river basin commissions in China also revealed that, in the absence of formal membership of local governments, collective interest and basin protection were not achieved (da Silvera and Richards 2013), particularly if they lacked the power to address dilemmas across agencies and administrative areas (Song et al. 2010). For example, the Yangtze River Water Resources Commission is subordinate to the Ministry of Water Resources and cooperates with local water administrative departments, but lacks a direct administrative relationship with local governments along the Yangtze River. Although local water administrative departments receive their guidelines from the Ministry of Water Resources, they prioritize local governments' decisions. Local governments could disregard commissions' views for local interests. This is a typical horizontal (*kuai*)-based vs.

vertical (*tiao*)-based management problem (Kostka and Zhang 2018). The YRPL aims to resolve the coordination and cooperation problems by breaking the barriers between the water environment, water ecology, and water resources so that all public authorities coordinate to protect water in an integrated manner. At the same time, it could be argued that adaptive governance processes going forward should not fundamentally breach or displace the existing governance system as a whole (Craig et al. 2017). Although the Coordination Mechanism is not higher in hierarchy or power than coordinated authorities and may not function as a new authority, this does not prevent it from rectifying fragmentation of basin governance and supporting adaptation, creativity, and cooperation of administrative and governmental units.

Participatory Capacity

Participation of public actors has improved considerably in China's environmental governance with increasing information disclosure and transparency, and greater institutionalization of public participation in the 2002 Environmental Impact Assessment Law, the 2014 Environmental Protection Law, and other environment-related laws and regulations, as well as through environmental litigation and environmental public interest litigation (Xie and Xu 2021). Due to the Chinese political structure, political and social barriers still prevent the institutionalization of nongovernmental participation as understood in Western democracies (Gaudreau and Cao 2015). Often, participation is greatly enhanced as long as it is below the top framework. It is, however, evident that the Chinese state continues to experiment with new models of public participation that fit specific contexts (Hensengerth and Lu 2019).

One of the institutional design principles to increase capacity for adaptive decision making and cooperation is enhanced public participation in law (Ostrom 2014, as cited in DeCaro et al. 2017). An increase in public participation could engage diverse stakeholders relevant to the SES to participate in decision making and to understand and communicate needs and feedbacks (Chaffin et al. 2014*b*, Cosens and Gunderson 2018, Arnold et al. 2014, Arnold 2015). The YRPL enhances social and public participation in several provisions. For example, the state shall encourage and support entities and individuals in protecting the ecology, environment, resources and promoting green development in the YRB (Article 16). The state shall encourage investment of private capital in the restoration of the ecology and environment in the YRB (Article 63). Citizens, legal persons, and organizations have the right to obtain information related to the ecological and environmental protection of the YRB, report, and sue for damage made to the YRB, including natural resources depletion, pollution, and harm to the ecosystems (Article 79). Although these provisions are drafted in quite vague terms, various forms of participation have emerged in practice.

One type of participation is encouraged by the state. For example, individuals without any party affiliation and members of political parties besides the China Communist Party participate in the process of the YRB governance. With the approval of the Party Central Committee, eight groups started a 5-yr supervision of the ecological and environmental protection of the YRB (Xinhua 2021). Each of them is in charge of one particular region on the YRB. For example, the Democratic Progressive Party Central Committee is in charge of Jiangxi Province, and the members of their group will work with the provincial and local governments of Jiangxi Province to collect public opinion, generate on-the-ground knowledge and practice, and detect issues in a timely fashion. The work resulting from these public participation groups will later generate feedbacks that enter China's YRB governance system and facilitate learning of local knowledge.

Another type of participation involves public initiatives, unhindered by law or politics. Following the proposal of the YRPL, the controversial, decade-long hydraulic project at Poyang Lake revived protection and conservation discussion. For years, the project has sought to build a sluice gate that would cut the lake where it connects with the Yangtze River. In a seminar organized by the China Biodiversity Conservation and Green Development Foundation (CBCGDF) in early 2021, dozens of academicians, researchers, and NGOs opined about the possible impacts of the dam on an already fragile ecosystem. Within a month, the Poyang Lake Hydro Project Construction Office, under Jiangxi province's water resources department, discussed with the CBCGDF the potential changes in water levels at both the Poyang Lake and the Yangtze River, and the impacts on flood control and ecological conditions (CBCGDF 2021*b*). Although the project has not been canceled, the notice of construction has changed from approved to under review. Another noticeable effect since the YRB was raised in national priority is that decision makers and experts are taking a broader perspective that considers the basin scale. For instance, experts suggest the necessity to view the hydraulic project at Poyang Lake within a broader context and spatiotemporal changes at the basin scale, with consideration given to the historic relationships between the upper and lower basin regions (CBCGDF 2021*a*).

BALANCE BETWEEN FLEXIBILITY AND STABILITY

One of the primary roles of law is to ensure stability and certainty (Tyler 1990, Arnold 2015, Camacho and Glicksman 2016). As Ruhl (2012) noted, law's overall purpose "is to produce more order than chaos." However, adaptive governance seeks to increase adaptive capacity through flexibility in the face of changing SESs (Cosens et al. 2017, Chaffin et al. 2014*b*). Thus, if law is to facilitate adaptive governance, it faces the paradox of balancing flexibility and stability (Craig et al. 2017). To better reflect the reality of SES instability and to facilitate the emergence of adaptive governance, linear and largely static legal systems need to suit the nonlinear dynamics of SESs (Cosens 2008). Flexibility refers to latitude within a governance structure, substantive rules, standards, and norms, and the procedural requirements process "without fundamentally breaching or displacing the governance system as a whole" (Craig et al. 2017).

Possible ways to make legal frameworks more flexible and adaptive can include "in-built review mechanisms or sunset clauses for regulatory objectives or entire statutes" (McDonald and Styles 2014: 40). According to DeCaro et al. (2017), legal sunsets allow "planned periods of comprehensive evaluation, in which environmental policies and agreements can be periodically examined, renegotiated, and potentially modified." Several provisions in the YRPL exhibit periodic assessment. For instance, Article 8 of the YRPL provides for a general survey of wildlife and their habitats every 10 yrs, to be disclosed to the public. The central government and local governments will also conjunctively

establish an index of biological integrity of aquatic life in the river basin (Article 41). The index will serve to assess the basin's overall ecosystem health. The YRPL further specifies that the index shall be connected to the water environmental quality standards. Similar endeavors include periodic assessments of natural resources conditions, establishing a natural resources database, evaluation of the environment's carrying capacity, and disclosure of this information to the public (Article 8). Although these examples represent, to a certain extent, flexibility of the YRPL to adapt to "the rhythms of SES growth and collapse" (Chaffin and Gunderson 2016), they are poorly defined, and no meaningful legal consequences could be deduced from them yet. Adaptive capacity should be enhanced with incremental revision (Craig et al. 2017), adjustment (Cosens 2008), and periodic review (Craig and Ruhl 2014), but the YRPL missed the opportunity to use assessment results to achieve these theoretical notions and truly influence governments' planning and rules based on the complexities of SESs.

The YRPL also established minimum requirements and maximum thresholds. Article 26, for example, prohibits the construction or expansion of chemical parks or projects within 1 km of mainstem or tributary shorelines. It also prohibits the construction, conversion, or expansion of tailings ponds within 3 km of mainstem shorelines or 1 km of important tributary shorelines. The latter prohibition is, however, coupled with an exception for conversion for the purpose of improving safety and ecological and environmental protection. Violations of these prohibitions give rise to legal liabilities, such as income confiscation, fines, demolition, or restoration, as appropriate (Article 88). These stringent and relatively inflexible legal requirements serve to signal approaching ecological thresholds (Gunderson and Cosens 2018) and ensure that ecological thresholds are linked to legal thresholds (Garmestani and Benson 2013).

Another type of flexibility involves flexible decision making delegated to authorities. The Ministry of Transport, in cooperation with the Ministries of Natural Resources, Water Administration, Ecology and Environment, Agriculture and Rural Affairs, Forestry and Grassland, delimits prohibited and restricted navigational areas according to aquatic life habitats (Article 27). Vessels are prohibited from navigating within these delimited areas, but navigation needed for national development and livelihood is permitted nonetheless, subject to approval and with minimum interference with key aquatic life (Article 27). Another example involves a sand mining prohibition. Sand mining in China has put unprecedented pressure on rivers, floodplains, and deltas, especially on some major national rivers and river basins. The scale of this activity in the YRB has destroyed crucial aquatic organisms in past decades (Chen 2017). The YRPL strictly bans sand mining within prohibited areas and periods (Article 28). Prohibited areas and periods are to be determined by the basin management agency under the water administration department of the State Council in coordination with local governments. There are also provisions without flexibility, such as a complete ban on alien species (Article 42), solid wastes (Article 49), toxic chemicals (Article 51), and economic fishing in protected areas (Article 53). Within specified periods, economic fishing is prohibited in the mainstem, important tributaries, large lakes, and other prescribed areas. Specific measures are to be formulated by the Ministry of Agriculture and Rural Affairs. An example of such measures has already taken effect: a 10-yr fishing ban in key waters of the Yangtze River was imposed to give fish stocks time to recover.

Other than these substantive rules, the YRPL is worded in vague terms. Other than the historical reason that Chinese laws are all quite vague, the YRPL is especially vague on how to concretize collaboration and coordination of existing structures in the YRB. This could be attributed to the absence of successful examples of legislation for other basins to learn from. Hence, to experiment with approaches that enhance local adaptive capacity while maintaining stability and accountability toward achieving common goals (Cosens et al. 2017), the provisions are vaguely written to allow more flexibility. For now, the YRPL serves as an overarching framework to facilitate coordination and cooperation of existing structures, but the implementation of the vague provisions relies heavily on the will of China Communist Party and governmental agencies. Flexible rules are crucial for the emergence of adaptive governance; unbalanced adaptive governance too tilted toward flexibility may be perceived or experienced as destabilizing and disruptive (Craig et al. 2017), endangering its effectiveness (Cosens and Williams 2012). The YRPL is at a very early stage of implementation, and it is yet to be seen how effective the YRPL will be to the YRB, orwhether it is too flexible, vague, or lacks clear enforcement.

CONCLUSIONS: POTENTIAL FOR ADAPTIVE GOVERNANCE AND FUTURE DIRECTIONS

This article has sought to contribute to understanding the role of the YRPL in the emergence of adaptive governance in the YRB by analyzing some of its legal provisions conjointly with legal and institutional design principles identified in the scholarship as having the potential to foster the emergence of adaptive governance. Consistent with adaptive governance scholarship, ecological and social disturbances have catalyzed the political will to better govern the YRB while maintaining the adaptive capacities of the Chinese regime. The political support for the YRB has in turn allowed the passage of a new law that transitions the informal discussion previously under policies and action plans to the legal basis of the YRPL. The attributes in the YRPL identified in this article confirm the attributes identified in the literature of adaptive governance on law: (1) aligning legal and biophysical boundaries, vesting legal authorities, and imposing legal responsibilities on agencies and local governments within the SES; (2) an interagency mechanism to address geographical and sectoral fragmentation; and (3) enhanced participatory capacity. These commonalities show that they are fundamental to tackle geographic and sectoral fragmentation, which is one of the main challenges in governing complex systems. However, these attributes of structure and capacity are worded in quite vague terms to allow flexibility and local experiments and leave many details of implementation outside of law to allow flexibility while maintaining a certain degree of stability. The YRPL is itself an experiment for finding more appropriate governance for basins and may offer lessons for other SESs in China. However, in its current form, the YRPL leads to questioning about the adequacy, legitimacy, and necessity of legislating for a basin. If an overabundance of legal responses to SESs weakens the overall accountability, would it be more appropriate to legislate instead for SESs in general? Moreover, it raises the question of how

flexible legal provisions on structure, capacity, and process should be, without potentially leading to destabilizing and disruptive effects and endangering the effectiveness of law.

In closing, the value of the YRPL case is not so much that the YRPL is the end step of an adaptive governance trajectory; rather, it is only the beginning of a fundamental change in the structure, capacity, and processes to manage SESs holistically in China with lessons for other parts of the world. It is not an illustration of traditional environmental law that primarily aims for environmental and ecological protection or pollution prevention, despite what its name may suggest. Rather than returning the system to a desired state, the YRPL is likely to create a regime shift or a more desirable state aiming to harmonize ecology and society. To what extent adaptive governance will be practiced in the YRB is unclear. Further investigation into the implementation of the YRPL and harmonization of economic development with ecological protection, a key issue to the Global South, is needed. What other jurisdictions may learn is how to use critical transition periods prompted by social-ecological factors and changes to build new forms of integrated and comprehensive governance to direct future developments of river basins toward sustainability. Likewise, another lesson is to make use of traditional centers of power to create laws and legal frameworks to enhance the ability, authority, and capacity of existing stakeholders to creating a new governance trajectory.

Data Availability:

Data/code sharing is not applicable to this article because no data/code were analyzed in this study.

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