

Beyond contradiction: The state and the market in contemporary Chinese water governance

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ABSTRACT

State/market interactions in water governance have long been interpreted in terms of the contradiction between water as a commons and water as a commodity. Recent challenges to this dichotomisation claim that it cannot provide a useful lens through which to interpret the complexity of water resources and their management. This paper provides evidence from China to show that a dichotomous interpretation of state/market interactions has little power to explain the formulation and evolution of water governance regimes. Through an analysis of China's water policy development over the 1998–2018 period, the paper outlines how state control and marketisation are complementary rather than contradictory, collectively contributing to a governance regime that serves broader political and economic goals as much as water management ones. We argue that better understanding of the roles of state and market in water governance requires moving beyond an 'either-or' point of departure, and paying greater attention to the 'both-and' hybridisation increasingly observed in water management.

1. Introduction

Governments around the world are increasingly confronted with major challenges in sustainable water management. Long standing drivers of change such as population growth, economic development, urbanisation, and rising living standards are all amplifying and now combining with climate change such that water governance must now contend with an unprecedented degree of non-stationarity (Milly et al., 2008). Water governance regimes are thus under great pressure to manage water scarcity, variability and uncertainty, while balancing multiple competing values of use in water allocation. These new conditions are forcing new accommodations between the state and markets in water governance regimes, and certainly there is evidence of change in many places (Bakker, 2014; Easter and Huang, 2014; Woodhouse and Muller, 2017).

There has been a transformation in water management in the late 1990s and early 2000s, away from state-controlled water regimes that had a heavy reliance on administrative allocation of water and supply-side management, to new regimes in which markets increasingly play a major role in water allocation to balance the policy goals of economic

efficiency, social equity, and environmental sustainability (Bakker, 2014, 2003; Biswas, 2001; Gleick, 2000; Hassan, 2011; Pahl-Wostl et al., 2011). At the same time, the language used to describe the administration of water has shifted from 'management' to 'governance'; here governance includes management paradigms, scale(s) of operation, information management and sharing, technological infrastructure, risk management, and environmental factors (Pahl-Wostl, 2007). Water governance therefore goes beyond 'management', 'policy', and 'government', referring to 'the range of political, social, economic and administrative systems that are in place, which directly or indirectly affect the use, development and management of water resources and the delivery of water services at different levels of society' (WWAP, 2006, p. 47).

Over time, so called 'soft' allocation and management mechanisms like water markets have been gaining momentum (Easter and Huang, 2014; Pahl-Wostl et al., 2011). There is also plenty of evidence of a neoliberal reprogramming of water governance in several countries, including the United Kingdom (Bakker, 2005), Ecuador (Rodríguez-Lado and Boelens, 2016), Chile (Budds, 2013), and Australia (Edwards, 2013). Researchers have characterised such transformation in water

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management as a paradigm shift (Pahl-Wostl et al., 2011). Bakker (2014) has called this new paradigm ‘market environmentalism’, defined as ‘a doctrine premised on the synergies between environmental conservation and protection, economic growth, market economies, and neoliberal governance’ (Bakker, 2014, p. 474). Justified by a critique of the shortcomings of state actors, market environmentalism is therefore framed as an alternative to the state hydraulic approach to water governance (Bakker, 2014). However, this paradigm shift is far from straightforward and without contestation. Debates on the effectiveness of water markets in resource allocation continue (Budds, 2019; Hernández-Mora and Del Moral, 2015; Wheeler et al., 2017), and the privatisation of water is repeatedly scrutinised (Bakker, 2013; de Gouvello and Scott, 2012; Sanchis-Ibor et al., 2017).

The commons/commodity dichotomy in water paradigms is manifest in the way that competing paradigms rise and fall, flowing through different historical periods. Such dichotomisation implies that water is either managed as a commons through state control, or as a commodity through marketisation (Paerregaard and Andersen, 2019). Through this conceptual lens, water reforms are often observed as old, failing paradigms challenged by a new paradigm struggling for dominance (Pahl-Wostl et al., 2011). Recent research has started confronting the limitations of this commons/commodity and the state/market duality in the context of Peru (Paerregaard and Andersen, 2019), opening opportunities for other empirical observations. Paerregaard and Andersen (2019) argue that most attempts to explain water governance start from the assumption that water can be managed either as a public good or as a private commodity, and that this assumption is no longer justified given new forms of hybrid water governance such as they have observed in Peru. In this paper we describe the increasing hybridisation of water governance in China, and find that here too a dichotomous understanding of water governance as a matter of either states or markets has little explanatory power.

This emerging debate about the power of the state/market dichotomy to explain contemporary water governance is as germane to China as anywhere. Previous studies have interpreted China’s water governance through such a dichotomous lens. China is often seen as a bastion of the old state hydraulic approach, making any shift to market environmentalism slow and difficult (Easter, 2000; McCormack, 2001; Shen and Wu, 2017; Speed, 2009; Y.H. Wang et al., 2018). The idea that ‘people are bound to conquer nature (人定胜天)’ remains a deeply rooted philosophical approach to water governance in China. Indeed there has been a boom in the construction of hydraulic infrastructure in recent years (Crow-Miller et al., 2017; McCormack, 2001; Shen, 2014), including the South-to-North Water Transfer Project (SNWTP) which is the world’s largest inter-basin water transfer project, and a record RMB 2 trillion investment in water infrastructure in the 12th Five-Year Plan period (2011–2015). Some studies even argue that China is exporting its heavily state-driven techno-political water regime beyond its borders, contributing to the resurgence of concrete-heavy approaches to water management globally (Crow-Miller et al., 2017; Webber and Han, 2017).

That said, China has also pursued a raft of institutional reforms in recent years in response to overstretched water resources. China now claims to be building a ‘water-saving society (节水型社会)’, which includes the development of water markets and tradable water rights (Jiang, 2018; Shen, 2014; Speed, 2009; Sun, 2009). While a water market, as defined by western standards, may not exist in China, there is an increasing volume of water rights trading. This begs the question of where China’s water governance sits in the supposed teleological transition from state to market directed approaches. It is indeed not clear if there even is a transition from state-controlled to market environmentalism in water governance in China of the kind that mirrors those in many other countries. Given China’s socialist market system, it may not necessarily be the case that state and market-led approaches to water management are as contradictory as the literature implies.

Against this backdrop, this paper asks: is the state/market

dichotomy an appropriate lens through which to interpret China’s water governance? It does this by examining the interplay between state control and market-oriented approaches to water allocation in China at the policy level, and in so doing reflects on what we know about contemporary water governance regimes. Our key argument is that China’s case represents new evidence to show that the state-market dichotomisation has limited power to explain the complex processes during which water governance regimes are formulated and evolve, each of which will be shaped by the particular political economies in which they are embedded.

A review of policy material including relevant laws, regulations, other measures, key policy documents, five-year plans, statistical yearbooks, speeches by the Minister of Water Resources, and media reports was undertaken to trace the development of these two aspects of water governance over the past two decades in China. Our analysis is focused on the evolution of policy - we do not examine local practices or particular projects - nonetheless, it is contextualised by our research on various aspects of water management in China over the past 15 years. Through our analysis we identified a series of major policy events between 1998 and 2018, during which the high-level approach to water management shifted. In this paper we examine each of these events, identifying the specific policy decisions that were made, the broader context in which they were made, and their implications and effects. Our findings lead us to argue that state and market-directed approaches are not necessarily contradictory or even working parallel to each other, but can actually work in tandem within an evolving system of water governance in China.

2. Positioning China’s water reforms

China has seen extraordinary growth in water supply infrastructure. In 1949 there were only 23 major dams and reservoirs in the country, then between 1949 and 1979 an average of over 600 dams were built each year (Shui, 2016). Government investment in water infrastructure¹ grew from RMB 92 million (263 million in 2018 prices) in 1950 to RMB 3.7 billion (10.6 billion in 2018 prices) in 1979, accounting for 7.1% of all national construction investment over the period (Jin, 1992).

The 1990s saw yet more dramatic growth in construction, with investment in water infrastructure in 1990 reaching RMB 4.9 billion (10.65 billion in 2018 prices) (Jin, 1992). Nevertheless, relative to all construction investment in China water infrastructure represented only 3.3% of national spending during the 1990s.² Compared to the 1950s, 1960s and 1970s, which focused mostly on the construction of small- and medium-sized dams and the expansion of irrigated land, the 1980–1999 period was characterised by much larger-scale water projects with large storage and hydropower generation capacity (Liu et al., 2013). The Three Gorges Dam was one of the most notable mega water projects mobilised during this period. As explained earlier, mega water projects continued in the 2000s, and the 12th Five Year Period (2011–2015) marked a record RMB 2 trillion investment in water infrastructure.

However, this story of the manifestation of the traditional approach to water management is one-sided if we do not recognise institutional reforms. Indeed, from the beginning of the 21st century, experiments in market-oriented water allocation mechanisms, particularly water rights

¹ Water infrastructure includes water projects for purposes of flood control, water supply (e.g. irrigation, urban water supply, and water transfer), water and soil conservation, eco-environmental protection, hydropower and others (Liu et al., 2013). Water supply infrastructure has been a major focus of China’s water projects, accounting for 43% of the total investment in water infrastructure during 1953–2009 (Liu et al., 2013), though the share has varied.

² The data are sourced from China Water Statistical Yearbooks, China Water Conservancy Yearbooks, and Statistical Yearbooks of the Chinese Investment in Fixed Assets.

trading, have been at the centre of China's water policy reforms aimed at building 'a water-saving society' (Jiang, 2018; Shen, 2014; Sun, 2009). While traditionally, government took complete control in water supply and (re)allocation, there is now increasing acceptance of a role for markets for allocating water (and many other goods). For example, the Third Plenum Decision of the 18th Chinese Communist Party Congress in November 2013 set directions for deepening economic reform with a view to letting the market play 'a decisive role in resource allocation' (Kroeber, 2016, p. 5). In line with such national vision, the new discourse of water governance is emerging, called the 'two-hands' approach (两手发力) (combination of the government hand and the market hand in water governance). These and other national-level policy innovations to develop water markets deserve close examination.

There has been little analysis of what these changes mean for China's overall water governance regime. Previous studies have tended to see explorations of soft approaches as being in competition with and ultimately overwhelmed by a reinforced infrastructure-based, engineering-heavy water regime (Crow-Miller et al., 2017). This is perhaps due to the enduring trope of China's 'hydraulic civilisation' and other environmentally-deterministic approaches to China and water (Ball, 2017; Wittfogel, 1957). Studies that approach Chinese hydro-politics through the lens of techno-politics or Foucault's conception of governmentality are not necessarily concerned with reprogramming or reframing of water governance (Rogers et al., 2016; Webber et al., 2017), while studies focused on authoritarianism in Chinese water management do not examine how new market-oriented water allocation mechanisms interact with traditional state-controlled approaches (Moore, 2014). More recently, some researchers have interpreted market-friendly reforms in Chinese water management as manifestations of neoliberalisation (Sheng and Webber, 2019).

China therefore presents a particular political and historical context, one different from many other Western countries on which much of the literature about water reform is based. In what follows we demonstrate how a distinctive water governance regime has formed in China by examining the interplay of the state and market over the 20 years between 1998 and 2018. We begin by discussing what we identify as the starting point of China's experimentations in water marketisation, which is the emergence of the 'Building a water-saving society' concept in 2000. We then extend our analysis through to the late 1990s to understand the broader contexts driving policy developments aimed at water reform, including the Global Financial Crisis (GFC) in 2008 and the beginning of Xi-Li administration in 2013.

3. Interpretation of major policy events

3.1. The 1998–2007 period

Between 1994 and 2000, North China experienced seven consecutive years of drought, reaching an emergency level in many northern cities, including Beijing. The year 2000 was called the 'Dragon Year Drought of the Century' (Wang, 2000, p. 6). In 1999, the then-Minister of Water Resources, Wang Shucheng, delivered a speech at the 7th National Congress of the Chinese Hydraulic Engineering Society, encouraging water policy and research communities to discuss how management of China's water resources should face the 21st century (Wang, 1999). His speech called for an ideological transformation from project-oriented water management to resource-oriented water management, arguing that depending solely on engineering measures was no longer working. The Minister referred to the SNWTP when explaining that water infrastructure projects must be based on water saving and that, in addition to engineering solutions, non-engineering measures need to become an increasingly important component of water management (Wang, 1999).

In response, the Chinese government initiated the 'Building a water-saving society' reform (Jiang, 2018; Shen, 2014). The concept was first introduced by the central committee of the Chinese Communist Party in

its advice to the national 10th Five Year Plan (2001–2005) in 2000. The advisory document suggested that water management should emphasise both increases in supply and decreases in demand (开源与节流相结合). On the supply side, the SNWTP was highlighted as a solution to the water scarcity problem in the North. On the demand side, the water-saving society concept was introduced to promote water conservation measures and develop water-saving agriculture, industry and services. Interestingly, the concept of a water-saving society was discussed in the same context as suggestions to strengthen infrastructure construction. Indeed, this period saw a massive increase in investment in water projects, from RMB 46.8 billion (64.1 billion in 2018 prices) in 1998 to RMB 94.5 billion (123.7 billion in 2018 prices) in 2007 (MWR, 2013).

Later in October 2000, Minister Wang's speech 'Water rights and water markets: economic measures for achieving optimal allocation of water resources' at the annual conference of the Chinese Hydraulic Engineering Society further argued that the construction, operation and management of the SNWTP should be based on a 'quasi-market' principle (Sheng and Webber, 2019; Liu, 2002). The Minister's call for the exploration of market-based water allocation mechanisms generated heated academic discussion about water rights trading. Research was then undertaken to explore the principles of water rights for the SNWTP. The SNWTP Construction Fund mobilised these principles by requiring that receiving regions obtain a water use right (represented as a share of the volume of transferred water) to the project by contributing to the Fund; the contributions are themselves to be raised through the collection of water resources fees³ (Liu, 2002). An institutional arrangement was proposed to operate the SNWTP as a rights-based 'quasi-market (准市场)' with national control at the macro level (Liu, 2002). From this perspective, some observers optimistically argue that the project may have potential to become the largest water rights trading market in the world (Liu, 2002; Zhang et al., 2015).

Water trading in China then started to develop. One month after the Minister's speech, the very first water trade in China took place when two counties in Zhejiang Province - Dongyang and Yiwu - transferred the use right for 50 million cubic meters per year from Dongyang's Hengjin Reservoir to Yiwu city for payment of RMB 200 million (Jiang, 2018; Shen, 2014). The agreement was highly controversial and ground-breaking because there was no real legal foundation for water trading at that time. According to the Constitution and the Water Law, water resources are owned by the state and State Council exercises the ownership of water resources on behalf of the state (Jiang, 2018). Therefore, local governments had no legal rights to dispose of water resources in their jurisdiction at the time of the trade. Nevertheless, the Ministry of Water Resources (MWR) supported the trade – yet another example of China's appetite for policy experimentation. The Dongyang-Yiwu case led to strong support by the MWR for local level experiments in water trading in the context of 'Building a water-saving society'. Key examples of experiments include a pilot program in Zhangye, Gansu Province for water right transfers between farmers, and larger-scale water transfers from agriculture to industry in the Yellow River Basin (Inner Mongolia and Ningxia) (Jiang, 2018; Shen, 2014; Speed, 2009; Y.H. Wang et al., 2018).

In 2002, the 1988 Water Law was substantially amended to incorporate the resources-oriented water development and water rights strategy (Shen, 2014). Major changes included 'Building a water saving society' as a fundamental principle (Article 8), and the recognition of water abstraction rights in Article 48 (Jiang, 2018).⁴ Taking a

³ According to the principle of paid use of water resources, water resources fees are applicable for water use that directly abstracts surface water and groundwater.

⁴ Article 48 of the 2002 Water Law stipulates: entities and individuals that abstract water resources directly from rivers, lakes, or ground waters shall, in accord with the provisions of the water abstraction permits system and the paid water use system, apply to water administration departments or river basin

conservative approach, the 2002 Water Law did not explicitly allow water trading (Speed, 2009). In 2005, the MWR developed the Framework for Establishing a National Water Rights System⁵, consisting of three key components: water resources ownership, water resources use rights, and water rights transfer (MWR, 2005). Following this, the 2006 Regulation on Administration of Water Abstraction Permits and Water Resources Fee Collection (取水许可和水资源费征收管理条例) loosened restrictions on the transfer of water abstraction permits to allow corporations to invest in the construction of irrigation rehabilitation projects to improve irrigation efficiency in exchange for abstraction rights to the water saved through the investments (Jiang, 2018; Speed, 2009). On this basis, China's first property law (2007 Property Law) explicitly recognised water abstraction rights as a type of water use right separated from the state ownership of water resources, and that can be transferable under certain circumstances.

Therefore, between 1998 and 2007 there was strong growth in the construction of water infrastructure, as well as the first trials of water trading and the introduction of a water rights system. Fig. 1 lists the major developments in water trading during this period. China's water governance regime was modified during these reforms as property rights were introduced as an instrument to govern water use and allocation (Bromley, 1991). China's water resources had been, for a long period, effectively an open access (non-property) resource, although legislation provided for a state property regime (Jiang, 2018; Li et al., 2011). From China's first water law (1988 Water Law), through its amendment in 2002 (2002 Water Law), to the 2007 Property Law, water abstraction permits were transformed from an administrative instrument to deliver direct government control over water use, into the basis for water use rights that, in turn, underpin water trading. These developments demonstrate how market-oriented allocation mechanisms were incorporated into the traditional administrative approach to water governance even as infrastructure-based, supply-side measures continued to be supported.

3.2. The 2008–2012 period

The Global Financial Crisis (GFC) saw China's gross domestic product (GDP) growth drop from 14.2% in 2007 to 9.7% in 2008 and then to 9.4% in 2009 (World Bank, 2018). Among the factors that helped China maintain still relatively high annual growth during the GFC was its ability to quickly adopt a strong stimulus package (Li et al., 2012). This stimulus package drove an acceleration in construction of water infrastructure. A State Council executive meeting in November 2008 decided to take 10 measures, including speeding up rural infrastructure construction, expanding domestic demand, and promoting economic growth in the context of a substantial reduction in foreign demand for China's exports. In addition to the RMB 4 trillion stimulus package for 2009 and 2010, a total of RMB 100 billion was committed for the fourth quarter of 2008, which included 20 billion specifically allocated to water infrastructure investment. The SNWTP was again highlighted as an example of an important water project, and was allocated RMB 2 billion as part of this package. In December 2008, the MWR released Guidance on Accelerating the Construction of Water Infrastructure (关于加快水利基础设施建设的指导意见), prioritising the construction of a number of major water diversions and water source projects, including diversion projects such as the Tao River Diversion in Gansu Province

(footnote continued)

authorities for a water abstraction license, pay the water resource fees and thus obtain the water abstraction right.

⁵ According to the Framework, the concept of water rights system refers to the rules that define, allocate, adjust, protect, and enforce water rights, and clarify the entitlements, obligations and interests between governments, between governments and water users, and between water users. It is a suite of laws, institutions, and mechanisms, to regulate and protect water rights (MWR, 2005, Sections 2, 3–4).

and the Datong River-Huangshui River Diversion in Qinghai Province. During 2008–2012, investments in water infrastructure increased dramatically, at an average annual rate of 24%, from RMB 108.8 billion (137.2 billion in 2018 prices) in 2008 to RMB 396.4 billion (444.8 billion in 2018 prices) in 2012 (MWR, 2013).

Alongside this accelerated construction of infrastructure were packaged developments in water trading (Fig. 2). These macro-level policy developments were not specifically dedicated to the adoption of market mechanisms, but they comprised an essential component of the institutional governance framework needed for water trading (Jiang et al., 2010; Shen, 2014).

One important development was the national strategic plan for water resources development for the period 2010 to 2030. In 2010, the State Council approved the National Water Resources Comprehensive Plan (水资源综合规划) (2010–2030). For the first time, sustainability was embedded in China's water plan.⁶ The 2010 water plan was the first national water planning document that recognised the environment as a water using sector and the need to allocate water for that purpose (called 'ecological water'). Demand control and protection of the ecological environment were put alongside increases in water supply as key elements for achieving sustainable water use. The plan set a target of keeping total water use for the entire country below 700 billion cubic metres by 2030; and corresponding upper bound water resource use targets were set for each major river basin.

The No. 1 Central Document of 2011, Decision from the CPC Central Committee and State Council on Accelerating the Development of Water Resources Reform (中共中央国务院关于加快水利改革发展的决定) was the first central government document that expressly laid out the intended directions of national water policy development. The document first addressed the strategic importance of water infrastructure, which was represented as an obvious weak link in overall national infrastructure, and therefore proposed to accelerate the construction of water infrastructure including water source projects, interconnection projects, and diversion projects. One the other hand, the No. 1 Central Document affirmed the strictest water resources management system as national policy with introduction of 'Three Red Lines' targets for water use (the first and second red lines) and pollution (the third red line) (Xu et al., 2018). The Three Red Lines were affirmed in 2012 by State Council's Opinions on the Implementation of the Strictest Water Resources Management System, which adopted the annual 700 billion cubic metre figure as the first red line for controlling total water use (State Council of China, 2012). To improve water use efficiency, two indices of water use productivity were set as the second red line for industrial use (under 40 cubic meters of water per RMB 10,000 output) and irrigation efficiency (0.6). The third red line aims to control water pollution by setting limits to total pollutant discharges in line with water quality standards applied to zoned sections of water bodies (Nickum et al., 2017).

However, the total water use control policy is open to two-fold criticism: on the target-setting side, the 700 billion cubic meter total water use cap is more a tool aimed at limiting growth in water use according to business-as-usual projections, and therefore may be too loose to drive substantial reductions in water use (Nickum et al., 2017). Indeed, compared to the 2011 water use level of around 610 billion cubic meters, the cap leaves space for increases in water use and supply, which explains why the pace of water infrastructure construction increased at the same time. On the implementation side, enormous challenges exist to effectively monitor and enforce the caps set by water allocation plans at both the basin level and the regional level; the caps are yet to function as regulatory instruments and exist more as

⁶ According to its Foreword, the 2010 water plan is a "programmatic document for sustainable use of water resources, and provides an important basis for development, utilisation, governance, allocation, conservation, protection and management of China's water resources" (State Council of China, 2010, p. 3).

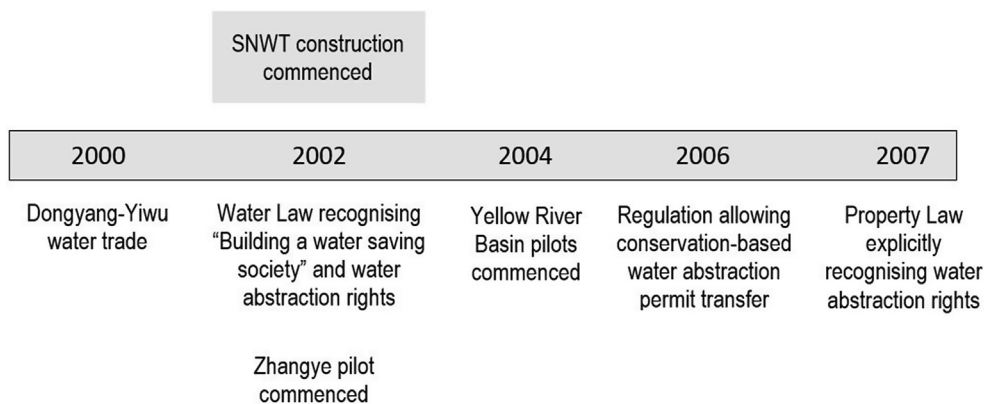


Fig. 1. Major policy developments 2000–2007.

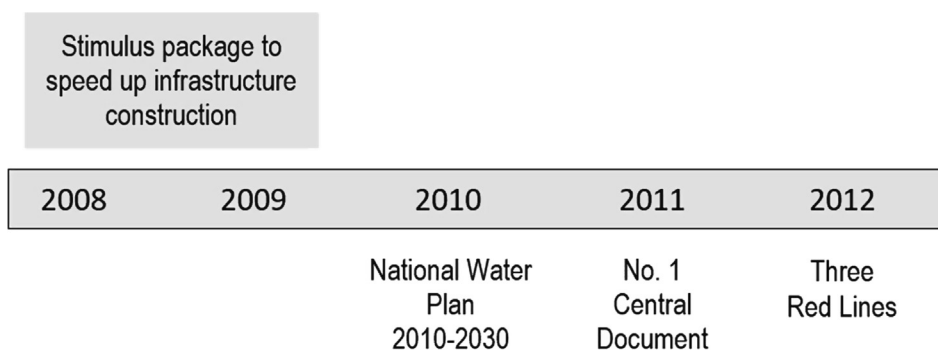


Fig. 2. Major policy developments 2008–2012.

aspirational recommendations (Shen and Speed, 2009). At the water abstraction permit level, the implementation of the water abstraction permit system also lacks clarity and embodies inconsistent water allocation plans through multiple levels (Li et al., 2011; Shen and Speed, 2009).

Though far from perfect, these proposed limits on water use do have significant implications for water trading, as they comprise the first step towards quantified water entitlements (Jiang, 2018; Nickum et al., 2017; Shen, 2014). By setting total water use limits for major river basins and provinces, the national water plan calls for further specification of water entitlements at lower levels - including quantification of water quotas at the prefecture and county levels as well as volumes for water abstraction permits. The second red line for irrigation efficiency is also aligned with water trading from agriculture to industry: public investments in irrigation efficiency create water availability for water trading, and the agriculture community obtains additional fund for efficiency improvements through trading, which in turn contributes to meeting set targets.

Over this period, there was a clear trend in China's water governance regime: the strategic importance of water security received unprecedented recognition, and high-level policy was introduced to prepare for the emergence of market-based mechanisms. The national water plan with its defined water use limits and the three red lines required more rigorous implementation of the water abstraction permit system. The limits imply that when abstractions have reached the defined cap, no further abstraction permits should be issued or approved, so water trading then becomes the only means through which to obtain more water use rights. Such an arrangement, if effective, is expected to provide a governance framework to underpin water rights trading similar to Australia's cap and trade approach (Australian Water Partnership, 2016). The 12th Five-Year Plan (2011–2015) for Water Resources Development reaffirmed the two narratives, stressing infrastructure for supply as a priority area on the one hand, and the national water rights system as a key task on the other (NDRC et al., 2011). Thus

in this period a water governance regime that uses market-based policy instruments to complement administrative allocation began to take shape in China.

3.3. From 2013 onwards

Under the new leadership of President Xi Jinping and Premier Li Keqiang, a new economic strategy that economists call *Likonomics* emerged (李克强经济学) (Huang, 2013; Wu et al., 2014). *Likonomics* features a shift from a focus on the quantity of growth to quality, with the aim of decelerating, deleveraging, 'balancing' the economic structure, and retreating from government stimulus programs. While this 'new normal' saw the end of double-digit growth and the introduction of measures to cut overcapacity (去产能), lower costs (降成本), destock (去库存), and deleverage (去杠杆), structural reform featured a fifth component - to improve weak links (补短板).

Government-led infrastructure spending therefore continued to grow, though at a slower pace (Huang, 2013). As a priority area for the improvement of weak links, water infrastructure continues to receive substantial public investment. In May 2014, a State Council executive meeting chaired by Premier Li decided to speed up construction of water projects: 172 major water projects were identified, aiming to begin by 2020, for an increase of annual water supply by 80 billion cubic meters, at a cost of RMB 600 billion. This list of 172 major water projects includes: irrigation district projects (auxiliary, extensive projects, and water-saving projects), water diversion and transfer projects (water distribution, supply, and interconnection), water source projects (new reservoirs as water sources), and river basin control projects. This diversity in water projects indicates that the focus of water infrastructure investments has expanded to not only increase in water supply, but also optimisation of water distribution and connectivity, which facilitates expansion of market-based mechanisms.

Since 2014 there have been major developments in water trading (Fig. 3). In July 2014, the MWR commenced a nation-wide water rights

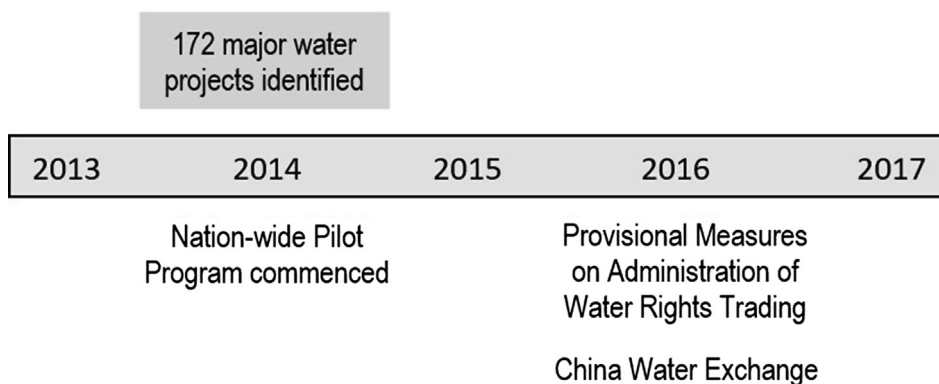


Fig. 3. Major policy developments 2013–2017.

pilot scheme to scale up its previous local-level pilot programs. Seven provinces and autonomous regions across the country were selected to explore various forms of water rights trading, including verification and registration of water rights (Ningxia, Jiangxi, Hubei), and exploration of water rights transfer models (Inner Mongolia, Henan, Gansu, Guangdong). In April 2016, the MWR released the Provincial Measures on Administration of Water Rights Trading (水权交易管理暂行办法), to guide water trading practices. The regulation listed three types of water rights trading: regional water rights trading (between county-and-above local governments), water abstraction rights trading (from water abstraction permit holders, but excluding urban public water supply enterprises), and water rights trading between irrigators (water users' associations or individual users of irrigation water with clearly defined water rights). Compared to the earlier regulation in 2006, which only allowed trading of conservation-based water abstraction permits (State Council of China, 2006), the 2016 regulation has significantly broadened the types of tradable water rights in China. Indeed, the inclusion of regional water rights trading is the first time that local governments above the county level have been given legitimate right to dispose of their regional water entitlements (Jiang, 2018).

In 2016 China also launched its national water exchange in Beijing. Jointly founded by the MWR and the Beijing Municipal Government, China Water Exchange (中国水权交易所) is expected to facilitate water rights trading, and provide services including trading consultation, technical evaluation, market information, intermediary services, and public services. Efforts have also been made by local governments in the legal, policy, and institutional infrastructure required to create their own local water markets. For example, several provinces – Inner Mongolia, Henan, and Guangdong – have established their own water trading platforms.

Alongside continued investment in water infrastructure during 2013–2017, there appears to be continuing strong political will at multiple levels to develop market-oriented mechanisms. The most recent efforts include reflections on experiences from the 2014–2017 nationwide water rights pilot scheme to inform the roll-out of water rights trading. Transactions through the China Water Exchange are increasing, reaching a total of 152 trades by early August 2019, involving approximately 2.8 billion m³ of water volume traded for RMB 1.7 billion (China Water Exchange, 2019). A new water governance principle promoted by the central government in its 13th Five-Year Plan (2016–2020) for Water Reform affirmed the ‘two-hands’ approach, which combines functions of government and markets in water allocation (NDRC et al., 2016). This direction of water reform mirrors China's broad economic reform, in which the core issue is to handle the relationship between government and the market well (Kroeber, 2016). The principle for the state-market balance in the water governance context is interpreted as, in general terms, the market should play a decisive role in water allocation; however, as water is a public good with strategic importance, state control is also necessary, which can be

delivered through market-based mechanisms (J.P. Wang et al., 2018). While it is too early to discern a neat division of responsibilities between government and market, there is a clear trend that government is allowing, encouraging, and even assisting the market to take over some of its responsibilities in allocation. Both hands are presented as important to ensure China's water security; the policy direction points to a making of the market (Shi and Zhang, 2018).

4. Discussion

Since 1998 China's water infrastructure investment has hit new highs. Increased public spending in water infrastructure has been used as fiscal stimulus and as part of building a network of water diversions to ensure national water security (水安全保障). The administrative approach to water allocation also remains dominant, with direct government control over water use delivered through strategic water planning, annual water allocation planning, management of water abstraction permits, and water distribution. So there is clear evidence of significant state involvement on the management of China's water for public good purposes.

Concurrently though, China has been experimenting in the creation of water markets. These experiments have been constrained by the absence of basic legal, policy, and institutional infrastructure, and as a result the development of water trading still relies heavily on government initiatives, with little organic driving force from the market. To western eyes, Chinese developments in water trading cannot be described as water markets in which supply and demand determines prices in a competitive environment. Instead, Chinese government agencies are direct participants in the trading activities as buyers, sellers, intermediaries and regulators, with administered prices for the trades, while private actors play a minimal role. As water markets are claimed to be a kind of ‘quasi-market’ in China (Liu, 2002; Nickum et al., 2017; Zhang et al., 2015), the current developments in water rights trading are not only underpinned by the state through provision of legal and regulatory frameworks, but also created by the state through direct participation in trading activities and active guidance of market development.

Nevertheless, after nearly two decades of legal, policy, and institutional developments and pilots, China has now established a preliminary framework for a national water rights system to underpin further marketisation (Jiang, 2018). While new dams, reservoirs, and diversions continue to be built, water trading is increasingly used to manage demand in those regions where total water use is now strictly capped and where water rights are increasingly well-defined – for example in the Yellow River Basin. If we take seriously the Chinese government's discourse of a ‘two-hands’ approach to water management, then these two trends can be seen to facilitate each other. For instance, the SNWTP is not just a mega water supply project, but also the site of experiments in water rights trading that aspire to become the

world's largest water market. In Henan, one of the seven provinces that participated in the nationwide water rights pilot program, water share quotas for diverted SNWTP water are being traded between different areas within the province. Unlike other western countries such as Australia, where water markets have been used to avoid expensive new infrastructure (Bakker, 2014), supply-side solutions in China (e.g. water diversions) create potential water markets by making water transfers between users feasible through physical infrastructure – and in China's case this is across vast areas linking multiple basins. In turn, water trading often requires the construction of more infrastructure: in many existing water trades in China, buyers need to build their own diversion channels to obtain water under the water entitlements that they have bought.

We can also understand the 172 water projects underway as reflecting China's determination to build a network for water security, facilitated by a combination of physical water infrastructure and market mechanisms. Water infrastructure projects are used to interconnect both natural and human-made water systems to raise water use efficiency and support market allocation. Within this network, water trading can allow water to flow to where demand is highest. While China is comfortable with and skilled at big engineering solutions and will continue to use these to address problems of water security, the government does appear to see water markets as complementary to state control over water supply and allocation. There is little evidence in China of one regime displacing the other, or the two being in conflict.

It is therefore fair to conclude that the 'both-and' approach that China takes does not imply that marketisation necessarily means the withdrawal of government, or that water is regarded as exclusively a public or a private good. Rather, market-based mechanisms are viewed as an additional part of a toolkit used to complement administrative command and control instruments for optimised water allocation for both public and private purposes. The traditional government-controlled way carries on, but at the same time the government continues to set up institutions, experiments and other prerequisites for the development of water markets.

Of course, water policy is shaped by broader economic, political, and environmental drivers: severe droughts, the GFC, and the new Xi-Li administration all drove China's water policy in particular directions. In this sense the past two decades of water governance in China reflect a certain pragmatism, with a willingness to experiment with and modify governance mechanisms and institutions to achieve higher-order social and economic development goals. The incremental/experimental approach to water reform is consistent with the literature on policy innovation in Chinese economic reform writ large (for instance Ang, 2016; Heilmann, 2011; Lim, 2017; Zhang and Chang, 2016): local-level experiments test potentially risky new approaches, and if successful these experiments spread to larger areas and eventually inform national-level policy. Despite the particular characteristics of water as a social and economic good, how it is governed in a given country has to be consistent with how other goods (such as health, education, or energy) are governed in that particular social, economic, and political context. Indeed, it would be surprising if the logics and techniques for the governance of water were markedly different from those for other goods. What is yet to be seen is whether China's current hybrid approach to water policy will form part of a broader China 'model' with the explicit intent of providing lessons for other countries. Given the extent to which water policy has been shaped by a particular confluence of economic, political, and environmental factors, we suggest that a wholesale export of China's approach is unlikely. Indeed, the twists and turns of water policy over the past decades seriously complicate the notion of a single China model (see also Dirlik, 2012).

5. Conclusion

Our analysis has examined major changes in water policy over 1998–2018 to understand the logics of water governance in

contemporary China. Through the analysis of China's water policy in the past two decades, this paper has outlined the interplay between two trends in water governance – state control and marketisation. Our analysis shows how experiments in water rights and water trading have continued alongside renewed growth in water supply infrastructure and continued state control of water rights and allocation. We argue that instead of contradicting or supplanting each other, these two trends in water management are complementary, collectively contributing to a distinctive governance regime that serves broader political and economic goals as well as the goal of water security.

Nevertheless, it is important to emphasise that the reforms examined in this paper are primarily about the marketisation of trading and exchange mechanisms, not necessarily the other elements of market environmentalisms that Bakker (2014) defines (such as privatisation or commercialisation of water resource management, or the neoliberalisation of governance). China's experiments in water trading are a particular form of marketisation with particular goals, which are certainly not premised on a critique of the abilities of state actors. The market 'hand' continues to be shaped by and respond to state prerogatives. In this regard, our analysis of the evolution of China's water governance policy may not be replicated in many other places, though it does support Paerregaard and Andersen's (2019) arguments about hybridisation, and suggests that this may take many diverse forms according to the characteristics of particular political-economies.

Our observations on the interaction of the two trends in China shed light on the limitations of the existing water governance literature, in which water reforms are conceptualised as competing approaches to water governance struggling for dominance (Bakker, 2014; Gleick, 2000; Hassan, 2011; Pahl-Wostl, 2007; Pahl-Wostl et al., 2011). Transformations of water governance regimes in the developed world, such as Australia, the United States, and Western Europe, may neatly mirror such an interaction. However, previous studies of China's water reform through this lens identify inconsistent and contradictory trends (Crow-Miller et al., 2017; McCormack, 2001; Moore, 2019; Woodhouse and Muller, 2017), and – we have argued – are a less accurate interpretation of China's water governance than the one we have presented. The Chinese approach is different from the 'either-or' approach observed in other countries where transformations in water governance regimes can be neatly framed as market environmentalism displacing a state hydraulic paradigm. Our analysis suggests that the state hydraulic paradigm has remained strong in China at the same time as market-based demand management has received increasing emphasis. Rather than assuming that one has displaced (or should displace) the other, making sense of China's water reforms requires us to consider how the two approaches complement each other in a water governance regime that aims to meet the overarching goal of national water security.

China therefore provides another empirical context in which the usefulness of the state/market dichotomy is challenged as a theoretical frame through which to interpret the complexity of water governance. We thus echo the arguments made by Paerregaard and Andersen (2019) that the dichotomous notions of commons versus commodity and state versus market fall short of explaining water governance 'as a multifaceted and complex activity' (Paerregaard and Andersen, 2019, p. 459), shaped by the social, political, physical and hydrological processes of a particular context. Moving beyond the 'either-or' point of departure, the 'both-and' hybridisation may offer a new lens through which to clarify the fundamental logic of water governance regimes clouded behind seemingly contradictory manifestations of state/market interplay in water governance.

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CRedit authorship contribution statement

Min Jiang: Conceptualization, Methodology, Investigation, Writing - original draft, Writing - review & editing. **Michael Webber:** Conceptualization, Writing - review & editing, Supervision, Project administration, Funding acquisition. **Jon Barnett:** Conceptualization, Writing - review & editing, Supervision, Funding acquisition. **Sarah Rogers:** Writing - review & editing, Funding acquisition. **Ian Rutherford:** Writing - review & editing, Funding acquisition. **Mark Wang:** Writing - review & editing, Funding acquisition. **Brian Finlayson:** Writing - review & editing, Funding acquisition.

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