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# The Paradox of Small Hydropower: Local Government and Environmental Governance in China

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**ABSTRACT** *Small Hydropower is regarded by the Chinese state as a method for both poverty alleviation and environmental protection in rural areas. This paper finds that local government officials develop an 'environmentally bundled economic interests' approach that simultaneously fulfills the central state's new political mission and local economic development demand. The small hydropower plants however have paradoxically become the destroyer of the environment as local government at different levels develop the plants in an un-coordinated manner. We use the growth of small hydropower in Yunnan province as an exemplar to show the new tendency and problems of China's environmental governance.*

## 1. Introduction

Small hydropower plants (SHPs) in China refer to those hydropower stations whose installed capacity is no more than 50MW (Zhou, Zhang, & Liu, 2009).<sup>1</sup> Due to their characteristics, such as their being small in size, flexible insofar as investment and construction are concerned, SHPs are regarded by the United Nations Development Programme (UNDP) as promoting clean energy that can largely improve rural people's electricity demand.<sup>2</sup> Similarly, the Chinese state has also used it as a tool for rural *electrification* and poverty alleviation (Chen, 2009), especially in recent years, when rural poverty has become more pronounced. In addition, the SHP is also regarded by the Chinese central state as a clean energy that can partially replace large dams<sup>3</sup> and coal power generation. It is because China has become the largest greenhouse gas (GHG) emitting country in the world that the global pressure against China to reduce its GHG emissions has radically increased (Chen, 2009; Yu, 2008). The Chinese central state has thus been eagerly looking for alternative energy resources that have the potential to reduce GHG emissions, including encouraging the building of a large number of SHPs (Bing, 2008).

Building SHPs has thus been regarded by central and local government officials as a political mission in the past decade. Thousands of new SHP stations have been established in remote rural and mountain areas, and the electricity that they have generated has doubled the installed capacity in less than a decade since 2000 (see Table 1). Nonetheless, the huge demand for SHPs has created serious environmental damage due to the competition among firms to “demarcate the river territories” (*paoma quanshui*) in order to build the power stations. The intensive construction of SHPs has

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**Table 1.** Development of SHP in China

Year	1949	1978	1990	2000	2009
Designed capacity (kW)	3,634	5,266,500	13,180,300	24,851,721	55,121,211
Realised capacity (100 kW)	523	997,300	3,928,300	7,998,249	15,672,470
SHP in hydropower (%)	NA	22	31	33	30

Source: *China Water Statistical Yearbook 2010*.

dried up some parts of the river and has seriously damaged the natural environment, including the deterioration of biodiversity along the river basin (Zhou, 2010, 166). The SHPs have indeed paradoxically become the killer, not the savior, of the environment. One of the major newspapers focusing on the energy issue in China, *zhongguo nengyuan bao* (China's Energy Daily) even uses the title 'waner de xiao shui dian (Damn the Hydropower)' to describe the environmental damage that SHPs have created.

Most existing studies on China's development of hydropower have focused on big dams and their environmental and socio-political impacts (Hensengerth, 2009; Liebman, 2005; Magee, 2006; McNally, Magee, & Wolf, 2009; Mosert, 2000; Onishi, 2007), and few have concentrated on issues related to SHPs. There are even many studies which have either focused on the technological feasibility issue (Paish, 2002) or on the development tendency (Huang & Yan, 2009; Zhou et al., 2009), but of which surprisingly very few have addressed the issues related to the roles of key actors in the development of SHP: local government and private capital. This article will fill this gap by asking how the local government officials respond to the demands for social and environmental protection from the central state, while simultaneously promoting economic development? Why has the rapid development of SHP become environmental disasters in China?

In a way that is different from the existing fragmented authoritarian thesis (Lieberthal & Oksenberg, 1988; Mertha, 2008, 2009), the local state corporatist (Lin, 1995; Oi, 1992, 1995; Walder, 1995) and cadre personnel management approaches (Chan, 2004; Edin, 2003), this article takes the most recent political developments in China into account and argues that local government leaders under these new circumstances tend to conform to national environmental directives by bundling the national priorities with local economic interests and compensating businesses for their financial losses by other means, such as bank financing or real estate projects (Heberer & Senz, 2011; Kostka & Hobbs, 2012). As a result, there has been an environmental disaster, as different levels of local officials have allowed private firms to develop different segments of water power without adequate coordination. Together, these actors have paradoxically damaged the environment through their implementation of policy demands from above.

This article will use Yunnan Province to investigate the institutional factors inherent in the development of SHPs. Yunnan Province is located in the south-west of China and borders Myanmar, Laos and Vietnam. The province has more than 600 rivers, has 24 per cent of the country's hydropower potential, and already provides more than 10 per cent of China's hydropower. There are many large dams already being built along the Yangtze (*Jinsha*) and Lancang Rivers (Mertha, 2008). In addition, a large number of SHP stations have already been built which are fully supported by lower levels of local government. Indeed, many of the existing SHP stations in Yunnan are run by private businessmen from other provinces, such as Sichuan and Zhejiang.

The data used in this study have been collected as a result of field trips conducted by the authors in two prefectural cities in Yunnan Province and Beijing City in China in August 2011, July 2012 and August 2013. A total of more than 20 informants were interviewed face-to-face. Each interview was conducted by the authors, and was completed within one or two hours. Our informants were mainly high-ranking executive officials of central and local governments, the owners of SHP stations, engineers of power grid companies, executives of chambers of commerce, industrial researchers, directors of NGOs, and university professors in China.

## 2. Local Government's Role in Social and Environmental Governance

SHPs are mainly built in rural and remote mountain areas, which need to be officially approved and monitored by lower levels of local government. The local government's behaviour thus largely determines the way in which an SHP is constructed. Most studies on local government in China have been focused on China's fragmented authoritarian state structure, its economic activism or on the cadre personnel management system which determines local officials' methods of promotion; very few have paid attention to the issues related to how local officials respond to environmental sustainability and the rural social development demands of upper-level governments (for exceptions, see more recent studies by Heberer & Senz [2011]; Kostka & Hobbs [2012]; Tilt [2009]).

The economic activism of the Chinese local government has been well documented by many scholars (Lin, 1995; Oi, 1992, 1995; Walder, 1995). The actions taken by local governments in relation to economic development have been reflected in the concerted manner in which economic growth is pursued in the market reform era; each level of the state bureaucracy has its own goals, and those at the lower levels are subject to the directives of the higher levels. This economic activism is certainly one of the essential elements that underpin China's rapid economic growth (Qian & Weingast, 1996; Shirk, 1993). As Oi (1995) describes, China's local development is distinguished by its reliance on existing bureaucratic networks:

somewhat akin to a large multi-level corporation, the county can be seen as being at the top of a corporate hierarchy as the corporate headquarters. Each successive level of government is fiscally independent and is thus expected to maximize its economic performance. (Oi, 1995, 1138)

The local state corporatism thesis has found that local governments in the economic reform era had a very strong incentive to develop local economies, in which many local cadres were pioneers in leading the local economies to develop and move away from decadence (Oi, 1995). This phenomenon has been particularly noticeable in urban development, where city officials have worked closely with real estate developers to greatly transform the city landscape; however, this urban transformation has been based on grabbing the land from peasants, which in turn has given rise to enormous human tragedies and social unrest in recent decades (Guo, 2001; Hsing, 2010; Zhu, 2004).

As China has entered the new millennium, serious social and environmental problems have resulted owing to the unruly development of the past few decades. The central state in the new decade has thus introduced many new social and environmental policies in order to alleviate the deteriorating conditions. For example, Hu Jintao's 'concept of scientific development' which he spoke on at the Communist Party of China (CPC)'s Seventeenth Party Congress in 2007 laid special emphasis on the principles of a 'humanistic center' (*yi ren wei ben*), 'active coordination' and 'ecological protection' in the government's work, in a departure from the former 'development is hard fact' approach. How have the local cadres responded to the new social and political demands from above as the central state has transformed its policy priority? The existing local state activism literature cannot adequately answer the question.

Why have local officials been so economically motivated to develop the local economy? This is the question that the cadre personnel management approach wants to answer (Chan, 2004; Edin, 2003; Heberer & Senz, 2011). This perspective argues that the local officials' strong motivation in developing the economy has been deeply rooted in the personnel evaluation system of the CCP, with its strong emphasis on the local officials' performance in promoting economic development. Therefore, although local officials have many tasks to perform simultaneously, they tend to pick economic development as their priority because this is related to their promotion. As Edin (2003, 39) observes, there are three types of performance targets: soft targets (*yiban zhibiao*); hard targets (*ying zhibiao*); and priority targets with veto power (*yipiao fojue*). While veto power implies local officials' failure to attain these targets (mainly family planning and social order) will cancel out all other work performances, hard targets tend to be economic in nature, and the completion of hard targets is important both for receiving bonuses and for political rewards. According to Edin, local officials tend to keep a careful

eye on political targets while concentrating their efforts on achieving hard targets (for state-owned enterprises, see Chan [2004]).

In the new millennium, the Chinese central state has met enormous challenges from society, especially from social protests that have arisen due to land grabbing in the urban areas, the failure to resolve the ‘Three Rural Issues’ (*sannong wenti*)<sup>4</sup> in the rural areas, and widespread environmental pollution (Chen, 2012; Hsing, 2010; O’Brien & Li, 2006). How, then, has the central state’s concern over the decrease in social tension become a priority target to which local cadres have to respond? This is an issue that has rarely been discussed before in this thematic approach (with the exception of Heberer & Senz [2011]).

Finally, the ‘fragmented authoritarianism’ thesis asserts that Chinese authority was authoritarian and fragmented; that is, ‘the structure of authority requires that any major project or policy initiative gains the active cooperation of many bureaucratic units that are themselves nested in distinct chains of authority’ (Lieberthal & Oksenberg, 1988, 22). Therefore, the decision-making process in China has to go through long-lasting bargaining and consensus-building among various agencies and spatial regions. The decision-making process thus was protracted, disjointed and incremental. More recently, Mertha’s (2008, 2009) study on major dam projects and construction in China has found that the Chinese state has now become much more tolerant towards the rising civil protests and more adaptive to these protests by changing its policy. The fragmented authoritarianism thesis has correctly pointed out the bargaining and protracting processes in decision-making which gave local governments incentives to flexibly interpret national policies. However, scholars who follow this theme on the one hand tend to focus on decision-making at the level of the central state, while on the other hand they have paid less attention to the recent developments in which the central government has been determined to improve the deteriorating social and environmental situation on which this article intends to focus.

Given the above shortcomings, some recent studies have found that local governments in China have responded to the central state’s demands regarding environmental issues by changing their behaviour. For example, Heberer and Senz (2011) have found in their field study that environmental protection, which tended to be a kind of ‘soft target’ before, has currently become a ‘hard’ target that has been treated as a mandatory requirement for lower-level government officials to accomplish in their evaluation list. Similarly, Kostka and Hobbs (2012) also found that, in order to implement the central state’s demands to reduce carbon emissions, local governments develop an ‘interest bundling’ approach that on the one hand requires that the firms reduce the production of coal and on the other give the collaborated firms the privileged benefits of other items, such as bank loans. As they argue, ‘officials often opt to “kill two (or more) birds with one stone” by choosing implementation pathways that balance local priorities with national targets’ (Kostka & Hobbs, 2012, 766).

The above-mentioned recent studies highlight the impact of new political environment in China on the behaviour of local officials, which differs greatly from the past, when economic development was regarded as the only policy goal (Edin, 2003; Oi, 1992). Nonetheless, although the concept of ‘interest bundling’ (Kostka & Hobbs, 2012) has pointed out the fact that local officials are able to create new mechanisms to integrate policy implementation with local economic interest, it does not carry too much weight on the ways in which local government responses to central state’s environmental policy demand. In fact, the bundled interest concept is not very different from the concept of local state’s economic activism that describes local officials’ creative role in developing local economies. Therefore, in order to precisely decipher the new political situation that stresses environmental improvement, we revise the concept into ‘environmentally bundled economic interest’ in this article in order to highlight the local government’s behaviour in integrating environmental policy implementation with local economic interests. Indeed, our study on the development of SHPs at the local level has shown that local state bureaucrats have been responding to the environmental demands from above by binding private firms’ engagement in the SHP business with other local state-controlled and profitable projects, such as real estate, as financial compensation. However, as we will also argue, because local governments at different levels and in different places tend to develop their own SHPs without having a comprehensive river-shed development plan, this paradoxically results in environmental disasters that were not predicted.

### 3. Small Hydropower in China

The Chinese central state has implemented a series of policies to promote SHP in rural areas since the early 1950s. The first major campaign for rural electrification through SHPs was launched during the Great Leap Forward (1958–1960). During this period, rural areas were encouraged to build SHPs to initiate decentralised energy systems and to promote rural electrification (Yeh & Lewis, 2004, 442). This policy had been swung back and forth before the economic reform in 1978. In the 1980s, because of rapid economic growth in the Eastern Coastal Provinces, the whole country met a serious electricity shortage. Therefore, a series of policies was introduced to encourage investment in the energy sector, including the SHP ‘self-construction, self-management and self-use’ policy. By 1988, there were 63,000 SHPs installed in China which addressed the electricity demands of one-third of China’s rural counties and 40 per cent of its county-owned industries (Yeh & Lewis, 2004, 443). There had also been some notable successes in rural electrification, and the achievements in this regard were quite unique in the world. In the 1990s, owing to the severe power shortages, the Chinese state began to allow foreign and privately owned companies to invest in the electricity sector in order to meet the rapid increase in electricity demand (Liu, 2006), including SHP. In 2002, there was a market reform in the electricity sector, through which the energy sector was marketised and partly privatised (Mertha, 2008; Yeh & Lewis, 2004).

From the initial stage of its economic reform, the Chinese central state usually selected a few areas or provinces in order to experiment with specific policies and thereby encourage those areas to generate innovative strategies and create internal competition among these areas (Shirk, 1993). The provincial governments in turn also used similar methods that they would apply to a few selected cities and counties to encourage the experiments and realise the assigned political goals. In encouraging the development of SHPs, the central state in 2003 selected five provinces, namely Shanxi, Sichuan, Yunnan, Guizhou and Guangxi, and 26 cities/counties to promote SHPs so as to expand its electrification policy, alleviate rural poverty and also protect the environment, or the so-called ‘electricity for forest woods’ (*yi dian dai cai*).<sup>5</sup> In 2006, the experiment was expanded to much larger areas throughout the country. The assignment directly imposed from above immediately became one of the evaluation indicators for the cadres’ annual performance review. Therefore, the city/county governments have had to regard the construction of SHPs as one of the major political goals to be accomplished.

Due to promotion by the central and provincial governments, a large number of lower-level governments allied with small, privately owned hydropower companies to develop SHPs along small branches of the rivers. Indeed, the number of SHPs increased rapidly after the turn of the century. Over half of the 2,800 counties had SHPs (about 45,000) in 2009, with the installation capacity of SHPs having increased four times by 1990 (see Table 1). SHPs consistently accounted for around 30 per cent of all hydropower in the electricity industry, supplied electricity for over 300 million residents in rural areas, and covered up to 99 per cent of rural areas as compared to merely 40 per cent in the initial stage of the economic reform (China Water Statistical Yearbook, 2010).

In the past, each SHP built its own grid, referred to as the rural or agricultural grid, that supplied electricity in the nearby rural areas. In the early 1980s, the state’s policy was to decentralise power supply besides the nation-wide power grid. Accordingly, there were 790 county grids that linked rural agricultural grids, which were also integrated into 42 regional grids that were supplementary to the national grids (Liu, 2006; Zhou, 2010). These SHPs and agricultural grids, which were controlled and managed by provincial governments and lower levels of local government, supplied the rural areas’ demands for electricity and contributed greatly to the development of rural industrialisation during the 1980s and early 1990s. In the process, however, the state invested very little in maintaining the existing power grids, especially those in remote rural areas.

This integration of the power stations with the grid policy was abandoned in the 2002 electricity reform. In a nutshell, there are three major elements in the market reform of the electricity sector that have largely determined the patterns of hydropower development. The first element was the principle of separating enterprise from governmental functions (*zhengqi fenli*) so as to let power-generating

state-owned enterprises (SOEs) run like businesses that basically follow the market principle. Thus, in the process of the reform, many power-generating SOEs were separated from the Ministry of Electricity to become independent companies. Second, the state separated the grid from the power-generating sector and established a regionally competitive market in the latter sector;<sup>6</sup> the state invested even more in the construction of the national grid system in order to support the policy of inter-regional electricity exchange such as ‘sending electricity from the west to the east’ (*xi dian dong song*). Third, all the power had to be connected with the national and regional grids, and the prices of electricity were determined by the market competition mechanism. However, there were still some SHPs, which were mainly located in remote areas, that had independent agricultural grids and had not yet been linked to regional or national grids (Liu, 2006; Zhou, 2010). The principles of ‘the division of operator and grid; price competition for connecting with the grid’ and ‘forced connection’ in the electricity reform have largely determined the fate of the SHPs since 2002.

Along with this market reform, the governance structure of the new electricity regime has been changed to the following system since 2003. While the Ministry of Water Resources is responsible for the development of SHPs, the administrative work of investing in hydropower stations was allocated to different levels of local governments (Liu, 2006; Zhou, 2010). In addition, the national power grid companies have also been expanding their market territories; they not only have gradually acquired the existing regional grid, by building high voltage transmission networks across provinces, they have also had the institutional capability to determine whether or not to buy the electricity that the power operators have generated. They have enjoyed the monopoly position in the market in which the small privately owned SHPs have had no other choice but to be in a subordinate position.

#### 4. The Role of the Local Government

‘Local government’ in this article mainly refers to local authorities at the county or city levels. Because China is an authoritarian state where the CCP is the only party that controls the state power, the state thus simultaneously refers to the party and the state authority. As has been discussed above, the CCP uses its cadre personnel management system to monitor its members’ behaviour and thus ensures that the party’s decisions are applied through different levels of governmental administration (Chan, 2004; Edin, 2003). On the other hand, the upper level of the state bureaucracy also has the power to evaluate the performance of state officials at lower levels and to recruit potential talent. Thus, state officials tend to follow the orders from the party or from the upper levels of the administration in order to maintain their good record based on an annual evaluation, and especially on the hard target of economic growth that is good for their promotion. As the Chinese central state has begun to regard social harmony, rural reconstruction and ecological protection as being as important as economic development, it has become a challenge for local government officials to reconcile those new social and environmental requests from above with economic performance at the local level.

Indeed, Tilt (2009, 144) finds that the concept of sustainability has been interpreted differently at different levels of the government’s environmental agency. At the township or village level, the concept of sustainability tends to be regarded by the environmental agency as promoting social and economic development, rather than as an abstract concept as the central state bureaucrats maintain, in order to provide local jobs and to increase income and taxes in contrast to idealised environmental protection. This is because, at the lower level of government, environmental agencies have been very weak, have not had an independent budget, and have been directly governed by the township or city mayors or party secretaries, thereby having little independent authority.

These findings are also reflected in our field study in Yunnan. From 2006 onwards, because of the ‘Eleventh Five-Year Plan’, ‘the New Rural Reconstruction Under Socialism’ (*shehui zhuyi xin nongcun jianshe*) Plan and ‘sustainable development’ have been implemented and have involved funneling more resources into infrastructure construction in rural areas, including enhancing rural electrification, rural irrigation systems, rural agricultural grids, telecommunications, clean water, and so on. In the years that have followed the launching of the Plan, the state-level departments’ yearly

Document Number One (*yihao wenjian*) have all been focused on the issues of rural reconstruction. This indicates that the central state has treated rural reconstruction as one of its priority targets so as to meet the stringent issues arising from economically decaying rural areas. These actions have alerted local officials that the rural poverty problem has become an urgent issue that they have to carefully tackle.

Although Yunnan Province has an abundance of water resources, the distribution is very uneven and is mainly concentrated in the north-western area. The central and south-eastern parts always suffer from drought due to the weather conditions. In addition, because of its plateau landscape, those people who live in the mountainous areas of the province suffer the most from water shortages. Furthermore, the Karst topography of the east mountain plateau seriously impacts the water supply for both agriculture and households.<sup>7</sup> Situations from the above areas have become much more severe in the past few years, as the dry weather conditions have become more regular due to the global climate change. Therefore, besides the Central State's New Rural Reconstruction Plan, the provincial government of Yunnan also has its own policy on rural water preservation and on the construction or maintenance of irrigation systems. These policies include the maintenance of existing small dams and water channels, as well as the construction of new dams to preserve the water in the rainy season (roughly from June to October) for the remaining dry season. In order to mobilise the resources, Yunnan Province encourages private firms to construct water channels and to build SHPs simultaneously. The electricity market reform in 2002 has been especially beneficial to those local governments that have had no financial resources to repair and maintain the existing hydropower stations.

As the concept of scientific development has become the core political ideology and guiding principle of the central state since 2007, the city or county officials have clearly acknowledged, according to the logic of the Chinese bureaucracy, that sustainable development (or ecological civilisation) has become one of the best strategies for procuring financial resources and gaining the attention of the higher echelons of the party and administration. Thus, by promoting SHP, a local government can not only express its loyalty to the central state's policy, but can also illustrate its determination to protect the environment (forests). Indeed, in T city's official documents,<sup>8</sup> where we visited, all strategies that are relevant to SHP are dubbed as ecological protection, sustainable development, green industries, and so on.

The local governments' promotion of SHP thus not only has political ramifications, it also has very real financial benefits. Because the promotion of SHPs has become the central state's policy, a large quantity of financial resources have been budgeted for their construction in consecutive years. Similarly, the provincial governments have also allocated a corresponding amount to the same item. In order to receive financial support from both the central and provincial governments, the city and county governments have used every possible approach to apply for abundant financial resources from the upper level of government. As our case shows, T city obtained financial support amounting to over RMB \$542 million for water resources and SHP categories during the first three quarters of the year 2011, which accounted for almost one-fifth of the whole city's annual budget.<sup>9</sup> It is thus very clear that promoting SHP and maintaining water resources are a major economic benefit to the local government.

Furthermore, in order to ensure the implementation of the promotion of SHP, the upper level of government also uses the annual performance evaluation system as a tool to manoeuvre the lower-level officials. In the Yunnan case, the Water Resource Department of the provincial government used the 'electricity for forest woods' policy as the main political goal to evaluate the performance of lower-level city or county officials. The lower-level officials have to sign the annual responsibility contract with the upper levels so as to assure them of their target goals. The common practice is that after the annual evaluation has been done, the provincial government announces the rankings publically. This puts great political pressure on local officials and generates severe competition among them.

Although promoting SHP is the government's political goal, the application and installation of an SHP is the company's own work. The building of an SHP starts from a private company's application to develop a power station along a river. The company has to prepare all the necessary documents and applies to the Bureau of Water Resources at the local level. The review and approval are conducted by



the Development and Reform Commission at both the local level and provincial level. The capability of the SHP will determine what level of local government has the final say. For example, the city level can only approve the capability up to 25,000 kW; above this level up to 50,000 kW has to be approved at the provincial level. In addition, all SHPs have to be connected to the regional or national grids. The price of the electricity that an SHP generates is determined by each province's or local government's Bureau of Commodity Prices and also has to be approved by the local government's finance department.

For local officials, those smaller-scale irrigation systems and SHPs can be better managed by private companies, because they have neither the financial resources nor the manpower to manage them. However, in order to realise the mission of rural reconstruction, local officials on the one hand have established good relationships with local businessmen, but on the other hand want to keep their power in realising their political missions. Alternatively, as an official described:

In relation to the public utilities, the government at the current stage has to pull back the market forces a little bit and the government has to become more involved; now the government has the power to let the market run its course. (Interview data EO1102-0804)<sup>10</sup>

In order to attract private investment to this SHP sector, some local governments have also offered financial incentives – for example, local tax rebates for five years – to the investors.<sup>11</sup> Moreover, local officials have been actively involving public–private collaboration networks in facilitating the projects. For example, during our field trip in Yunnan, we found that many of the SHPs were built by businessmen from Zhejiang, Fujian or Sichuan. Those businessmen who came from the same province would attend the Provincial Business Association, such as the Sichuan Business Association in Yunnan, to make friends, collect information and build up social networks. Although these associations are so-called autonomous civil organisations, the secretaries of the associations tend to have a CCP party background, which provides better channels to communicate with local governments, and they serve as the liaison between the local governments and business associations.

The business association we visited most of the time has a social gathering function, but it is also a place for business networking. When there is a development project, the association becomes the place to find interested partners. The secretary of the association will then be the person to communicate and bargain with local officials about the project and other related bureaucratic procedures, including the tax rate; sometimes, these businessmen will participate in real estate projects, in which local officials may share to some degree.

In the SHP sector, we found in our field trips that the companies would use every possible means to get closer to local officials who were in charge of water and electricity in the departments of water resources, as well as of reform and development. For example, the SHP companies tend to invite retired officials to be the companies' consultants in order to establish closer network relations with the incumbent officials, and to know more clearly the obvious and under-the-table rules. The construction of *Guanxi* is the basic rule of the companies' operations in local society. Through the above channels, therefore, local officials tend to have closer networks with local business people.

For local officials, encouraging private firms to engage in the construction of SHPs thus has many benefits. First, it fulfils the demands of rural reconstruction from above, both for rural irrigation and electrification purposes. Of course, formally, the local government would require that an SHP make irrigation its priority rather than the generation of electricity. However, the reality has always been the opposite, with the private firms' interest having been to earn money and not to focus on public goods. Second, it is supposed to have a good effect on the environment, because electrification largely reduces the rural peasants' dependence on the forest for energy that would lead to deforestation. Thus, as one official said:

Because of our policy of attracting private capital to investment [*zhaoshang yinzi*], our main rivers have been fully developed by SHPs. ... All in all, SHPs have created very good effects. (Interview data EO1101-0804)<sup>12</sup>

## 5. The SHP Companies

In the initial stages of the electricity market reform, privately owned SHPs indeed earned a lot of profits in developing hydropower, the return being estimated to reach as much as 20 per cent in the late 1990s and early 2000s (Cao, 2008, 92). This was due to the fact that the government at that time was not so serious about the environmental impact, nor did it have to follow formal procedures when making an application to construct an SHP. As long as the applicant found the water resource, the firm could then draw up the construction plan and received approval in a very short period of time. However, after 2006, the central state announced a new measure referred to as the 'Notification Regarding the Orderly Development of Small Hydropower Plants to Protect the Ecological Environment'. From then on, all the necessary procedures were set up in the application, including an environmental impact assessment. From then on, the state began to check those 'Four Nos' regarding the SHPs – no registration, no construction plan, no acceptance certification and no suitable management – and as a consequence forced most of them to close down. Subsequently, a serious problem began to emerge, particularly in relation to the plants' profit margins. As a result, the average annual profit rate of an SHP is currently about 8–10 per cent (Interview data EO1101-0804).<sup>13</sup>

One of the reasons for the shrinking profit margins of the SHPs was the forced connection policy of the SHPs to the national grid. In the case of Yunnan province, it is the South Power Grid that has the dominant position in the market (which decides whether or not an SHP can be connected to the national grid), whereas the SHP has to comply with it in order to survive in the market. Although the state requires national grid companies to purchase electricity generated by the SHPs, the real situation is that these grid companies are reluctant to fulfil the obligation. One of the main reasons why the national grid does not like to buy the electric power generated by the SHP is its unstable nature. One of our interviewees referred to it as garbage electricity.<sup>14</sup> In the rainy season, SHPs can generate more power in a similar way to the big dams; nonetheless, the electricity provided by the latter is already sufficient for the grid to supply the market demand. As a result, the electricity that an SHP has generated has to be sold at a much lower price or be given up. On the other hand, in the dry season, the flow of the river is not abundant enough to be used for power generation, and therefore the SHP is not able to supply electric power to the grid. Therefore, the grid company lacks interest in the SHPs and even adopts certain measures to prevent them from being connected to the grid (Zhou et al., 2009, 1079). In general, the grid company is very supportive of building big dams along major rivers in Yunnan.<sup>15</sup>

As a result of the forced connection policy, according to a report (Cao, 2008, 43–44), there were as many as 12 provinces in which the cost of power generation was higher than what could be recouped by selling the electricity to the grid company, which thus led to the companies in these areas recording a deficit. For example, in Guizhou province, the grid company paid the SHPs only 0.15 RMB per kW/hour, and sometimes this rate was even lowered to 0.12 RMB per kW/hour. By contrast, the grid sold the electricity to rural enterprises at 0.318 RMB per kW/hour, and thus the grid company earned a large amount of profit from this transaction. As one hydropower developer pointed out:

Hydropower has seven advantages, including the raw material (no need to worry about the sources), the market, the transportation, the quality, the inventory and the state's support. However, these seven advantages are less important than one disadvantage; that is, it is a highly monopolised industry that in practice is manipulated by the state by a lower price. Whether or not the price should be raised is not what we can say. (Guan, 2012)

In fact, our field trip in Yunnan confirmed this observation, for the developers are now complaining that the lowering of the purchase price by the grid company may mean they suffer a deficit. Some firms are even expecting to use the Clean Development Mechanism (CDM) to compensate for their currently very low profit margins.<sup>16</sup>

Even worse has been that the rural electricity companies have gradually been merged and acquired by the powerful grid companies and have become their affiliates. As a result, the local rural electricity

companies have totally lost their initial function of benefiting poor rural areas, as the low-efficiency and high-cost state-owned power generating companies now run the whole of the power generation market in China, or in Yunnan in particular.

Why are so many private companies still interested in investing in this SHP sector, given the fact that many have suffered from heavy financial losses? We found that local governments would compensate those companies by means of other administrative methods, such as real estate development projects whose profits are much larger than those from the SHPs in order to maintain the alliance. According to our interviews, the owners of the SHPs usually had more than just one station each. Thus, while the profit margins of the SHPs have been shrinking over the years, they still continue to invest in more stations due to the fact that, on the one hand, there is still some amount of shrunken profits and the stations can run for a long period of time and, on the other hand, they help the local officials fulfil the political missions assigned to them by the upper levels of government, which will later lead to other returns from the local officials.<sup>17</sup> As one of our interviewees said:

The SHP project has been one of the most important items that the local government has had to implement according to the national evaluation criteria. Local officials require you to accomplish the already bided project within a specific time duration, and they can help you to shorten the administrative procedures to a week as compared to the normal two months. ... Whenever you help local officials to accomplish political assignments, even though those items' profit-margins are very thin, local officials will compensate you in return on other construction items ... We evaluate our project not based on a single item, but rather in a holistic manner. (Interview data EW1102-0806)<sup>18</sup>

This statement clearly shows the close alliance between local officials and private capital, and the environmental interest bundling approach through which private capital may suffer from short-term financial loss in return for much larger and long-term benefits. This may explain the paradox of the deficit-investment phenomenon in the small hydropower sector.

The close alliance between local officials and the privately owned SHPs has given rise to a phenomenon referred to as 'demarcating the river territories' (*paoma quanshui*), indicating that the rivers have been divided into sections by different parties for building large and smaller dams, as well as hydropower stations. The phenomenon has generated widespread criticism and reports in the media, and has finally received responses from the state in reformulating the application procedures for SHPs by adding the environmental assessment item mentioned above.<sup>19</sup>

Ironically, most of the environmental non-governmental organisations (NGOs) have paid less attention to this environmental disaster, and have instead devoted much of their limited resources to watching big dam construction, such as the 13 cascade dams along the Nu River (Mertha [2008]; also interview data ENG1101-0802).<sup>20</sup> It is also because big dams create a much larger-scale environmental impact than the SHPs, and therefore NGOs have devoted much energy to big environmental events compared to the smaller scale SHPs. However, NGOs were indeed aware of these impacts of SHPs on the environment in Yunnan Province, and provided in-depth reports to the media. One renowned environmentalist lamented:

The main problem with SHPs now is their blind development which results in not only electricity not being able to be sold, but also a shortage of clean drinking water because all the river water is used for generating electricity. (Interview data ENG1101-0802)<sup>21</sup>

## 6. Conclusion

This article asks how the Chinese local state officials respond to the demands for social and environmental protection from the central state, while simultaneously promoting economic development. This article has shown that the local governments in Yunnan have responded to the political and environmental demands by allying with private capital to build more SHPs to fulfil the political

mission, while at the same time granting other benefits to the privately owned firms to compensate for the profit-losing SHP projects. Our research conforms to the findings of recent studies on the behaviour of local governments in China that find that a new cadre evaluation system has emerged (Heberer & Senz, 2011) and that there are ‘bundled interests’ between local government officials and businesses (Kostka & Hobbs, 2012). We use the concept of ‘environmentally bundled economic interests’ to decipher the emerging phenomenon, based on Kostka and Hobbs’s (2012) original ‘bundled interests’ concept. We further argue that, although the Chinese central state has begun to impose new social and environmental missions on local governments, the local governments have tended to interpret the political mission in a way that can be integrated with local economic development and to collaborate closely with private interests. Through this collaboration, local state bureaucrats simultaneously fulfil the central state’s environmental and political mission and local economic development demand.

We also show that due to the market reform of the electricity industry in 2002, which has resulted in the major electric-power-related SOEs pursuing profit maximisation, SHPs’ profit margins have been radically squeezed. Nonetheless, the shrinking of profits has only further enhanced the local government officials’ alliances with the SHPs by allowing these SHPs to develop other profitable projects in order to fulfil the political mission. The result of this collaboration has been that the hydropower stations in the upper, middle and lower streams of the rivers may belong to different companies that have conflicts of interest in terms of utilising the rivers for generating electric power (Zhou, 2010, 163).

Although we have found that the building of a large number of SHPs in rural areas has brought about an environmental disaster, by agreeing with UNPD we regard, the Chinese government’s promotion of SHPs as being a positive part of its climate change policy and rural poverty alleviation due to its easy implementation and low cost. However, it was the uncoordinated development that has resulted in the environmental damages. Therefore, the policy implication of this article is that in order to benefit from the development of SHP, China has to have a more coherent bureaucracy and comprehensive bureaucratic procedures to coordinate and review the applications of SHPs in order to rescue the rural economy from bankruptcy and save the environment.

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### Notes

1. There are four grades below the 50MW installed capacity of small hydropower: 0.5–5MW, 5–10MW, 10–25MW, and 25–50MW (Zhou et al., 2009).
2. The UN Development Programme (UNDP) has supported many countries in building small hydropower plants, which it regards as a clean energy; so does the Chinese state. With regard to its mission in China and the Asia-Pacific Region, please see <http://www.hrcshp.org/en/about.html>.
3. Building large dams in the world and in China now creates colossal disputes, not only within domestic politics but also in the international arena, especially when the river is transnational; for example, the Lancang River flows into Myanmar, Cambodia, Thailand and Vietnam. Building large dams may cut the water flow of the rivers and trigger international disputes (Hensengerth, 2009; Liebman, 2005; Mosert, 2000; Onishi, 2007).
4. The ‘Three Rural Issues’ (*sannong wenti*) refers to three issues highly relating to rural development in mainland China. Specifically, these issues are rural areas, agriculture and peasants.
5. This means that by building more SHPs, rural peasants would have electricity for cooking and other domestic energy utilities. This would then reduce the peasants’ incentive to cut wood from the forests.
6. The new companies include two power grid operators, namely the State Power Grid (covering mainly the northern, north-eastern, north-western, eastern and central China areas) and China South Power Grid (covering the Yunnan, Guizhou,

- Guangxi and Guangdong areas); and five state-owned electricity operators such as Huaneng, Datang, Guodian, Huadian, and the Electricity Investment Corporation. Accordingly, the existing regional and rural agricultural grids have been incorporated into the two newly established national grid systems.
7. Please see Larson, C. (2010, January 18) for the impact of Karst landscape on water supply.
  8. T city is the anonymous name we use for the city in which we did our field study in Yunnan.
  9. Interview data EO1102-0804, data obtained from local informant in T city during our field study.
  10. Interview data EO1102-0804, an officer from the City's Development and Reform Commission, Kunming City, 4 August 2011.
  11. The value-added tax was 17 per cent in one of the cities that the authors had visited in Yunnan. Of this 17 per cent, 75 per cent went to the central state and the remaining 25 per cent was local tax. The local government would return this 25 per cent to the investor over a five-year period.
  12. Interview data EO1101-0804, with an officer from the Agricultural Bureau, Kunming City, 4 August 2011.
  13. Interview data EO1101-0804, with an officer from the Agricultural Bureau, Kunming City, 4 August 2011.
  14. Interview data EE1101-0711, with engineers of South Grid Corp., 11 July 2011.
  15. Interview data EE1101-0711, data based on interview with engineers of South Grid Corp., 11 July 2011.; also interview data EOE01-0710, data based on an interview with engineers from the Bureau of Water Resources, T City, Yunnan, 10 July 2011.
  16. Interview data EW1202-0708, owner of a small hydropower plant, 8 July 2012, in T City, Yunnan. In addition, CDM is a type of flexibility mechanism that provides trading schemes for emissions reduction projects that generate Certified Emission Reduction (CERS) units. The CDM allows industrialised countries to buy CERS and to invest in emission reductions where it is cheapest globally. Of course, China is one of the largest countries to benefit from the CDM mechanism.
  17. Interview data EW1201-0707, owner of a small hydropower station, 7 July 2012, T City, Yunnan. The returns may consist of different types, and one of them may be a real estate development project which has much larger monetary profits.
  18. Interview data EW1102-0806, owner of a small hydropower station, 6 August 2011, T City, Yunnan.
  19. There are a lot of reports on the environmental impacts of SHPs. These documents are also one of the main sources of this research.
  20. Interview data ENG1101-0802, with a local environmentalist of green NGO, Kunming City, 2 August 2011.
  21. Interview data ENG1101-0802, with a local environmentalist of green NGO, Kunming City, 2 August 2011.

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