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Darrin L. Magee



# **New Energy Geographies: Powershed Politics and Hydropower Decision Making in Yunnan, China**

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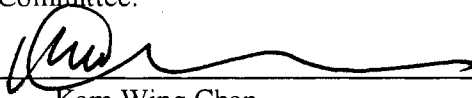
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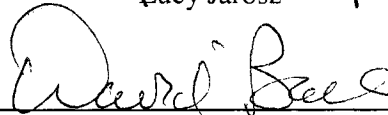
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**Abstract**

New Energy Geographies: Powershed Politics and Hydropower Decision Making in  
Yunnan, China

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This study analyzes decision making related to large-scale hydropower in China's Yunnan Province. The study has five aims: to contribute empirical knowledge about hydropower development on the Lancang (upper Mekong) and Nu (upper Salween) Rivers; to explain the institutional, legal, and political economic factors affecting decisions about large-scale hydropower; to use the peculiarities of water to complicate models of center-local and interprovincial relations; to underscore the importance of geographic constructs in framing and legitimizing certain development patterns; and to contribute to debates on China's "civil society."

After reviewing literature in political ecology, China geography and area studies, and scale theory, I develop an analytical framework called a powershed. Like a watershed, a powershed reflects a space over which a resource is collected. It also has political meaning: first, as a way of understanding how policies and investments are deployed to facilitate electric power transfers from Yunnan to Guangdong; and second, as a means for signaling the importance of geographic constructs in legitimizing certain

discourses, actions, actors, and policies while de-legitimizing others. Most importantly, it provides a dynamic, context-specific analytical framework that enables us to trace the processes of hydropower development. Next, I provide details of Lancang and Nu hydropower and of the energy geographies to which the projects belong.

My analysis picks apart decision flows from blueprint to dam, identifying two distinctly different perspectives. I conclude by arguing first that supra-provincial institutions such as watershed commissions, hydropower companies, and grid companies are important in shaping relations between Guangdong and Yunnan vis-à-vis electricity production, distribution, and consumption. A corollary is that reforms in the electricity and water sectors have created overlapping responsibilities and unclear jurisdiction among institutions charged with water resources oversight. Second, social organizations and academic institutions are increasingly important in society-environment decision making if only for their ability to alter the terms of debate. Finally, hydropower development in “rural” Yunnan must be understood in a context of urbanization and industrialization processes in Guangdong. This study advances the application of political ecology to the study of China and solidifies the link between scale theory and spatial administrative models of China.

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NB: All line maps in this dissertation were made using GeoMedia® software and datasets from the World Health Organization's MapServer for Public Health Mapping (<http://mapserver.wpro.who.int/default.cfm>), the University China in Time and Space Project (<http://citas.csde.washington.edu/>), and the China Historical GIS Project (<http://www.fas.harvard.edu/~chgis/>).

## Preface

### The Hydropower Workers' Song\*

*Heave! Ho! Heave! Heave, ah Heave! Ho! Heave! Heave, ah*

*Cut the mount, split the ridge, 1000 mountains, 10,000 rivers  
Our footprints, the iron dragon rolls, transmitting light;  
Let burning ambition illuminate Heaven and Earth, cherish the majestic hydropower  
Man, winds, and rains, how many springtimes of lofty sentiment  
Written on the great Earth; 'tis the springtime of hydropower  
The heavens ablaze with color, la! la!  
We're a new generation, a new generation of hydropower workers, a new generation  
Our achievements endure a thousand years, good for the country, good for the people  
Morning is coming  
Bringing the people an undying star!*

*The four seas are our home, we work night and day, seeking brilliance  
Our spirits, iron and steel our army, tenaciously advancing;  
Let the Jade Emperor above be struck with awe, pleased with the tribute of hydropower  
Man, hot blood forged into rivers, bold science and technology  
Creating a glorious industry, from the high ridges come plains  
The waters reflecting white clouds, la!  
A new generation of hydro workers, bringing fortune to the fatherland, to the people  
The march of modernized construction brings the people an undying star  
Morning!*

\*To be sung in the key of B flat, *allegro* and proudly. Original Chinese version (*shuidian jianshezhe zhi ge*) obtained from <http://www.sinohydro.com>.

## Acknowledgements

According to University of Washington enrollment records, this dissertation is the product of four years of work. My own recollection is different; in reality, it began over a decade ago when I first started learning Chinese. Throughout my educational journey I have benefited from the support and encouragement of family, friends, colleagues, and mentors, and offer my gratitude to them all. In these few paragraphs I would like to mention a few in particular.

I would first like to thank my family. From the time I was old enough to understand spoken words (and probably before then), my parents have continuously exhorted me to indulge my love of learning. Since I completed my undergraduate education more than a decade ago, my grandparents have wondered when I would finally be finished with school; they now marvel at the fact that it has taken me precisely as long to get out of college – 12 years – as it did to get in. My younger siblings have been particularly patient with my stories and my tendency to argue. While they have no doubt been puzzled at times by the path I chose, my family have unfailingly supported my educational pursuits, and for that I am exceedingly grateful.

I also wish to thank a number of professors at the University of Washington whose influence has fundamentally shaped my Ph.D. experience. My committee chair, Kam Wing Chan, convinced me in short order that I was a geographer at heart and that my research would be well-suited to the UW Geography Department. David Bachman, Madeleine Yue Dong, and Kent Guy all encouraged me to return to UW for a Ph.D. after I had been working for several years following my M.A. program; they have been

mentors and friends for a decade now. My other committee members, Lucy Jarosz and Craig ZumBrunnen, have provided critiques when necessary, encouragement always, and valuable perspectives on the breadth of approaches to the study of nature-society relations. Finally, I would like to reach back to the fall of 1993 when, by some accident of fate the Japanese class at Louisiana State University was full, and I decided to take Chinese. Fen Chou (Zhou Laoshi), my first Chinese instructor and a good friend to this day, is one of the most inspiring teachers I have ever met. I have the utmost respect for the teaching profession and for great teachers, and I have been fortunate to have had many who have kept me honest about what I don't know while inspiring me to learn more. I consider myself doubly lucky that I can call these people my friends, and I regret that I don't have space to thank them all.

During my year of fieldwork in China, numerous individuals provided invaluable assistance to me in my quest to understand the inner workings of the water and power sectors in China. First among them is Professor He Daming, Director of the Asian International Rivers Center at Yunnan University in Kunming. When I first approached him with a topic akin to "the politics of large-scale hydropower in Yunnan," he responded with skepticism and pushed me to refine what I meant by politics, or risk making little headway with my research. When he later agreed to serve as my sponsor, he welcomed me to the AIRC as a colleague and a friend, "the foreign expert who can write complex characters." The same is true for the other faculty at the AIRC, including Professors Feng Yan, Gan Shu, and Liu Jiang, and the graduate students there who were my mentors, my students, and my friends. This dissertation would truly not have been

possible without my sojourn at the AIRC, and without the assistance and encouragement I received from my mentors and colleagues there. Each time I return I am welcomed as family, and I hope that one day I will be able to repay the favor. In addition, I also thank the many individuals in China who agreed to my requests for interviews; their insights, experiences, and perspectives made this study much richer than it otherwise would have been.

Throughout my doctoral program I have received generous financial assistance for my coursework and research. The first two years were funded by a Jackson Fellowship from the Henry M. Jackson Foundation. Later, the Jackson School's China Studies program provided funding for my year of fieldwork in Yunnan. Portions of my research were also supported by a Chester Fritz Award from the Jackson School and a grant from the Geography Department's Howard Martin Fund. These fellowships carried no teaching requirement, and allowed me to focus all my energy on my coursework and research, a luxury I am not sure I merited. I extend my deep gratitude to the faculty and staff of the Geography Department and the Jackson School, to the trustees of the Jackson Foundation, and to the professors and others who have advocated on my behalf.

My graduate experience has been personally and intellectually enriched by the countless other graduate students I have come to know over the past decade. My colleagues at the University of Washington never fail to amaze me with their breadth of talents and interests, and they have been an important source of ideas, laughter, and encouragement. In addition, I have had the good fortune to spend several weeks at the Universities Service Centre at the Chinese University of Hong Kong, an extraordinary

facility for China scholars from around the world. I greatly appreciate the hard work, dedication, and friendliness of USC director GUAN Hsin Chi, associate director Jean Hung, and the staff of the USC, and for the opportunities my visits there afforded me to meet many talented and inspiring China scholars.

Finally, I would like to thank my wife, Beth Kinne, for her unwavering love and support throughout my graduate career. When I needed flashcards cut for my classical Chinese course, she was there to cut them for me. When I needed a sounding board for my dissertation research, she told me which of my ideas were good and which ones needed more work. And it was she before all others who, recognizing my love of learning, teaching, and research, encouraged me to return to school for my Ph.D.

Notwithstanding the long list of individuals who have contributed to the completion of this dissertation, I remain personally responsible for any errors in the work.

## **Dedication**

This dissertation is dedicated to Beth Kinne, my wife, colleague, and best friend.

## Chapter One: Introduction

The mountains stand tall and upright, the rivers gallop past, and dam after dam rises from the earth. On a miniaturized satellite topographic map of Yunnan, the 39 dams that are built, under construction, or planned are shown, turning the three rivers area into a beautiful necklace of pearls (P. Zhang, 2003, my translation).

### *Overview and Motivations*

This dissertation is a study of water and power in contemporary China. Specifically, it focuses on decision making processes regarding two large-scale hydropower development projects over the past quarter-century, situated on two important (*zhuyao*)<sup>1</sup> rivers flowing through Yunnan Province in the southwestern part of the country. China's hydropower development plans and overall energy situation have attracted increasing media and scholarly attention over recent years, especially since work began on the massive and controversial Three Gorges Project on the Yangtze River in the mid-1990s. Widespread and recurring electricity shortages in China in 2003 and 2004, coupled with concerns within China and abroad about China's growing thirst for petroleum and the potential security implications thereof (Downs, 2004), have kept China and its energy dilemma in headlines throughout the world. Many of these headlines are sensationalist and even fear-mongering, filled with speculations about China's ambitions as a rising, energy-hungry power, skeptical of its leaders' claims to seek only peaceful integration with the world political and economic system, and frequently written by people who display surprisingly little understanding of the realities of contemporary

---

<sup>1</sup> The term *zhuyao* (important, primary, principal) is used frequently to refer to projects, rivers, transportation corridors, policies, and other things deemed to be relevant on a national or provincial scale. There are no precise criteria for delineating a *zhuyao heliu* (important river), but as is discussed later in this dissertation, such designation automatically re-centers responsibilities for the river at a higher administrative level than would otherwise be the case.

China. Lacking from the vast majority of these writings is any in-depth analysis of decision-making processes related to energy and natural resource development in China.

A similar lacuna is also evident within the scholarly literature, including geography, political science, and Asian studies. This is especially surprising given the rapid changes in the sociopolitical and economic context in which today's natural resource development decisions occur; the important policy environments of the 10<sup>th</sup> (2001-2005) and 11<sup>th</sup> (2006-2010) Five-Year Plans vis-à-vis natural resource exploitation, environmental protection, and national development; and the impact of China's entry into the World Trade Organization in 2002 on enterprise and banking reforms. As will be shown in the literature review later in this study, most geographic research on China has tended to focus on urban China, with little attention paid to the important "life support systems" (water, food, and power provision, for instance) for urban centers frequently situated dozens or hundreds of kilometers away. This very fact attests to the importance of moving beyond a priori scalar containers (e.g., urban areas, nation-states) in geographic research and focusing instead on the processes that render those scalar constructions relevant in particular socio-historical situations.

On the surface, this project involves an examination of the politics of hydropower development in rural southwestern China. At the same time, it is also a study of urban industrial development in Guangdong Province, a coastal province some thousand kilometers away in southern China (see Map 1-1). Yunnan hydropower development is thus at once extremely place-based and place-independent, making it particularly suitable to analysis from a political ecological perspective. Given Yunnan's proximity to

electricity markets in mainland Southeast Asia, its long history of relative autonomy with respect to the central government, and the large number of Chinese and international NGOs<sup>2</sup> working in Yunnan, I believe it important not to force generalities based on a



**Map 1-1: Map of China indicating Yunnan and Guangdong Provinces**

study of a handful of hydropower stations in Yunnan. Thus at first glance this dissertation may seem of little interest to those interested in broader questions of China's overall economic development, integration into the global political and economic system,

---

<sup>2</sup> As I explain later, I use this term cautiously due to the particular relation, in law at least, between social organizations and the Chinese party-state apparatus.

interprovincial disparities, the effects of economic reform on party-state rule, or even decision making about hydropower elsewhere in China. I contend, however, that while studying large-scale hydropower development may not immediately provide all the answers to questions such as these, it does provide important insights into how we go about seeking answers, and where we might expect to find peculiar cases that challenge generalized theories about “how China works.”

### *Aims of the Study*

This study has five principal aims and makes unique and new empirical, methodological, and theoretical contributions to the state of knowledge of natural resource development politics and human-environment interaction in contemporary China. Overall, this project expands geographic research on contemporary China and extends our understanding of decision-making processes and center-local government relations, particularly with respect to natural resource governance in a context of industry reforms and growing domestic and international demand for electric power. More specifically, it contributes empirically to our understanding of energy resources development and politics in China; theoretically to a geographic understanding of regional development, inequality, resource governance, and interprovincial/center-local relations; and methodologically to the application of a political ecology approach to the study of resource development and management politics in contemporary China.

I also hope to speak to China researchers outside the discipline of geography with this project. In order to do so, I will endeavor to show why a geographic perspective is relevant to researchers studying China from other disciplinary perspectives. Non-

geographers (and many geographers as well) often struggle with geographers' fixation on scale. Is this a reference to analytic scale or map scale? How does it differ from a political scientist's levels-of-analysis approach? What is meant by the social construction of scale, or by scalar politics? These and other questions frequently present obstacles to productive and constructive cross-over between geography and other disciplines with which geography otherwise has much in common. It is my intent in this study, therefore, to write for both a geographic audience as well as anyone who is intrigued by the changing patterns and institutions of natural resource management, governance, and exploitation in China. More broadly, the dissertation is also relevant to those seeking to further understand the nature of civil society in China, the impact of industrial reforms and economic liberalization on the development of China's so-called "socialist market economy with Chinese characteristics," and the ever-changing nature of interprovincial and center-local relations.

The first specific aim of the study is to contribute to basic empirical knowledge of past and present large-scale hydropower projects in Yunnan and their significance on a provincial, regional, national, and international scale. The first dam on a transboundary river in Yunnan, the Manwan hydropower station, was begun in 1985 and completed (all turbines) in 1992. With six turbines having a combined installed capacity of 1,500 Megawatts (MW), it has roughly three-quarters the capacity of the massive Hoover Dam in the United States. Yet aside from popular media reports generally critical of "China's" dam development on international rivers (P. S. Goodman, 2005; Konglang, 2004; Macan-Markar, 2004; Yardley, 2004b), very little has been written in English about that dam or

its successors. The paucity of English-language scholarly research on natural resource development and environmental issues in general in China is surprising, given the malaise about the high levels of pollution of air, water, and soil in China and strategic concerns about China's future energy and commodity demands. In addition, relatively little scholarly work exists on the Develop the West Campaign (*xibu da kaifa*). Given the official launch of the campaign in 1999 and its centrality to the 10<sup>th</sup> and 11<sup>th</sup> Five-Year Plans, there is clearly a need for detailed research assessing the historical motivations, political economic drivers, and socio-ecological impacts of the Campaign.

The second aim of the study is to describe and explain the institutional, legal, and political economic factors that affect how decisions about large-scale hydropower development in Yunnan have been made over the past two decades. In this project, I focus only on large-scale projects that are, for a variety of reasons, beyond the jurisdiction of provincial governments, and by extension, of any governments at lower levels. From my earliest engagement with the academic and popular literature related to these projects, it has been clear to me that few attempts have been made to understand what "beyond the jurisdiction of provincial governments" actually means in practicality; most large projects are still understood through what might be called a "Three Gorges lens," which effectively reduces decision-making about large hydropower to the whims of hydraulic engineers cum national leaders motivated by personal vanity and visions of national greatness. At the other extreme, where decisions are not so easily traced to one key person, they tend to be "black-boxed," the assumption being that transparency is the last thing to expect in an authoritarian system like China. In a word, for many observers

these are “China’s” dams, and those critical of the projects insist that “China” must stop building them. I contend that the dams examined in this study are situated within a complex and contested legal, institutional, and political economic environment and, as such, demand careful examination in order to assemble the pieces in the decision-making puzzle and move beyond the oversimplifications about “China’s” dam-building ambitions and actions. While this dissertation may fail to trace all the political economic linkages behind the Lancang and Nu dams, it goes a long way in opening up the black box.

The third aim of this study is to use the peculiarities of water resources development to complicate and augment current models of center-local relations and interprovincial dynamics in China. Water is an unruly medium that does not conform to the tidy political and administrative boundaries of the current state-based global system (Fox, 2000; Lampton, 1987a; Swyngedouw, 1997b); as one China scholar puts it, the “life-giving fluid blithely cuts across territorial and functional lines of administration” (Lampton, 1987a, p. 188) Yet it is clear that economic development and social well-being, so commonly framed and measured at the national scale, are highly dependent on water resources that are sufficient in both quality and quantity. In addition, given the increasing uncertainty of the future of fossil fuel supplies, the growing recognition worldwide that combustion of fossil fuels is having serious environmental consequences, the predicted increases in electric power consumption in China over the coming decades, and the relatively low level of hydropower exploitation in China today, effective and comprehensive water resources management in China will only grow in importance in the coming years. Building hydropower stations in western Yunnan to power industrial

centers hundreds of kilometers away is a testament to the way in which water resources in a seemingly remote corner of a remote province are expected to play a central role in China's economic development. Indeed, as I show in Chapter Six, high-voltage transmission lines form a literal corridor between Yunnan and Guangdong, and provide a material basis for new geographies of electric and political economic power. Similarly, the South-to-North Water Transfer (*nan shui bei diao*), involving three corridors through which water from the Yangtze (Changjiang)<sup>3</sup> watershed will be piped northward to the parched and over-extracted Yellow River (*Huang He*) watershed, is yet another example of the power of water to reshape regional dependencies, reinforcing existing core-periphery relations while constructing new ones. Both underscore the contradiction in which abundance of water resources is not necessarily geographically coterminous with economic wealth.

The fourth aim of this project is to underscore the importance of geographic constructs in framing and legitimizing certain development patterns. The theoretical intent here is to push for a better engagement between the scale theory (or politics of scale) and political ecology literatures. In order to achieve this aim, I devote a section of Chapter Three to analyzing the ways in which scalar constructions – China's "west," the Greater Mekong Subregion, rural Yunnan, and others – are deployed by different actors in ways that legitimize certain political economic discourses and actions while de-

---

<sup>3</sup> Changjiang ("Long River") is the Chinese name for what is generally referred to outside China as the Yangtze (or Yangzi). In reality, the Yangtze refers strictly to the last several hundred kilometers of the river near its mouth. In Yunnan, the Changjiang is usually referred to by its principal tributary in that province, the Jinsha ("Golden Sands") River. Illegal mining for gold and other precious metals through sluicing operations has become an increasingly common occupation along the Jinsha, especially among former loggers who have been out of work since the ban on logging in the upper Changjiang watershed went into effect in 1998.

legitimizing others. Traditionally, geographers have tended to understand the notion of scale in two rather straightforward senses: map scale (e.g., 1 cm = 1 km), where representational needs and physical realities require the equating of one unit of measure on a map to another “in the real world”; and analytical/operational scale, or the frame of analysis a researcher might choose for a particular problem or question (Paasi, 2004; Swyngedouw, 2001). Central to this part of my argument is an understanding of scale in a third, more slippery sense that is dynamic, relational, socially constructed, and ontologically unstable. In this sense, the importance lies not in the size or shape of a particular geographic scalar construct, but rather in the motivations of those actors who delineate and deploy that construct. As I will show, numerous different scalar constructs are deployed by a variety of actors to support or oppose certain development models for Yunnan’s important rivers. By paying careful attention to the processes and discourses intertwined in each of those constructs (e.g., poverty alleviation, regional security, economic stability), we not only seize an opportunity to provide yet another answer to the fundamental geographic question of why space matters, but also gain insights into creating an effective *analytical* scale with which to frame the research problem at hand.

Finally, the fifth aim of this study is to contribute to the longstanding debate and rich literature on the nature and effectiveness of China’s “civil society.” Specifically, I show how non-governmental actors such as (quasi-) NGOs and academics are at times succeeding, at other times failing or being prevented from, participating in decision-making processes regarding large projects such as the Yunnan dams. Much ink has been spilled over the past decade debating whether or not “civil society” has arrived in China,

or what form it might take when it does (Brook & Frolic, 1997; D. S. G. Goodman & Segal, 1994; Whiting, 1991). Yet fundamental questions remain as to the relevance and applicability of a Western notion such as civil society to contemporary China. Some scholars see the growing prevalence of social group formation and persistence in China outside the immediate control of the state as evidence of China's nascent civil society. Others take a more structural approach, arguing that legal requirements for social groups to register with the government and conduct their operations under the oversight of a government office mean that "true" civil society is still a long way off for China. I opt instead for a functional perspective that focuses on what such organizations do and how they manage to do it, despite their frequently ambiguous legal status. From this perspective, I analyze four different social organizations and one academic research institution that employ different approaches to engagement in natural resource development and environment/culture preservation debates in Yunnan, and which have met with varying degrees of success and failure.

### ***Mountains of Megawatts: Hydro-potential in China and Yunnan***

Yunnan Province has a long history of hydropower development, and was the site of China's first hydropower station, Shilongba ("Stone Dragon Dam"), nearly a century ago (D. Zhou & Zhang, 2003, p. 144). The French colonial administration in Indochina itself had visions to develop Shilongba, but a Chinese company raised the funds to purchase two 240-kW German turbines and began construction on the project in 1909, finishing three years later in May 1912. Power generated by Shilongba was sent directly to Kunming, simultaneously illuminating more than 7,000 electric lamps throughout the

city. The visual image of water bringing light to the city is a powerful one, and as I show later, the theme remains salient a century later. Contemporary geographic imaginaries in China of the country's west envision Yunnan in particular as a base for electric power generation that will again propel China into a new era in its economic development.

The point of departure for this research is a massive and somewhat controversial pair of hydroelectric dam cascades currently underway in rural Yunnan that will, to a large extent, power growing industrial urban centers in Guangdong and mainland Southeast Asia. Generating electricity through hydropower is often seen as environmentally benign compared to thermal production methods using fossil fuels, and proponents of large-scale hydropower in China have gone to great lengths to embed hydropower within discourses of sustainable development, scientific development,<sup>4</sup> poverty alleviation, conservation society,<sup>5</sup> and national security. Some influential researchers within China have openly contested the linkage between the "scientific-ness" of current patterns of large-scale hydropower development and water resources exploitation in China (see, for instance, various authors in Zheng, 2005). Others argue, however, that the large reservoirs behind impoundment dams may actually produce significant amounts of methane (a known greenhouse gas) through the decomposition of plant matter in areas submerged by the reservoir (World Commission on Dams, 2000), not to mention other ecological and social disruptions related to reduced sediment flows,

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<sup>4</sup> The term "scientific development" (*kexue fazhan* or *kexueguan fazhan*) has established a certain foothold in development discourse in China in recent years, especially toward the end of the Tenth Five-Year Plan (2001-2005). As I discuss in Chapter Seven, however, attempts to discredit scientists whose views do not coincide with resource triumphalist (Bridge, 2001) and technocratic solutions remain commonplace, though not always effective.

<sup>5</sup> Like "scientific development," conservation society (*jiyexing shehui*), too, has taken hold in recent years through government propaganda extolling the virtues of reducing waste, particularly that of water.

altered flood patterns, and impeded fish migrations (Goldsmith & Hildyard, 1986).<sup>6</sup>

Further complicating factors emerge when the size and type of dam is considered; the World Commission on Dams found that large dams have far greater negative social and ecological impacts than smaller dams (World Commission on Dams, 2000).

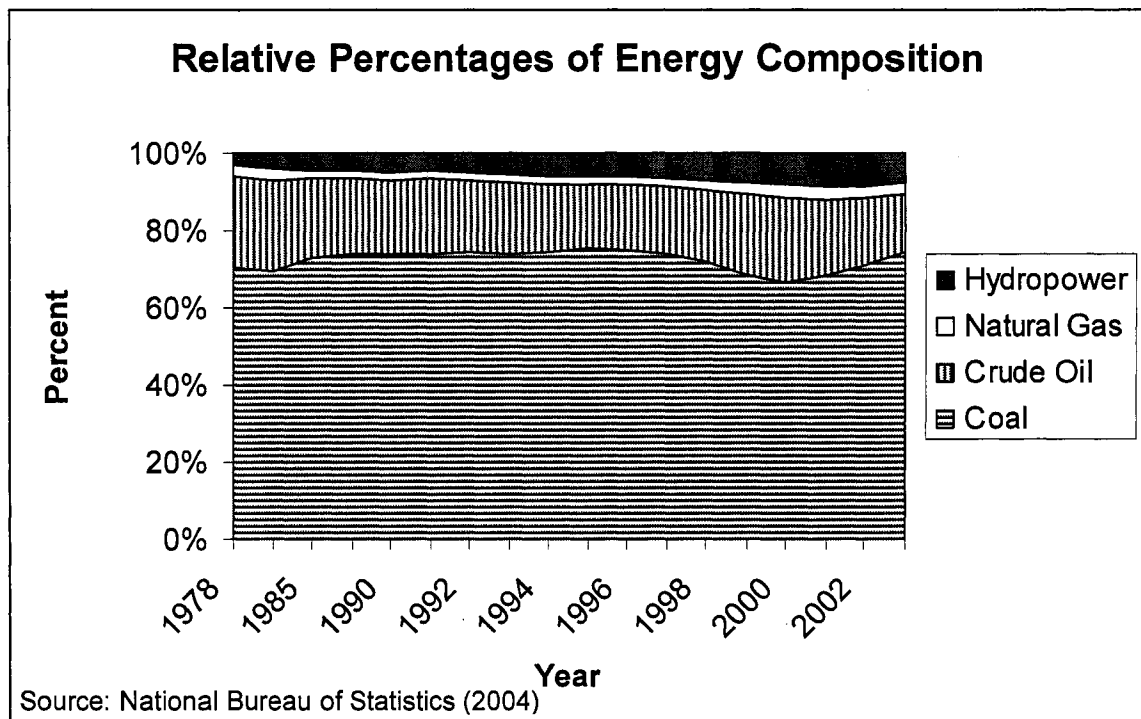
Central to my arguments in this dissertation is the importance of Yunnan's hydropower potential on a national scale. As a country, China ranks first in the world in terms of total theoretical potential hydropower resources, at some 384 Gigawatts (GW),<sup>7</sup> yet hydropower currently provides less than 10% of China's total electrical power, compared to the 75% or so provided by coal (National Bureau of Statistics, 2004; see Figures 1-1 and 1-2). Estimates of how much of that potential is concentrated in Yunnan range from 20% to nearly 25%. According to national statistics for 2003, however, Yunnan currently only provides 10% of the country's actual hydroelectric generation, falling behind Sichuan at 18% and Hubei at 15% (See Figure 1-3). As detailed later in Chapters Four and Five, much of Yunnan's hydropower potential is concentrated on the Lancang and Nu Rivers, the two rivers at the focus of this study. Hydropower in China has historically lagged behind thermal power in terms of investment and development, and by 1990 the Ministry of Electric Power estimated that only some 26% of total hydropower potential in China had been developed (L. Zhang, 1998). Figure 1-4 shows

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<sup>6</sup> It should be noted that the phenomenon of methane emissions resulting from rotting submerged vegetation in reservoir areas seems to be more pronounced in tropical climates.

<sup>7</sup> One Terawatt = 1,000 Gigawatts; one Gigawatt (GW) equals 1,000 Megawatts (MW); one MW equals 1,000 kilowatts (kW). Installed capacity is measured in terms of power (GW, MW, kW), and reflects the size and capacity of the generators (turbines), whereas actual generation output is measured in terms of power-time, as in Terawatt-hours (TWh) or kilowatt-hours (kWh). Due to the differences in the way the base-10 numbering system is used in China, installed capacities and power generation output are usually expressed in terms of 10,000 kW (*wan qianwa*) or 100 million kWh (*yi qianwashi; yi du*); the actual translation for Megawatt (*zhaowa*) is less common.

the historical trend in installed generating capacity for all of China (excluding nuclear and wind) since the founding of the People's Republic in 1949. Thus the keen interest in government agencies and hydropower development companies to pour resources into development of new hydropower is easily understood.



**Figure 1-1: Composition of China's energy production by source**

As mentioned above, much effort has been made in China in recent years to frame hydropower as a clean, renewable, and sustainable energy source. Indeed, it is hard to imagine that anyone who has spent a winter in China's coal-fired north would opt for more coal-powered electric generation plants. Yet since the publication of the World Commission on Dams Report in 2000, and its subsequent revision in 2003, the debate about the extent of impacts of large hydroelectric projects has only grown more intense.

Proponents of large-scale hydropower development in Yunnan frequently point to the correlation between rates of electrification (particularly through hydropower development)

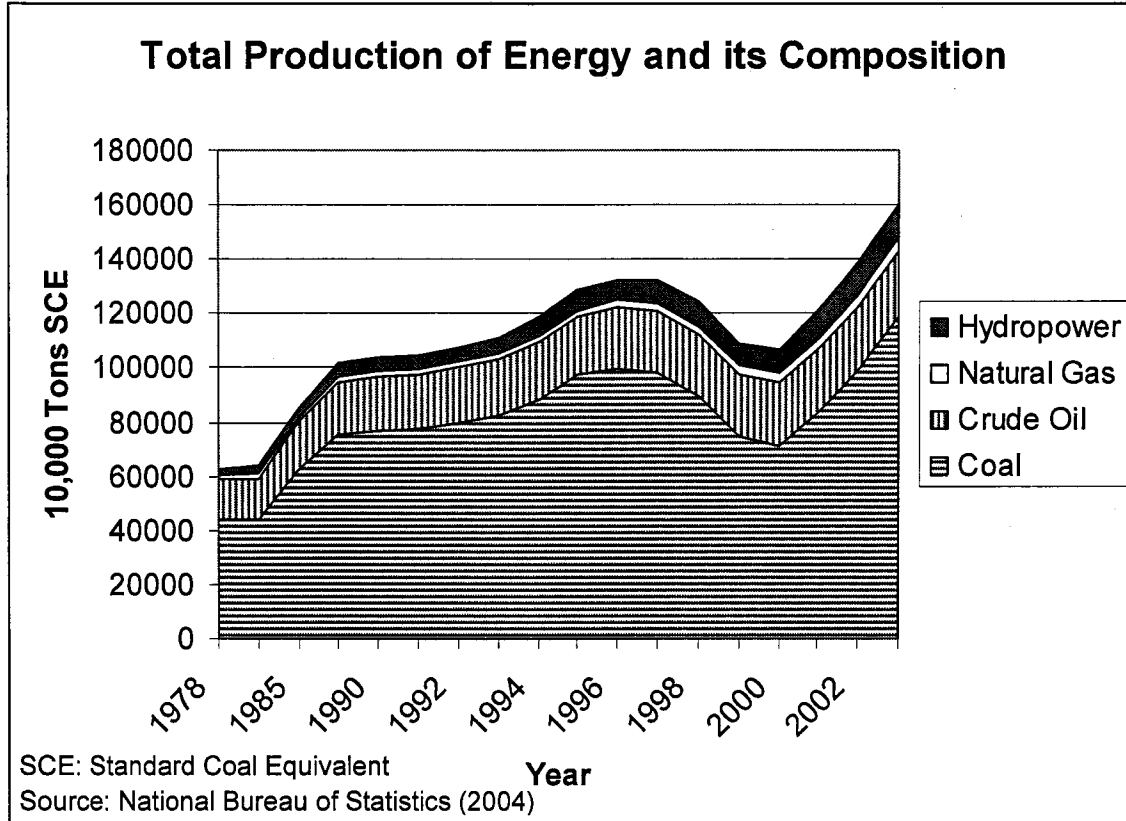
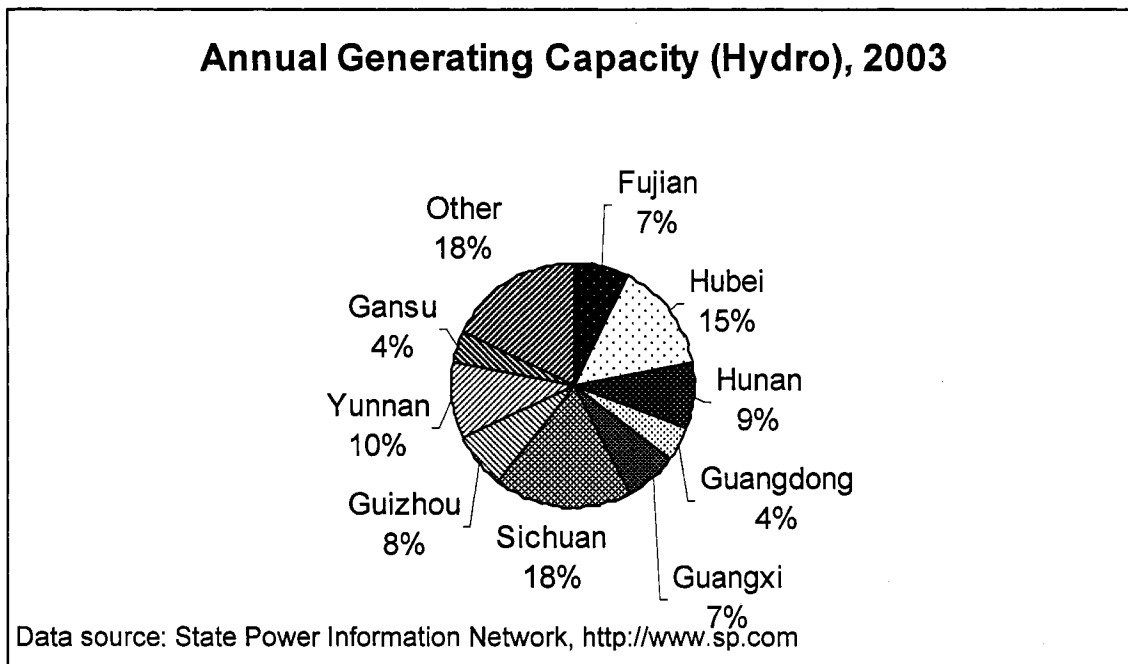


Figure 1-2: Trends in China's energy production

and level of economic development. Not surprisingly, their most cited example is the United States, where the legacies of the Bureau of Reclamation and the Army Corps of Engineers in turning hydraulic head<sup>8</sup> into high-voltage electricity are cemented across the riverine landscape of the American West. Hoover Dam, the Columbia River, and the Tennessee Valley Authority all speak volumes to Chinese policy makers and hydroelectric engineers about the importance of harnessing the power of rivers before

<sup>8</sup> Hydraulic head refers to the vertical distance water falls between one point and another. Frequently, it refers to the difference between the height of water behind a dam (i.e., the reservoir) and that at the outflow of the dam. Sufficient head is required to spin the turbines and generate electricity. Rivers with a steeper gradient allow for greater hydraulic head over shorter horizontal (lateral) distances.

they flow “wasted” into the sea. Such lessons abound; Erik Swyngedouw (2003, p. 95), arguing for water’s centrality to Spain’s modernization, notes that “Hardly any river basin, hydrological cycle, or water flow has not been subjected to some form of human intervention or use; not a single form of social change can be understood without simultaneously addressing and understanding the transformations of and in the hydrological process.”



**Figure 1-3: Hydropower generation by province (2003)**

Despite calls to double current hydropower production capacity in China by the end of the 11<sup>th</sup> Five-Year Plan (2010), it is important to note that, relatively speaking, hydropower is not expected to make up a larger percentage of China’s total energy mix. Predictions for the coming 20 to 50 years estimate that coal will remain the primary fuel for generating electricity at approximately 75%. At the end of 2004, official statistics put

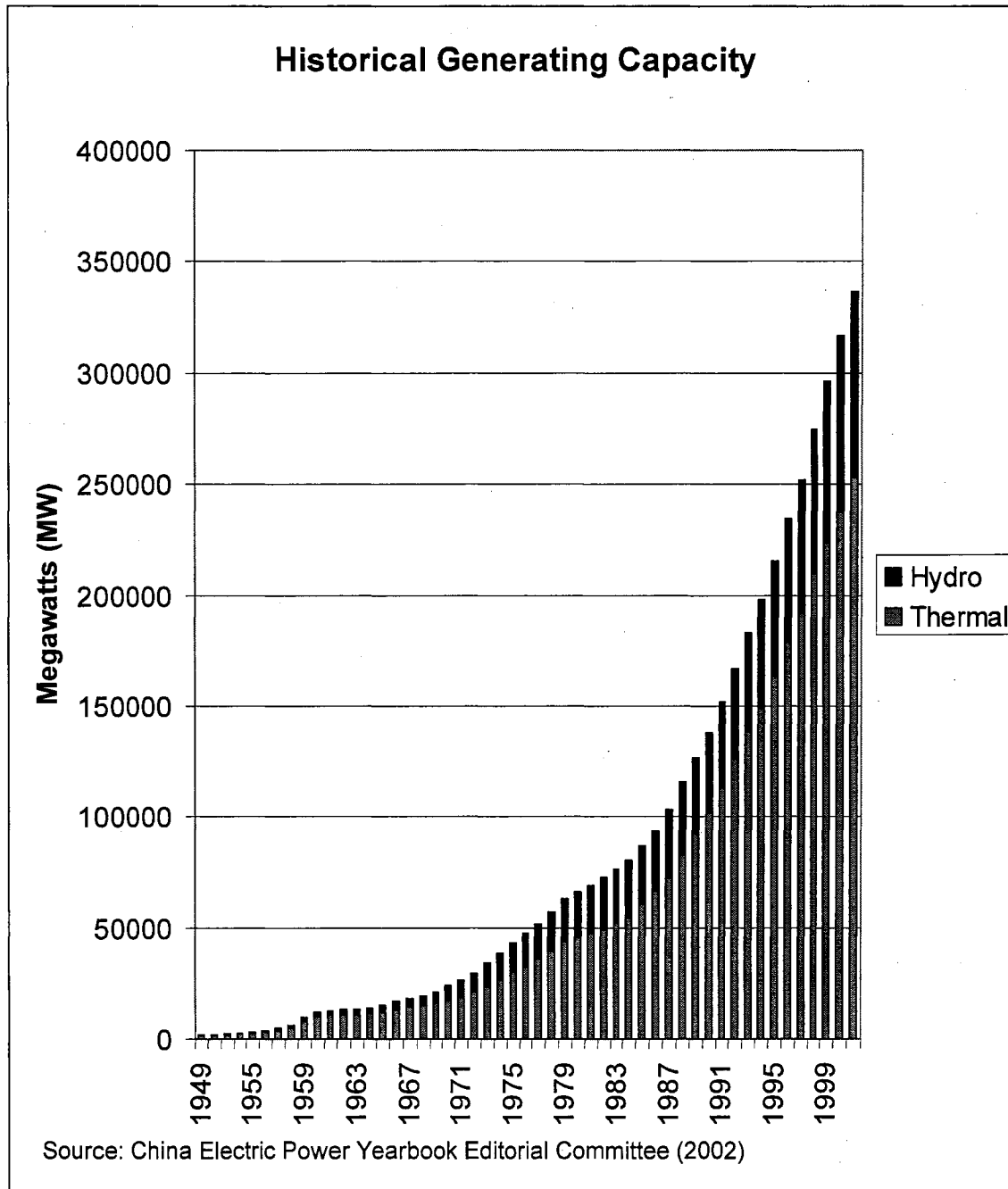


Figure 1-4: Historical installed generating capacity (thermal & hydro)

China's total installed generating capacity at some 442 GW; a year later, that had risen to roughly 500 GW ("China's electric power sector," 2005; China Electric Power Yearbook Editorial Committee, 2005). The claim is frequently made, often in reference to the Three

Gorges Project, that electric power generated from hydroelectric dams will *replace* some 40 to 50 million tons of coal per year that would otherwise be used to generate that power, thereby reducing greenhouse gas emissions. Since coal-fired generation is unlikely to actually decline, it is probably more accurate to say that hydropower generation will *supplement* already existing (and future predicted) coal-fired generation; thus the claim of reduced emissions is tenuous. At any rate, it is safe to say that large-scale hydropower development will continue to see a heyday for the coming decade at the very least, thus our time is better spent understanding how that development will take place rather than speculating about whether it will come to pass.

### ***Importance of New Geographies of Water and Power***

Water has always been of central concern to the Chinese state, regardless of whether during imperial, Republican, or Communist regimes. Indeed, Wittfogel (1957) famously argued that the Chinese state's need to mobilize its subjects by the thousands in order to carry out large-scale water control and management projects over the past two millennia gave rise to a particular form of "Oriental Despotism." Despite critiques of Wittfogel's thesis, primarily on grounds that despotic governments have arisen outside "the Orient" based on similar organizational capacities and that there is nothing particularly "Oriental" about such regimes, the fact remains that the vastness of China's land area and the size of its population coexist uneasily with the relative scarcity of its overall water resources and, most importantly, the spatial distribution patterns of those resources. These conflicts are becoming increasingly acute as municipal, agricultural, and industrial consumption demand increases.

Improving our understanding of decision-making processes regarding large-scale infrastructure development in China has important implications from both a domestic and international perspective. First, it contributes to existing understandings of the relationship between central and local government organs in China. Much has been written on the fiscal decentralization policies that began in the late 1970s and on the effects such policies have had on the relative capacities of central and local government organs. Less, however, has been said about how such policies have affected decision making regarding natural resource exploitation, particularly in cases of transboundary (both trans-provincial and trans-national) resources such as many of the rivers flowing through Yunnan. Yunnan Province is at once a central figure in China's 'west,' a part of the country generally construed as resource-rich, developmentally and culturally 'backward,' and dependent upon corrective policies from the central government to improve socioeconomic conditions and counter problems of poor "quality" (*suzhi*) of many of its residents, most notably non-Han minorities. The most recent example of such a policy is the Great Western Development Strategy (*xibu da kaifa*), which was officially launched in 1999, but became part and parcel of the Tenth Five-Year Plan (2001-2005).

Yunnan is also a key player in the newly imagined geography of the Greater Mekong Subregion, a creation of planners and consultants at the Asian Development Bank who see the province as an important hub of electrical energy generation for (sub-) regional development, with the Lancang-Mekong playing the dual role of energy source and transport artery. Through an analysis of how decisions about large-scale hydropower are made, contested, and negotiated, we gain insight into how provincial and sub-

provincial government units respond to these opposing (centralizing versus de-centralizing) tensions vis-à-vis the central government, and about the opportunities and challenges such tensions present. In addition, by examining the fiscal and policy drivers behind shipments of resources (here, electric power) from Yunnan eastward, we stand to better comprehend the nature of interprovincial dynamics between relatively wealthy provinces like Guangdong and their poorer counterparts like Yunnan, another subject on which relatively little scholarship exists. In particular, we begin to see the important role electrical energy, and control over its production and distribution, plays in maintaining a tension between centralizing and de-centralizing forces, and in giving some provincial government office more (or less) bargaining than they otherwise might enjoy. The Yunnan-Guangdong relationship presents a fascinating case of such tensions.

A second dynamic upon which this study shines light is the effect of restructuring of state-owned enterprises (SOEs) on water resource development and management decisions. State-owned enterprises, the hallmark of the Soviet-style industrial economy, employ and provide basic social benefits such as housing to an estimated 60-70 million Chinese, and were responsible for approximately 40% of China's yearly gross industrial output value (China Data Online, 2004; National Bureau of Statistics, 2004). Yet in an increasingly market-oriented China, such industrial behemoths, frequently loss-making and dependent on regular bank bailouts, became a significant problem that the Chinese leadership was hesitant to address for fear of unrest from large-scale layoffs. Premier Zhu Rongji pushed through significant reforms in the SOE system in the late 1990s, but concerns about urban unemployment remain due to resulting layoffs, coupled with large

numbers of migrant workers. The companies responsible for planning, financing, building, and operating large dams in China today are in many ways hybrids between wholly state-owned and private companies, some being listed on international stock markets while retaining a governing structure that is decidedly governmental. As such, they are motivated to varying degrees by political incentives and profit depending on the particular situation at hand. In addition, since these companies are no longer seen as directly representing central state priorities, they are much more likely to face organized resistance from academics, social organizations (NGOs and quasi-NGOs), and others concerned that any negative social or ecological impacts of the dams must be carefully weighed against potential benefits (in terms of profits) accruing to a small number of individuals. This study, then, in combination with existing work on the dynamics and implications of enterprise privatization and industrial reform in China, highlights the changing role such companies play in decision-making processes that are often seen as strictly inter-governmental.

A third important contribution of this study is to the significant literature on Chinese civil society (or lack thereof, according to some authors), and to the ongoing development and growing influence of social organizations in China. A number of international non-governmental organizations (NGOs) have been active in Yunnan for relatively long periods of time. Most notable, perhaps, is The Nature Conservancy and its Yunnan Great Rivers Project, which focuses on biodiversity conservation in a remote corner of northwestern Yunnan where the Nu (Salween), Lancang (Mekong), and Jinsha (Yangtze) come tumbling down from the mountains of Tibet. Other international

organizations have been similarly active on a variety of issues ranging from HIV/AIDS prevention, gender equity issues, alternative energy production, and intravenous drug use treatment, and the province is generally seen as fairly open and permissive in its relations with NGOs, both domestic and international.<sup>9</sup> It is in this rather liberal context that, more recently, scores of “home-grown” social organizations have formed, organized around issues such as poverty alleviation, biodiversity preservation, and livelihood maintenance, and very frequently linked to the debate about natural resources development, including large-scale hydropower facilities on Yunnan’s most important rivers. By focusing on historical and geographical changes in how decisions about large-scale hydropower development are made and implemented, and on who is allowed to participate in such decisions and through what mechanisms, this study contributes to our understanding of the role of social organizations in contemporary China. In my discussion of such organizations, I argue that insisting on a structural definition of “non-governmental organization” effectively silences any discussion of China’s “civil society,” whereas a more functional approach allows us to focus on the positive and dynamic role of these organizations in what might well be labeled “civil society with Chinese characteristics.”

Finally, a more nuanced and complete understanding of hydropower decision-making processes also holds important implications from an international relations and even a regional security perspective. Much concern has been expressed about the

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<sup>9</sup> I use the term “NGO” with caution here, for as one leader of a social organization whose official status is a “non-enterprise organization” (*fei qiye zuzhi*) told me, “non-governmental doesn’t sound good in China.” Indeed, as is discussed later, a significant amount of ink has been spilled in the debate over whether or not Chinese social organizations can rightly be considered NGOs due to their embeddedness (sometimes real, often perceived) with government entities and the obvious constraints they face operating under China’s authoritarian regime.

potential impacts of Chinese dam-building on fisheries, agriculture, and livelihoods in mainland Southeast Asian countries downstream of China. Expressions of such concern are usually accompanied by calls for greater cooperation and consultation among decision-makers in the various countries involved, yet to date such appeals have met with few practical results. This study, by explaining the varying degrees of influence of different individuals and organizations, the channels through which such influence is exercised, and the institutional mechanisms involved, stands to contribute to efforts to improve trans-national cooperative resource governance regimes and reducing tensions over development projects on transboundary rivers. Rather than seeking to build broadly generalizable theories about why trans-national cooperative efforts at resource governance succeed or fail, the study seeks instead to explain the dynamics of decision making in the specific context of contemporary China related to large-scale hydropower projects on southwestern China's transboundary rivers.

### ***Research Questions and Hypotheses***

As noted above, the central problématique of this research project is to understand and explain the changes in decision-making processes related to large hydroelectric projects in China, specifically those situated within China's discursive and material "west." Four questions about the Yunnan hydroelectric dams in particular will shed light on different aspects of this central question. First, how can we best explain the Yunnan hydroelectric projects within the context of China's regional and national economic development plans such as the Great Western Development plan (*xibu da kaifa*)? Second, what new networks are formed to support and oppose the projects, and how do they differ

from past institutional arrangements related to hydropower development in China? Third, what role does the privatization of state-owned enterprises play in large-scale hydroelectric development projects in China, particularly in Yunnan? And finally, what implications might our understanding of Yunnan hydropower development have for questions of resource exploitation, regional development, and regional equality elsewhere in China and the world?

With these questions in mind, I developed four hypotheses to guide my research. While this project was not intended to be strictly a hypothesis-testing endeavor, these hypotheses were useful throughout the research and writing process insofar as they arose from two years of background research into the Yunnan hydropower projects and provided a starting point for the fieldwork. The first hypothesis is that Guangdong's influence is central in the development of Yunnan hydropower infrastructure. At first, I hypothesized more specifically that Guangdong financial capital was key to actual development of the projects, and while this may be true, I have at this point only anecdotal evidence supporting that hypothesis. What is clear, however, is that most of the electricity produced by the Yunnan dams will be sent to power-hungry Guangdong, and that a key debate currently underway in the China Southern Power Grid is how best to facilitate that transfer under conditions of maximum efficiency and reliability. It seems reasonable to expect that Guangdong development funds (either from provincial and/or specialized banks or from private enterprises) would be a key ingredient in the "self-financed" Yunnan dams. Indeed, as is detailed later in the dissertation, all of the major electrical energy development companies active in Yunnan have subsidiaries that are

listed on international stock markets, including Hong Kong and New York. While the State Assets Supervision and Administration Commission (SASAC) still controls a majority of shares, these international listings highlight the companies' desire to raise capital for large power projects from overseas investors.<sup>10</sup>

A second and related hypothesis is that the Yunnan dams are not simply a product of central planning mechanisms, but are instead situated in a web of political economic relations of production similar to that posited by Yapa (1996) at a variety of administrative levels and geographic scales. By production here I intend not only production of electric power, but also of profit, risk, and scientific and engineering knowledge related to the hydroelectric stations. In particular, continued economic dynamism of Guangdong's Pearl River Delta region and other coastal areas, and their importance as linkages to the global economy, exerts immediate and sustained pressure on fundamental services such as electrical power provision. As I show later in Chapter Six, Yunnan is expected to play a key role in relieving some of that pressure. Despite a history of central planning related to these dams, and anecdotal evidence suggesting that the general concepts for the dams date back as far as the Republican period in the 1920s and 1930s, I argue that the *current* push to step up dam building efforts in large part reflects a response to domestic and regional market pressures, both predicted and actual.

The third hypothesis, again closely related to the first two, is that the primary beneficiaries of the Yunnan dams will be urban industrial centers far from the dam sites (in terms of electric power generation) and the hydropower development companies

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<sup>10</sup> As I discuss later, there is a clear interest among at least some hydropower developers in using stock listings to raise capital for hydropower projects as well.

themselves (in terms of revenue generation). While it is true that at least some of the dams are intended to provide a portion of the electricity generated to local communities (Asian Development Bank, 1998), most beneficiaries will be far away from the dam sites. This is not surprising, given the preponderance of policy slogans about sending Yunnan electricity outward, not to mention the fact that the quantities of power generated by the dams is far greater than can be consumed “locally.”

Finally, I hypothesized that the quasi-privatization of state-owned enterprises (SOEs) charged with building and operating the dams would open new political spaces for the formation and mobilization of local and trans-local coalitions who oppose those dams based on their (perceived and/or actual) social and environmental impacts. This hypothesis led to perhaps the richest data I gathered during my fieldwork regarding the attempts by social organizations and academics to occupy those spaces, and the types of pressure they met once they did.

### ***Main Arguments***

In the chapters that follow I support the following three arguments. The first is that the development patterns of large-scale hydropower projects on Yunnan’s transboundary rivers are increasingly mediated and fundamentally shaped by newly corporatized, quasi-privatized hydropower generation companies and supra-provincial basin management commissions, particularly the Changjiang Water Resources Commission (CWRC).<sup>11</sup> Moreover, the effect of reforms in the water and power sector

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<sup>11</sup> This commission is also known as the Yangtze River Watershed Commission or the Yangtze River Basin Commission (*Changjiang liuyu weiyuanhui*). Even though the Lancang and Nu do not lie within the Yangtze watershed, the Commission was given jurisdiction over those rivers and their watersheds by the State Council in 2002. The CWRC is the largest of are seven such basin commissions in the country.

over the past decade, but most importantly since 2002, has been to strengthen the de jure authority of supra-provincial basin management commissions such as the Changjiang Watershed Commission in large hydropower development, while leaving room for that authority to be skirted in practice by hydropower development companies. In a word, legal reforms related to water and electric power, and institutional inertia are colliding in ways that allow much more pluralized participation in the debate, if not decision making itself, surrounding large-scale resource exploitation projects. Related to this argument, I suggest that current models of center-local relations risk underestimating (or overlooking outright) the importance of supra-provincial commissions like the CWRC.

My second principal argument is that by taking a functional approach to understanding “civil society” in China suggests that the role of social and academic organizations in influencing natural resource development decisions is growing. I argue that this remains true in spite of the persistence of bounds that must not be overstepped when voicing concerns or grievances, and the institution of new laws in the past two years attempting to better control China’s “home-grown” grassroots organizations. I further assert that both academic institutions and civil society organizations in China are increasingly sophisticated in their ability to build domestic and international coalitions, raise funds and awareness, and provide input into policy making processes regarding natural resources development and exploitation issues like the Yunnan dams.

Finally, I argue that the so-called Yunnan dams to which I so often refer, planned and constructed for rural areas of an outlying province, must be understood as a key component of the economic dynamism (especially the future of that dynamism) in areas

like Guangdong. This assertion is supported by policy statements, and analysis of the direction of power grid infrastructure development, and patterns of electricity generation, transmission, and consumption. In addition, they are immersed in a discursive context that serves to legitimize their construction and intended function as a powerhouse for eastern China and areas of Mainland Southeast Asia, while attempting to de-legitimize opposition to the dams by equating it with opposition to noble goals as poverty alleviation and rural development. Geographic research on China stands to benefit from a more dynamic and open-ended consideration of the “urban” in China that recognizes the relationality between urban and rural China. The analytical framework I develop in this dissertation provides a useful tool for such analysis.

### ***Research Methodology***

This dissertation is based on two years of preliminary research from 2002 to 2004, followed by a year of fieldwork in China from September 2004 to September 2005. The bulk of the fieldwork was conducted in residence at the Asian International Rivers Center (AIRC) of Yunnan University in Kunming under the guidance of its director, Professor He Daming, though it also included documentary research at the Universities Service Centre of the Chinese University of Hong Kong, and interviews and data collection in several other cities in China. In addition, I made a four-week follow-up visit to Hong Kong, Kunming, Wuhan, and Beijing in January 2006.

The research employed a multiple methods approach including documentary research and discourse analysis; participant observation at the Asian International Rivers Center and Yunnan EcoNetwork; and interviews with approximately 30 key informants

and less formal exchanges with dozens of individuals knowledgeable about water resources governance, electric power industry, or the civil society sector in China. The multiple methods approach is valuable in triangulating research findings in order to increase confidence in their validity. Substantiating data from statistical yearbooks or company reports with key informant interviews, for instance, often provided nuances or clues to data interpretation that would not have otherwise been evident simply from the published sources.

Throughout the duration of my fieldwork I collected and analyzed textual data related to the Yunnan hydropower dams, the companies responsible for developing them, and the legal and institutional arrangements governing that development. Sources ranged from newspapers such as the *Yunnan Ribao* (Yunnan Daily), *Chuncheng Wanbao* (Spring City Evening News), *Renmin Ribao* (People's Daily), and *Xinhua* (New China) news agency. While these sources frequently are "in sync" with the Communist Party's current political priorities and generally frame their reporting to fit the political slogan of the day, they are nevertheless valuable sources of interviews with government officials from various administrative levels whose views may not always coincide. I also reviewed numerous sources from academic and professional journals such as *Yunnan Shuidian* (Yunnan Water Power), *Zhongguo Shui Ziyuan* (China Water Resources), *Yunnan Dili Huanjing Yanjiu* (Yunnan Geography and Environment Research) and *Dili Xuebao* (*Acta Geographica Sinica*) for discussion of technical issues ranging from relocation of reservoir-area residents to construction techniques in earthquake-prone western Yunnan; subject- or place-specific statistical yearbooks, almanacs, and gazetteers (local almanacs)

such as the *Zhongguo Shuili Fadian Nianjian* (China Water Conservancy and Electrical Generation Almanac) and *Zhongguo Shuili Nianjian* (China Water Conservancy Yearbook), *Yunnan Tongji Nianjian* (Yunnan Statistical Yearbook), *Yunnan Dianli Nianjian* (Yunnan Electric Power Yearbook) for data on energy supply and demand, capital investment and the like; and published and unpublished work by academics whose research focuses on issues related to water resources development in Yunnan and elsewhere in China.

The second and most personally rewarding component of my field research involved participant observation with my host institution and a second organization. The first instance was by default: the AIRC was my “*danwei*” (work unit, or more appropriately, host institution) in China, and I could not have asked for a more appropriate, hospitable, or collegial environment. I cannot count the number of conversations I had with the faculty of the Center about the nature, history, and direction of Yunnan hydropower development; had I been hosted somewhere else, I would have scheduled dozens of interviews with these individuals. I was expected to contribute to scholarship and all activities at the Center as if I were a regular employee, and through this experience I gained invaluable insights into the politicization of scientific knowledge about hydropower development, as well as into the effectiveness both of efforts to marginalize the proponents of such knowledge, and the tactics deployed to resist such marginalization. The second instance, in which I served as a volunteer for a local organization called Yunnan EcoNetwork, was equally rewarding. I had originally intended to conduct this segment of my participant observation work with Green

Watershed, but political troubles faced by that organization (detailed in Chapter Seven) led to a change of plans. While Yunnan EcoNetwork is not directly involved in the large-scale hydropower development debate, it does seek to change market conditions related to energy by promoting rural renewable energy development, primarily biogas and micro-hydropower. As a participant observer with YEN, I was able to share my experience in fundraising and organizational development, while gaining valuable insights into how such organizations negotiate the murky waters of China's legal and political system.

The third and without a doubt most challenging component of my research methodology involved semi-structured interviews with key informants. For the most part, I targeted individuals in leadership positions in central government ministries, provincial government departments (bureaus), and enterprises who I knew or suspected would be familiar with the various steps in a dam's progression from idea to installation. I generally relied on introductions through so-called snowball sampling, where one interviewee is asked to provide an introduction to one or more others whom he or she believes will be useful in the research. The interviews were at times conducted at my office in the AIRC, at times at the interviewee's office, and at times in informal settings such as teahouses and restaurants.

The interview component of the research was challenging in several respects. First, with the exception of one, all interviews were conducted in Chinese and without the help of an assistant. Though I have spent more than a decade learning the language and consider myself fluent, difficulties occasionally arose in note-taking due to particularly

challenging accents or overly technical vocabulary. In addition, even though I was cleared to record the interviews through the University of Washington Institutional Review Board, I knew that doing so would either drastically limit what participants would be willing to tell me, or close the door to the interview completely, due to the sensitive nature of hydropower development in Yunnan today. The second challenge lay in the simple fear of being refused or coming up empty-handed after an interview because I had failed to adequately prepare beforehand. Katz (1992) correctly asserts that the ethnographic encounter “oozes with power,” and while before beginning my field research I naively expected that as a Caucasian male “outsider” I would likely be the one with an advantage, in reality quite the opposite was true in all but one interview during my follow-up visit in January 2006. In that instance, I had called to arrange the interview on my own without an introduction, and to my surprise was invited to go to the interviewee’s office straightway. The interviewee turned out to be fairly young and had only recently begun his current job. Upon my arrival, I gave my usual spiel about the intent of my research, my institution, he asked to see my list of questions in case any might be deemed too sensitive and thereby require approval from his supervisor. The interviewee then made a quick phone call to which I was not privy, and returned to proceed with the interview. As we were wrapping up, he told me he would need me to provide “formal documentation” (*zhengshi wenjian*) attesting to my status and my affiliation with the AIRC, which he would in turn provide to his superiors. The problem was that during this visit I had come in on the far simpler 30-day tourist visa (compared to the foreign expert visa I had used the previous year’s stay), and therefore, strictly speaking, had no *official* affiliation with the AIRC (or anyone, for that matter), despite

the fact that the AIRC still refers to me as a visiting researcher. This resulted in 24 hours of phone calls back and forth between the interviewee, myself, and the AIRC, during which it was hard to tell who was more nervous, the interviewee or interviewer, whose supervisor was insisting that he obtain some verification of my status. In the end I submitted a pile of official paperwork from the previous year which proved sufficient. The interviewee apologized profusely for the confusion and hassle (as did I), and offered his help and friendship in the future – but in a teahouse, not his office.

### ***Selection of Case Studies***

As noted above, I analyze two important large dam projects in southwestern China using a framework I call a powershed. I explain the framework in detail in Chapter Three, but for now it may be understood as the electric power analog of a watershed. The primary aim of this research is to understand and explain the changes in institutional relations and decision-making processes regarding large-scale hydropower development in China within a context of national and regional economic development plans, enterprise “privatization,”<sup>12</sup> and growing importance of social organizations. The dam projects in question represent a miniscule fraction of China’s 40,000 or so large dams,<sup>13</sup> yet are important and representative in many ways in that they each involve different

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<sup>12</sup> I use this term with caution. As I show later in the dissertation, the term “privatization” is frequently conflated with “corporatization,” both indicating some shift in enterprise ownership structure from direct state control (i.e., the classic state-owned enterprise of Soviet-style economies) to a stock company. The problem with referring to this process as privatization is that the central government (through the State Assets Supervision and Administration Commission) retains majority stake in the enterprise through its possession of “non-tradable shares.” This arrangement ensures that the enterprise remains a state-owned, despite having made some movement toward the oft-touted goals of enterprise restructuring and modernization. More will be said about this later in the dissertation.

<sup>13</sup> This is up from a few dozen or so at the time of the founding of the People’s Republic in 1949. The World Commission on Dams estimates the number of large dams worldwide to be some 80,000, leaving China with fully half of those.

development, planning, financing and operating arrangements. Comparing the case studies sheds light not only on the different sociopolitical environments in which each dam was (is being) proposed, designed, built, and resisted, but also provides insights more generally into the nature of reforms in the electric power industry, banking, and state-owned enterprises. In addition, by approaching the study from a decision-making perspective, I attempt to show how various actors involved in different processes related to large dam construction interact, and on which issues and at which points in the decision-making processes do different types of actors wield the most influence.

The two case studies were selected based on several criteria. First, they are both situated on trans-national rivers that originate in Chinese territory, and therefore present unique challenges in terms of international relations and regional political economic dynamics. Numerous groups, including governments, inter-governmental organizations, and non-governmental organizations (NGOs) in the downstream countries have expressed concerns about the potential social and ecological impacts of Chinese hydropower development on trans-national rivers, yet institutions and agreements for cooperative development and/or management have been slow to develop. In addition, those opposing the dams from outside China rarely examine closely the role of certain actors and institutions in downstream countries themselves in furthering the projects. There are 18 major international river basins in China with a total annual outflow at the border of  $7,320 \times 10^8 \text{ m}^3$ , or 26.8% of the total annual runoff of the entire country (Y. Feng & He, 2006). With somewhere between 30 and 50 medium- to large-scale hydropower projects planned for transboundary river basins in southwestern China alone,

the institutional arrangements, legal environment, and political economic context surrounding them surely merits academic scrutiny.

Second, little has been written in English about development on these rivers, despite the existence of a significant amount of academic and technical writing in Chinese. Moreover, the recent toxic chemical spill on the Songhua River (which flows from China into Russia) further focused international attention on how China manages its transboundary rivers, and in the opinion of many river and water resources experts in China, placed China in an undesirable “passive” foreign relations situation. While the social and ecological implications of the Three Gorges Project are numerous and complex and justify scholarly attention, there is a clear need for increased research on other large dam projects in China, not only in order to understand how they resemble and differ from the Three Gorges Project, but also in order to fully comprehend their implications for regional transboundary relations, socio-ecological impacts (positive and negative), and changing institutional and inter-governmental dynamics in China.

Finally, these case studies bear consideration in light of several recent changes in the Chinese legal system that are having an impact on how the projects are carried out. The Water Law of China was first passed in 1988, and later revised in 2002. Many areas of ambiguity in the 1988 law were clarified in the 2002 version, while such clarifications at times resulted in new conflicts between what the law says and what the institutions responsible for implementing it have the habit of doing.<sup>14</sup> In 2003, the Environmental

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<sup>14</sup> Several interviewees in various governmental offices at the provincial and national level admitted to confusion over the limits of their offices’ jurisdiction regarding large-scale hydropower projects, especially those on trans-national rivers.

Impact Assessment (EIA) Law of China was passed, a component of which requires public disclosure of EIAs for projects such as the Nu River project discussed here. Indeed, the secrecy with which the EIAs for the Nu River dams have been held so far has even prompted some discussion among Chinese public interest attorneys of a possible lawsuit against the State Environmental Protection Agency (SEPA) and the National Development and Reform Commission.<sup>15</sup> The Three Gorges Project itself was (and still is) a site of much contention among government leaders, academics, and civil society groups, and the approval measure received a surprisingly high numbers of dissenters among the National People's Congress. There is clearly, then, a degree of uncertainty among the leadership and society at large about the necessity, rationality, and security of massive dam projects. Given the recent changes in the legal environment that seem likely to further facilitate expression of such angst through increasingly institutionalized channels, it only seems appropriate to turn the spotlight from central China's Yangtze to southwestern China's Lancang and Nu.

### ***Organization of the Dissertation***

This dissertation consists of eight chapters. Chapter One has outlined the motivations, aims, hypotheses, main arguments, and case studies. Following the introduction, Chapter Two provides a review of relevant literature. Due to the breadth of the study, I review literature in political ecology, China-related regional and natural resource geography, center-local and interprovincial relations, enterprise reform, and civil

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<sup>15</sup> Interview B20060131. I was first told this might happen in an interview in January 2006. The intent to file such a lawsuit was confirmed in April 2006 by a Hong Kong news report citing the Voice of America radio program ("Huanbaozhe zu Nujiang," 2006).

society. Where appropriate and relevant to this study, I also review Chinese-language literature published in Chinese academic journals.

In Chapter Three, I develop my analytical framework, which I call a powershed, and justify its utility in understanding contemporary large-scale hydropower development in Yunnan. The framework, grounded in critical realist political ecology, simultaneously acknowledges the material importance of biophysical processes and physical geography in influencing patterns of hydropower development, while recognizing that such development also takes place in a certain political economic environment where certain development options are, for a variety of sociopolitical reasons and by an array of different actors and groups, put forward as more favorable than others. In developing this framework, I focus first on several processes related to hydropower development, such as planning, development, and contestation, and the geographic constructs employed in each, as a means of bridging the conceptual gap scale politics and analytical scale. A key theoretical contribution of this framework and its primary focus on processes, rather than a priori scalar containers, is that it succeeds in linking theoretical insights from political ecology to those of the politics of scale literature.

Chapters Four and Five, respectively, detail the Lancang and Nu River case studies, focusing both on the biophysical and sociopolitical characteristics of the two rivers that make large-scale hydropower development there so attractive, at least in the eyes of those responsible for the development. The Lancang, or upper Mekong, has its source in the Qinghai-Tibet plateau, and traverses five countries after flowing out of China through southern Yunnan's Xishuangbanna Dai Nationality Autonomous

Prefecture. The Nu, or upper Salween, also originates in the Qinghai-Tibet plateau, and flows through Myanmar (Burma) into the Andaman Sea after leaving China through western Yunnan's Baoshan Municipality and Lincang District. Both rivers tumble down from the eastern Himalayas through narrow gorges that in many ways are ideal for large dam development. Those same gorges, however, are also home to several of Yunnan's 25 ethnic minority cultures, some of western Yunnan's most fertile land, and concentrations of dire poverty. These two chapters highlight the complex physical and sociopolitical environment in which the hydropower projects in question are being developed, as well as the details of the projects themselves and the constellation of institutions responsible for their development.

Chapter Six makes the case that the large-scale hydropower development projects described in Chapters Four and Five should be understood not as rural/local development, poverty alleviation, or self-sufficiency projects for Yunnan, but rather as a key component of continued rapid economic development and urbanization processes in the coastal province of Guangdong, more than 1,000 km to the east. The chapter also explains the geographic, socioeconomic, and historical factors that have contributed to making Yunnan a "hydropower base" for China and Mainland Southeast Asia. Yunnan, which means "South of the Clouds," has long been distant from the administrative centers of China in political reality and in the geographic and cultural imaginaries of the Chinese people. Its distance, both real and imagined, has contributed to Yunnan's reputation as something of a backwater, where economic development and the particularly (Han)

Chinese notion of “social development” are seen as lagging, and thereby in need of correction or improvement.

Chapter Seven steps back from the dams and their rural-urban linkages to focus on decision-making processes related to hydropower development. Rather than begin with an examination of bureaucratic politics, the first half of the chapter instead examines how certain groups are taking advantage of the space reforms have created for new participants in decision making. I explain how three NGOs<sup>16</sup> and one academic research institute have negotiated the sometimes treacherous waters of advocacy related to energy and environment issues in Yunnan. The three organizations include two Yunnan-based organizations, Green Watershed and Yunnan EcoNetwork, and one Beijing-based organization, Green Earth Volunteers. The academic research institute is the Asian International Rivers Center of Yunnan University. Each organization has a different relationship to the various government entities charged with oversight of NGOs in China, as well as different legal status, and differential capacities to influence the direction and shape of energy and economic development projects in Yunnan. These organizations exist at the nexus of a dynamic (sub)culture that is eager to express its views on a variety of environmental and social issues; a changing legal framework that on the one hand creates spaces and channels through which such views may be heard, while at the same time attempts to referee their expression; a transnational discursive milieu that touts lofty ideals such as participatory decision making, sustainable development, and heritage (both natural and cultural) preservation; and a party-state apparatus (along with its economic

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<sup>16</sup> As noted above, I use this word with some caution, and in Chapter Seven opt to refer to domestic organizations as civil society organizations (CSOs).

agents such as state-owned enterprises) that remains wary of any kind of social organization not founded first and foremost on party loyalty and national interest. The second half of the chapter then shifts to the legal and institutional reforms in China's water and electric power sectors over the past decade, focusing on the reforms' impact on how large dams move from an idea to a blueprint to a concrete Great Wall across a river. The tableau of decision making that I paint is no doubt incomplete, imperfect, and unstable. Such processes are complex; the sheer breadth of issues that must be considered, from resettlement to dam engineering to flood prevention and a host of others, necessitates a vast array of specialists in China as in any other country. The novelty here, though, is that contrary to common perceptions of how such projects are designed, financed, built, and operated, there are ways to get inside the presumed "black box" of decision making in China, and by doing so we stand to learn much of the implications of institutional and legal reforms there against a backdrop of China's increasing interconnection with the global political economic system.

Finally, Chapter Eight concludes by first reviewing key findings of the study. I then discuss their implications, most importantly as regards methodology for political ecology research in China and theoretical frameworks for understanding center-local relations in China. Finally, I point out the shortcomings of the study and identify several areas where further research is needed. A bibliography and appendices follow the conclusion.

## Chapter Two: Literature Review

### *Introduction*

In this chapter I review the theoretical and empirical contributions of scholars within China and abroad writing in areas most relevant to this dissertation. First I address the political ecology literature, which informs my analytical framework, theoretical assumptions about society-environment interactions, and methodological approach. In this section I also discuss several dam-related works, including some that followed the report by the World Commission on Dams (2000), largely seen as the catalyst for much anti-dam sentiment and activism over the past several years. I then turn to the China geography and area studies literature, focusing particularly on four subsets of that literature: center-local and interprovincial relations; regional and uneven development; resources, energy, and environment; and civil society/NGO development. Included here is a review of the relatively sparse literature on the Western Development campaign.

These literatures are particularly relevant to this study, yet there remain several gaps that this dissertation helps fill. The first, most generally, concerns natural resource geography in China, and more specifically, decision-making processes related to natural resource exploitation and development. As I show below, geographers of China have largely tended to focus on urban areas, leaving ample room for further research into questions of rural China, resource exploitation, and society-environment interaction; such a bias has been noted previously (Williams, 2002). While it is important to understand the shifting dynamics of cities as key interfaces for China's engagement with the global political and economic system, especially since China's accession to the World Trade

Organization in 2002, it is also vital that the role of China's vast hinterlands in that engagement be examined. China's interior is constitutive of its cities in many ways, and by ignoring those linkages we risk misunderstanding both rural and urban China.

The second gap lies at the nexus of the political ecology and politics of scale literatures. While a number of geographers have made important contributions in recent years to applying scale theoretical concepts to the study of China, those studies have perpetuated the urban bias already evident in China geography. Moreover, political ecologists, with few exceptions, have largely ignored China, home to a fifth of the world's population and site of rapid and sweeping changes in society-environment relations. This study demonstrates the usefulness of applying a political ecology approach to the study of society-environment interactions in a (post- or quasi-) Marxist economic setting, and the importance of considering issues of scale as part of the object of inquiry, rather than simply a framework of analysis. The copious literature on scale presents many contradictions, redundancies, and paradoxes, and the number of panels and discussions focused on scalar issues at, say, the Association of American Geographers' 2006 annual meeting suggests that the geographic community is by no means of one mind in its views on scale. I aim to contribute to the resolution of some of the epistemological, theoretical, and methodological debates related to scale, or at least to the furthering of those debates on the usefulness of scale as both an analytical construct produced and employed by the researcher and an object of inquiry in itself resulting from socio-ecological processes.

Finally, this study contributes to the China area studies literature by demonstrating the value of a geographic perspective on interprovincial, rural-urban,

center-local, and society-environment relations. Political scientists, anthropologists, and geographers have all weighed in on these topics at various points, yet the number of scholars who have explicitly considered resources and energy as key factors in these dichotomous relations remains small. The gaps in and among these three bodies of literature present an exciting opportunity to contribute to critical scholarship on society-environment relations and decision-making processes in contemporary China.

In the remainder of this chapter, I review the political ecology and the China area studies literatures. I save the review of the scale theory literature for Chapter Three, focusing on where it might usefully mesh with political ecological analysis, in order to develop my analytical framework. As an environment-society geographer grounded in critical realist theory, I recognize the importance of sociopolitical and biophysical processes in hydropower politics in China and elsewhere. I also acknowledge that most of these processes are unique neither to China nor to large-scale hydropower there, yet I insist that they be understood in the particular socio-ecological context of contemporary China. Nearly every country in the world, under regimes ranging from democratic to authoritarian, has undergone its share of large-scale hydropower development (Goldsmith & Hildyard, 1986; McCully, 1996; Reisner, 1986; World Commission on Dams, 2000). Much of that development has been carried out by a small number of very powerful actors – government ministries, military-engineering institutions, and international aid agencies – and has been criticized for failing to accurately or honestly account for the social and ecological costs of large dams. Though the current wave of large-scale hydropower dam development in Yunnan Province displays many troubling

characteristics criticized by analysts of large dam development detailed below, a closer look at the processes in question reveals key leverage points that will be useful to anyone wishing to understand or improve the process.

### ***Political Ecology***

Political ecology is a sub-discipline of geography, anthropology, human ecology, and environmental history. It might be best understood as “a *method or perspective* that demands attention to context (historical, social, ecological), and complexity (non-linearity, non-equilibrium, uncertainty)” (Magee, 2006a). The lineage of the political ecology literature is commonly traced to work by Piers Blaikie and Harold Brookfield in the mid 1980s (see, for instance, Blaikie, 1985; Blaikie & Brookfield, 1987). Blaikie and Brookfield sought to link problems of soil erosion in African farming villages to broader political economic forces by identifying “chains of explanation” (Blaikie & Brookfield, 1987), rather than accepting conventional wisdom that blamed farmers (“land managers,” in their terminology) for poorly managing the soil and failing to prevent the effects of erosion. Vayda (1983) had earlier coined the term “progressive contextualization” to describe a methodological approach to understanding proximal (and gradually less proximal) factors in localized land-use change (or environmental change, more broadly). A number of authors have since applied political ecology to case studies that have, until recently, been concentrated in the global south, primarily in Africa and Latin America. Geographers have played a key role in advancing the field and pushing for further development of theoretical frameworks (historical materialist, poststructural, feminist, etc.) underpinning the approach.

Several features are generally accepted as characteristic of political ecological analysis. First, political ecology analyses involve detailed case studies that are usually (at least in principle) interdisciplinary in nature (Zimmerer & Bassett, 2003). Second, most are critical, implicitly or explicitly, of colonialism and/or the current global economic system based on the capitalist mode of production, especially regarding the commodification of nature into resources to be exploited and controlled by powerful elites (Blaikie & Brookfield, 1987; Escobar, 1996; Peet & Watts, 1996b). Political ecology demands an attention to cross-scale linkages that connect micro-scale (place-based) environmental change to macro-scale (global) political economic structures and discourses (Bassett & Zuéli, 2003; Blaikie & Brookfield, 1987; Swyngedouw, 1997a; Vayda, 1983); a recognition of a politicized environment (Adger, Benjaminsen, Brown, & Svarstad, 2001; Bryant & Bailey, 1997; Stott & Sullivan, 2000); and a recognition of plurality in evidence and explanation (Blaikie & Brookfield, 1987; Escobar, 1996; Peet & Watts, 1996b). Finally, attention to marginality – geographic, economic, and political – is also common to political ecological analyses (Blaikie & Brookfield, 1987; Rangan, 1996).

This basic framework has been variously critiqued and modified by authors who felt it focused too little on politics and too much on ecology (Moore, 1996; Neumann, 1998; Peet & Watts, 1996a); too much on politics and too little on ecology (Vayda & Walters, 1999; Walker, 2005); or that it was too structural (Moore, 1996), too reliant on oversimplified notions of nature and environment (Castree, 2003), or too prone to overlook issues of gender and ethnicity (Rocheleau, 1995; Rocheleau, Thomas-Slayter, &

Wangari, 1996). In the end, the debate about how much politics versus how much ecology constitutes a “good” political ecological analysis is probably not very useful, since no study can capture all relevant factors influencing environmental change and society-environment interactions. Despite my own interest in the biophysical conditions that both facilitate and result from large hydropower installations, I confess that my analysis in the following pages focuses primarily on political economic processes rather than biophysical ones.

An important collection edited by Peet and Watts (1996b) sought to “explore the absences, silences, and weaknesses of political ecology” (x). The strains of political ecology that emerge from the chapters in this volume draw on, to varying degrees, a poststructural attentiveness to the power of discourse and the discourses of power; a Marxian focus on the social relations of production and resultant class antagonisms; a neo-Marxian recognition that class struggle is but one source of transformative power; and a critical realist acceptance of the materiality of poverty, marginalization, and environmental change, coupled with an awareness that perceptions and explanations of such material conditions vary along many axes. Thus the editors propose a “liberation ecology” that studies

the processes by which environmental imaginaries are formed, contested, and practiced in the course of specific trajectories of political-economic change. It borrows from poststructuralism a fascination with discourse and institutional power, yet remains within that tradition of political ecology which sees imaginaries, discourses, and environmental practices as grounded in the social relations of production and their attendant struggles.

(Watts & Peet, 1996, p. 263)

Two chapters in the Peet and Watts volume are particularly relevant to this dissertation. The first (Escobar, 1996) is generally recognized among political ecologists as a key step in the move towards a poststructural political ecology. Escobar's key point is that the very notion of nature, a crucial component in political ecological inquiry, is socially constructed and carries multiple meanings for different people in different contexts. Setting off from a historical materialist starting point, he argues for a poststructural political ecology that recognizes two "ecological" forms of capital. The first is a destructive, extractive form, which he labels modernist. The second, postmodern form is more subtle and centers on technological strategies such as commodification of genomes and other aspects of "nature" into discourses of sustainable development. He offers as an example contemporary moves to remake rainforests into genetic repositories (for potential pharmaceutical use, thus commodification), as contrasted to more blunt and immediately destructive activities whereby commodification was (is) achieved through the felling of trees, selling of lumber, and planting of cash crops. In this way, and through the discourses of sustainable development, Escobar argues that "nature is reinvented as environment so that capital, not nature and culture, may be sustained" (49).

For Peet and Watts, as well as for numerous other contributors to the volume, a neo-Marxian critique of the capitalist mode of production is a central theme. O'Connor (1988) had earlier proposed a "second contradiction of capitalism," wherein capitalism destroys (and is incapable of reproducing) the very *conditions* of production (labor, space, and environment) necessary for its own perpetuation. In a second chapter most useful for the present study, Yapa (1996) makes a fundamentally Marxian argument that

“improved” Green Revolution seeds are situated at the nexus of a web of relations of production that are not merely social (as classical Marxism would have it), but also cultural, academic, technical, ecological, and political. All these contribute to the production of seeds not simply as a foodstuff, but as stores of an entire suite technoscientific processes and relations based on inputs such as consultants, petroleum-based nitrogen, irrigation, and pesticides. Yapa argues that at each of these nodes where scarcity is constructed, so, too, can resistance be mounted. His point about construction of scarcity can be applied to the present case of large-scale hydropower in southwestern China. Just as socially constructed narratives of scarcity, poverty, and hunger in India fueled development of “improved” seeds, so too do narratives of electricity scarcity, hydropower abundance, and poverty alleviation undergird plans for dam construction in some of western Yunnan’s poorest regions. Yunnan’s dams, like Yapa’s seeds, can be understood to be situated in a complex nexus of relations of production: production of electricity by water cascading over turbines; production of academic knowledge about the potential benefits and harms of large dams; production of cultural authenticity in an attempt to stymie dam development; production of profits for hydropower development companies; and, eventually, production of consumer goods in eastern coastal industrial areas such as Guangdong Province, the so-called “factory of the world.”

Given political ecology’s roots in less developed countries, Bryant and Bailey (1997) felt it appropriate to explicitly devote an entire edited volume to explaining the merits of political ecological analysis in the Third World. While such a volume immediately begs the question of whether there is value in creating a distinction between

First- and Third-World political ecologies (Walker, 2003), Bryant and Bailey do address several topics that seem more immediately relevant to developing-world settings, namely the role of the state, the attractiveness of many countries as pollution havens, and the engagement of Third World states with international organizations, including so-called development agencies and multinational corporations. In the end, if political ecologists adhere to the analytical strictures of process-tracing, progressive contextualization, and chains of explanation, it is likely that the distinction between First World and Third World will blur during the analysis. One important point that Bryant and Bailey make in their conclusion is that political ecologists have been “relatively negligent” in examining questions of air and water alterations, inter-state “hydropolitics,” and “how control over water is linked to unequal power relations” (Bryant & Bailey, 1997, p. 193).

Important exceptions to the land-based bias among political ecology research do exist. Swyngedouw (1997b) examines the importance of flows of water and capital in shaping urbanization processes in Ecuador. Later (Swyngedouw, 2003), he focuses on the role of water in defining modernization in Spain. These two pieces pave the way for further exploration of the flows of capital and power that are tied to flows of water. Swyngedouw situates his study of Spain’s waterscape in the context of a failing empire in dire need of “*regenerationismo*,” in which waterworks would play a key role, producing not only ecological but social harmony as well. Dominant discursive formations lamented water “lost” to the sea that had not paid its “tribute to the earth” (p. 101) and called for state-led construction of a nationwide network of irrigation and dam projects that would replenish Spain’s drylands and rejuvenate social spirit. The same images of water being

lost to the sea without first turning hydroelectric turbines are ubiquitous in developmentalist discourse in China, put forth by proponents in government offices and hydropower companies alike.

Neumann (1998), studying the conflicts between parks and people in Tanzania's Arusha National Park, explores the use of parks as instruments of social control and underscores the importance of political struggles over landscape meaning among different social groups. As I show later in the development of my analytical framework, constructions of meaning and value of the steep mountains and swift rivers of western Yunnan rely on a variety of geographic imaginaries that sometimes overlap and frequently conflict. Political struggles over such meaning, and the differential abilities of various actors to participate in meaning-making and decision-making processes, present a prime object for political ecological analysis.

A critique by Vayda and Walters (1999) centered on the tendency of political ecology to prioritize the analysis of political economic processes over ecological ones. As a solution, Vayda and Walters instead proposed an event ecology, or evenemental ecology, as a way of capturing important biophysical processes they felt were often overlooked by other political ecology research. There are similarities between their approach and my own in the recognition of the importance of processes, both biophysical and political economic, which Vayda and Walters would see as ensembles of events. Forsyth (2002) called for a critical political ecology approach based on a re-centering of political and ecological explanation as co-constructed by various actors with diverse motivations. Such an approach, according to Forsyth, argues that local-scale

environmental change is directly related to broader-scale political economic processes, explained differently according to individual and institutional interests, and that the impacts of such change are differentially experienced and resisted along lines of gender, ethnicity, and class.

Bakker's (1999) study of the political ecology of hydropower on the Lower Mekong, followed by later work on the privatization of water in England (Bakker, 2000) and Spain (Bakker, 2002), is attentive to discourses that construct not only "natural" resources that can then be commodified, but also scarcities of those resources. Her work on the Mekong underscores the need for multi-scale analyses, and in terms of methodology, suggests once again that a focus on the processes of development (such as finance, policymaking, and resistance) can overcome potentially static a priori scalar frames. Bakker's work on the 1995 drought in England and Wales is also interesting in its attempt to simultaneously engage Regulation Theory with what she calls "real" regulation that, she claims, is a major determinant of scarcity and therefore of the social problems resulting from an allegedly "natural" drought.

In a brief review of political ecology vis-à-vis the larger corpus of political geography, Robbins (2003), already known for his innovative work to bring political ecological analysis to bear in the industrialized world (Robbins, 2002; Robbins & Sharp, 2003), argues that political geographers interested in environment and political ecologists often proceed in the same direction but on different tracks. A recent collection of political ecology works (Zimmerer & Bassett, 2003), written according to the editors from an intentionally geographic perspective, seems to heed this advice and that of Forsyth.

Zimmerer and Bassett seek to engage “both the ecological and political dimensions of environmental issues in a more balanced and integrated manner”; expand the “geographical range of political ecological studies to include urban and industrial settings of the global North and South”; strengthen “one of the analytical cores of political ecology by arguing for a more creative consideration of geographic scale”; and provide “sustained discussion of the research methods in political ecology” (pp. 1-2). The collection is rich in case studies and most valuable in its contributions in terms of methodology. Lacking, however, is any engagement with geographic scale as an object of inquiry, a trait symptomatic of the failure thus far of a substantive cross-pollination between the political ecology and scale politics literatures (J. C. Brown & Purcell, 2005). I address this disjuncture more thoroughly in Chapter Three.

As I show in the following section, the number of political ecological studies of society-environment interactions in China has been limited, especially when compared to the number of such studies set in Latin America or Africa. The same is true for Chinese scholars writing in Chinese and publishing within China. While a search of any Chinese academic journal database for the keywords “*zhengzhi shengtai*,” the closest literal translation, yields numerous results, they are largely misleading. Most, if not all, use the term in reference to intra-institutional dynamics and/or interpersonal politics. Thus a Chinese political ecology article might focus on the ecology (in the sense of cycles, dynamics, and interrelationships) of a local party committee or ministerial office. This is not to say that Chinese scholars do not think about the environment as politicized. Indeed, quite the contrary is often true, as evidenced by the openness with which an increasing

number of scholars write about issues of resource exploitation and society-environment interactions in such terms. Ironically, many of the individuals making frequent contributions to Chinese academic and professional journals in the field of hydropower and water resources development, and for whom environment (and by extension, natural resources) is inherently politicized, are managers and engineers within development ministries, bureaus, and hydropower companies. For these researchers, whose articles more often resemble propaganda than academic research, questions of natural resource exploitation are usually, if not always, equated with questions of national development and party-state greatness. Thus the ecological is definitely political, but rarely does one find a critical perspective on this fact among Chinese scholarship.

Several studies of the socio-politics of large dams and their impacts, whose authors do not necessarily self-identify as political ecologists, are particularly relevant to the present research. Like political ecologists, the authors of these studies situate large dams within particular socio-historical, economic, and ecological contexts, and address the same issues of marginality and access to decision processes that are common to much of the political ecology literature. The studies are frequently interdisciplinary, drawing on engineering and physical science perspectives as well as social and natural science. An enormous literature exists, primary in engineering journals, that attests to the benefits of large-scale dam construction and addresses the technical and engineering challenges posed by massive hydraulic projects. This literature is beyond the scope of my review, for this dissertation focuses more on the political economic processes that lay the figurative foundation for large hydropower projects, rather than the scientific and engineering

processes that impact their physical foundations. I merely note in passing that a common theme of Chinese engineering science related to the Yunnan projects is the history of fairly strong earthquakes in the province in relative proximity to some of the projects (see, for instance, Du, Tu, & Chen, 2000; see, for instance, Hou, Chen, & Yang, 1988).

A somewhat dated yet influential study by Goldsmith and Hildyard (1986) goes to great lengths to argue that large hydro-engineering projects are more often than not political projects first and foremost, and that the cost-benefit analyses that are conducted are usually cursory, biased toward lower costs and higher benefits, and done after the political machinery has already been set in motion to design, finance, and construct the project. Such arguments clearly resonate with much of the political ecology work reviewed above, particularly as far as the role of the state in development projects is concerned. The authors correctly note that “no dam is built in a political vacuum,” (p. 241) a truism equally applicable in Egypt, the United States, and China. Their study covers a broad range of large dams built for irrigation, hydropower, and navigation purposes, and can be fairly characterized as a condemnation of large dam construction around the world. Their observations about the poor treatment or resentment of migrants following resettlement due to dam construction again echo concerns of marginalization in political ecology, and ring true in China today (Padovani, 2004). This is especially true in linguistically diverse China where migrants from a few dozen kilometers away, let alone a few hundred, often speak dialects that may be mutually unintelligible. Equally relevant is their claim of “complete lack of coordination among organizations involved in putting up a dam” (p. 103), a theme that also runs throughout Reisner’s (1986) account of the

politics of dam development and water engineering projects in the American west. As I show in Chapter Seven, the lines of authority and jurisdiction regarding large dams on transnational rivers in China are far from clear, and conflicts between the letter of the law and the habit of the institutions are common.

The World Commission on Dams (2000) report has likely been the most influential and controversial study on large dams. The Commission, which involved academic and technical experts, conducted a study of a non-random sample of some 30 of the world's estimated 45,000 large dams, focusing on eight in particular for in-depth examination. The study ("advisory" rather than "investigatory" in nature) was carried out over a period of two years, and involved site visits and consultations with experts and locals who supported and opposed the dams. The study's first conclusion was blandly positive: "Dams have made an important and significant contribution to human development, and the benefits derived from them have been considerable." The remaining four were decidedly critical, citing high social and ecological costs, inequitable distribution of costs and benefits, and non-participatory decision-making processes that were too often guided by development agencies rather than local needs; once again, such themes echo the concerns of many political ecological analyses of development projects. Several years prior, McCully (1996) had written a stinging and well-researched critique of large dams that presaged many of the findings of the WCD. He later updated his study following and in response to the WCD Report (McCully, 2001). Highly critical of large dam projects, McCully equates them with modernist projects such as nuclear weaponry and automobiles and modernist ideals of controlling and mastering nature.

Also responding to the WCD report, the International Commission on Large Dams (ICOLD) criticized its small, aged, and non-random sample of dams. ICOLD claimed that of the estimated 45,000 large dams around the world, the WCD only selected eight for in-depth review, most of which were more than 30 years old, and therefore could not be considered representative of the present state of large dams in terms of social and ecological impacts (Varma, 2000).<sup>17</sup> Though the criticisms of the methodology of the WCD report may have some merit, the ICOLD response to the report most likely overstates concerns that WCD guidelines, particularly those calling for negotiated decision making, will cause “public and private developers and financial institutions [to] view these delays as too time consuming and costly, and will stop water and energy development entirely.”

Finally, a small number of other studies have set China’s construction of hydroelectric dams on transnational rivers in a context of international relations and security. A study by the U.S. National Science Foundation (1998) suggested that regional conflict would likely only arise if the Chinese dams were shown to cause severe water shortages or seasonal flow changes in downstream countries, a possibility the Chinese government and Chinese hydrologists argue is highly unlikely. The NSF study did point out an important facet of the political economic environment surrounding regional dam development that remains valid today, namely that the six countries in the Mekong region, and especially the lower four (Thailand, Cambodia, Laos, and Vietnam), frequently compete for project funding from international donors, and may mask

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<sup>17</sup> This criticism was repeated by Cassio Viotti, President of ICOLD, at the 2005 World Water Week conference in Stockholm, Sweden.

underlying conflicts with rhetoric of cooperation. Another author (Dupont, 2001) suggested that the Lancang dams could lead to “water wars” with downstream nations, a somewhat alarmist claim given the participation of those downstream nations in the actual financing, construction, and use of the dams through power purchase agreements. Makim (2002) assesses the “resource regime” in the Mekong region and concludes that resource governance may in fact reflect the desire of area countries to maintain a stable international situation, which seems somewhat surprising given China’s lack of official membership in the Mekong River Commission, the most long-lived resource governance regime there. Finally, Economy, whose earlier (2004) study on the environmental challenges China faces is thoughtful, comprehensive, and (perhaps too) optimistic, touches briefly on China’s dam development on Yunnan’s transnational rivers in her analysis of China’s growing role in Asia (Economy, 2005). Unfortunately, she stumbles slightly with her facts regarding the Lancang projects, claiming that only one was completed as of 2005 (there were two), and repeating claims from downstream actors that the historic low water levels in the Mekong in 2004 were caused by China’s dams.<sup>18</sup> In fact, as the Mekong River Commission later acknowledged, the low water levels were most likely caused by historic droughts in the region rather than Chinese dam operations.

### ***China Geography and Area Studies***

I now turn from the broader theoretical literature on society-environment relations to the China-specific literature most pertinent to the present inquiry. Geographic research on China has been said to occupy a peripheral or limited position within the overall

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<sup>18</sup> A report from Thailand had earlier blamed low water levels on the Chinese dams (Konglang, 2004).

corpus of China scholarship, as compared to research in political science, economics, and anthropology (G. C. S. Lin, 2002; Williams, 2002). Coupled with the relative paucity of China geography is a tendency for geographic research to concentrate on urban areas.<sup>19</sup> As McCarthy (2005, p. 773) notes, most rural geography research tends to focus on industrialized and more developed countries, whereas investigation of rural areas of the developing world and Global South is left to “scholars of development, postcolonialism, natural resource industries, and other areas of the discipline.” One of the most noticeable gaps in academic literature on China concerns issues of natural resources and energy. Despite some contributions by a small number of scholars whose work I review below, these issues remain largely unaddressed by social science researchers. In addition, the classics that do exist in this vein, including Brown’s widely read work at the WorldWatch Institute (see, for instance, L. R. Brown, 1995) tend to be fairly paternalistic and rely on neo-Malthusian narratives that reduces all environmental problems in China to population pressure on resources (PPR), implying that China’s environmental problems are China’s alone. On the whole, these texts fail to engage political economic explanations that link China’s water pollution or deforestation problems to the global economic system in which China is increasingly enmeshed. A political ecology approach requires such engagement and provides a useful means for reconceptualizing “China’s” environmental and resource issues.

### **Center-local and Interprovincial Relations**

Several bodies of China literature are relevant to a political ecological analysis of hydropower development in Yunnan and elsewhere in the country. First is the fairly

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<sup>19</sup> I discuss some of the reasons for this urban bias at the end of the chapter.

broad corpus on center-local and interprovincial relations. A 2004 article in the *New York Times* described a move by China's premier, Wen Jiabao, to temporarily halt the preliminary construction work on several hydroelectric installations on the Nu River (Yardley, 2004a). Wen, perhaps responding to pressure from groups within and outside China,<sup>20</sup> declared that work on the dams should be halted until China's laws requiring environmental and social impact assessments were followed and such studies conducted. Yet the very next day a newswire cited a local official in Yunnan as saying that as far as he knew, policies had not changed and work on the dams was proceeding as before ("China's premier reportedly orders restudy," 2004; "No Conclusion Drawn," 2004). This instance of apparent center-local disjuncture needs to be understood in a larger context.

Skinner (1977) made a foundational contribution to ways of thinking about sub-national regional development patterns. Arguing that China scholars needed to look past provincial boundaries in their analyses, Skinner saw river basins as the fundamental areal unit for demarcating economic development patterns, referring to the nested economic systems that arise within them. He divided China into physiographic macroregions that basically mirrored watersheds, each with a core and periphery that responded to cyclical shocks not bounded to administrative regions. Skinner's work was highly influential but not without criticisms, if for nothing else than the "naturalness" of the macroregions he posited and their lack of porosity (see, for instance, Cartier, 2002). Skinner's attentiveness to river basins is clearly relevant here, but as I show, such configurations must be considered as dynamic, socially constructed, and even fleeting. The new

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<sup>20</sup> See Chapter Seven.

regionalism linking Hong Kong, Guangdong, and Shanghai to Yunnan through geographies of electric power is a product of a particular socio-historical and ecological context, in which the peculiarities of economic development in Guangdong, coupled with constraints on energy production there, make feasible and attractive the long-distance relationship with Yunnan to tap into southwestern China's hydropower potential. There is no reason to assume fixity with this regional arrangement, however. Indeed, as Jarosz (1996, p. 149) notes in a political ecological study of deforestation in Madagascar, "reconstructed regional geography reveals how resource extraction, control, and distribution are social processes which shape, and are shaped by, particular regional contexts, contingencies, and activities."<sup>21</sup> Were a number of new nuclear plants approved for Guangdong, it is entirely conceivable that the once economically and politically feasible transfer of billions of kilowatt-hours from Yunnan to Guangdong would suddenly become less feasible.

Shue (1988) sets forth the notion of a "cellular" structure of rural China, arguing that decentralization of fiscal control to lower-level authorities in the reform period does not equate with a diminution of (central) state capacity. She insists on the juxtaposition of fine detail about local-scale processes with "the most sweeping of discernible trends and patterns" (p. 4) on a larger scale, an approach she labels the study of social intertexture, similar to a political ecology approach. Lampton (1987b) explored the disjuncture between (central) policy formulation and (local) policy implementation, marveling at the

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<sup>21</sup> By "reconstructed regional geography," Jarosz intends the term region to be socially defined, mutable, and simultaneously constituted by and constitutive of social processes. This contrasts with a more traditional geographic understanding of region as fixed, immutable, and often *determinative* of social processes.

“tenuous” (p. 4) hold Beijing allegedly had on the hinterlands during the first decade of reform. Two decades later, that holds has perhaps proved not so tenuous. Similarly, Turner’s (1997) study of local officials’ policy entrepreneurship in response to three centrally mandated water policies found that prioritization of economic development, coupled with insufficient financial resources, often hindered implementation of water policy at the local level.

One model of center-local relations that has been particularly influential, though not uncontested, is that of local state corporatism (Oi, 1992, 1999). Oi argues that one consequence of the post-1978 economic reforms, and particularly of decollectivization in 1984, is that local officials have gained stature and economic power thanks to their ability to assert control over assets that were formerly state- or collective-owned. Her main point is that reforms led to property rights of officials, which in turn led to incentives to pursue local development, which then took the form of corporatism where officials essentially act as directors, making decisions about management, credit, resource allocation and reinvestment. Thus for Oi, local governments are the principal agents of economic development in the post-Mao era. For Whiting (2001), however, Oi’s model fails to explain why the first wave of enterprise privatization only occurred in the mid-1990s, rather than immediately following decollectivization a decade before. Whereas Oi downplays the role of the central state, Whiting argues that it is precisely the hardening of budget constraints due to national fiscal restructuring in the mid-1990s that made local officials aware of the financial burden of maintaining ownership over failing enterprises.

Chung (1995) provides a useful overview of academic perspectives on center-local relations, organizing scholarship along three axes: the cultural perspective, which posits that stable center-local relations demand a shift in traditional values and loyalties from locality to the central state; the structural perspective, which instead focuses on the importance of institutions and institutional change in mediating center-local relations; and the procedural perspective, which emphasizes the role of negotiation, bargaining, and other dynamic processes in determining the nature of center-local relations. Chung also discusses different methods employed by scholars seeking to understand center-local relations in China, and concludes by asserting, like others (Naughton, 1995; Saich, 2000; Shue, 1988; D. Yang, 1994; Zhao & Dickson, 2001), that center-local relations must not be seen as a zero-sum game, and that both the issue at hand and the level of analysis must be taken into consideration. Chung (2001) later picked up on similar themes in an examination of the direction, contradictions, and consequences of China's reforms. Like others, Chung is reluctant to accord too much weight to centrifugal tendencies associated with China's rapid economic development in the reform era that might strain center-local relations to the breaking point. He credits changing norms of center-local relations, from uniform compliance to local discretion, as playing a key role in moderating economic and political forces that might otherwise be destructive.

A generous assessment of central state institutions is found in the so-called "helping hand" paradigm (Montinola, Qian, & Weingast, 1995). This notion seeks to explain China's rapid economic growth during the reform period as the product of a benevolent, hands-off central state apparatus whose revenue-grabbing hands are

increasingly tied by fiscal contracts that devolve authority over revenue to lower levels of government. This, along with increasingly clear property rights, allegedly has resulted in a quasi-federalist system that enables local cadres to invest their energies in revenue-generating activities such as TVEs that have fueled China's rapid economic growth. Local officials, faced with factor mobility and "the threat of people and investors voting with their feet" (p. 75) are forced to limit their own predatory behaviors.

Tsui and Wang (2004) counter that the helping hand paradigm is too generous, and argue that a strong central state remains a fundamental force in revenue allocation and expenditure decisions due to its cadre management system, unfunded mandates, and legislated expenditures. Their argument challenges the federalist/helping hand paradigm and is bolstered in the case of large-scale hydropower by one simple but fundamental fact: lack of factor mobility. Yunnan's fast-flowing rivers and narrow canyons are the primary reason hydropower development is so attractive there, and similar physical geographic conditions are by no means ubiquitous in China. Tsui and Wang point out how the restructuring of power generation enterprises in Yunnan some two decades ago, in particular the shift "upwards" of enterprise ownership at the start of the reform and opening period, served to decrease provincial revenues, despite contract commitments on behalf of the center to honor the ownership of local revenues resulting from power generation. As I show later, despite the restructuring of China's electric power industry from Ministry to state-owned enterprise to stock corporations (in which the central government retains majority stake), this pattern of centralizing revenues persists today.

Focusing on a more overt form of central control, Mertha (2005) proposes the notion of “soft centralization,” arguing that a trend in recentralization of certain offices has become evident in recent years. According to Mertha, concerns in Beijing about the threat presented by local protectionism, whether justified or not, have nevertheless led to an attempt to recentralize certain offices within a handful of bureaucracies, shifting the chain of command from a localized (*kuai*-based) system of supervision to a more vertical (*tiao*-based) one. Since this centralization stops at the province, however, the effect has been a strengthening of the bargaining power of provincial-level governments vis-à-vis the center, which Mertha suggests may lead to “a sort of perverse federalism” (p. 792). The results of my study suggest that the role of non-local, non-central entities such as watershed commissions and hydropower development corporations must also be considered in any attempt to assess the degree to which China might qualify as a quasi-federal system, especially in light of the significant oversight, through the State-owned Assets Supervision and Administration Commission and other central offices, of Beijing authorities on the makeup of hydropower development’s corporate leadership.

Table 2-1 summarizes the key theoretical conceptions of center-local state relations in China. A common tendency among all models is to assume a fairly rigid dichotomy between center and locality, and to subsume all sub-provincial tiers of government into the category of “local.” As I demonstrate in the following chapters, it is virtually impossible to classify two key sets of actors in large-scale hydropower development, namely the hydropower development corporations and the basin (watershed) management commissions into either of these neat categories. Yet actors of

both types exert a deciding influence on the nature and direction of hydropower development in contemporary China. Through an analysis of the ways in which actors in these two groups interact with central and local government entities, this study will build on the important center-local relations models proposed by other scholars and contribute to our theoretical understanding of the Chinese government.

**Table 2-1: Some models of central-local relations**

Model	Proponents	Characteristics
Vertical control	(Tsui & Wang, 2004)	Center's control over the cadre management system (target responsibility system), coupled with its ability to issue unfunded mandates and legislate expenditures, means that central authorities retain much voice in how funds are spent despite ostensibly having relegated that voice downward
Institutional	(Whiting, 2001)	Changes in property rights and extraction regimes are key; political logic of career advancement motivates local cadres; "Principled evasion" (p. 198) by local officials resisting central mandates
Market-preserving federalism / helping hand	(Montinola et al., 1995)	Fiscal contracts between successive levels of government limit central state's predation and give more control of revenues to local officials; further enhanced by property rights
Local state corporatism	(Oi, 1992, 1999)	Rational local officials, with access to resources and their eyes on economic growth and social stability, act as managers in a vertically integrated system
Soft centralization	(Mertha, 2005)	Provinces benefiting from re-centralization of certain offices stops at the province, leading to strengthened provinces

### **Regional and Uneven Development**

Energy transfers such as the ones at issue in this dissertation figure prominently in official and academic rhetoric regarding regional development and interprovincial relations in contemporary China. Several scholars have made important and at times controversial contributions to the regional (uneven) development literature. Fan (1997) provides an excellent and thorough review of Chinese-language academic writing on uneven development in China, including a detailed discussion of numerous Chinese

authors' perceptions and critiques of policies that accept or encourage regional inequality. She also notes the impact uneven development has on center-local relations in that provincial authorities employ an array of tactics, ranging from lobbying to protectionist barriers on the flow of goods and raw materials, in order to mitigate the impacts of what they perceive are unfair policies. Fan makes the very important point that, among both critics and supporters of reform-era uneven development, there remains the near universal assumption that government policies and plans are the main factors affecting development patterns in China. She counters instead that more attention should be accorded to other "agents of development" (p. 632), including firms, enterprises, and non-state economic ventures. Clearly, this admonition is applicable in this study of large-scale hydropower, which is unfolding at the nexus of a complex ensemble of state, non-state, and quasi-state agents of development.

Several studies have examined comparative and competitive advantages of different provinces, attempting to explain how various policies and investment patterns have arisen out of those differences and what, in turn, they do to reinforce them (Hendrischke & Feng, 1999; Y. D. Wei, 2000). Wei's (1999) survey of numerous works on regional inequality in China yields a broad and essentially irrefutable synopsis:

In short, the legacy of history, an uneven geographic distribution of resources, an emphasis on industrialization and national defense, decentralization and policy changes, and political and social unrest, have all contributed to the persistence of regional inequality in China (p. 51).

Despite this conclusion that basically everything contributes in some way to regional inequality, Wei notes that increasing availability of socioeconomic statistical data

coupled with methodological advances have made contemporary analyses of China's regional inequalities much more tractable and meaningful. He also notes the ongoing debate among China scholars (including those within China) over whether regional inequality has increased or decreased during the post-Mao reform period since 1978. One of the key factors that make such a determination difficult is the large number (perhaps 100 million) of migrant workers whose work is vital to the economic performance of certain urban areas and provinces over others, but whose presence is essentially undocumented due to their lack of official urban residence permits (*hukou*). Methodological issues, Wei notes, contribute as well: scales of observation do not always coincide with data availability; reliable time series data do not always exist for the issues examined; and description of a phenomenon does not equate to explaining why it occurs.

One widely read yet controversial work by Wang and Pai (1991), originally published in Chinese in 1986 and later translated into English, addresses China's growing uneven economic development. In an openly Han-centric (at times bordering on chauvinistic) fashion written from a modernization theory perspective, the authors blame the "poor quality of human resources" for continued "backwardness" and poverty of China's western regions, particularly areas of high minority concentrations. They recommend increased state intervention and improved social needs provision such as education, but the subtext of the work is that a Han-civilizing project needs to occur in China's west in order to bring about development and help free China's minorities from the grip of "backward" traditions, religions, and economic systems. The authors, both members of a prominent reformist economic think-tank in the late 1980s, conclude by

recommending a stronger role for the central government, exporting skilled (Han) personnel into the regions, constructing new towns from scratch, fostering (Han) nationalism among minorities, and carrying out religious reform among minority populations. While the argument that central state subsidies have increased, rather than decreased, western China's dependence on the center and further exacerbated conditions of impoverishment may have some merit, the frequent equating of minority traditions with backwardness is problematic. Unfortunately, reference to the notion of quality (*suzhi*) of individuals and groups, and especially to the perceived linkage between low quality (*di suzhi*, usually referring to people with minimal or no formal education) and economic under-development has become quite commonplace in urban China today.

Such usage surfaces even in scholarly writing published outside China, including in several chapters of a recent scholarly compilation on China's western development campaign (D. Lu & Neilson, 2004).<sup>22</sup> This flaw aside, several chapters in the collection are useful to understanding the nature and direction of the campaign, and a persistent theme throughout the volume is the tension between relying on government assistance versus market mechanisms. Li, Hou, and Feng (2004) argue that part of China's new economic geography revolves around four economic collaboration belts that funnel energy, labor, and agricultural products eastward, and the resultant economic growth of western areas that provide those commodities. The authors identify as one belt the Pearl River Economic belt, a "natural connection for the south of China between the country's eastern and western regions" (p. 87). This belt coincides significantly with the Pan Pearl

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<sup>22</sup> This collection resulted from a conference held at the University of Victoria (Canada) on China's western development campaign. For a thorough and fairly critical assessment, see my review (Magee, 2005a).

River Delta and the southern corridor of the Send Western Electricity East project.<sup>23</sup> Chin (2004) analyzes institutional politics and decision-making processes regarding implementation of western development policies. His argument that western development faces “dual challenges of policy-making and policy implementation” (p. 137) echoes the conclusions of other scholars already noted about the disjuncture between policy and implementation. Chin identifies the Western Region Development Party Leading Group (rather than the Western Region Development office, housed in the State Council) as the key decision-making authority for western development projects. He also notes the tensions among central bureaucracies related to western development projects, which frequently involve input from a variety of line ministries. As I show in Chapter Seven, such tensions are also evident in large-scale hydropower development projects.

Naughton (2004) provides perhaps the most concise and informative account of the origins, content, and potential of the western development campaign. He begins with a discussion of regional economic development trends across China in the reform period that led to increased concern among the central leadership about the centrifugal tendencies regional disparities might present. For Naughton, the western development “package” is something of a hodgepodge of various policies that, while perhaps not all fitting together cohesively, represent a true concern on the part of the central government about poverty alleviation and reducing regional disparities. Notwithstanding that concern, the campaign is primarily a national-scale project aimed above all at strengthening national unity, and Naughton is fairly pessimistic about what will be actually achieved

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<sup>23</sup> See my discussion of the PPRD and southern electricity corridor in Chapter Six below.

over the ten years of the policy in terms of reducing regional inequalities. He remains more optimistic about the campaign's potential for alleviating poverty in western areas, as long as progress is made to tackle the incentives systems for local leaders in ways that prevent the program from degenerating into a patronage system for local pet projects.

Two noted Chinese researchers (Shaoguang Wang & Hu, 1999) offer a relatively neutral assessment of interprovincial inequality based on a survey of economic and non-economic indicators. Wang and Hu, building largely on their previous work in Chinese, analyze the political economic causes and results of uneven development in China during the reform period and find that interprovincial inequality has grown in terms not only of provincial GDP but also life expectancy, literacy, infant mortality, and other social measures. While they do seem somewhat alarmist about the trend in growing inequality – “Should China’s leaders be concerned about this ominous trend? Absolutely.” (p. 201) – they do make a compelling argument that policy direction in the 21<sup>st</sup> century needs to, among other things, redress the coastal investment bias, design a better system of fiscal transfers and tax collection, and provide the necessary level of social development opportunities to improve the quality of life for China’s poorest regions. Several scholars outside China have recently argued that the Western Development strategy merely adds legitimacy and urgency to resource transfer schemes dating back to the height of central planning, and can even be seen as a type of internal colonization in which the key beneficiaries will be the hydropower companies and the eastern provinces now able to tap into cheaper electricity. Oakes (2004) argues that large-scale hydropower development in Guizhou, framed as Western Development, is more accurately seen as a central-state-

strengthening project and a continuation of uneven exchange with coastal provinces such as Guangdong. Similarly, Goodman (2004) argues that the campaign and its related policies, buttressed by investments and favorable development climates, simply reinforce patterns of resource transfer that have existed for decades.

I have argued that research into the role of China's hinterlands in promoting industrial and economic growth in coastal cities remains a key area where geographers can make important contributions. One aspect of such core-periphery or rural-urban linkages – namely, migrant workers – has already been the focus of numerous scholarly studies. Chan (1994; 2001) has written about the importance of the household registration (*hukou*) system as a spatial-administrative tool for extending state authority and control past administrative boundaries and to the scale of the individual, also examining the patterns of worker migrations amid an array of push and pull factors. Chan and Zhang (1999) argue that despite reform-era relaxation in hukou administration and enforcement, the system remains an important state-serving project for controlling people's lives. A more recent work (Chan & Wang, 2004), as yet unpublished, looks at the copious literature on interprovincial inequality and income disparity. Relying primarily on census data rather than statistical yearbooks, Chan and Wang argue that most scholarship on regional disparities to date has overlooked the impact of China's massive number of migrant laborers (estimated at upwards of 100 million) when calculating provincial per capita GDP. Large numbers of migrants from less developed provinces have a dual impact on comparative per capita GDP, simultaneously reducing the denominator in low-income provinces (thereby raising per capita GDP) and increasing it in high-income

provinces (thereby lowering per capita GDP figures there). Accurate population figures, they argue, are vital when making generalizations about regional disparities.

### **Resources, Energy, and Environment**

Only a handful of scholars have addressed natural resource, energy, and pollution questions in China. An early study of the bureaucratic politics of China's energy sector (Lieberthal & Oksenberg, 1986) was groundbreaking in its detailed look at the inner workings of energy policy formulation. As I show in later chapters, many of their observations from two decades ago remain relevant to China's hydroelectric sector today. At the time of their study, electric power and water resources governance were housed under one roof, the Ministry of Water Resources and Electric Power. Even at that time, tensions between the water resources side and the electric power side of the ministry were already clear to Lieberthal and Oksenberg, with policy decisions regarding water resources projects being more decentralized than those regarding electric power projects. Not surprisingly, hydropower presented then, as it does now, particularly difficult "contradictions," most importantly the oft conflicting uses of dams with large reservoirs for flood control (where storage is the primary goal) and power production (where releases spin the power generation mechanisms). The authors sketch out a typical policy cycle for the development of a hydroelectric project, about which I say more in Chapter Seven when I discuss the current ways in which such policy making takes place.

Perhaps most prolific and well known among those scholars writing about environment-society relations in China is Vaclav Smil. Smil's work on environmental degradation in China (Smil, 1984, 1993, 1996), though empirically rich, has been largely

atheoretical and remains situated within a national development context, rather than framing environmental degradation in China as a consequence, at least partially, of China's increasing engagement with the world economic system. Smil has also written of the continuity of China's energy composition and its relation to the natural endowments of the country, arguing nearly a decade ago that it is simply a matter of time before China becomes the world's greatest emitter of greenhouse gases (Smil, 1998, 2003).

Still other scholars have written of society-environment relations in China from an environmental degradation perspective. Edmonds (1994) began with a limited definition of degradation that approximated that of early political ecology research in Africa (see next section). The problem with a land-based degradation approach, however, is that it risks neglecting processes of water resource use and degradation that are equally important. In addition, Edmonds see environmental degradation as directly related "to the ratio of population and natural resources," essentially a neo-Malthusian perspective that does not go so far as to analyze why the patterns of resource exploitation in China are as they are. In a later piece, Edmonds (1999) maintains the tight explanatory connection between population, resource consumption, and environmental degradation, yet expresses optimism based on what he sees as growing awareness and openness regarding environmental concerns in China. The hesitation with which the news of the November 2005 benzene spill in northeastern China's Songhua River was made public, especially given its importance as an international river, unfortunately suggests that such optimism must still be tempered. McCormack (2001), after a cursory but telling examination of several large water projects underway or on the drawing board in China, concludes that

the Chinese government continues to hold a modernist vision of large-scale water engineering despite the challenges faced by that paradigm in the wake of the World Commission on Dams (2000) report. The conclusion by McCormack and many others that large hydro-engineering projects are a thing of the past, however, seems now to have been decidedly premature; according to Jamal Saghir, head of the World Bank's Energy and Environment Bureau, the Bank is "back in business" with regard to dams. The key issue, he notes, is not large dams versus small dams, but good dams versus bad dams.<sup>24</sup>

The linkages between economic development and ecological change are not new, as Marks (1997) argues in his engaging study of agricultural and human settlement patterns in late imperial China (1400-1850). An environmental historian, Marks could just as well be writing as a political ecologist for his methodological creativity, attention to biophysical and sociopolitical processes, and his sensitivity to the impacts of economic and geographic marginalization of human communities on ecological systems. He tells a very compelling story that links Mongol invasions and Han in-migration, land reclamation in the Pearl River Delta, grain market development, and destruction of forest habitat, challenging the notion that "traditional" economic systems are somehow more ecologically sustainable than contemporary capitalist ones. Of particular relevance to the current study is the fact that, already in the mid-1600s, demand for rice in Guangdong (resulting from Guangzhou-area specialization in plantations for its booming silk export economy) had turned the West River area of Guangxi into a specialized export route for rice to be grown and sent to Guangzhou. As I show in Chapter Six, the current demand

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<sup>24</sup> From a speech delivered at World Water Week in Stockholm, Stockholm International Water Institute (Stockholm, Sweden), August 22, 2005.

for electric power in Guangdong plays a key role in the naturalization of the Pan Pearl River Delta (stretching all the way from Shanghai to Yunnan!) as a hinterland for Guangdong's development.

Moving to the 20<sup>th</sup> century, Shapiro (2001) assesses the environmental legacy of the Maoist period, but does so from a contemporary perspective regarding resource management that would not have applied to Mao's attempts to reshape the Chinese nation. Her chapter on Huang Wanli's opposition to the Sanmenxia on grounds that siltation would very quickly reduce the dam's hydropower generation capacity, however, is certainly relevant to the present study; several scientists have refused to endorse the Lancang, Nu, Jinsha (Yangtze), and Three Gorges projects due to similar concerns.<sup>25</sup> Finally, Economy (2004) advances a much more forward-looking view of China's environmental crises, citing the development of an environmental conscience among government leaders and NGOs as cause for guarded optimism. In China, as in other countries, there remains an important disconnect between central government rhetoric on sustainability, however, and actual implementation of policies at the central and local levels that would truly change the nature of economic development in ways that reduced, not to say reversed, patterns of environmental degradation that are considered externalities in current economics.

A small number of political ecology researchers have moved beyond describing the number and seriousness of China's environmental woes, seeking to situate those problems in a broader socio-economic and historical context. Muldavin (1996) uses a

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<sup>25</sup> For more on this, see Chapter Seven.

political ecology approach to understand changing farming patterns in northern China and link macroeconomic policies to water pollution and shortage issues. Refusing to restrict blame for resource over-exploitation to China's population size and rate of increase, Muldavin claims that since China "is simultaneously a cross between a NIC,<sup>26</sup> a Soviet-style industrialization model, an export-led growth model, an import-substitution model, and a sweat shop/subcontractor to the world's corporations" (229), it is subject to pressures on its resources that originate far from its borders. He argues that while much of the economic growth in China during the post-1978 reform period has relied upon a mining of the collective capital built up during the Maoist period, such is not necessarily the rule, as a case of re-collectivization in Heilongjiang Province demonstrates. It is difficult to tell whether this instance of re-collectivization represents a broader trend or an anomaly. Yet in light of the increasingly apparent division of wealth between haves and have-nots in China, and the sense in outlying areas that the cities are the only places getting rich, it seems plausible that such re-collectivization could indeed be happening in other areas. Similar trends have certainly occurred with small- and medium-sized state-owned industrial enterprises, many of which became the property of their workers (thus, in effect, collectively owned) following bankruptcy as they adjust to market pressures.

Thus while Muldavin's analysis equates "long-term sustainability of production" with "environment," which seems somewhat simplified, it does provide a compelling case for using a political ecological approach to uncover instances of resistance to the excesses of global capital as manifested in China. Further political ecology research in

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<sup>26</sup> Newly industrialized country.

different areas is needed in order to explore the actual forms of resistance – whether through collectivization, uprisings, increased participation in decision making, or other means – to the commodification of land, water, and other natural resources. Muldavin has since broadened his inquiry to encompass environmental policy in post-Mao China from a political economic perspective, using a case study from Henan Province, but does not provide a critical perspective on the notion of sustainability (Muldavin, 2000). This is important because of the tendency for sustainability to be co-opted by business and government (both in China and elsewhere) in ways that focus on sustaining economic growth without addressing the “externalities” of that growth. In China, the term “sustainable development” (*kechixu fazhan*) has essentially been equated with “scientific development” (*kexueguan fazhan*) in an attempt to bolster the legitimacy of investment practices and policy incentives that prioritize increasing trade, resource exploitation, and traditional industrial development.

Other political ecological studies on China include Yeh’s (2000) work on mushroom harvesting in Tibetan regions of northwestern Yunnan, in which she shows how the penetration of market forces into remote corners of Yunnan Province has led to a novel arrangements for asserting property (use) rights and resolving conflicts arising among various rights-holders. Higgitt (2000) notes the army of individuals employed in the service of erosion monitoring in China, but points out that the largely unidirectional flow of data (i.e., toward the center) hampers locally-based efforts to curtail erosion. Jiang (2004) makes the interesting argument that political ecology studies have privileged cases of conflict rather than cooperation, and to counter that she offers an analysis of

Mongol-Han cooperation that shows how “state” (i.e., Han Chinese) policies and practices as well as “local” and “traditional” ones (i.e., Mongol) both have mixed legacies of environmental degradation and improvement. Though Jiang’s assertion that Mongols (the less powerful nationality) are empowered through cooperation with the Han Chinese (the more powerful nationality) seems to paint a somewhat rosy picture of inter-ethnic relations, her mixed-methods study (from qualitative interviews to satellite imagery analysis) is impressive, and her point that political ecology studies stands to gain by not neglecting “politics of cooperation” is well taken.

Finally, several doctoral dissertations in recent years have made important contributions to understanding society-environment relations, particularly those involving water, in reform-era China from a political ecological perspective. Liu (2001) analyzes water resource management in Xinjiang’s Tarim River Basin, arguing that the transition to a market economy is colliding with uncertain property rights, ambiguities in the legal system, and institutional fragmentation to produce profound effects on the way water is managed in an extremely (and increasingly) water-scarce environment. Parts of her story resonate with my own, particularly the lack of clarity of institutional jurisdiction and its impact on water management. Like many, however, Liu stops short of problematizing the term “sustainability,” suggesting instead several means for achieving sustainability without questioning how the term is constantly deployed and reworked in economic development rhetoric within China and around the world, usually in ways that re-legitimize development patterns that are far from unsustainable. Shifting focus to urban China, Boland (2001) analyzes the privatization of urban water supply in Beijing. She

sees it as a manifestation of increasing neoliberal processes taking hold in China's socialist market economy, facilitated by rapidly changing laws and institutions regarding foreign investment. Clearly, more such studies are needed, particularly as they can help elucidate flows of resources and capital in ways that refine our understanding of society-environment relations and transcend artificial dichotomies such as rural-urban, center-local, and nature-society.

### **Civil Society/NGOs and Decision Making**

Since the beginning of the reform period following Deng Xiaoping's ascension to power in 1978, and especially since the fall of Communism in Eastern Europe and the Tiananmen Square Incident in 1989, China scholars have watched expectantly to see what form non-state social organization would take in post-Mao China (Davis, Kraus, Naughton, & Perry, 1995; Frolic, 1997; Wakeman, 1993). Yet significant questions remain about whether the concept of civil society, originally applied in a European context, is appropriate or even useful in the Chinese context (Rowe, 1993).<sup>27</sup> This is particularly true in regard to non-governmental organizations (NGOs), seen as a hallmark of civil society in that they advocate on behalf of society (or a subset thereof), operating autonomously from the state and bringing pressure for democratization. Definitional questions have proved problematic for scholarship on civil society development in China for nearly two decades. Cooper (2006, p. 115) opts for a pragmatic compromise for a

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<sup>27</sup> Rowe's article was one of several in a 1993 issue of the journal *Modern China* (19.2) that was devoted to exploring public sphere and civil society in China following the 1989 Tiananmen Square incident. Despite Rowe's discomfort with attempts to locate civil society in China, he agrees that the term is a useful analytical device for understanding contemporary China in a historical context. He, like Rankin (1993) in the same volume, argue that certain features of Chinese state-society relations during the imperial (pre-1911) period suggest that something akin to a public sphere was likely understood, based on linguistic differences between words such as *guan* (official), *gong* (public), and *si* (private).

definition of civil society that is useful for the present study: “Organized formal and informal voluntary social activity outside (but with various connections to) the state and business spheres.”

Following closely on the heels of post-Tiananmen repression of non-state-sanctioned organizations, Whiting (1991) argues that the “NGO” (her term) phenomenon in China a decade into the reform period reflected an “attempt by the state to divest itself of some of the burdens of socio-economic development without at the same time sacrificing political control” (p. 17). Advocating a corporatist approach that seeks to identify ways in which the state constrains and co-opts social organizations, Whiting then makes a useful distinction between organizations seeking political change and those seeking socio-economic change, arguing that the latter does not necessarily require autonomy on the part of the organization. While many might question to what degree political change can a priori be separated from socio-economic change, the distinction is useful nonetheless in terms of how organizations *frame* their work.

More recently, Saich (2000) notes that many organization leaders and staff in China are hesitant to refer to themselves as NGOs (*fei zhengfu zuzhi*) for fear of being branded as anti-governmental. During my research for this dissertation from 2003 to 2005, more than one organization leader expressed a similar concern. As one said, “non-governmental just doesn’t sound good in China” (*feizhengfu zai Zhongguo bu hao ting*).<sup>28</sup> By extension, and as I demonstrate later, these organizations carefully frame their missions (when they enunciate them) and work (programs and activities) in ways that

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<sup>28</sup> Interview K20031213.

echo policy priorities set forth by the party-state (G. Yang, 2005). Opposition to large dams in western Yunnan, for instance, is usually couched in terms of improving local livelihoods, ensuring sustainable development, preserving biodiversity, respecting cultures, all of which are common tropes in Chinese policy-speak.

An edited volume on civil society in China in the late 1990s (Brook & Frolic, 1997) tackled the question of whether or not the concept of civil society is appropriate for understanding changes in contemporary Chinese state-society relations. The collection combines the perspectives of China experts writing from a variety of disciplinary perspectives (political science, religious studies, education, and history), and begins with three conceptual chapters that set forth differing theoretical approaches to understanding the notion of civil society as applied to China. Brook approaches the concept by examining examples of auto-organization throughout modern Chinese history (since the Republican period). Along the way, he notes the contradictions inherent in the Communist Chinese state's sanction of mass bodies (*qunzhong tuanti*) in the 1980s, and calls for a limited degree of autonomy (*zizhi*) among those bodies. He also makes a distinction between organizations that were political and those that were organized for politics, arguing in conclusion that all organizations will inevitably "act in ways that...will be construed as political" (p. 45); the open question, of course, is how the state will respond. Frolic then assesses the applicability of several western notions of what defines civil society, concluding that the Chinese case may require something of a hybrid where the state assumes a much more proactive leadership role than has happened elsewhere; this he terms "state-led civil society," arguing that the Chinese state's creation

of “hundreds of thousands” of organizations (*shehui tuanti*, *minban*, or *minjian* groups) that are not part of the official party-state apparatus, but which still serve as vital communication links between the masses and state organs, disseminating policies downward on the one hand, focusing state attention on certain sectors on the other. As the name implies, these organizations are decidedly not instances of society *against* state.

Finally, the third conceptual chapter (Des Forges, 1997) examines three historical versions of civil societies that have appeared and persisted throughout Chinese history: *wenmin shehui*, *shimin shehui*, and *gongmin shehui*. Refusing to accept the modern European lineage of civil society as definitive, Des Forges envisions a global civil society that might draw on traditional Chinese notions of what civil and uncivil societies are, and which might reflect Confucian notions of harmony and socialist notions of justice. As justification of this historical approach, he argues that part of the failure of the 1989 Tiananmen uprising was due to Chinese intellectuals’ inability to fully grasp the backing their own history gave them, and that increased awareness of the roots of “civil societies” that are indigenous to China may help counter suspicion on the part of the Chinese state that “civil society” is a uniquely western concept.

The three conceptual chapters offer drastically different perspectives on how the notion of civil society might be useful in the Chinese context. As is often the case with edited volumes, we hope for a coherent whole, yet the cohesiveness of the individual chapters frequently fails. The four case studies presented in the second half of the Brook and Frolic volume, while interesting each in its own right, further contribute to the overall feeling that scholars – at least those contributing to this volume – have not reached a

consensus regarding how to understand the dynamics of the “spaces in-between” in China. This, in my opinion, is not necessarily a bad thing; if nothing else, it highlights the difficulty of migrating theoretical concepts from one socio-historical context to another, and forces constant reevaluation of those concepts.

Though Whiting and other researchers (Cooper, 2006; G. Yang, 2005; Xin Zhang & Baum, 2004) refer to social organizations in contemporary as NGOs for the sake of convenience and comparability, Saich (2000) opts simply for the term social organizations (*shehui tuanti*), due to their restricted autonomy vis-à-vis the state apparatus. Noting the increasing political space within which social organizations can act with relative ease and confidence in contemporary China, Saich is critical of state-dominant theories for “obscuring the dynamics of change in China and the capacity of the ‘co-opted groups’ to influence the policy-making process or to pursue the interests of their members” (p. 125). As I show in Chapter Seven, Saich’s observations coincide with my own conclusions about social organizations working on issues of environment, energy, and development in Yunnan. Indeed, the nature of the relationship between these organizations and the state can vary widely, and my research in Yunnan shows that the organizations are highly adaptable and creative in pursuing their objectives, recognizing the constraints of working within the system while at the same time realizing the consequences of going too far to change or subvert the system.

Regardless of the terminology they use, scholars in recent years have focused increasing attention on China’s social organizations and have made important contributions to the literature, primarily in terms of diverse case studies. Writing

decidedly from a non-state-centric perspective, Zhang and Baum (2004) examine an economic development association in Qinghai exclusively devoted to rural poverty alleviation (a politically palatable mission), finding a constellation of organizational characteristics they claim is characteristic of a large number of grassroots organizations devoted to local causes around China, and which have been vastly under-studied by China scholars. Yang argues for greater attention to the agency of organizational entrepreneurs who avail themselves of openings and opportunities presented by the domestic political system as well as the mass media, Internet, and international NGOs to push for changes, however modest, in policies regarding environmental issues. He also provides a very useful typology of NGOs in China to which I again refer in Chapter 7. Cooper (2006) uses data on 12 legally registered NGOs in Yunnan, Sichuan, and Guizhou and plays off of the notion of local state corporatism (Oi, 1992, 1999) to develop a framework she calls the “local state associational model.” While her argument that civil society actors seek to expand state accommodation “through securing creative legal registration and defending the space allocated by the state” (Cooper, 2006, p. 120) rings true with my own experience of energy- and environment-focused social organizations in Yunnan, there is an evident teleology which may not be warranted: “power dynamics between state and society are becoming permanently altered to accommodate more and stronger grassroots forces - parallel to the experiences in Eastern Europe and the former USSR” (pp. 129-130). The Chinese government is extremely wary of the implications of such a statement, and an internal report published by a research institute in Shanghai in January 2005 apparently warned of the role environmental NGOs in China could play in a “color revolution” of the type that has occurred in Eastern

Europe and Central Asia in recent years.<sup>29</sup> It is perhaps not surprising, then, that a new law was promulgated in March 2005 that tightened the requirements and limitations on registration for non-profit social organizations (Qiu, 2005).

Finally, one recent study (Mertha & Lowry, forthcoming) focused on the role of Chinese social organizations and the media in forcing a halt to a hydropower construction project near the 2,000-year-old irrigation project at Dujiangyan in Sichuan Province.<sup>30</sup> Briefly, the Dujiangyan irrigation works, completed in 251 B.C., divided a stretch of the Min River into two portions, one for irrigation, the other for flood control. The project has long been recognized as a symbol of advanced Chinese technological capacities at the time, and in recent years has been hailed as a model of sustainability since the system continues to function essentially as designed two millennia later. In 2001, however, the irrigation works were threatened by a hydropower project seven kilometers upstream and the potential for a second one just over one kilometer upstream. Mertha and Lowry detail the alliance between journalist Wang Jinglin, the Dujiangyan World Heritage Office, and numerous municipal offices in Dujiangyan that succeeded in having the approval for the closer of the two dams rescinded by central authorities.<sup>31</sup> Key to the success of the project's opponents was their ability to frame the discourse of the debate as one in which a two-millennia-old engineering marvel and testament to the greatness of the Chinese civilization – which continues to play a role in Sichuan's agricultural productivity – should not be sacrificed for the short-term interests of one electric power generation

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<sup>29</sup> Interview B20060129.

<sup>30</sup> The Dujiangyan works and nearby Mt. Qingcheng (celebrated as the birthplace of Daoism) were recognized as a UNESCO World Heritage site in 2000. See <http://whc.unesco.org/en/list/1001>.

<sup>31</sup> Yangliuhu is the closer of the two projects. Zipingpu, the project situated seven kilometers upstream of the Dujiangyan works, is still underway.

facility. As I show in Chapter Seven, some opponents of the Nu River hydropower cascade have made similar attempts to frame the dams as threats to cultural and biological heritage.

Two key differences, however, distinguish the Nu case from the Dujiangyan case. First, the Nu projects would be built in an area dominated by ethnic minorities, where is no comparable architectural or engineering marvel that can serve as a flag around which to rally opposition to the dams. Second, the local government in the Nujiang Prefecture is decidedly in favor of the projects, which they see as vital for raising the standard of living in an impoverished area that depends on central government subsidies for the vast majorities of its revenues. Thus even though the same type of media-NGO alliance that Mertha and Lowry describe in Dujiangyan can be found in the Nu case, the local government actors that played so important a role in the outcome of Dujiangyan will not, barring a radical turn of events, be part of a similar alliance in Nujiang Prefecture.

### ***Summary***

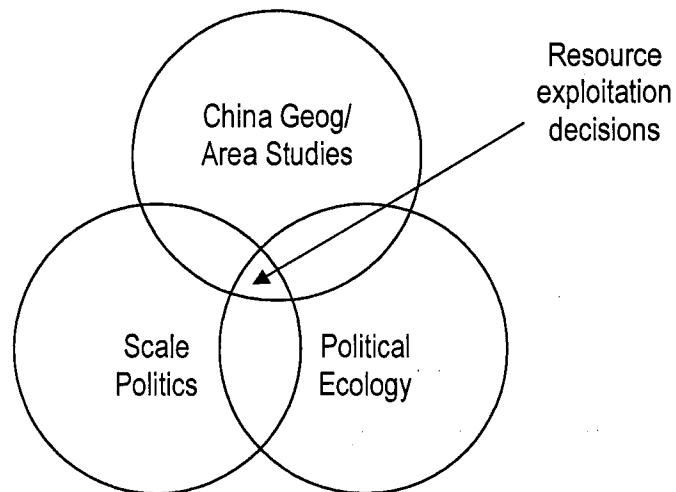
Both the China geography and area studies literature and the political ecology literature have much to contribute to the present study of hydropower development in southwestern China. Political ecology research, a rich and diverse literature, has fallen at various points on the spectrum between the political and ecological, at times focusing more on biophysical processes, at times on socioeconomic processes, and at times on the deconstruction of such dualisms in order to reinvent a social-nature that is at once the nexus of biophysical and socioeconomic processes and a plurality of cultural meanings associated with those processes. China area studies scholars, including geographers,

political scientists, historians, and anthropologists, have made vital contributions to the ways we think about today's China and its engagement with the global political and economic system. Yet China scholars have made only limited inroads into understanding decision-making processes related to natural resource use, and political ecologists – well trained to pick apart such processes and explain them in their cultural, geographic, and historical contexts – have largely steered clear of China.

There are several possible reasons for the lack of overlap in the literatures reviewed here. The first and most obvious probably has to do with the simple matter of language. Much of the data on rural areas of China, whether in statistical yearbooks, government or industry almanacs, local newspapers, or gazetteers, is published only in Chinese. In Latin American and African countries where most political ecology research has focused, this kind of information is often available in English or other western European languages. The second reason may be a skepticism, warranted or not, among Chinese scholars in particular, of the ability of classical Marxian class-based critiques to adequately explain issues such as environmental change, differential access to resources, or marginalization in China. Such skepticism might be misplaced, however, in that it overlooks many (neo-Marxian) works in contemporary political ecology that seek to explain these topics along axes such as gender and ethnicity, as shown in the previous section. Finally, the largely urban focus of geographers studying China likely reflects data availability and accessibility. From 1949 to 1976, it was virtually impossible for western scholars to conduct research in mainland China at all, let alone on sensitive issues such as hydropower development in ethnic minority regions. Following the reform

and opening period that began in 1978, access to data and officials has gradually become more open, with the exception of the few years following the Tiananmen Square incident in June 1989. Whereas now it is fairly commonplace to conduct year-long or multi-year ethnographic field research in rural China, such was not the case even a decade ago.

This study builds on the limited base of political ecological research in China and stretches the analytical and theoretical bounds of the China geography scholarship. In addition, as I show in the following chapter through the development of my analytical framework, there remains much room for productive overlap between the scale politics literature and the political ecology and China area studies literatures. This is critical, for it is my view that decision making about natural resource development in general, and large hydropower development in particular, can be best understood through the combined perspective of the three literatures (see Figure 2-1),<sup>32</sup> whether the case study in question is in China, Brazil, the United States, Russia, or anywhere else for that matter.



**Figure 2-1: Venn diagram showing gaps in literature**

<sup>32</sup> Discussion of the scale politics literature is left for Chapter Three.

As I show in the next chapter, a critical political ecology approach refined according to the particular demands of this study proves useful for understanding the complex political economic and biophysical flows and processes related to the Yunnan hydroelectric projects. Specifically, this approach allows three different vantage points for understanding the Yunnan dams in the broader geographic, political, and socioeconomic context. The first, a top-down view, emphasizes the role of central government bodies such as the State Development and Reform Commission and the Ministry of Water Resources, national planning policies such as the Western Development campaign, central subsidies, and in general a ‘traditional’ model of dam building as a central state-led effort. The second, what might be called a provincial or local approach, emphasizes interprovincial linkages, the role of development organizations such as the Asian Development Bank, and Yunnan’s opening to mainland Southeast Asia. The third revolves around the ongoing privatization of China’s state-owned enterprises (SOEs) and the shifts in decision-making authority from governmental authorities to managers in recently restructured (corporatized) enterprises where, despite calls for “separation of politics and enterprise” (*zhengqi fenkai*) the managers and the party authorities are frequently still the same individuals. My perspective on questions of hydropower development and decision making processes from all three vantage points is informed and guided by the central tenets of political ecological analysis I outlined above. These are, most importantly, attention to marginality, including differential access to resources and decision processes; acceptance of plurality in knowledge, explanation, and causality; recognition of a politicized environment; and a particular attentiveness to the relations of production that revolve around Yunnan hydropower development.

## Chapter Three: Powersheds as an Analytical Framework

[The] transformation of nature is embedded in a series of social, political, cultural, and economic constellations and procedures (i.e., social relations) that operate within a nested articulation of significant, but intrinsically unstable, geographical scales (Swyngedouw, 2001, p. 130).

### *Introduction*

The above quote by Erik Swyngedouw, a noted geographer and scale theorist, encapsulates the way in which sociopolitical (and, I would argue, ecological processes) and scalar constructs are interlinked. Indeed, questions of environment and natural resources exploitation, management, and protection frequently transgress the boundaries upon which state sovereignty and the international political system are based (Bryant & Bailey, 1997; Dupont, 2001) and challenge analytic dichotomies such as urban/rural, local/global, and nature/society. This is especially true in cases of water resources management on transboundary rivers (Fox, 2000; He, 2004). In this chapter I develop an analytical framework called a powershed, informed by a critical political ecology perspective, to examine institutional dynamics and decision-making processes regarding hydroelectric development in China. As I explained in the introduction, one of the primary motivations for this project is to understand and explain flows of water, electricity, capital, and influence linking hydroelectric dams in rural Yunnan to urban industrial centers elsewhere in China and in neighboring countries. The case studies at hand require an understanding of both the biophysical processes involved in the production of electrical energy as well as the political economic processes central to the production of risk, profit, new energy geographies, and new regimes of capital

accumulation. Consequently, the framework used to analyze such linkages must be sufficiently flexible to encompass such a broad range of processes and actors.

This chapter in part continues the literature review begun in Chapter Two, focusing on the intersection of the scale politics and political ecology literatures in order to provide a rationale for my analytical framework. A recent article by Brown and Purcell (2005) critiqued what they perceive as political ecologists' failure, especially since the mid-1990s, to critically engage the geographic politics of scale literature, and to instead fall into a "scalar trap" in which policies, institutions, and actions at the local scale are perceived by default as more "emancipatory and environmentally sensitive" (p. 620) than those originating at other scales. While I agree with the authors' assertion that there remains much room for mutual theoretical reinforcement between the scale politics and political ecology literatures, their limitation of political ecology to a field that "examines the relationships among humans and between humans and the physical environment in the context of development in the global South" (p. 608) ignores recent work that broadens the geographic range of political ecological inquiry to the global North (Carney, 2003; Robbins & Sharp, 2003; Walker, 2003). It is also surprising that Brown and Purcell fail to examine several recent works that explicitly attempt to problematize geographic scalar constructs as politically powerful, socially constructed, and contestable (Bassett & Zuéli, 2003; McCusker & Weiner, 2003; Neumann, 2003; Peet & Watts, 1996b; Rangan, 1996; Zimmerer, 2003).<sup>33</sup> In this study I endeavor to strengthen the theoretical linkage between the political ecology and scale politics literatures in order to draw on the

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<sup>33</sup> One reason Brown and Purcell may not have considered these authors is that their 2005 publication was originally submitted in November 2003.

strengths of both in my analysis of hydropower development in China. I also build on the work of numerous scholars (Castells, 1996; Lefebvre, 1990; Marston, 2000; Marston & Smith, 2001; Smith, 1984; Swyngedouw, 2001) by providing an example of an analytical scale that is process-defined and useful for studying environment-society interactions related to large-scale<sup>34</sup> hydropower development. My point is to underscore the insights gained when one considers scale as socio-ecological process rather than box, recognizing that it is not so much the size or shape of the scalar construct under consideration that matters, but the agenda and motivations of the individual or institution demarcating and deploying that construct.

The process-based approach to political ecology research I outline below begins by analyzing various processes inherent to hydropower development in China in order to uncover the way scalar constructions are part and parcel of political projects, not merely containers in which political acts take place (Swyngedouw, 2001). This approach seeks to distinguish scale as an analytical framework from a priori scalar constructs like urban areas, provinces and nation-states that are presumed to be ontologically stable, but which are in fact socially constructed, historically contingent, and contestable (Smith, 2001). I illustrate the utility of this approach through the construction of my analytical framework, a powershed, which I then use in the remainder of this dissertation to analyze the

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<sup>34</sup> “Large-scale” here refers both to the size of the individual dams and the extent of the hydropower “cascade” envisioned for the Lancang (upper Mekong). The World Commission on Dams and the International Commission on Large Dams considers dams whose height is over 15 m from the foundation as large. The WCD adopts existing standards classifying as “major” those dams whose height is over major 150 m, volume is over 15 million cubic meters, reservoir volume is over 25 billion cubic meters, or installed capacity is over 1,000 MW (World Commission on Dams, 2000, p. 346). In China, dams with an installed power generation capacity greater than 250 MW are generally classified as large. By these classifications, five of the eight Lancang projects and nine of the thirteen Nu projects discussed in Chapters Four and Five, respectively, qualify as major. Likewise, two of the Lancang projects and three of the Nu projects qualify merely as large.

decision-making processes through which large-scale hydropower projects on the Lancang and Nu rivers, two transboundary rivers in southwestern China, have proceeded (or are proceeding) from blueprint to barrage. After demonstrating the inadequacy of traditional scalar frameworks for capturing the sociopolitical and biophysical processes most important in influencing human-environment interactions vis-à-vis large dam construction in modern-day China, I argue that those processes may instead be usefully thought of as occurring within the powershed of certain urban and industrial areas (most importantly, Guangdong Province).

The politics of scale literature, largely a product of geographers writing in a radical political economy tradition, argues that scale is not an a priori, ontologically fixed entity, but rather a social construct that is dynamic, politicized, and relational, and which can in any given context simultaneously exhibit characteristics of fluidity and fixity. Numerous geographers have argued that space, and by extension scalar concepts representative of geographical spaces, should be considered in a dynamic, processual, and socially produced sense (Castells, 1996; Lefebvre, 1990; Smith, 1984; Swyngedouw, 2001). The now-familiar debate between Marston and Smith (Marston, 2000; Marston & Smith, 2001) and Brenner (2001) had as its focus the question of whether or not the household, as the locus of the processes of social reproduction (as opposed to social production), constituted a valid scale of analysis, or merely risked, as Brenner argued, a blunting of the analytical edge of geographic scale through inadvertent conflation with other geographic notions such as space and place. Escobar highlighted the processes by which capital develops a “conservationist tendency,” whereby “nature is reinvented as

environment so that capital, not nature and culture, may be sustained” (Escobar, 1996, pp. 47-49). Gandy (2002), stepping out of the developing world mold that is the usual domain of political ecology research, examines how political economic processes shaped the urban “nature” of New York City. These are just a few examples of process-driven analyses in which scale emanates from process instead of simply bounding it. Most of the work on the production of space and scale has dealt specifically with how these processes are fundamental to capitalist society and a necessary component of capitalism’s expansionist tendencies. As a result, some might question the appropriateness of applying the concepts of scale and scale politics to China, an ostensibly non-capitalist society. I argue, however, that there are enough parallels between the so-called “socialist market economy with Chinese characteristics” of today’s China and capitalist market systems elsewhere in the world – to say nothing of China’s economic relations with those systems – as to invalidate such criticism. As I show below, the production of scalar configurations by a number of actors and groups plays a central role in promoting and resisting hydropower development in western Yunnan.

It is clear, then, that geographers have long recognized the importance of processes in delineating and deploying scalar constructs. Likewise, geographers writing in a political ecology tradition also recognize that the understanding of political economic and biophysical processes alike is as fundamental to political ecological inquiry as the framing of the scales at which those processes occur. Yet rarely do they actually succeed in letting process actually *define* their methodological/analytical scale. It is precisely this

which I do here.<sup>35</sup> In the following section, I briefly critique several important contributions to the political ecology in the past few years. I have already touched upon some of these in the previous chapter, but here I am focusing specifically on their treatment of and/or use of the notion of geographic scale. I then turn to an examination of several processes surrounding large-scale<sup>36</sup> hydropower development in southwestern China's Yunnan Province. By examining the discursive constructs employed in processes such as planning, finance, construction, implementation, and resistance to frame issues deemed relevant within certain scalar configurations, I demonstrate the strengths of a process-centered approach that at once encapsulates both biophysical and political economic processes shaping human-environment interactions.<sup>37</sup> Finally, after mapping a series of competing and complementary discourses related to Yunnan's large-scale hydropower development, along with the scalar constructs employed in each, I outline the concept of a powershed as an analytical framework that acknowledges the utility of regional-scale approaches to understanding society-environment interactions (Walker, 2003) while insisting on a lack of fixity for any particular region. This framework is useful in this particular context and also holds promise for inquiries centered on development projects other than large-scale hydropower.

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<sup>35</sup> I am grateful to David Bachman for reminding me that there is not necessarily anything that makes "process" or "processes" any more ontologically stable than scale. My point is simply that a certain degree of fixity or rigidity is frequently assumed about scalar constructs such as regions, nation-states, and urban areas. It is this fixity I wish to challenge by arguing that such constructs can also be understood as products of socio-ecological processes and that they are, therefore, dynamic and changing rather than fixed.

<sup>36</sup> As I noted above, my use of "large-scale" in reference to hydropower projects carries certain specific meanings regarding the size of individual dams and the extent of the cascade developments proposed. It is an unfortunate fact of the English language, and a reminder of one reason why the notion of scale is so problematic for geographers, that the same term is used in these two contexts.

<sup>37</sup> I am grateful to my friend and colleague Gregory Simon at the University of Washington for many a fruitful discussion on the linkages between process and scale, in particular on the idea of "process ecology" as a way of characterizing a process-based approach to political ecological inquiry.

***Limits to political ecological scale***

In the introduction to their edited volume on geographic political ecology, Zimmerer and Bassett (2003, p. 1) set forth “strengthening one of the analytical cores of political ecology by arguing for a more creative consideration of geographic scale” as one of the goals of the collection. They point out that early conceptions of scale in political ecology work tended to treat scale as ontologically fixed and hierarchical, resulting in “a conceptualization of scale as a series of pre-given sociospatial containers such as rural-urban, local, regional, national, and international” (p. 2). They then highlight important work done by geographers that moves beyond such a static and stable conceptualization of scale, and towards a view that recognizes the socially constructed nature of scale and the importance of understanding the political economic factors that motivate certain actors (e.g., individuals, groups, governments) to frame certain projects (e.g., development projects, mitigation efforts) at certain scales.

Despite this promising initial engagement with the politics of scale literature, only a few of the twelve substantive chapters in the collection actually treat geographic scale as an object of inquiry in and of itself. It is unclear why this is so; perhaps the individual authors felt compelled by political ecology’s long tradition of detailed micro-scale case studies, and therefore opted to focus on that scale for their analysis without interrogating the very construct “micro-scale” itself. This does not mean, however, that they necessarily fall into the “scalar trap” posited by Brown and Purcell, for the decision to focus on micro-scalar analysis does not constitute an assertion of the value of that particular analytical scale over another, but rather a methodological choice. The case studies are all rich in detail and often evince the authors’ sometimes surprising (and

refreshing) understanding of biogeophysical and sociopolitical contexts and processes. Still, only the chapters on the scale dependence of political ecological integration with geospatial technologies (McCusker & Weiner, 2003) and on the scalar politics of World Bank intervention in grassland management in Côte d'Ivoire (Bassett & Zuéli, 2003) treat scale as an object of inquiry per se. In the former, the authors underscore the scale-dependence of integrating political ecology with geospatial technologies, warning that social and ecological processes can become disjointed through the aggregation and scaling-up of various geospatial images. The latter, more directly relevant to my own study, points out how "truths" about environmental change vary depending on the scale at which they are constructed. As I show later in this chapter, a host of actors and institutions have sought to manufacture various truths about large hydropower development on the Lancang and Nu Rivers in Yunnan. Each of those truth narratives is explicitly framed at particular geographic scales, ranging from the more common scalar referents like the prefecture, province, and watershed to more obviously manufactured ones such as the Pan Pearl River Delta and the Greater Mekong Subregion.

A series of other works in geographic journals has sought to theorize nature-society relationships, but has not made scale a central component of the theorizations. Castree (2002) classifies environment-society writing into two categories, "problem-solving" and "critical," but does not find themes in the way either group treats the question of scale. In a similar review a year later, he argues that "relational politics" might be the best way to understand nature-society relations, accepting nonetheless the limits of constructivist narratives (Castree, 2003). While he still does not address scale

explicitly, the theme of relationality is widely accepted with respect to scalar politics, and is evidence of the importance of sociopolitical processes in political ecology. Blaikie and Muldavin (Blaikie & Muldavin, 2004), the latter one of the few political ecologists writing about China, tell of the limited impact poststructural awareness of positivist science has had on policy-making in China and India. Their analysis, though, is clearly framed at the nation-state scale, justifiably since they are interrogating national policies regarding transnational environmental change.

Geographers of China have made important contributions to our understanding of contemporary China, yet have generally approached the scale politics issue from a slightly different angle than other geographers. For the most part, China geographers have tended to focus on urban issues. Where scholars have addressed geographic scale<sup>38</sup> explicitly, they have adapted the notion to fit what some refer to as China's "spatial administrative hierarchy." Certain aspects of spatial administration practiced by the contemporary Chinese state, for instance, present particular challenges to the application of scale theory to China, while also providing a unique opportunity to extend theorizations of scale in ways that are useful in the Chinese case. Laurence Ma (2002) notes how changes in the administrative status and rank of Chinese urban areas, and in the various means by which rural areas are incorporated and reclassified into urban areas, is a "rather peculiar development" (p. 1560) that has widely reorganized China's territorial administration and merits further research to understand the impacts on fiscal, administrative, and spatial relationships between "urban" and "rural" China. Ma

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<sup>38</sup> That is, scalar constructs that are fungible, socially constructed, and replete with political economic meaning.

underscores the role of the Chinese state in China's economic development, especially in the form of "hidden or disguised bureaucratic capital" (p. 1562), and argues that, as a result, geographers of China should seek ways of theorizing scale in a way that recognizes China's unique political economy, while not ignoring opportunities to make non-country-specific generalizations where appropriate. In a conference presentation, Chan and Tsui argued that, in addition to simply reorganizing territorial administration, China's spatial administrative hierarchy represents an important redistributive mechanism with real and tangible fiscal implications for local governments (Chan & Tsui, 2003). My own research shows how certain scalar configurations – namely, river basins – that are not normally considered part of the spatial administrative hierarchy have important implications for the relationship between centrally-governed power generation corporations and local governments at the provincial level and below. The lack of congruence between the scale at which hydroelectricity development is framed by power generation corporations and basin commissions (i.e., river basins), and the scale at which other administrative and fiscal decisions are based (i.e., provinces, prefectures, townships) means that a multi-scalar approach is vital to understanding decision-making processes and their outcomes.

Ma (2005) elaborates on his thesis that China's restructuring of spatial administration has as a major goal the notion that cities and "city-regions" should play leading roles in China's economic development. Here, he argues that the administrative rank of territorial units in China must be included in any China-specific theorization of scale. Due to the rigidity of China's administrative hierarchy, the rank assigned to an

institution or individual plays a significant role in determining the negotiating power of that institution or individual vis-à-vis others.<sup>39</sup> Ma's point is relevant to my study of hydropower in Yunnan, not only because Yunnan as a province enjoys the same administrative rank (*xingzheng jibie*) as central ministries, but also because the same is true of the hydropower development corporations that were once part of a central ministry.<sup>40</sup> In addition, my own findings on the importance of Guangzhou-area industrial and economic development in driving hydropower exploitation hundreds of kilometers away in rural Yunnan echo Ma's point that Chinese cities are "the spatial foci for the development of China's regional economy" (p. 485). I take that argument one step further, however, by showing how such long-distance electric power linkages stretch our understanding of what constitutes "rural" and "urban," arguing that electric power generation nodes and distribution links underscore to what extent rural and urban must be understood in a relational, co-constitutive manner.

Cartier (2005), too, discusses the Chinese state's periodic restructuring of administrative jurisdictions to accomplish certain political economic goals. This perspective is essentially the same as that embraced in the scale politics literature, with the key difference being that the Chinese state is the primary actor responsible for creating and deploying different scalar constructs, rather than a multiplicity of actors (e.g. development organizations, multinational corporations, states) commonly implicated in the wider scale politics literature. Given the amount of policy discourse in China centered on regional disparities, urbanization, rural-urban migrations, and other fundamentally

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<sup>39</sup> Lieberthal and Oksenberg (1986, pp. 123-129) also note the importance of rank for bureaucracies, corporations, and individuals, including non-Chinese entities.

<sup>40</sup> I say more about this in Chapter Seven in my discussion of decision processes.

geographic problems, there remain numerous opportunities for geographers interested in scale as a socially (or state-) constructed political tool to begin to pick apart the scalar constructions associated with various policies and development objectives.

Disciplinary nail-biting over scale is likely due in part to persistent confusion about the difference (and overlap) among various meanings of the word itself. This is evident in much geographic literature where scale and level are conflated. The problem is compounded by our need to speak of scale as both an analytic device and an analytical object: the former a socially constructed (by the researcher) means of bounding a problem for analysis; the latter a socially constructed, context-dependent political tool that enables actors, in framing certain issues or problems as occurring “at” or “within” a certain scale, to legitimize or de-legitimize certain discourses, actions, and interventions. I explore below a variety of scalar constructs created and employed by different actors involved in large-scale hydropower construction in Yunnan. By “involved in” I mean as participants in the processes related to hydropower development, including (though not limited to) planning, finance, construction, and resistance. Based on the results of my analysis, and particularly of how each scalar construct is put to political use by those who employ it, I then take part in the exercise myself by suggesting a scalar framework useful for conceptualizing and analyzing the processes that define hydropower development in this case. That framework, which I call a powershed, captures both the biogeophysical processes that make Yunnan hydropower such an attractive energy option for industrial areas hundreds of kilometers away, and the political economic ones that shape and constrain efforts to implement or resist such development.

*The scales of (hydro)power and the power of scales*

Hydropower development in China has drawn increasing attention over the past decade due primarily to the construction of the world's largest hydroelectric dam, the Three Gorges Project, on the Yangtze River (Edmonds, 1992, 1993, 1994; Jian, 2003; Pearce, 1995; She, 1991; Yin, 1996). More recently, popular media and scholars have turned to another series of contentious projects underway in southwestern China's Yunnan Province. There, ambitious plans to construct dozens of hydropower dams in a province that holds nearly a quarter of China's total hydropower have come under fire from communities and countries downstream from the dams, international and domestic social organizations,<sup>41</sup> and academics. More than 20 of the projects, a handful of which are built or are under construction, are slated for two transnational rivers, the Lancang (upper Mekong) and Nu (upper Salween) (Magee, 2006b). Others, no less contentious, are scheduled for the upper stretches of the Yangtze, called the Jinsha in Yunnan, near the famous Tiger Leaping Gorge; work has already begun on two that will purportedly provide important enhancements to the functioning of the Three Gorges Project downstream, in addition to generating large amounts of electricity their own ("Four more units planned," 2005; L. Li, 2005; P. Zhang, 2003). Put simply, the debate is over whether or not to take advantage of steep terrain and fast-flowing rivers to produce vast amounts of electricity, the bulk of which will be shipped to load centers hundreds of

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<sup>41</sup> I use the term social organizations here to include non-governmental organizations (NGOs) outside China, as well as their analogs in China. All social organizations in China are required to have a government *danwei* (unit or office) as their sponsor, and recent changes in laws regarding social organizations have tightened restrictions on the kinds of organizations that can legally register (Qiu, 2005). These organizations in China are often referred to as quasi-NGOs by scholars outside China, or simply as *minjian zuzhi* (civil-society organizations) within China. Interestingly, the authors of one recent article (Xin Zhang & Baum, 2004) chose to refer to such organizations as "people's NGOs," out of concern that the normative connotations of "civil society" are too strong. I would argue that the "non" of non-governmental organization (NGO) is equally strong, however, and therefore opt for the term "social organizations."

kilometers away from the dam sites. Table 3-1 lists the major rivers of Yunnan and estimates of the hydropower potential on each.<sup>42</sup>

**Table 3-1: Hydroelectric potential on western Yunnan's rivers**

Watershed	Hydropower Potential		Exploitable Hydropower Resources	
	Theoretical Potential (MW)	Theoretical Generation (TWh/year)	Exploitable Potential (MW)	Exploitable Generation (TWh/year)
Jinsha 金沙 (Yangtze)	40,282.5	352.87	35,435.3	195.491
Nanpan 南盘 (Xijiang/Zhujiang)	4,246.5	37.2	1,870.2	9.283
Hong/Yuan 红/沅 (Red)	9,800	85.85	3,575.1	20.124
Lancang 澜沧 (Mekong)	25,500.9	223.39	19,686.0	106.33
Nu 怒 (Salween)	19,740.1	172.92	10,306.3	61.505
伊洛瓦迪 Irawaddy	4,102	35.93	295.0	1.72
Provincial Total	103,672	908.16	71,167.9	394.453

Source: Magee (2006b).

Proponents of the dams in China claim they are necessary for maintaining China's continued high levels of economic growth, and are a key component of both "scientific" and "sustainable" development as framed by development planners, policy makers, and some academics (Q. Cheng, 2004; Yaohua He & Jianming Feng, 2004; "He Youxiu: 'yi daziran wei ben'," 2005; "Sheng Zhengxie weiyuan," 2004; R. Zhang, 2005).<sup>43</sup>

<sup>42</sup> The Dulong (D'rung), or upper Irrawaddy, is the westernmost transboundary river in Yunnan, and anecdotal evidence suggests planning is already underway for one or more hydropower stations there. As no reliable information on concrete plans is available at the time of writing, however, I have omitted the Dulong River from this study.

<sup>43</sup> The slogans of sustainable (*ke chixu de*) and scientific (*kexue guan de*) have become so common in developmentalist propaganda and academic research in China as to basically lose meaning. "Sustainable"

Opponents, for the most part, fear that the projects will line the pockets of hydropower company executives, many of whom have close ties to party-state officials; while drowning valuable farmland in areas where there is little available and threatening biological and cultural diversity and providing few (mostly temporary) alternative livelihood opportunities. One hydropower company executive openly agreed that the primary beneficiaries of the projects will be the hydropower companies themselves. The official hastened to add, though, that such large projects are in fact not simply projects of the companies, but projects of national significance, and therefore of national benefit (*liyi*).<sup>44</sup> Opponents in downstream countries, raise different concerns, questioning what impact flow regulation caused by the dams will have on downstream fisheries and agriculture that are dependent on seasonal flooding cycles. The official Chinese central government position from the start has been that the dams will benefit all countries, not just China, by providing cheap and clean electricity, improving navigation (through providing more regulated flows season to season), and minimizing harmful flooding.

In order to understand scalar politics<sup>45</sup> related to large hydropower development in Yunnan, it is first necessary to understand the sociocultural and ecological context of the province. Though I go into more detail in Chapters Four and Five, some basic information is useful here. Yunnan Province is slightly larger than Germany at 394,000

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development has been a slogan throughout the 10<sup>th</sup> Five Year Plan (2001-2005), and “scientific” development has become more prevalent leading up to the 11<sup>th</sup> Five Year Plan (2006-2010). The two are frequently conflated; it is assumed in much Chinese government and academic writing, in fact, that one implies the other. Proponents of large-scale hydropower argue that it is both sustainable and scientific, while opponents argue that it is neither.

<sup>44</sup> Interview K20050814. This executive, like many of his peers, also holds the position of party committee secretary in the company.

<sup>45</sup> Recalling the definition at the bottom of p. 85, scalar politics refers to the ways in which scalar constructs are not a priori, ontologically fixed entities, but rather social constructs that are dynamic, politicized, and relational, contested, and fluid.

square kilometers, and half as populous at some 44 million (University of Michigan & National Bureau of Statistics, 2006).<sup>46</sup> Of the total area, some 84% is covered by mountains and another 10% by plateaus (Statistical Bureau of Yunnan Province, 2002, Chart 1-6). Yunnan is also home to 26 of China's recognized 55 ethnic minorities (Statistical Bureau of Yunnan Province, 2002, Chart 4-3), and by many indices is one of the poorest of China's 31 province-level administrative areas. Many of the counties and prefectures where per capita income is lowest are also those where ethnic minorities represent the majority of the local population. These are also areas where rugged terrain, minimal (or oft disrupted) transportation and communication lines, and frequent geophysical hazards such as landslides and earthquakes further restrict residents' ability to participate in China's so-called socialist market economy with Chinese characteristics.

Yet even while constraining some communities, many argue that those same physical geographic characteristics stand to make Yunnan Province as a whole a key player in China's economic development as a nation-state over the coming decade. The terrain in Yunnan slopes from Himalayan peaks of more than 5,000 m in the northwestern reaches of the province (where the two rivers under consideration here first enter Yunnan) to several hundred meters where the rivers leave the province (and China). This drop creates tremendous potential for generating electricity, which for hydropower is based on the concept of hydraulic head, or the distance water falls over which its potential energy can be converted to kinetic energy (and subsequently electricity) by spinning turbines. As I show later in this chapter, proponents of large-scale hydropower

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<sup>46</sup> This figure is cited in the macroeconomic statistics section as of year-end 2005.

in Yunnan variously frame the province as an engine, powerhouse, military base, or even aircraft carrier supporting local, provincial, national, and regional development, and those very scalar constructions each serves in its own way to help legitimate plans for development. At the same time, resistance and opposition to the projects relies on another set of justifications, of which scale is a key component. It is these collisions (and overlaps) of socially constructed scales, and the political agendas of various groups backing each, that I wish to explore here.

Large-scale hydropower development in Yunnan and elsewhere in China is carried out by six mega-corporations (holding companies) that have very close ties to the Chinese central government. In late 1997, the first step in reforming the electric power industry was taken when the State Council (China's highest administrative decision-making body<sup>47</sup>) ruled that the Ministry of Electric Power should be restructured as the State Power Corporation of China (SPCC) as of January 1998. This was to be the first step in transitioning the industry from a planned economy to a more market-oriented economy; SPCC would still be a state-owned enterprise (SOE), but not a ministry. Nearly five years later, the next step in power industry reforms came when the State Council ordered SPCC to be broken into five mega-corporations, with each given basin-wide development rights over China's seven major river basins. The sixth, Three Gorges Project Corporation,<sup>48</sup> had already been established by the State Council in 1992 to build the Three Gorges Dam and develop other Yangtze basin hydropower resources. Each of

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<sup>47</sup> The standing committee of the Politburo of the Communist Party of China is the highest overall decision-making body.

<sup>48</sup> The full name of the company is the China Yangtze River Three Gorges Project Development Corporation. It is also frequently referred to as the China Three Gorges Project Corporation.

the five corporations resulting from the break-up of SPCC was reorganized, at least on paper, as stock a company (*gufen gongsi*), ostensibly further proof of a move toward market economy practices and standards that was no doubt at least partially influenced by China's pending admission into the World Trade Organization in December 2001.<sup>49</sup> The caveat was that a majority of the shares of these companies were earmarked as non-tradable shares, meaning they were owned by the central government.<sup>50</sup> Specifically, they remained under the control of the State Assets Supervision and Administration Commission (SASAC), which answers directly to the State Council.<sup>51</sup> Thus while a fraction of the shares of these companies appeared on international trading bourses in Hong Kong, New York, and Shanghai, the majority remain under the control of SASAC, making the corporations in many ways similar to their former incarnations as SOEs.<sup>52</sup>

Table 3-2 shows some of the principal discourses swirling around large-scale hydropower development in western Yunnan, along with the scalar constructs, proponents, and tactics associated with each. The table is not meant to be exhaustive, nor am I arguing that the organizations and institutions promoting certain discourses, scalar constructs, and development strategies necessarily speak with one voice. It is important to note that in some cases, groups whose goals are diametrically opposed may employ

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<sup>49</sup> China's accession was officially approved by the WTO on November 10, 2001, and took up formal membership on December 11, 2001. See [http://www.wto.org/English/thewto\\_e/countries\\_e/china\\_e.htm](http://www.wto.org/English/thewto_e/countries_e/china_e.htm).

<sup>50</sup> This is true of all SOEs that were similarly restructured.

<sup>51</sup> The Chinese government has declared at several points its desire to move forward with converting all non-tradable (state-owned) shares to tradable ones, to be sold on securities markets in Hong Kong, Shanghai, and elsewhere. This has caused concern among investors over a flood of low-value stocks, and has probably played a role in China's stock markets' less than stellar performance over recent years. A recent news article from Shenzhen, one of southern China's economic powerhouse cities, claims that all non-tradable shares will be converted by the end of 2006 ("Firms must float," 2005).

<sup>52</sup> More detailed information on the restructuring of China's hydropower industry since the mid-1990s can be found in Xu (2002b), Yeh and Lewis (2004), and Magee (2006b), and in Chapters Four, Five, and Seven of this study.

precisely the same scalar constructs in their arguments, just as groups with common aims may use different scalar logics to justify their perspectives. This matrix of discourses, scalar constructs, and strategies is obviously quite simplified, but nevertheless captures the diversity of scalar imaginaries deployed to support (or resist) various agendas.

Table 3-2: Principal discourses and scalar constructs surrounding Yunnan hydro

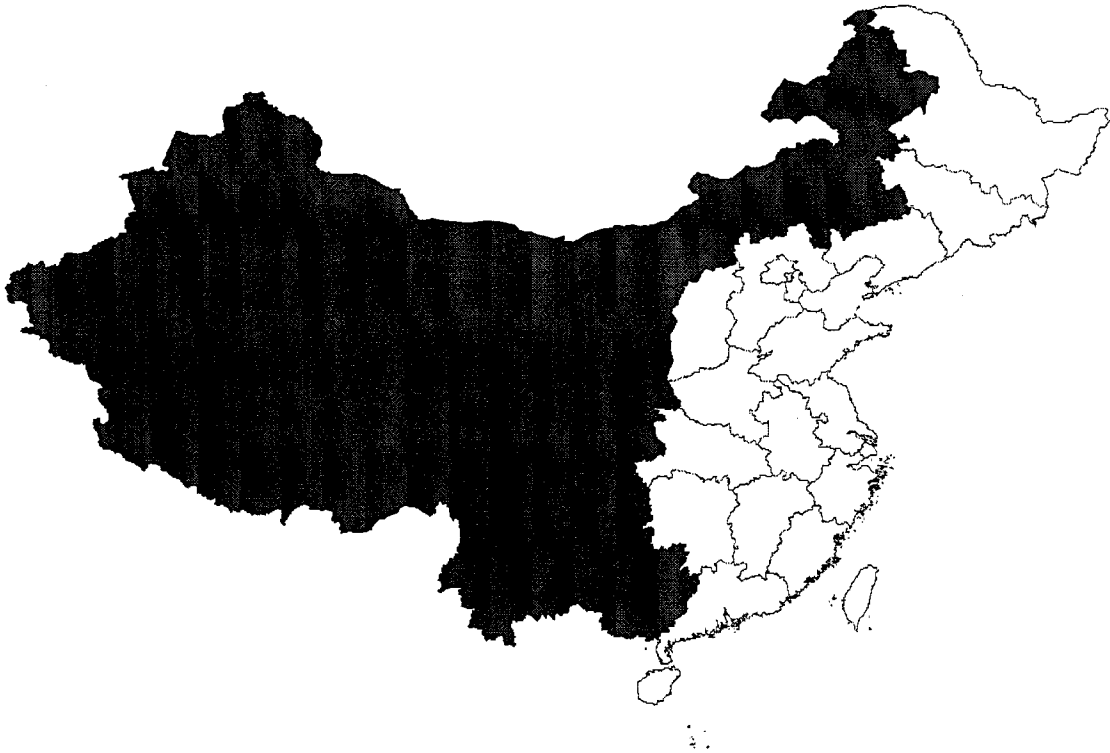
Discourse	Scalar Construct(s)	Proponents	Strategies/Arguments
Poverty alleviation	West China Rural Yunnan	HDC PCG	Dam construction & operation (taxes & revenue)
	West China Rural Yunnan	NGO CSO	Alternative employment (e.g. ecotourism)
Economic security	China (national state)	NDRC	Sustaining growth; reducing need for energy imports
	Yunnan (provincial state)	NDRC	Sustaining economic growth; reducing need for energy imports
Regional cooperation	Greater Mekong Subregion	ADB NDRC YDRC EGAT	Using Yunnan's comparative advantage in energy; promoting trade through infrastructure development
Livelihood security	Watershed Rural Yunnan West China	CSO NGO	Costs and benefits of large dams are geographically uneven
Environmental protection and/or biodiversity	Watershed Yunnan	HDC NDRC YDRC	Hydropower is clean and sustainable energy source
	Watershed Yunnan Protected Areas	NGO CSO	Dams and reservoirs reduce or alter habitat, threatening protected areas and species
Cultural preservation	Rural Yunnan Watershed	CSO NGO	Dam-led modernization threatens traditional ways
Scientific development	Yunnan (provincial state) China (national state)	NDRC CAS CASS	Science should be used to "harmonize" economic environment and development
Sustainable development	Yunnan (provincial state) China (national state) West China Rural Yunnan	NDRC	Sustaining economic growth should be primary focus, environmental protection can be done simultaneously

Abbreviations: ADB=Asian Development Bank; CAS=Chinese Academy of Sciences; CASS=Chinese Academy of Social Sciences; CSO=civil society organizations (Chinese); EGAT=Energy Generating Authority of Thailand; HDC=Hydropower development companies; NDRC=(Chinese) National Development & Reform Commission, formerly the State Development & Planning Commission; NGO=non-governmental organizations (non-Chinese); PCG=Prefectural and/or county government YDRC=Yunnan Development & Reform Commission.

### China's "West" and the Poverty of Plenty

The shaded part of Map 3-1 shows the area commonly referred to as China's "West" (*xibu*) in official documents, academic literature, and popular media. The differences between China's coastal, densely populated, economically advanced, internationally linked, and relatively cosmopolitan "east" and the its inland, less densely

populated, economically “backward,” isolated, and culturally inferior west in many ways parallel the differences between the eastern and western United States. China’s “West” is home to most of China’s minorities, and the source of most of China’s “floating population” of migrant workers leaving the farms and heading to the cities in



**Map 3-1: China's West**

southeastern China’s economic powerhouses. The provinces and autonomous regions grouped in China’s west suffer from much higher rates of poverty and lower per capita incomes. Following its initial proclamation in 1999, the Great Western Development (*xibu da kaifa*) campaign became the centerpiece of the 10<sup>th</sup> Five-Year Plan (2001-2005). One principal component of the campaign was to increase resource extraction efforts in the west, including oil, natural gas, electricity (in the form of hydropower), and even

tobacco and vegetables, for shipment eastward. Proponents of the plan argued that China's west should make use of its abundant natural resources in order to improve its shaky economic situation.

The use of western resources to fuel eastern development did not begin with the Western Development campaign. In 1986, a very influential book was published by two researchers at an economic think-tank in Beijing. The book, later translated into English as *The Poverty of Plenty* (X. Wang & Bai, 1991), was lauded by Chinese policy makers and scholars alike, and the English translation was well received among scholars outside China. The authors' thesis was that central government subsidies to poor provinces in China's west had led to dependence on subsidies that further exacerbated impoverished conditions in an area that should rather be rich from its natural resource endowments. A corollary throughout the book was that the "poor quality of human resources" in western China was a major factor in the region's inability to perform economically. Solutions proposed by the authors include targeted subsidies in areas such as transportation, education, communications, science, and health care, which presumably would help increase the level of education and training of "human resources" (i.e., work force). Several other recommendations such as bringing Han Chinese managers into the western regions to modernize business practices, encouraging Han nationalism among non-Han ethnic groups, and encouraging religious "reform" away from "superstitious" minority religions, perhaps inadvertently, seem to equate backwardness with non-Han ethnicity. This tendency continues to surface in contemporary scholarship two decades later. An edited volume produced from a conference in Victoria, Canada in 2003 on China's

western development campaign contained several chapters in which the authors noted the “backwardness” and “low quality” of people in China’s western regions (D. Lu & Neilson, 2004). Such language can give the impression, even if unintended, that progress – and more importantly, the potential to achieve it – is directly correlated with the embrace of Han leadership, cultural habits, and even ethnicity.

Deployment of the notion of “west” in China related to Yunnan hydropower development exhibits the same patterns as earlier uses, and in the view of one author, represent a form of internal colonization legitimized through policy (D. S. G. Goodman, 2004). China’s west is a place of trade-offs between environmental protection and economic development (Interfax-China, 2004); where “preserving the environmental beauty or helping local residents out of destitution” are options in a zero-sum game (Yunnan Electric Power Network, 2004); and where Yunnan should refrain from being too demanding in order to maintain its comparative advantage in hydroelectric power resources (Weng, 1996). Investment in the west’s hydropower is key to “opening the door to prosperity” (Q. Chen, Liu Liu, & Ying Zhang, 2005), benefiting the “people and the country” (Y. Ma, 2005). One author, however, likening China’s west to its coastal Special Economic Zones (SEZs) and arguing that western development should be similarly promoted through central policies, also called for a “Western Development Law” that would, *inter alia*, clearly delineate China’s west and establish a division of rights and responsibilities among localities and the central government (Bai, 2000).

### **Battles for Western Yunnan**

Discourses of security are by no means new to energy debates, whether those debates center on petroleum-based energy, nuclear energy, or hydropower. The current state of concern among some members of the United States Congress over China's attempts to arrange petroleum supply contracts around the world is an excellent example, as some lawmakers see such attempts as a deliberate threat to U.S. national security by a hostile "red China." Within China, security discourses have likewise made frequent use of militaristic metaphors in order to underscore the importance of developing Yunnan's hydropower resources. Yunnan is construed as a place where hydropower development needs to be waged like a war: China's west will become a base from which strategies and forces for developing electric power will be deployed. While such rhetoric is not uncommon in reference to business competition around the world, the militaristic metaphors shown below are particularly pervasive in China. The opposing sides in this electric power war are presumed to be the five mega-corporations formed from the former Ministry of Electric Power cum State Power Corporation of China in 2002.<sup>53</sup>

Such rhetoric is most common among official media outlets (national and provincial newspapers), as well as hydropower company websites, press releases, and white papers. According to one article, the construction of Manwan hydropower station, the first on the Lancang, represented a "beach assault" (*qiangtan*), after which the figurative hydroelectric engineering "troops advanced" (*jinjun*), seeking to reshape Yunnan into a "green energy base" for China and Mainland Southeast Asia (P. Zhang, 2003). One can almost imagine a corps of hydroelectric engineers, dusting their hands

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<sup>53</sup> More detail is provided on this transition in Chapter Seven.

clean from chores recently completed at Three Gorges, marching triumphantly westward to tame the “galloping” rivers of Yunnan. Indeed, many government and media sources paint western Yunnan (*Dianxi*) as the “primary battlefield (*zhulu de zhuzhanchang*) for investors seeking to seize control of the [power empire]”; investors who, since their rebirth from the ashes of the erstwhile Ministry of Electric Power, have run from river basin to river basin “enclosing the waters” (*quanshui*)<sup>54</sup> in order to control them through hydropower development (B. Cheng, 2004a). The province is also a site for constructing an “electricity mother ship” (*dianli hangmu*)<sup>55</sup> from which newly created electric power investment companies will be the “principal force” (*zhulijun*) to provision China’s east as well as cities in other countries in Mainland Southeast Asia (Henan Province Electric Power Co., 2004). When Dachaoshan power station, the second hydropower station on the Lancang, first connected to the provincial grid in November 2003 and began producing power a year ahead of schedule, the Yunnan Dachaoshan Hydropower Co. fêted the event by announcing that Yunnan had borne a “new force” (or “strong soldier,” *shenglijun*) in the service of the Send Western Electricity East strategy (H. Chen, 2003). The same article also mentions the “Lubuge Attack” in reference to Lubuge Hydropower

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<sup>54</sup> The term *quanshui* is a play on words that recalls the term *quandi* (encircling the lands), referring originally to land enclosure practices by industrialists in England. More recently, *quandi* has come to signify the expropriation of rural agricultural land for urban use, most specifically the conversion from agricultural use to township-village enterprise (TVE) industrial use in post-reform China. Chan and Su (2005) argue that during the period of fiscal reforms begun in the 1980s, local (especially township-level) governments adopted a dual role of “government + profit-seeking group” (*zhengfu + mouli jituan*) and used their privileged access to resources (especially land) to further the economic interests of their localities. During its heyday in the early 1990s, this type of land profiteering culminated in an estimated loss of over 10,000,000 *mu* of tilled land per annum, and resulted in several measures by the central government to put an end to *quandi* activities.

<sup>55</sup> *Hangmu* is also the word for aircraft carrier, but here it seems more appropriate to translate it as mother ship.

Station, a 600-MW project on the Huangni River on Yunnan's eastern border and the first power project in China built with World Bank support.

### **Substations for Subregions: Yunnan and the GMS**

In 1992, the Asian Development Bank created an office for the Greater Mekong Subregion, consisting of Vietnam, Cambodia, Laos, Thailand, Myanmar, and Yunnan Province.<sup>56</sup> Of little concern was the fact that such a geographic entity had heretofore not existed on paper. Like China's west, the Orient, and any number of other geographic groupings or containers, the GMS, too, was a creation of someone's imagination that served to legitimize certain investment schemes and long-term development goals. Similarly unproblematic were the fact that the subregion consisted of five nation-states and a province (albeit one the size of a nation-state), and the omission of an even larger area containing the headwaters of the Lancang-Mekong, namely Tibet. The GMS office of the ADB, perhaps seeking to fill the void by a largely absent (at the time) Mekong River Commission,<sup>57</sup> jumped headlong into economic development plans for the area, and from the start envisioned a basin-wide interconnected economy built on the foundation of highways and electric power grids linking the six countries, with the steep and swiftly flowing stretches of the Lancang-Mekong in Yunnan and Laos providing the hydroelectric potential to power GMS development (Asian Development Bank, 2003; Xinhua News Agency, 2002).

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<sup>56</sup> A map of the GMS (Map 6-3) is provided in Chapter Six, where I discuss new energy geographies.

<sup>57</sup> China has never been a member of the Mekong River Commission or its predecessor organizations, and currently participates only in an observer capacity (dialog partner) along with Myanmar. Space limitations preclude any extended discussion of the organization here, but there exists a copious literature on the history of the MRC, including the politics of China's non-membership.

To date, the notion of a basin-wide transnational subregion has been widely accepted in China among academics (L. Chen & He, 1997; Y. Fan, 1999; He & Lin, 1997; Y. Lu, 2004) and business and government leaders ("GMS huiyi," 2005; D. Li, 2005; Yunnan Electric Power Network, 2004), as evidenced most recently by the hosting of the Second GMS Leaders' Summit in Kunming in July 2005. In the weeks leading up to that event, Kunming was treated to an extensive (and expensive) makeover. All major streets in Kunming were repaved; new regulations prohibiting left-hand turns off those streets at major intersections were instituted and systematically enforced; low fences were installed in a largely ineffective attempt to prevent people from crossing the streets at areas outside designated crosswalks; murals were painted on walls thrown up to hide unsightly construction zones; bustling street markets filled with migrants from the countryside selling produce and all manner of wares were systematically patrolled and "cleaned up"; and a massive propaganda campaign was instituted on billboards, buses, and in newspapers congratulating the city for hosting the meeting and extolling the virtues of subregional cooperation (see Figure 3-1). Outside academic, governmental, and international business circles, many were uncertain of the meaning of subregion (translated directly into Chinese as *ciquyu*) and saw the summit simply as the latest in China's never-ending series of campaigns and activities (*huodong*). During the closed-door 2005 meeting, officials signed agreements on furthering cooperation on subregional electrical grid development and interconnection, facilitating trans-border movement of people and goods, and preventing animal-borne diseases, among other things ("GMS huiyi," 2005). Even before the summit, however, progress on regional power grid development had seen a major advance with the first sale of electricity from China

(Yunnan) to Vietnam through lines passing at Hekou (Lao Cai) in fall 2004 (Yunnan Electric Power Network, 2004).



Figure 3-1: Billboard in Kunming coinciding with the 2nd GMS Summit

Perhaps the most fascinating characteristics of the GMS construct is the inclusion of one provincial state (Yunnan) among a group of nation-states and the exclusion of another provincial-state (Tibet). The exclusion of Tibet, despite its being home to the headwaters of the Lancang-Mekong, most likely reflects the Chinese government's concern that separatist tendencies within Tibet might use membership in an international forum as a channel for seeking support for their cause among other members of the forum. China's Guizhou Province, too, has now been invited by Cambodian Prime Minister Hun Sen to take part in the GMS following the July 2005 summit in Kunming, despite the fact that no part of Guizhou lies within the Lancang-Mekong watershed

("Cambodia PM seeks further cooperation," 2005). This makes Tibet's exclusion from the GMS seem even more problematic. To be sure, material realities such as the lack of transportation and communication infrastructure in many parts of Tibet, including near the Lancang north of Yunnan, present significant obstacles to economic linkages with other GMS countries. Yet within Yunnan, the GMS construct is used precisely to promote infrastructure construction and enable the enhancement of transportation and communication linkages to countries in the region. It is likely that Chinese central government officials are concerned that such linkages might also provide greater opportunities for those with human rights or other grievances related to Tibet to liaise across China's borders. Thus whereas the Lancang-Mekong watershed had in some ways naturalized and legitimized the GMS as a region for certain political economic reasons (Paasi, 2004), we see just how fluid, contextually bound, and porous such "natural" regions can be.

### ***Thinking out of the Box: Letting Process Define Scale***

The analysis of three hydropower-related discourses and their scalar referents in the previous section illustrates the insights gained by letting process define scale, instead of allowing scale to limit the extent of processes examined. As Swyngedouw (2001, pp. 131-132) notes, starting an analysis from a pre-defined scale seems "deeply antagonistic to apprehending the world in a dynamic, process-based manner." Similarly, Brown and Purcell (2005, p. 612) argue that "we cannot train our eye on one particular scale and hope to capture the essence of any of these processes." By taking the processes of hydropower promotion and resistance as our starting point, then unpacking the scalar

constructs deployed by proponents of each strategy, we succeed in looking past the scalar “boxes” of county/prefecture, province, nation-state, and region and arriving at a more comprehensive understanding of the power dynamics of hydropower development in Yunnan. In particular, we apprehend the ways in which geographic constructs are invented and reified in support of various arguments. We also avoid the “scalar trap,” moving instead closer to uncovering and understanding the various actors involved and the agendas they put forward.

This approach to studying hydropower development in China is one way in which political ecologists concerned with understanding the relationship between environmental change and political economic processes may engage the geographic political economy literature that treats scale itself as an object of inquiry. Hydropower construction is one of countless examples of how nature is transformed through social processes into the circulation of money and profit (Swyngedouw, 2001) and, in this case, electricity. In the case examined here, our inquiry into the strategic use of *geographic* scalar constructs suggests an *analytical* scale useful for envisioning and understanding the complex relationships between large capital- and technology-intensive hydroelectric projects situated in seemingly remote areas of China, yet vital to the functioning of some of the country’s most internationally linked, economically powerful, and densely populated urban areas. It is this analytical scale to which I refer as a powershed, which is capable of encapsulating biophysical processes, while simultaneously opening the door for inquiry into political economic processes operating in tandem. Our analysis thus moves beyond fixed administrative boundaries of provinces and cities, yet retains a regional-scale

perspective with the important caveat that the region here is defined by the processes we seek to understand.

I intend the term powershed in much the same way hydrologists or ecologists use the term watershed, the land area drained by a river or stream. The two notions are analogous in many ways, and might best be thought of as “a space over which a portable resource (water or electricity) is collected and concentrated for use” (Magee, 2006b). My goal is primarily to produce a partial map of the spatial extent of Guangdong’s dependence on electric power generation to fuel its economy. As I show in Chapter Six, this dependence (actual and expected) extends to areas other than Guangdong, particularly northern Vietnam and Thailand, but Guangdong is by far the most important recipient of Yunnan hydropower on the Lancang (and eventually the Nu). Other scholars have invoked notions such as “ecological footprint” (Rees, 1992), “ecological shadow” (Dalby, 2002), and “water footprint” (Swyngedouw, 2001) to indicate the amount of resources (land, water, food, timber, etc.) required to support a certain entity, whether it be a country, city, household, or an individual. All of these terms effectively emphasize the multi-scalar dimensions of electricity production and consumption.

Thinking in terms of a powershed not only focuses our attention on processes of electric power generation and consumption, but also opens the door for analysis of political economic power (in the form of policies and investments, for instance) as well as more subtle but no less important discursive processes that exemplify power in a Foucauldian sense. It is here that I believe the concept has its greatest utility, and it is here, too, that we come full circle. I began earlier in this chapter by identifying key

processes related to hydropower development in western Yunnan (recall Table 3-2). I then unpacked the various *geographic* scalar constructs deployed in discursive practice for each of those processes. Informed by those constructs, and by the ways in which their owners<sup>58</sup> use them to achieve certain objectives and affect the way in which others achieve (or fail to achieve) their own, we have now created an *analytical* scale that has the potential of neatly packaging – at risk of being too cliché – the instantiations of material and discursive action that link water falling over turbines in Yunnan to electrons flowing through high-voltage lines to end users in Guangdong. Though the concept of a powershed has a clear regional connotation to it, the importance lies in the fact that the region is dynamically constructed by the researcher according to demands of the particular problem under study. One could just as well examine the powershed of Guangdong with respect to thermal (coal, gas, and nuclear) generation of electricity, and the outcome would be decidedly different.

### ***Summary***

In this chapter I have argued for a geographic political ecology in which the processes supporting and opposing hydropower development on an important trans-national river, along with the scalar referents they invoke, provide a starting point for analysis. Through a brief exploration of some of these processes, I have shown how geographic constructs – an impoverished west, a site where battles for an electricity empire will allegedly be fought, and a newly created subregion – play an important role

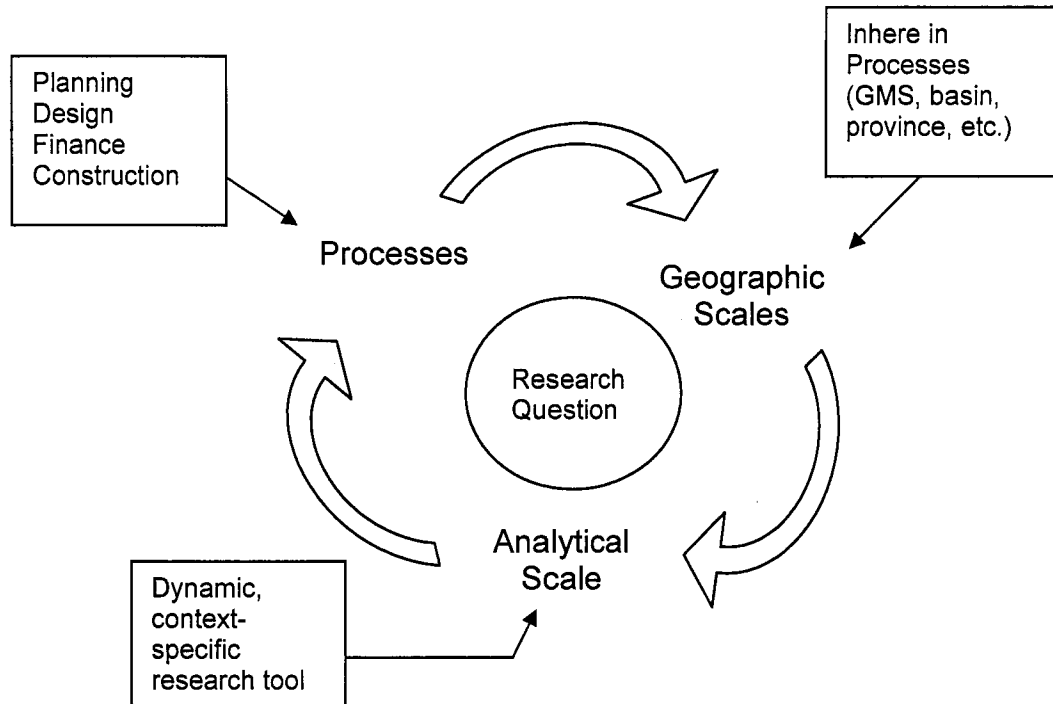
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<sup>58</sup> I use this term with some hesitation. The agency of individuals, made manifest in their discourse and actions regardless of where they stand in the debate on Yunnan hydropower, is constrained by social, political, and cultural structures. Thus while speaking of an actor's (or group's) ownership of a certain discourse, I concede that that ownership may not be total or resulting from the conscious choices of the individuals or groups in question.

in legitimizing or de-legitimizing certain arguments, based on the political agendas of those individuals or groups who choose to deploy those constructs. Hydropower development in “remote” and “pristine” areas of Yunnan is highly contested, and groups with competing agendas vis-à-vis such development deploy similar scalar constructs to support their arguments, with certain discourses and their scalar constructs coming to gain legitimacy and prevalence over others.

There is nothing revolutionary about beginning my analysis of Yunnan hydropower with processes rather than scales, flows rather than boxes. Indeed, as I have noted throughout this chapter, numerous other scholars have pointed to the importance of doing just that. Likewise, those and other scholars writing from a political ecology perspective have repeatedly called for an engagement of geographic scale in a fashion that recognizes both its materiality, the importance of discursive practices in lending it that materiality and politicizing it, and the ramifications “on the ground” of both the scalar constructs and the policies and actions they enable. The process of uneven economic development in China, for instance, necessitates the discursive creation of China’s west as a coherent and cohesive region in the central state’s plans to “open up” and “develop” that West through the Western Development campaign (*xibu da kaifa*). At the same time, the impacts of processes resulting from investment and other activities in that West manifest themselves in villages, watersheds, counties, nationally, and across a variety of scales, depending on how far one is willing to chase the processes.

The novelty of the present study rests in actually making a deliberate linkage between processes involved in hydropower development, the geographic scalar constructs they invoke, and a methodological scale that in turn facilitates analysis of those processes



**Figure 3-2: Relating process, geographic scale, and analytical scale**

(see Figure 3-2). In many cases, this means simply rephrasing the questions guiding our inquiry. Using the methodological construct developed above, an examination of the powershed of industrial centers in China such as Guangzhou, Shenzhen, or Shanghai, or of urban centers in northern Thailand or Vietnam such as Chiang Mai or Hanoi might lead us to ask questions similar to the following:

- From what sources do hydropower development companies in Yunnan derive their investment capital? (*process=investment*)

- What do the projects' design parameters and related infrastructure tell us about the intended use and geographic range of the power generated? (*process=design*)
- Which institutions, and through what mechanisms, are involved in designing and approving the projects, and by what means are the outcomes negotiated, if at all? (*processes=design, approval, negotiation*)

In the chapters that follow, we shall see that answering such questions leads us, for instance, to focus on flows of electricity through Asian Development Bank-invested high-voltage transmission lines from Yunnan hydropower stations to Guangdong load centers, or on the flows of capital, influence, and expertise from Beijing, Hong Kong, the United States, Canada, Norway or elsewhere into remote areas of Yunnan. Criticisms of hydropower development in southwestern China over the past decade have tended to be rather one-sided, frequently pointing an accusatory finger at a monolithic and hegemonic China bent on pursuing unilateral hydropower development on the upper reaches of the Mekong that threatens the livelihoods of millions downstream who depend on the Mekong (Antaseeda, 2002; Barnes, 2001; Borton, 2002; Fackler, 2001; Gray, 2002; International Rivers Network, 2002). It is true that large-scale dam building in China does indeed fall far short in terms of certain ideals, such as transparency in decision making, regarding democratic decision-making and socio-ecological impact assessments; the same can be said of hydropower development during its heyday in the American West, and probably anywhere else, for that matter. Yet tilting against a China-sized windmill inevitably fails to address domestic and transnational processes and political economic factors important in such projects, including (ironically) the Electricity

Generating Authority of Thailand's decision to directly invest first in the 1500-MW Jinghong project and later in the 5800-MW Nuozhadu<sup>59</sup> project, the largest slated for the upper Mekong.<sup>60</sup> In addition, it provides no vantage on the potential leverage points in decision processes might exist, which would clearly be useful to anyone hoping to influence how those processes function. In a country with a fully integrated power grid, such linkages will likely be more opaque due to the very nature of the grid as a system designed to accept power generated from a variety of geographically dispersed facilities and distribute it to similarly dispersed load centers. In China, however, grid company officials estimate complete power grid interconnection to be probably still five to ten years away, and in many cases direct links between generation sites and load centers remain quite transparent. Thus the notion of a powershed as a process-defined methodological scale of analysis is appropriate and useful in this context.

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<sup>59</sup> For comparison, the massive Three Gorges dam in China has an installed capacity of 18,200 MW, while that of Hoover Dam in the United States has approximately 2,000 MW.

<sup>60</sup> More detail is provided in Chapter Four. EGAT was originally a majority investor in the Jinghong hydropower station, currently under construction and situated some 100 km from the point where the Lancang-Mekong leaves Yunnan to form the border between Myanmar and Laos. Later, after a series of adjustments, EGAT withdrew its direct investment in Jinghong and instead committed to a minority share in a Jinghong-Nuozhadu joint project.

## Chapter Four: Lancang River Case Study

### *Introduction*<sup>61</sup>

While much scholarly and media attention has been directed at China's massive Three Gorges Dam project, construction of a cascade of eight hydroelectric power stations on the lower and middle<sup>62</sup> Lancang River (upper Mekong) in southwestern China's Yunnan Province, has been ongoing since 1986. Critics of the projects, especially those in the downstream countries of Laos, Cambodia, Vietnam, and Thailand,<sup>63</sup> cite as the driving forces behind the dams China's imperial history, aspirations of renewed regional hegemony, and continued reliance on centrally planned economic development that is fond of mega-projects and insensitive to local needs. Such accusations may hold some truth, but it is important to understand that the Lancang dams are closely tied to an international political-economic order in which processes collectively labeled "globalization" play a key role in legitimizing, financing, constructing, and operating the dams. In particular, the Lancang dams may be understood as part of a global-scale division of labor driven by consumption patterns in industrialized and industrializing countries alike: despite discourses of rural electrification, local development, poverty alleviation, and regional sustainability surrounding the dams, their

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<sup>61</sup> Parts of this chapter were previously published as a journal article (Magee, 2006b).

<sup>62</sup> The upper Mekong within China is generally referred to as the Lancang, which itself is divided into lower, middle, and upper reaches. The lower reach is generally understood to stretch from A to B; the middle reach from B to C; and the upper reach from Gongguoqiao northward to the headwaters.

<sup>63</sup> Myanmar (Burma), which borders Yunnan, is also one of the downstream countries, but criticism of Chinese hydropower development on the Lancang-Mekong from Myanmar has been muted. There are exceptions, mostly from non-governmental organizations in the West supportive of Myanmar's ethnic minority populations (many of which are concentrated near the Myanmar-Yunnan border) and committed to resisting the current military authority in the country. China maintains friendly relations with the military government and has made several investments in hydropower development and river transportation in Myanmar ("China to help fund dredging," 2001). One report claimed that by 2002, Yunnan alone had invested over 500 million *Yuan* in hydropower station development in Vietnam, Laos, and Myanmar, including exporting more than 20 completed turnkey (*chengtao*) plants (P. Li, Lin, & Zhang, 2002).

primary purpose is to provide electricity for energy-starved (and foreign investment-sated) industrial powerhouse coastal provinces, particularly Guangdong, in southern and eastern China that serve both the global market and the increasingly important domestic market for manufactured goods.

Plans drawn up in the early 1980s originally called for a stair-step series 14 dams to be constructed on the Lancang in Yunnan (L. Chen & He, 2000; "Lancang Jiang shuidian kaifa licheng," 2002). That plan was later reduced to eight, allegedly due to the lack of infrastructure (mainly roads) and difficulty building it in the northern reaches of the river in Yunnan. Preliminary work for several of the upper Lancang dams, however, is underway, and it is likely that they will eventually be built (China Hydropower Engineering Consulting Group, n.d.-b; PowerClub, 2004).<sup>64</sup> Of the eight hydropower stations planned for the middle and lower reaches of the Lancang cascade, two are already completed (Manwan and Dachaoshan); another two are under construction (Xiaowan and Jinghong); preparatory work has begun on two others (Nuozhadu and Gongguoqiao); and the final two (Ganlanba and Mengsong) are still on the drawing board. The combined generating capacity of the entire cascade is only slightly smaller than that of the Three Gorges Project, and every kilowatt-hour of the two dams that are currently in operation is already allocated. While some of the concerns of downstream countries regarding social and ecological impacts may be warranted, the processes of planning, financing, constructing, and operating large-scale hydropower facilities in China are extremely complex and merit closer examination.

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<sup>64</sup> Appendix Two provides details on the upper Lancang projects.

While the Chinese government has only relatively recently (since the early 1980s) solidified plans for the Lancang projects (Lihui Chen, 2002; L. Chen & He, 2000), the first surveys on the Lancang were begun in the 1950s ("Lancang Jiang shuidian kaifa licheng," 2002). Plans for development on the lower Mekong date back to the Mekong Consultative Committee for Coordinated Development, established by the United States and the United Nations in 1957. The Committee carried out numerous surveys and assessments in the late 1950s, but no plans were implemented due to the political upheaval that destabilized the region for the second half of the 20<sup>th</sup> century, leading to Cambodia's withdrawal from the organization for nearly 20 years.

Cambodia reapplied for admission in 1991, and after a period of organizational restructuring, the Committee was reestablished as the Mekong River Commission in 1995 with four members: Cambodia, Thailand, Lao PDR, and Vietnam. Much has been written about the strengths and failures of the Commission.<sup>65</sup> To date, the MRC's effectiveness has been limited due, among other things, to lack of formal participation on the part of Myanmar and China, and reluctance on the part of the MRC and China to exchange data considered sensitive. Scholars and consultants who have worked with the MRC are often cynical about the tendency of its secretariat to bend to donor priorities rather than local needs within the Lancang-Mekong watershed. Insofar as China's lack of membership in the organization is concerned, the situation is generally portrayed as one in which a recalcitrant China refuses to undertake any participation in the organization for fear its development priorities would be hampered (Decherd, 2002; Fackler, 2001; Sine, 2002).

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<sup>65</sup> Browder and Ortolano (2000) provide a historical overview of the MRC. Dupont (2001, Chapter 6) offers a more critical perspective written from a national security. Jacobs (2000) discusses the US role in the early days of the Mekong Committee and subsequent (post-1975) lack of engagement.

One interviewee suggested that one reason for China's lack of participation may well have been resistance on the part of Japan (a donor country to the MRC) to include China; this is anecdotal, however, and there is little evidence of the veracity of such a claim.<sup>66</sup> The Chinese official position has always been that any development pursued on the Chinese stretch of the river will make careful consideration of downstream impacts, especially those in the downstream five countries ("China's river data helps," 2002). In less reassuring terms, that position is often reduced to "whatever action [China] takes to exploit the Mekong's potential is purely an internal matter." (Dupont, 2001, p. 129) In reality, however, such a hardline position has softened over recent years as the Chinese government and individual companies have sought to improve cooperation on issues of trade, economic development, drug smuggling, and health.

### ***Geography of the Lancang Watershed***

The Lancang begins its 4,800-km journey to the South China Sea at 5,500 m in the Qinghai-Tibet Plateau, dropping 5,000 m by the time it leaves China (Lihui Chen, 2002). As it flows through Yunnan Province alone, the river loses 1,780 m in elevation (Xiao, 2002), yielding a theoretical hydroelectric potential of approximately 25,000 MW ("Lancang River: Energy Base," 2002). After flowing through Yunnan for approximately 1,200 km, the Lancang exits the province through Mengla County in Xishuangbanna Prefecture.<sup>67</sup> Upon leaving Yunnan the river is referred to as the Mekong, and first forms the border between Myanmar and China, later flowing through Laos, Thailand, Cambodia, and Vietnam before emptying into the sea. The Lancang-Mekong ranks

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<sup>66</sup> Interview K20050313.

<sup>67</sup> The Statistical Bureau of Yunnan Province (2004) puts the river's length within Yunnan is 1,227 km, while a geographic text (Shengyue Wang, 2002) claims it is 1,170 km.

among the world's most important rivers according to a number of criteria: watershed population, sediment discharge, flow volume, channel length, and fisheries richness, to name a few. The six-country area drained by the system, some 810,000 km<sup>2</sup>, is home to over 60 million people, many of whom depend on the river for their livelihoods (Fackler, 2001; International Rivers Network). The Lancang's annual hydropower generating capacity within Yunnan is estimated to be more than 100 TWh per year. This is slightly more than the estimated potential in Laos, and two to twenty times more than that of the other four Mekong countries (Y. Fan, 1999; Statistical Bureau of Yunnan Province, 2004). As a reference, 80 TWh per year would be enough to power the cities of Guangzhou, Shenzhen, Dongguan in Guangdong Province, as well as Kunming combined (See Figure 4-1).

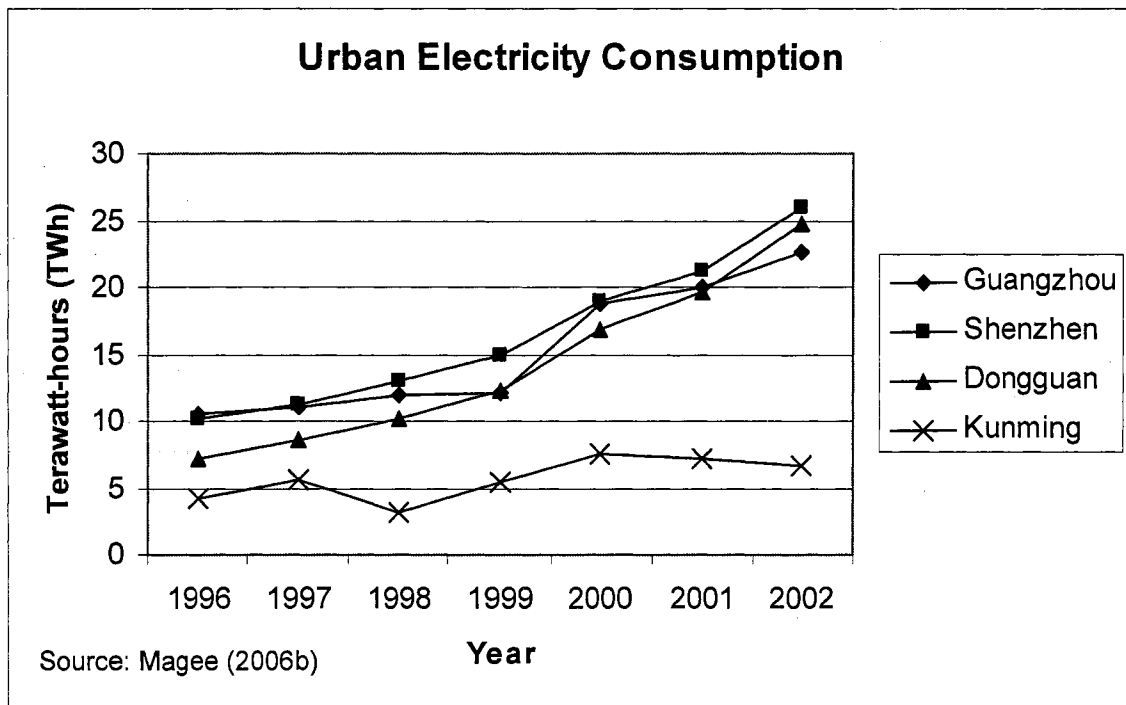
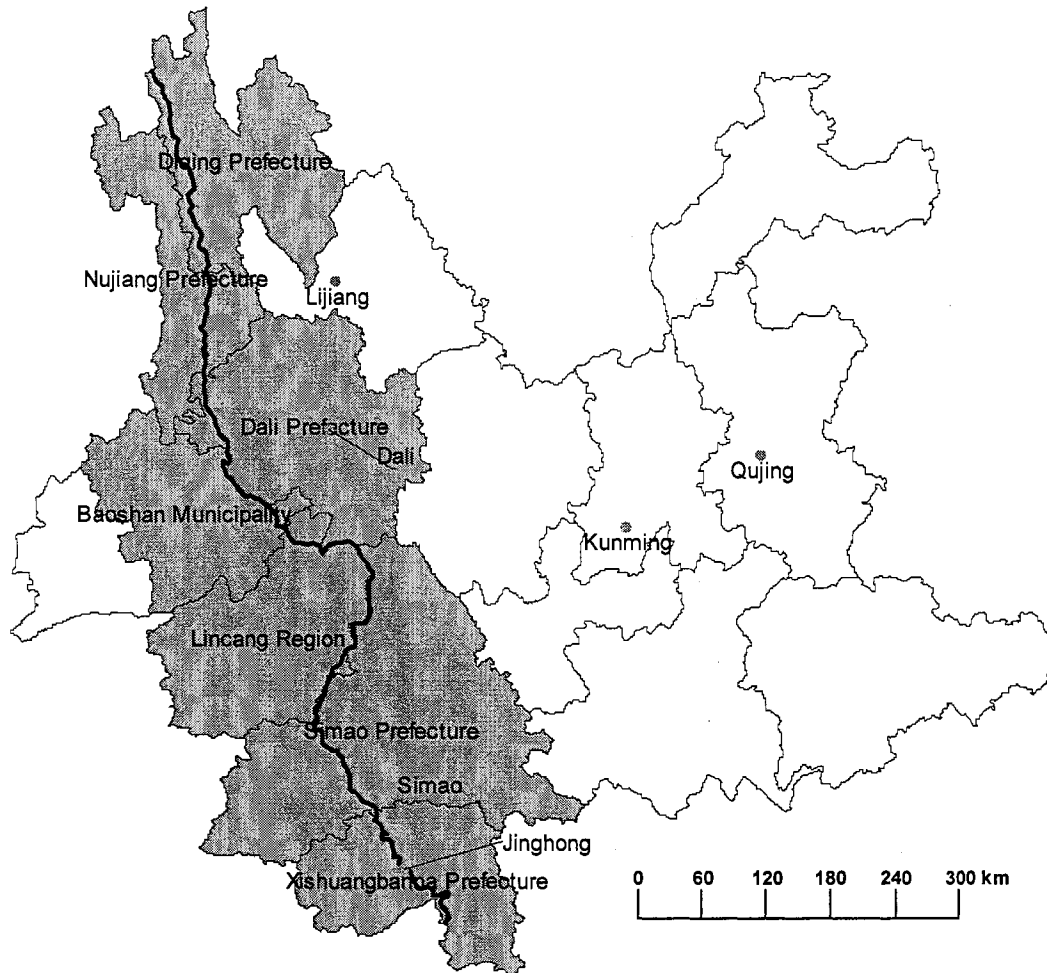


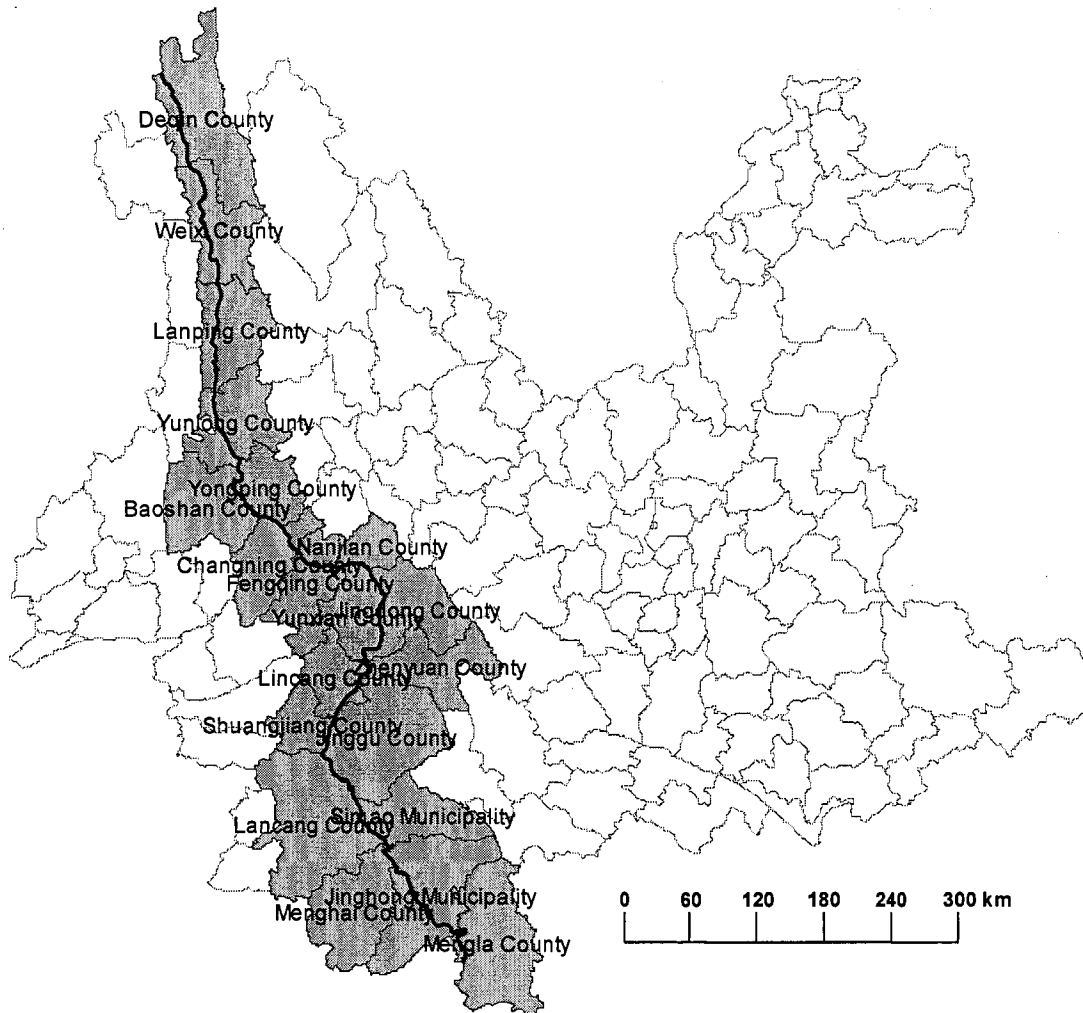
Figure 4-1: Urban electricity consumption trends in Guangdong and Yunnan

The precise source of the Lancang lies in Qinghai's Yushu Tibetan Nationality Autonomous County (He, 1995). After leaving Qinghai, the river flows through Tibet and enters Yunnan Province, where it travels through or along seven prefecture-level administrative areas and 20 county-level administrative areas (Maps 4-1 and 4-2). The area drained by the Lancang within Yunnan encompasses parts of an additional two county-level administrative units (Gengma and Puer) for a total area of approximately 89,000 km<sup>2</sup>, over which the average annual rainfall is 1,342 mm (Shengyue Wang, 2002, p. 113). The entire Lancang basin (within China) encompasses glacial, riverine, lake, and groundwater hydrological characteristics, ranging from arctic to tropical in nature (He, 1995).



**Map 4-1: Prefecture-level administrative areas along the Lancang**

In terms of human geography, aside from a few exceptions, the region drained by the Lancang (and, as we shall see later, the Nu) is relatively sparsely populated and less economically developed than other parts of Yunnan. The ethnically diverse population of the Lancang watershed within Yunnan is approximately five million. If Yunnan already can be counted as a “less developed” province of China in terms of socioeconomic indicators such as per capita GDP, educational attainment rates, then western Yunnan qualifies as less developed within Yunnan by those same criteria. Like China’s west,



**Map 4-2: County-level administrative areas along the Lancang**

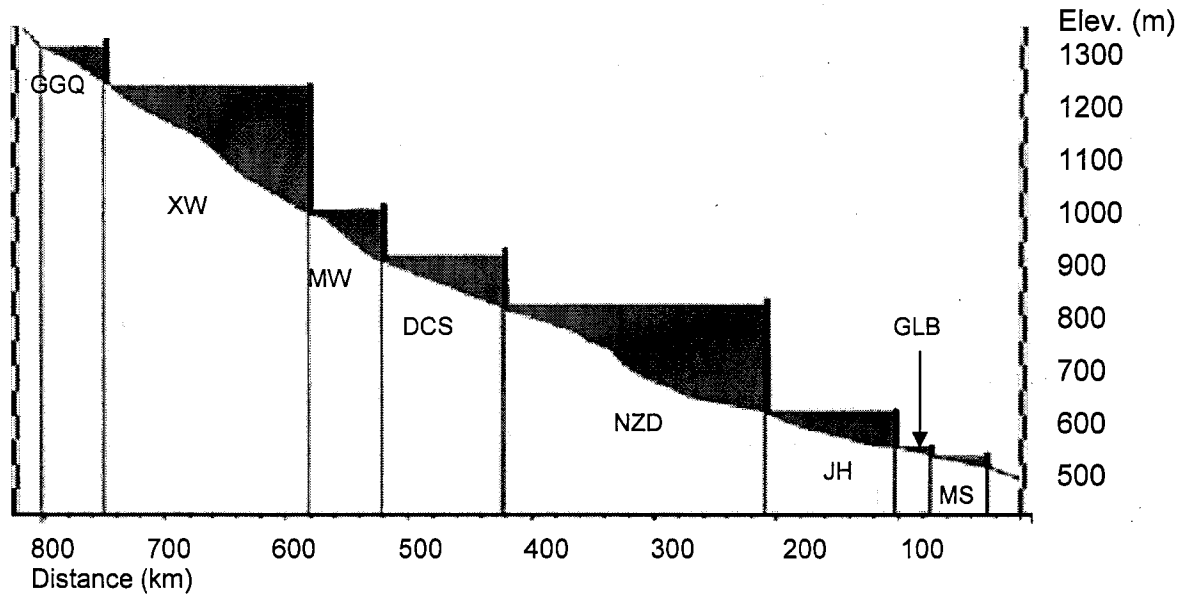
Yunnan's west is a place where discourses of abundant natural resources abound: among its nicknames is the ever-catchy "Paradise of Non-ferrous Metals" in recognition of the province's copious deposits of tin, zinc, lead, copper, cadmium, and other minerals. Such discourses of abundance, though, often overlap with others of "poor" human resources, generally understood to refer to Yunnan's numerous and widely dispersed ethnic minority communities. These groups live in relatively isolated locations with limited transportation and other infrastructure, have lower educational attainment standards, and

for the most part are detached from the “socialist market economy” that powers China’s economic growth elsewhere. As evidenced by claims that the Lancang and Nu dams are for the benefit of local people, or as one new item put it, “the dream of all ethnicities of Yunnan,” (“Lancang Jiang shuidian kaifa licheng,” 2002) the existence of these minority populations, and more importantly their socio-economic status, is crucial to arguments supporting and opposing the development of large-scale hydropower in the area as discussed previously in Chapter Three.

### ***Details of the Lancang Cascade***

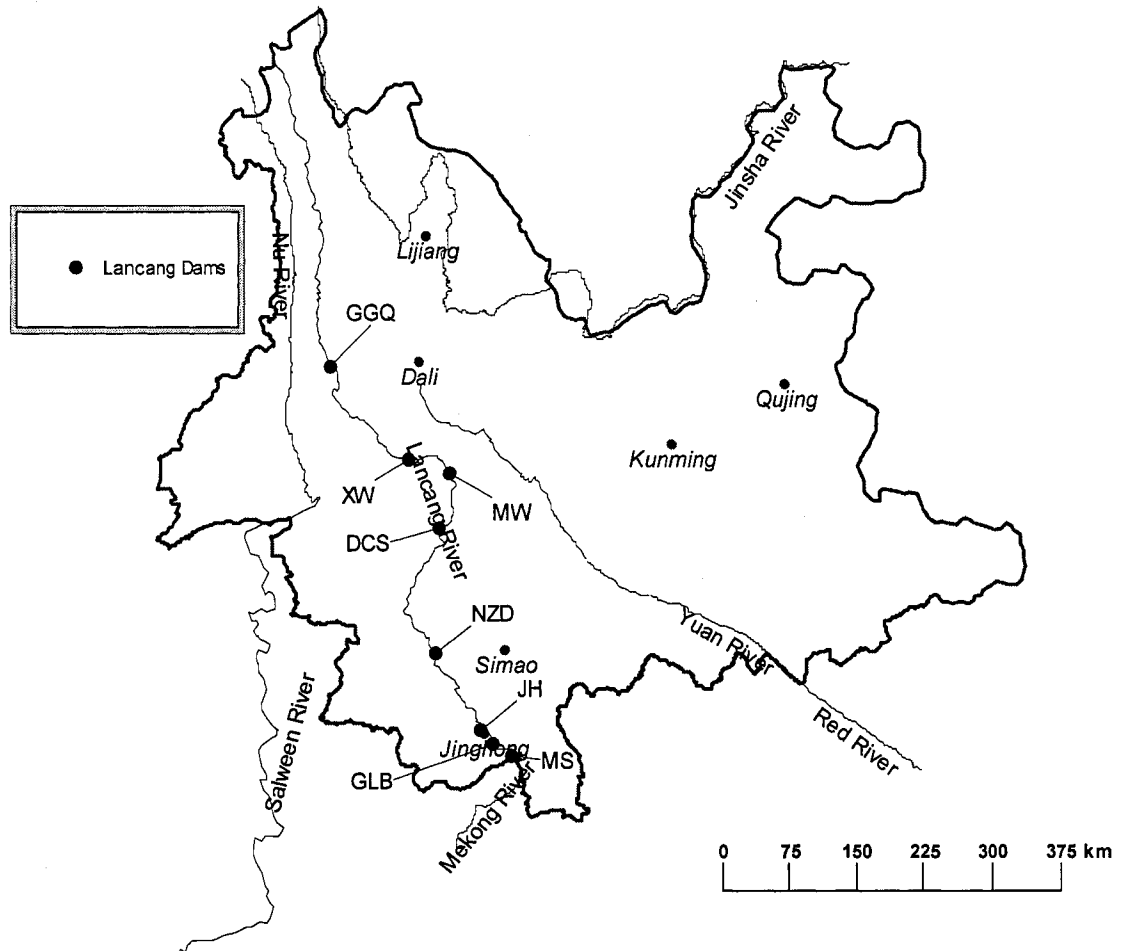
This section examines the Lancang hydropower projects in chronological order of their development start dates. Even though the section is highly empirical and descriptive, there are several reasons for proceeding in this fashion and for presenting such detail on each project. Most importantly is that there is a large degree of partially accurate or incomplete information, especially on the Internet, regarding the Lancang cascade. Much of the English-language information is based on a 1996 article, published first online (Chapman & He, 1996a) and later as a chapter in a book (Chapman & He, 1996b). For years, the Internet version of this article was the only scholarly source of information in English on the Lancang cascade, and as such it provided fuel for many of the debates that have developed around the Lancang dam projects. Yet the specifics of several projects have changed since 1996, as have the institutional and legal environments in which those projects are being developed. Figure 4-2, from the company responsible for developing the majority of the Lancang dams, shows the approximate layout of the Lancang cascade, including dam elevation (above sea level) and placement (linear distance) along the river.

Map 4-3 indicates the approximate locations of the Lancang dams; abbreviations for each dam name are listed in Table 4-1 at the end of this chapter.



**Figure 4-2: Profile of Lancang cascade (middle and lower reaches)**

A concerted planning effort for hydropower development on the entire stretch of the Lancang within Yunnan began in the early 1980s. Planners, primarily the Kunming Institute of Hydropower Survey and Design (at the time housed under the Ministry of Hydropower), quickly trained their energies on the middle and lower stretches of the river from Gongguoqiao downstream (see Map 4-3), which runs for some 772 km and drops 828 m (Zhu, 2002, p. 248). In 1986, planners from the Kunming Institute produced a “Planning Report for the Middle and Lower Lancang” in 1986 (Zhu, 2002, p. 247). This plan, which was approved in May 1987, is often referred to by hydropower experts in China as the “comprehensive plan” for the Lancang, though in comparison with



**Map 4-3: Approximate locations of Lancang dams (middle and lower reaches)**

comprehensive planning for the Yangtze River basin that began in the 1950s, it is hard to imagine that the two are very similar. According to Article 15 of the newly revised Water Law of China ("Zhonghua Renmin Gongheguo Shuifa," 2002), specific (*zhuan ye gui hua*) plans for river development (such as those for hydropower stations) must conform to the comprehensive plans (*zong he gui hua*) for overall basin development (i.e., plans that address irrigation, transportation, navigation, and other aspects of riverine water resources use). As will be discussed later, the revised water law presents several new sites of conflict between law and implementation due to institutional inertia. One of these in

particular regards a hydropower planning vis-à-vis comprehensive planning, and the varying responsibilities and limits of authority for each. It should also be noted that the plans (comprehensive or not) for these rivers are not publicly available as they are considered *neibu* (internal, or classified) since they deal with data on “important” (*zhuyao*) rivers that the Chinese central government considers relevant to national security. Several sources describe the plans, however (particularly those for the Yangtze and Lancang), and thus provide some insights into the early thinking regarding hydropower development and other water management and use projects.

### **Manwan**

Ground was broken on the Manwan dam, the first on the Lancang-Mekong, in 1987, though planning for the project had begun several years before, and work on related infrastructure (roadways and diversion tunnel) had begun in 1985 (Jingdong Yizu zizhixian zhi bianzuan weiyuanhui, 1994). The station was designed by the Kunming Institute of Hydropower Survey and Design,<sup>68</sup> one of eight more or less regional subsidiaries of China Hydro Consulting.<sup>69</sup> The first of 250-MW turbines came online in 1993, and the initial phase of five 250-MW turbines was completed in June 1995 for a total installed capacity of 1,250 MW. The final turbine was installed in a second phase in 1995 that involved an underground powerhouse separate from the other five in the above-

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<sup>68</sup> *Kunming Shi Shuili Shuidian Kance Sheji Yuan.*

<sup>69</sup> *Zhongguo Shuidian Gongcheng Guwen Jituan Gongsi.* CHC is a “backbone” state-owned enterprise built on the foundation of the former China Hydropower Consulting Company and oriented to both the domestic and international market. It undertakes a broad variety of projects, rather than hydropower projects alone. CHC is a holding company, parent of an overall planning institute (Water Resources & Hydropower Planning and Design General Institute), seven regional hydropower survey and design institutes (Beijing, East, Northwest, South-Central, Chengdu, Guiyang, Kunming), and a state-subsidized project advisory company. CHC and its subsidiaries are responsible for planning, survey, design, advising, oversight, safety certification, and project contracting of large and medium hydropower stations and other water projects.

ground structure, giving the station an overall installed capacity of 1,500 MW. The dam stands on the border of Jingdong County (Simao) and Yunxian County (Lincang), and was named after Manwan Village and nearby Manwan Stream (Jingdong Yizu zizhixian zhi bianzuan weiyuanhui, 1994). Despite its occasional appellation as a “run-of-river” dam (see, for instance, Mogg, 1997), its reservoir holds more than a billion cubic meters of water, an amount that will further increase once the Xiaowan dam upstream is completed (see below).<sup>70</sup>

Manwan was financed and built through a partnership between the (then) Ministry of Water Resources and Electric Power and the Yunnan government, the first such arrangement for a hydropower project (H. Chen, 2003). Total cost of the project was reportedly 3.789 billion Yuan, or 3,031 Yuan per kilowatt of installed capacity (“Lancang Jiang shuidian kaifa licheng,” 2002). The ministry-province partnership arrangement is referred to as the “Manwan model” and is cited as an example of the creativity of Yunnan government officials and enterprise leaders in financing and implementing large-scale hydropower. The project was designed by the Kunming Institute of Hydropower Survey and Design, one of seven such institutes that formerly were part of the State Power Corporation. Construction on Manwan was powered by electricity from the Xi’er River power station at Xiaguan. In keeping with an agreement to provide electricity to the county seat (*zhen*) at Jingdong, work was begun on a 58.8-km 110 kV line from Manwan station on March 1, 1988. as designed by the Yunnan Province Electric Power Design Institute (*Yunnan Sheng dianli sheji yuan*). Construction on that line, undertaken by

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<sup>70</sup> Run-of-river dams generally have smaller reservoirs and a seasonal capacity to store water (referred to as regulation), as compared to storage dams with larger reservoirs that can store and release water over multiple seasons or years, depending on power generation or other needs (U.S. Bureau of Reclamation).

Qinghai Electricity Transmission/Transformation Project Company, was completed July 13 of the same year. Overall investment in transmission line and transformer station was 5.4 million Yuan, of which 2 million was from the Yunnan Electric Power Bureau; 200,000 from the Simao Provincial Administrative Office; 500,000 from Jingdong; and 2.7 million from loans. According to one publication from the Jingdong government, the Manwan station and related infrastructure was expected to provide power for key industries and people's livelihood needs no matter the season or rainfall level (Jingdong Yizu zizhixian zhi bianzuan weiyuanhui, 1994).

The Ministry-province partnership formed to develop Manwan resulted in the creation of a state-owned company called the Yunnan Manwan Power Generation Company. In 2003, this company was merged with the Yunnan Lancang River Hydropower Development Company and restructured to form Hydrolancang, the Yunnan subsidiary of the Huaneng Group that is responsible for Lancang development (Yunnan Sheng dianli nianjian bianji bu, 2004, p. 137).<sup>71</sup> More detail on this merger and restructuring is provided below in the section on the Xiaowan dam.

The Manwan station has been roundly critiqued since its completion. Critics claimed early on that dam designers failed to adequately account for negative social and ecological impacts before construction began. Even though agreements were signed between the Manwan Power Station Management Office (*Manwan Dianzhan Guanli Ju*) and the Jingdong government guaranteeing that residents in the dam area would receive electricity from the station, promises of the affordability of that electricity were not kept.

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<sup>71</sup> See also the Hydrolancang company website at <http://www.hnlcj.cn/newweb/gsj01.asp>

This was evidently due to the high cost of voltage conversion infrastructure necessary to connect the high-voltage output from the power stations to lower-voltage local grids. In addition, resettled residents complain that promises of compensation have not come true even though the Manwan dam has functioned since 1993 (B. Cheng, 2004b). Striking photos of displaced dam-area residents picking through trash piles to make a living, rather than farming on riverside land as they had before the filling of the Manwan reservoir, made the pages of Chinese media and even the *New York Times* (Yardley, 2004a). Social organizations have encouraged Manwan residents to speak to groups in areas that would be flooded by dams on the Nu River, which has brought pressure to bear on local officials in the Manwan area seen as responsible for improperly handling resettlement, compensation, and electricity pricing. In addition, biologists and ecologists have critiqued the project for being built and operated without an adequate attempt to assess its ecological impacts, resulting in a volume of nearly 700 pages discussing the ecology of the reservoir area (Z. Wang & Zhang, 2000). At least one hydrologist writing from outside China justified excluding the Manwan dam from his hydrological model of the Mekong watershed due to its “negligible” effects (Kite, 2001). Given the secrecy with which hydrological data for transboundary rivers are kept in China, however, it is highly likely that lack of data availability was also a key factor in his decision to exclude Manwan.<sup>72</sup>

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<sup>72</sup> Several interviewees told me that the National Development and Reform Commission has thus far refused to release the Environmental Impact Assessment (EIA) for the Nu River dams because it contains hydrological data and represents a national security concern. Those interviewees and others have argued that if such is the case, the hydrological data should be omitted and the remainder of the assessment made open to the public in keeping with the 2003 EIA Law.

## Dachaoshan

Following Manwan, other projects have proceeded rapidly. Dam developers have benefited from a favorable policy environment, basin-wide monopolies on development (allocated subsequent to the break-up of the State Power Corporation in 2002), and a vast cohort of hydraulic and hydropower engineers graduating from universities and design institutes around the country. Ground was broken on Dachaoshan, the second Lancang dam, in August 1997 (H. Chen, 2003), approximately 100 km downstream from Manwan ("Lancang Jiang shuidian kaifa licheng," 2002). Like Manwan before it, Dachaoshan was designed by the Kunming Institute of Hydropower Survey and Design, this time in conjunction with its partner institute in Beijing.<sup>73</sup> The first turbine came online in December 2001, and all six turbines began functioning in October 2003 ("Xidian dongsong gudan," 2003). The total installed generating capacity of the dam is 1,350 MW, with each of the six turbines capable of producing 225 MW apiece ("Yunnan Dachaoshan dianzhan 6 tai," 2003). Dachaoshan was hailed as providing much-needed relief to the strained electrical grid in Yunnan and making an important contribution to regional power production. One industry publication, however, by China Hydropower Consulting (the state-owned parent company of the regional survey and design institutes) noted that the main problem with Dachaoshan is its small reservoir, which limits its ability to store water – and, by extension, produce power – from wet season to dry (Zhu, 2002). As with Manwan, the financing and institutional arrangements of the Dachaoshan project were credited with breaking new ground (H. Chen, 2003) and trumpeted, by its management at least, as a prime example of a modern Chinese enterprise (L. Feng, 2004).

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<sup>73</sup> Beijing Institute of Hydropower Survey and Design (*Beijing Shuili Shuidian Kance Sheji Yuan*).

The Dachaoshan station was built by the (State-Invested) Yunnan Dachaoshan Hydropower Company, Ltd.,<sup>74</sup> branded as the first large-scale hydropower company in China organized according to modern corporate standards ("Loans granted for Yunnan hydropower station construction," 1997; Peng, 2003). Those standards were defined as "construction and management together, production and distribution separate, independent management, and self responsibility for profits and losses" (Peng, 2003). Established as a stock company in November 1994, the company was the result of a four-way inter-industry partnership, also the first of its kind in China, involving the State Development Investment Corporation, Yunnan Hongta Investment Co., Yunnan Province Development Investment Company, and the Yunnan Electric Power Company, with shares in the ratio of 5:3:1:1 (Yunnan Dachaoshan Hydropower Co., 2003).<sup>75</sup> According to the company's general manager, Feng Lisheng (quoted in Peng, 2003),

The benefits [of developing a new system to finance large dam development in Yunnan] were apparent from the beginning. In 1997, the country was in the midst of making economic adjustments, and no large hydropower project in the country had been approved. If we had followed the path of the planned economy [to develop Dachaoshan], there would not have been funding support. So at the time, Yunnan Province approved the establishment of the Yunnan Dachaoshan Hydropower Company.

The initial registered capital of Yunnan Dachaoshan Hydropower Company was 1.77 billion Yuan, compared to Dachaoshan's total projected cost in 2002 of 7.7 billion Yuan ("Lancang Jiang shuidian kaifa licheng," 2002), and the final actual cost of 8.87 billion

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<sup>74</sup> (*Guotou*) Yunnan Dachaoshan Shuidian Youxian (*Zeren*) Gongsi. The words *Guotou* (state-invested, representing State Development Investment Corporation) and *Zeren* (liability) are frequently omitted.

<sup>75</sup> The Chinese names of the four investors are: *Guojia Kaifa Touzi Gongsi*, *Yunnan Hongta Shiye Youxian Zeren Gongsi*, *Yunnan Sheng Kaifa Touzi Gongsi*, and *Yunnan Sheng Dianli Gongsi*.

Yuan.<sup>76</sup> The State Development Bank granted the company a loan for some 4 billion Yuan for the project in 1997.

The leadership of the Dachaoshan Company, not surprisingly, are all CCP members. In addition, most of them, like the majority of workers, were involved with the Manwan project. The company's governance consists of a board of stockholders, board of directors, board of supervisors, and board of managers, with each in principle having limited and complementary responsibilities and authority. The board of directors includes four representatives from the State Development Investment Corporation, two from Hongta, and one each from Yunnan Province Development Investment Company, Yunnan Electric Power Company, and the Dachaoshan company. In interviews with several people within the hydropower industry and familiar with the restructuring of the electric power industry in recent years, I often asked what the role of the Party Committee was in an enterprise allegedly reoriented toward market incentives and profit-seeking activities. I would also ask how (if at all) that role had changed since the time of the "classic" state-owned enterprises (i.e., before the enterprise was restructured as a stock company in which, theoretically at least, someone other than the State Assets Supervision and Administration Commission could own a controlling share of the company's stock). The responses were inevitably similar; most claimed that the Party Committee remained in the company to provide "overall guidance" while staying out of the quotidian affairs of management and operation.

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<sup>76</sup> See the Dachaoshan company website at <http://www.yndcs.com.cn/display.asp?fileid=1920>.

**Xiaowan**

The third Lancang dam is currently under construction and expected to be completed sometime between 2010 and 2012. Xiaowan is located 70 km upstream from Manwan on the border of Nanjian County in Dali Bai Autonomous Prefecture, and Fengqing County in Lincang District. As with the other Lancang hydropower dams, Xiaowan was designed by the Kunming Institute of Hydropower Survey and Design. Work on the station began in January 2002 (Dali Baizu zizhizhou difangzhi bianzuan weiyuanhui bangongshi, 2003; "Lancang Jiang shuidian kaifa licheng," 2002). The first generation unit was originally scheduled to come online by the end of 2009, later revised to 2010 (China Power Supply Information Network, 2003), and the entire station is expected to connect to the Yunnan grid sometime in 2010 ("Xiaowan shuidian zhan,"). Described as a symbol of Yunnan's realization of western development, it will be the highest arch dam under construction in the world at 292 m, with a reservoir of more than 15 billion m<sup>3</sup> (Chinese National Committee on Large Dams, 2003).<sup>77</sup> Aside from generating electricity, Xiaowan's other principal purpose is to provide more regular flows downstream. According to the chief engineer of the development company, such reductions in the difference between rainy- and dry-season flows will "help with irrigation and navigation in the lower reaches" (by increasing dry-season flow volumes) and improve flood diversion work downstream (Liang Chen, 2002). Regularized flows will also guarantee the ability downstream dams to generate electricity in times of peak

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<sup>77</sup> In comparison to mega-dams in the United States, this is a little less than half the volume of Lake Mead's 35 billion m<sup>3</sup>, the impoundment behind the Hoover (Boulder) Dam on the Colorado River, and about 27% more than that of Franklin Delano Roosevelt Lake behind Grand Coulee Dam on the Columbia River.

demand (X. Yang, 1998).<sup>78</sup> This has earned Xiaowan the moniker of “Dragon’s Head” (*longtou*) for the lower Lancang cascade (“Lancang Jiang shuidian kaifa licheng,” 2002). One industry publication claims that Xiaowan’s ability to store massive quantities of water (potential energy) from wet season to dry will increase the output of Manwan and Dachaoshan some 2 billion kWh per annually (Zhu, 2002).

Xiaowan was the first major dam undertaken in the midst of electric power industry reforms in 2002. The reforms had begun in 1997 with the restructuring of the Ministry of Energy into the State Power Corporation of China, effective January 1, 1998. The State Council, in announcing the change, argued that it represented yet another important step in the modernization of the electric power industry designed to separate politics from management and align power generation and distribution toward maximization of profit and efficiency. In January 1999, the Lancang River Hydropower Development Company, Ltd. was formed in a fashion similar to that of the Dachaoshan company. Investors this time were the State Power Corporation, Yunnan Electric Power Group, Yunnan Development Investment Corporation, and the Hongta Group, with an investment ratio of 29:31:28:12, respectively (Yunnan Nianjian Zazhi She, 2000, p. 174). As early as 1988, such a plan for diversified investment in Xiaowan had been underway: the “Two Provinces, Four Sides Agreement,” signed in June 1988 stipulated that Guangdong and Yunnan would jointly develop Xiaowan, and that the same sort of partnership would later be used in the development of Nuozhadu (X. Yang, 1998).

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<sup>78</sup> According to Yang, an engineer at the Yunnan Electric Power Company (now the Yunnan Power Grid Company), Xiaowan’s ability to harmonize seasonal flows will increase the efficiency (generation per unit of water) of Manwan and Dachaoshan to 98% and 95%, respectively. See also (“Lanchang (sic) river blocked for power project,” 1997)

The second key moment in this phase of electric power industry reforms came in December 2002 when the State Council announced that the generation and distribution assets of the erstwhile State Power Corporation would be separated. Thus power generation stations (*chang*) would be managed separately from power distribution grids (*wang*) in a process known as “separation of generation from distribution” (*changwang fenkai*). This resulted in the creation of five national power generation corporations and two grid corporations.<sup>79</sup> One of these corporations, China Huaneng Group,<sup>80</sup> was given development rights over the Lancang basin by the State Council. Huaneng assumed control of the assets of the Lancang River Hydropower Development Company through a restructuring operation that involved the merger of the Lancang River Hydropower Development Company and the Manwan Power Generating Company. The general manager of the Huaneng Group is Li Xiaopeng, son of former Premier Li Peng, himself trained as a hydroelectric engineer.<sup>81</sup> Huaneng’s Yunnan subsidiary, Hydrolancang,<sup>82</sup> now holds all assets of the two former companies, as well as the right to developing Xiaowan and the rest of the Lancang cascade. Interestingly, the capitalization structure of Hydrolancang consists of investments from Yunnan Huaneng Group, Yunnan Province Development Investment Corporation, and Yunnan Hongta Group in a ratio 56%, 31.4%,

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<sup>79</sup> See further discussion in Chapter Seven.

<sup>80</sup> *Zhongguo Huaneng Jituan Gongsi*.

<sup>81</sup> Li Peng is usually credited (or blamed) for being the primary motivation behind Three Gorges. Florence Padovani at the Shanghai Academy of Social Sciences has conducted research into the welfare of resettled villagers from the Three Gorges area, particularly on those who ended up near Shanghai. She found that the resettled villagers referred to themselves as Li Peng’s migrants, thereby seeking to claim legitimacy for their complaints of unjust treatment in their new villages, where they often do not speak the local language and lack familial and other networks (Padovani, 2004).

<sup>82</sup> Hydrolancang is the company’s shortened English name. The full name of the company is Yunnan Huaneng Lancang River Hydropower Company, Ltd. (*Yunnan Huaneng Lancang Jiang Shuidian Youxian Gongsi*).

and 12.6% (Y. Zhang & Zhu, 2004), quite different from that of the original holding company for Xiaowan. A quick glance shows that the fourth investor in the original company, the Yunnan Electric Power Group, is no longer present as an investor by the time Hydrolancang, child of the reforms, arrives on the scene. This is most likely due to the *chang-wang* (generation-distribution) separation that was mandated between the time the original holding company and the second one were established, and the fact that the majority of the Yunnan Electric Power Group's assets were power transformation and distribution infrastructure rather than large-scale generation infrastructure. In fact, the Yunnan Electric Power Group officially changed its name in November 2004 to the Yunnan Electric Power Grid Company, ostensibly further affirmation of the *chang-wang* separation (Wu, 2004).

Preliminary work began on Xiaowan in 1999, with planning and preparatory work going as far back as the 8<sup>th</sup> Five-Year Plan (1991-1995) ("Wo guo zhongdian shuidian," 2004). The first major infusion of development capital came in 2003 when Hydrolancang signed a loan agreement for 25 billion Yuan, of the total 27.7 billion Yuan estimated total construction cost (China Power Supply Information Network, 2003). Three banks provided the loan guarantee: China Development Bank (15 billion), China Construction Bank (6 billion), and China Industry and Commerce Bank (4 billion). The remaining 2.7 billion was to be provided by the three co-investors of Hydrolancang. Based on interviews with company officials and other individuals familiar with large-scale hydropower development, this ratio conforms with the general pattern of project

capitalization (*jizi*), where 10-15 percent of the initial investment is provided by the developers and the remainder is provided by the national development banks.<sup>83</sup>

Xiaowan will allegedly be a test case for Huaneng's four principles of hydropower development in Yunnan, namely "basin, cascade, rolling, and comprehensive."<sup>84</sup> Here, "basin" (*liuyu*) indicates basin-wide development and reflects the basin-wide development monopolies given the five large development corporations in 2002. "Cascade" (*tiji*) refers to the idea of a stair-step configuration of multiple hydropower stations along one river, some of which (like Xiaowan) have large reservoirs with multi-season or multi-year storage capacity that is expected to provide more predictable generation capacity for the smaller ones downstream.<sup>85</sup> "Rolling" (*gundong*) refers to a development model in which profits and power generated by one station are used to build others in the same area, thereby reducing (theoretically, at least) the ratio of loans necessary to finance each subsequent project. In reality, however, hydropower company officials admit that the amount of profits generated by one dam and reinvested in the next represents only a tiny fraction of the total investment capital.<sup>86</sup> Finally, the specific meaning of the term "comprehensive" is unclear, but it surfaces frequently in the context of large-scale hydropower development and is generally construed as a positive descriptor. Based on extensive interactions with individuals involved in hydropower

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<sup>83</sup> Interview K20050814.

<sup>84</sup> See the Hydrolancang company website at <http://www.hnlcj.cn/newsweb/gsjis.asp>

<sup>85</sup> Despite the seemingly apparent truism that more dams means greater ecological and social impacts, experts (engineers) in the Chinese hydropower construction industry claim the opposite. The logic is as follows: over a given stretch of river with a given vertical drop, there is a certain amount of hydropower that can be exploited. This number is essentially fixed. That potential can be exploited either by a small number of large dams or a large number of small dams. Since smaller dams have smaller reservoirs, the impact to nearby human and ecological communities is thereby lessened.

<sup>86</sup> Interviews K20041123 and K20050814.

development in China, and on hearing certain rhetorical patterns frequently repeated yet rarely clarified, my sense is that the term implies that development will proceed with attention to social and ecological impacts rather than in a chaotic (*luan*) fashion that neglects such impacts. The term also seems to imply that hydropower projects should also provide other benefits such as flood-control, irrigation, river transportation improvement, and (more controversially) sediment blocking ("Wo guo zhongdian shuidian," 2004).<sup>87</sup>

### **Jinghong**

The fourth Lancang project is Jinghong, situated four kilometers north of the capital of the Xishuangbanna Dai Autonomous Prefecture. Original plans for Jinghong called for five 300-MW Francis turbines for a total installed capacity of 1,500 MW (Y. Zhang & Zhu, 2004). Later, however, Hydrolancang (the developer) was reported to have contracted with Harbin Electric Machinery for five 350-MW turbines, which will give the dam a total installed capacity of 1,750 MW ("Qianyue Xiaowan shuidian zhan," 2005). Total initial investment for the project was projected to be 8.159 billion Yuan ("90 yi jianzao Jinghong," 2004), but it is likely that the decision to increase installed capacity will be reflected in the investment outlay. The project was approved by the State Council in April 2004 (Y. Zhang & Zhu, 2004). Following design by the Kunming Institute of

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<sup>87</sup> Aside from uncertainty about how the Lancang dams will impact flow regimes on the lower reaches of the Mekong, the most contentious and least understood issue is the dams' impact on sediment transport. There is no question that dams trap sediment; at issue is the question of how much of the sediment present in the lower Mekong (by the time it reaches Cambodia and Vietnam) originates from within China. Researchers, activists, and politicians downstream are particularly concerned about the potential for reduced sediment in Cambodia's Tonle Sap (Grand Lac) system, which is estimated to provide some 60% of Cambodia's protein. Reduced sediment load will reduce the nutrients available to aquatic ecosystems and thereby potentially harm fisheries and paddy rice cultivation in the area around the Tonle Sap. As of the time of this writing, there is one significant project underway to trace the pathways of water and sediment transport in the Lancang-Mekong system in order to better understand the impacts of the dams.

Hydropower Survey and Design, preliminary work onsite at Jinghong began in 2004, and the river was set to be closed from the dam site northward and upstream from January 6, 2005 after initial damming and diversion of the main channel, to December 31, 2009 ("Zhonghua Renmin Gongheguo Xishuangbanna Haishi Ju," 2004). Jinghong is expected to be completed sometime between 2009 and 2013.

Jinghong was originally designed to be a joint project involving majority investment from Thailand, namely from the GMS Power Company. The September 2000 agreement committed the Thai side to providing 70% of the estimated 10-billion-Yuan investment, and stipulated that all of Jinghong's capacity (1,500 MW at the time) would be designated for providing power for northern Thailand, transmitted via high-voltage transmission lines through Laos, beginning in 2013 ("Nuozhadu shuidianzhan qianqi," 2001; "PRC, Thailand agree," 2000). The Electricity Generating Authority of Thailand (EGAT) would be the purchaser of the power.<sup>88</sup> The interest within Thailand in developing electric power sources outside Thai territory can easily be understood given the already high level of exploitation of power generation resources within Thailand, and the vocal opposition to more large-scale dams following the Pak Mun dam controversy.<sup>89</sup> However, the Jinghong project is currently being built without Thai funding due, among other things, to a speedier timeline than originally specified in the memorandum of understanding between Yunnan and the Thai investors, along with decreased projections

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<sup>88</sup> In this dissertation I do not investigate the inter-agency and company relations in Thailand, though they are clearly relevant to the Yunnan projects on the Lancang, as well as to proposed projects for the Nu-Salween basin, as shown in the following chapter. Thailand's MDX Group, the parent company of GMS Power (formerly MDX Power), was apparently hit quite hard financially during and following the Asian financial crisis in the late 1990s (Kositchotethana, 2000).

<sup>89</sup> Detailed accounts of the Pak Mun controversy and other anti-dam movements in Thailand are numerous (Ishida, 2002; Sneddon, 2003).

of Thailand's future electrical demand.<sup>90</sup> Now, as with the three dams described above, the power generated by Jinghong will be transmitted directly to Guangdong by 500-kV high-voltage lines that will eventually be connected to the Southern China Power Grid ("China's State Council approved Jinghong," 2004). According to one company representative, despite having pulled out of Jinghong, Thai authorities have committed to joint development of Jinghong and Nuozhadu as one combined power generation unit (*yizu dianyuan*).<sup>91</sup> This agreement was apparently made even before the initial Jinghong-only arrangement was cancelled, and called for a three-way allocation of the (then) proposed 5,500 MW capacity of Nuozhadu: 3,000 MW for Guangdong, 1,500 MW for Thailand, and 1,000 MW for Yunnan ("Taiguo kan hao Yunnan," 2002). The Thai investor, GMS Power, has now taken a much less ambitious stance regarding its stake in the joint venture that will co-develop Jinghong and Nuozhadu, committing only to a minority share in the company that reflects the relative size of the Thai market for electricity sales vis-à-vis the south China market (Jianxia Wang & Zhou, 2003). It is unclear how or at what point this share will be determined, but for now, development is being undertaken by Hydrolancang alone, with loans for the majority of funds from the China Industry and Commerce Bank.

### **Nuozhadu**<sup>92</sup>

Nuozhadu, the fifth Lancang hydropower station, is by far the largest of the cascade. With a planned installed capacity of 5,850 MW (six 650-MW turbines), it will

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<sup>90</sup> Interview K20041123.

<sup>91</sup> Interview K20041123.

<sup>92</sup> Due to inconsistencies in pronunciation of the place names in many parts of Yunnan, especially in areas where ethnic minority languages or dialects are commonly spoken, this Nuozhadu is often pronounced and transcribed (in pinyin) as Luozhadu and even Ruzhadu.

have roughly one-third the generating capacity of the Three Gorges Project, and nearly three times the capacity of the Hoover Dam in the United States (C. Li, 2004; "Nuozhadu dianzhan keyan," 2002).<sup>93</sup> The dam site is approximately 100 km upstream from Jinghong on the border of Lancang County (Nuozhadu township) and Simao Municipality. Construction was scheduled to begin in early 2006, with the first turbine coming online in 2012 and the entire project expected to be completed in June 2017 ("Yunnan Simao zai jian," 2004; Zhong, 2003). Excavation of the dam embankments began in December 2004 and was completed in June 2005 (Sinohydro, 2005), with construction of the new cement road to the work following in August 2005 (Sinohydro, 2006). Like the others, design of Nuozhadu is being conducted by the Kunming Institute of Hydropower Survey and Design. Nuozhadu is explicitly expected to send electricity directly to Guangdong via ultra-high-voltage DC (direct current) lines. Current technology in China permits transmission of voltages up to 500 kV, but as the Nuozhadu-Guangdong line will span distances greater than 1,500 km, newer 600-kV (or even 800-kV) technology be required to reduce losses in transmission (L. Li, 2005).<sup>94</sup> According to interviews with experts familiar with power transmission technology, the technological hurdles of constructing such transmission lines are minor, and they are fully confident that the technology will be in place by the time Nuozhadu is completed.<sup>95</sup>

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<sup>93</sup> Three Gorges is designed for an installed capacity of 18,200 MW, while Hoover has just over 2,000 MW.

<sup>94</sup> The author of the source cited here is an engineer with China Southern Power Grid in Guangdong. The physics of power losses are far too complex to explain here, but I do say somewhat more about the technology in the discussion of the power grid system in Chapter Six.

<sup>95</sup> Interviews K20060116a and K20060116b.

As mentioned in the previous section on Jinghong, Nuozhadu is now considered by Huaneng as part of a combined power generation unit in conjunction with Jinghong.<sup>96</sup> Earlier plans for joint Sino-Thai (Huaneng-GMS Power) investment and development of Jinghong alone were shelved, the official reason being that Huaneng/Hydrolancang wanted to move forward with Jinghong at a faster pace than had been previously agreed upon in the memorandum of understanding between the Chinese and Thai parties. The ramifications of Thailand's (GMS Power's) apparently uncertain commitment in terms of investment amount to the Jinghong-Nuozhadu project are unclear, especially in light of that commitment's contingency on future trends in the Thai power market. For the time being all investment funds are still being raised by Huaneng and its subsidiaries alone, and do not involve funds from Thai investors. The most likely explanation for grouping the two stations as one is to further justify Huaneng's solicitation of Thai co-investors in the much larger project – Nuozhadu alone is expected to cost somewhere between 35 billion and 50 billion Yuan.

### **Gongguoqiao, Ganlanba, and Mengsong**

The final three dams in the middle- and lower-Lancang cascade are also the smallest and least developed thus far. As a result there is much less information publicly available about them. Gongguoqiao is actually the first (northernmost and furthest upstream) in the middle Lancang cascade, and is generally considered to mark the beginning of the middle stretch of the river. Ganlanba and Mengsong<sup>97</sup> are slated to be built downstream of Jinghong. The installed capacity of each of these three projects is

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<sup>96</sup> Interview 20041123.

<sup>97</sup> In some texts Mengsong is referred to as Nan'a Hekou dam, in reference to its location at the confluence of the Lancang and the Nan'A, the last tributary to the Lancang before it leaves Yunnan.

one order of magnitude smaller than that of the other ones on the Lancang cascade, and it is clear from Figure 4-2 that their reservoirs are quite small in relation to those of the other five dams. The smaller capacity results primarily from a smaller hydraulic head, or the vertical distance between the water level upstream of the dam and that downstream, over which the water falls and spins power generation turbines. Anecdotal evidence suggests that power from these three dams will be destined for use within Yunnan, specifically in load centers within close range (less than 500 km) from the dams.

Gongguoqiao is located in Dali Prefecture's Yunlong County, an area inhabited predominantly by people of the Bai ethnicity. Planning documents initially called for 750 MW of installed capacity for the dam, though a pre-feasibility study (*yukeyan*) for a 900-MW Gongguoqiao was approved in March 2005 ("Lancang Jiang Gongguoqiao," 2005). An earlier report announcing the start of survey and design work on the power station cited the progress on Gongguoqiao as a harbinger of future development on the upper Lancang (S. Li, 2004). Such expectations may downplay concerns about limited infrastructure in the uppermost reaches of the Lancang within Yunnan, along with the fact that several of the planned upstream dams would fall within UNESCO World Heritage sites (X. Fan, 2005). However, as noted earlier in this chapter, pre-feasibility studies, including substrate sampling and even site preparation, are already underway for several of the upper Lancang dams. Designers claim that building the upper Lancang dams would increase the power generating efficiency of the downstream dams by providing increased regulating capacity, thereby ensuring optimal flows for power generation over greater periods of the year (Xiao, 2002). No date has been set for

completion of Gongguoqiao, but a reasonable estimate would seem to be sometime between 2010 and 2015. Likely load centers for power produced at Gongguoqiao would be the Dali/Xiaguan area and the mining operations in neighboring Lanping County (Nujiang Prefecture).

The electricity produced by Ganlanba and Mengsong, the smallest two dams of the Lancang cascade, will almost certainly be solely for local consumption. The dam sites lie within several dozen kilometers of each other and in close proximity to two southern Yunnan port cities on the Lancang, Jinghong and Guanlei. Ganlanba and Mengsong are slated to have 150 and 600 MW of installed capacity, respectively. A meeting to discuss the draft basin-wide environmental impact assessment (EIA) for the eight Lancang hydropower projects was held in Kunming in November 2004 involving hydropower company representatives, provincial government officials, scientists, and engineers (Q. Cheng, 2004). Canceling the last two dams in the Lancang cascade, namely Ganlanba and Mengsong, had been suggested as early as the mid-1990s as a means for minimizing transboundary ecological impacts, particularly in terms of fish migrations. Meanwhile, some experts argue that those are precisely the dams that should not be cancelled, for they will provide important counter-regulating effects on the flow regime to balance flow changes caused by storage and release from the upstream dams. The topic surfaced again in the 2004 meeting and apparently met with lukewarm reception. Amid all the concern over the impacts of Lancang hydropower development, coupled with various calls to halt construction on the projects altogether, it is ironic that the only ones that would potentially be cancelled are the ones that aim to provide power locally. Cancellation of

both, however, does not seem to be in the cards, as a working group was recently formed to oversee preparatory work for Ganlanba. One of the justifications provided by more than one expert for the importance of the Ganlanba and Mengsong projects is precisely their ability to “smooth out” changes in flow caused by runoff conditions and upstream power generation.

### *Summary*

Table 4-1 provides a summary of the details of each dam in the middle and lower Lancang cascade, with the dams listed from north to south. Some of the data, especially technical specifications such as reservoir volume and installed capacity, have changed since the original plans were drawn up. Many earlier plans cite Nuozhadu’s installed capacity as 5,500 MW, for instance, rather than the 5,850 MW that most recent reports cite. I have attempted to verify with experts all the data cited here, and therefore report them with a high degree of confidence. It is, however, highly likely that some specifics may change over the coming years, especially since some of the projects are still many years from being completed. Appendix B provides details of the upper Lancang cascade as best as they could be ascertained at the time of writing. There is much less publicly available information regarding hydropower development upstream of Gongguoqiao at this point. These data should thus not be considered final or definitive, as I was unable to cross-check them across multiple sources as I did with the lower Lancang projects.

As this chapter has shown, hydropower development on the Lancang has developed at a fast pace over the past two decades, and will most likely continue to do so for the next two. Lancang hydropower is an important case for many reasons, not only

because it occurs on one of Asia's most important rivers (a transnational one at that), but also because of the different socio-historical contexts in which that development has occurred. From the time detailed planning began on the Manwan dam in the mid-1980s to the present, the China's economic system has undergone significant changes overall, and those changes have been no less important with respect to how water and electricity are managed and produced. Most important among these changes was likely the dissolution of the Ministry of Electric Power in 1997, its reincarnation in 1998 as the State Power Corporation of China, and the subsequent break-up of SPCC into five power generation corporations and two power distribution corporations. All this occurred under the banner of enterprise modernization (*qiye xiandaihua*), corporatization (*jituanhua*) and capitalization through transition to a stock system (*gufenzhi*). As we shall see in the next chapter, development on the Nu River, though still in preliminary stages with only surveying and design work underway, is unfurling in a socio-historical context that is in some ways entirely new. This is especially true of the degree to which the dams have been contested in an open fashion that seems to be having some impact on the manner, or at least the pace, in which Nu hydropower development will unfold.

Table 4-1: Details of middle and lower Lancang hydropower cascade

Dam Name	Installed Capacity (MW)	Annual Output (Twh)	Start Date	End Date	Dam Height (m)	(Est.) Cost (Billion Yuan)	Reservoir Volume (billion m <sup>3</sup> )	Abbreviation (Map 4-3 & Fig. B-1)
Gongguoqiao 功果桥	750	4.060	2006-2007	2010-2015	130	3.8	0.51	GGQ
Xiaowan 小湾	4,200	18.89	January 2002	2012	292	22.3 to 27.7	15.13	XW
Manwan 漫湾	1,500	7.805	May 1986	1995	132	3.4	1.06	MW
Dachaoshan 大朝山	1,350	6.70	August 1997	October 2003	120.5	8.9	0.88	DCS
Nuozhadu 糯扎渡	5,850	23.684*	End of 2005	2017	260	35.3	22.74	NZD
Jinghong 景洪	1,750	7.931	2004	2009-2013	107	17	1.23	JH
Ganlanba 橄榄坝	150	0.899	?	?	?	0.6	?	GLB
Mengsong 孟宋	600	2.888	?	?	65	2.2	?	MS

\*This figure was based on an installed capacity of 5,500 MW rather than 5,850 MW, so the final output would likely be higher.

Source: Magee (2006b)

## Chapter Five: Nu River Case Study

### *Introduction*

Aside from the Three Gorges Project, the proposals to develop a series of 13 hydropower stations on the Nu River (upper Salween) in western Yunnan have garnered the most attention in China and abroad of all hydropower projects in China. Even hydropower company officials admit that the Nu is one of the few remaining “undeveloped” and “virgin” rivers in China,<sup>98</sup> and a host of organizations and programs have sprung up to protect and preserve one of the world’s most biologically and ethnically diverse areas. As in the case of the Lancang dams, project opponents are vehemently opposed to perceived unilateral development on the Chinese stretch of the river for fear of negative socio-ecological impacts downstream and in the immediate area of the dam sites. Opponents within China claim that hasty and profit-driven development on the Nu would threaten fisheries, force resettlement of numerous ethnic minority communities, spoil an area rich in biodiversity and much more suited to less destructive development centered around industries such as ecotourism (X. Fan, 2005; Y. Ma, 2005). As with the Lancang dams, supporters in government and industry claim that the Nu River projects would bring much needed economic development opportunities to local communities, and insist that they be implemented as soon as possible (Y. Ma, 2005; “Nujiang zhongxiayou shuidian,” 2003). One recent report noted that the local government currently depends wholly on central government subsidies, making local

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<sup>98</sup> Another is the Dulong (D’rung), or upper Irrawaddy River, the westernmost river in Yunnan, only a small portion of which actually flows through the province. While there is some discussion of developing medium-scale hydropower on that river, there has been no discussion as far as I am aware (at the time of writing) of developing large-scale hydropower there.

officials highly supportive of large economic development projects such as the hydropower cascade that promise large and long-term revenues ("Huanjing yali," 2006).

A significant difference in the Nu and Lancang cases, however, lies in the fact that the political and institutional climate surrounding the Nu projects is much more open and pluralistic than it has been in the case of the Lancang projects. Dam development on the Lancang is, I argue, seen by many as a *fait accompli*, and even the upper Lancang projects deemed "less attractive" as described in the previous chapter have caused much less public outcry than their Nu counterparts. However, the case of the Nu is different. Recent publicity in the Chinese media regarding unrest over unfair compensation for land committed for dam development in Sichuan, central government mandates instructing provincial governments to solicit input from academic and social institutions regarding economic development projects, and draft laws requiring public participation in environmental assessments, have all built up expectations among domestic and trans-national social organizations, academics, activists, and even certain government officials at various levels, that large-scale hydropower development on the Nu can be affected and modified, if not outright prevented, in much more significant ways than on the Lancang ("Hu Jintao Wen Jiabao jiu Hanyuan," 2004; "Sheng Zhengxie weiyuan," 2004; Sun & Liu, 2006). In addition, the State Environmental Protection Administration has shown an increasing willingness and ability to intercede in the construction of projects deemed not in compliance with new environmental regulations (L. Ma, Liao, & Lai, 2005). In Chapter Seven I further explore these dynamics by analyzing the institutional and political economic context in which they occur, paying special attention to the

mechanisms by which academic and social organizations are able to participate in the decision-making process regarding the Nu River hydropower development. In this chapter, however, I focus on the specifics of the Nu projects and context, including the geography of the watershed, as well as details of the planned Nu River cascade.

International news media coverage in early 2004 increased the international profile of the Nu projects (Yardley, 2004a, 2004b). Combined with the work of activists and academics in China who opposed the projects for various reasons, such attention led to Premier Wen Jiabao's decision to call for a halt to the projects in March 2004. As justification for the moratorium, Wen claimed that proper procedures regarding environmental and social impact assessments had not been carried out by the parties planning to develop the dams, and insisted that a proper assessment of such impacts come before dam development should proceed. Shortly after this decision, however, local officials near the dam site and officials with Huadian, the parent company of the joint venture responsible for development of the Nu projects, claimed to know of no change in construction plans, and insisted that the project would go forth as originally planned ("China's premier reportedly orders restudy," 2004; "No Conclusion Drawn," 2004). Several weeks later, Hong Kong media reported that the National Development and Reform Commission would most likely approve a scaled-down version of the project that included only four of the original 13 dams. Now, nearly two years later, this does indeed seem to be the outcome of the Nu debate; four of the dams that had the greatest "consensus" have been given approval as of March 2006, while the remaining nine will

be further studied. Details of the individual projects are provided later in this chapter, and the decision processes leading to the decision are discussed in Chapter Seven.

### ***Geography of the Nu Watershed***

Like the Lancang, the Nu has its headwaters in the Qinghai-Tibet plateau, and flows some 2,015 km before leaving China through Yunnan's border with Myanmar. There, it becomes the Salween for another 800 km or so, running through the Myanmar states of Kayan and Mon, then briefly forming the border between Myanmar and Thailand before emptying into the Gulf of Martaban.<sup>99</sup> The Yunnan reach of the river stretches 621 km (X. Li, 1998; Shengyue Wang, 2002; D. Zhou & Zhang, 2003, p. 206),<sup>100</sup> throughout which it runs southward, paralleling the Gaoligong Mountains in western Yunnan for much of the way, just a stone's throw away from the Myanmar border.<sup>101</sup> Upon entering Yunnan, the first 50 km or so of the river passes through a UNESCO World Heritage Area that has seen much NGO work focused on rural energy alternatives and cultural preservation issues. The mainstream Nu's theoretical hydropower potential in China is estimated to be 36,400 MW (D. Zhou & Zhang, 2003; P. Zhou, 2003), which arises from the river's natural drop of 4,840 m over its entire course (Huang, 2004, p. 286). Exploitable potential of the Yunnan stretch, over which the river drops 1,116 m, is estimated to be some 21,000 MW (D. Zhou & Zhang, 2003, p.

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<sup>99</sup> The *Almanac of China's Water Power* (D. Zhou & Zhang, 2003) notes the river's length in China as 2,018 km, whereas another source (Huang, 2004, p. 286), citing the earlier *Yunnan Provincial Almanac: Water Resources Volume* (X. Li, 1998), sets it at 2,013 km.

<sup>100</sup> Another source sets this figure at 618 km (Statistical Bureau of Yunnan Province, 2004, p. 11).

<sup>101</sup> Throughout this chapter and the entire dissertation, I have adopted the convention of hydropower plans for the Nu and intend the "Yunnan portion" or "Yunnan reach" of the Nu to include about 20 km of the river just north of the border in Tibet, to the northernmost project planned at Songta. Within China, the Nu is divided into three reaches, the upper (from the source to the Tibet county of Seyida), middle (from Seyida to Nujiang Prefecture's town of Liuku), and lower (from Liuku to the Yunnan/Myanmar border).

201).<sup>102</sup> This is some 3,000 MW more than the installed capacity of the Three Gorges Project, and more than three times that of Grand Coulee Dam's 6,465 MW in the United States. Current plans call for developing 21,320 MW of installed capacity on the Yunnan stretch of the Nu (including Songta on the Tibetan side), with an estimated annual output of 102.96 TWh, slightly more than that of the lower eight Lancang dams (see Chapter Four) (Qiping Chen, Liu Liu, & Ying Zhang, 2005).

In Yunnan, the Nu flows through or along four prefecture-level administrative areas and ten county-level administrative areas, entering the province from Tibet through Nujiang<sup>103</sup> Lisu Nationality Autonomous Prefecture and leaving Yunnan (and China) through Baoshan Municipality's Luxi County (Maps 5-1 and 5-2). The river drains 7,906 sq km in Nujiang Prefecture alone (P. Zhou, 2003). Its drainage area for Yunnan Province as a whole is an estimated 33,366 to 45,500 sq km,<sup>104</sup> around half the area drained by the Lancang in Yunnan, and some 124,830 sq km over its entire course in China (Huang, 2004, p. 286; D. Zhou & Zhang, 2003, p. 206). In the upper reaches of the Nu (outside Yunnan), glacial melt is the primary source of runoff into the river; within Yunnan, however, monsoonal rains provide most of the runoff, with annual peak flows occurring around August. Average annual rainfall in northwest Yunnan is around 1,000

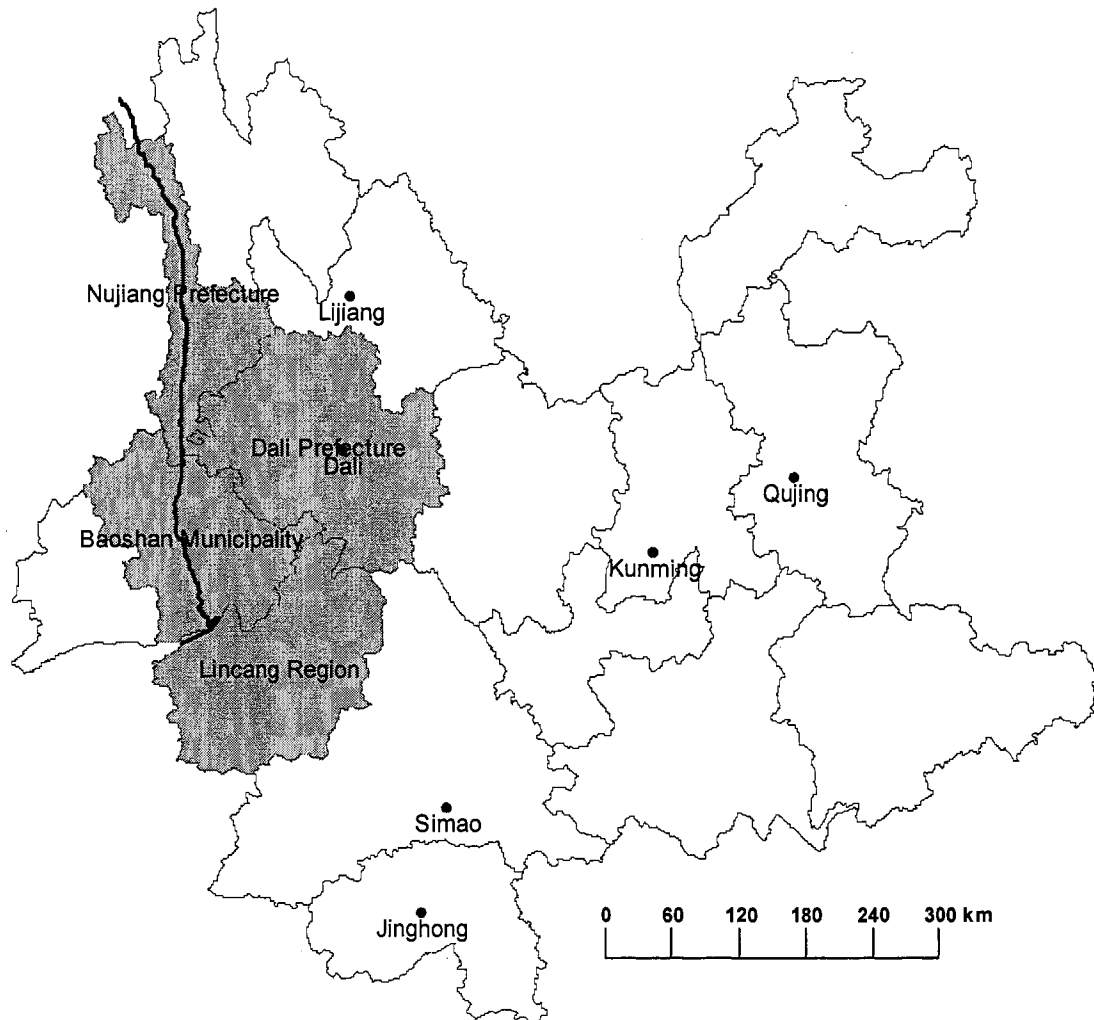
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<sup>102</sup> Estimates of exploitable (i.e., economically feasible) potential of the stretch of the Nu within Yunnan (not including Songta on the Tibetan side) vary dramatically. Hydrological surveys performed in 1980 estimated this figure to be a mere 10,000 MW, barely more than half of the 17,120 MW that Huadian plans to construct on that stretch of the river (D. Zhou & Zhang, 2003, pp. 201 & 206).

<sup>103</sup> Nujiang literally translates to Nu River (*jiang*=river), but the prefecture is generally referred to in English as Nujiang Lisu Nationality Autonomous Prefecture.

<sup>104</sup> The Yunnan Statistical Yearbook (Statistical Bureau of Yunnan Province, 2004) lists the Nu watershed area as 33,366 sq km, while a provincial geographic survey text (Shengyue Wang, 2002) lists it as 44,500 sq km.

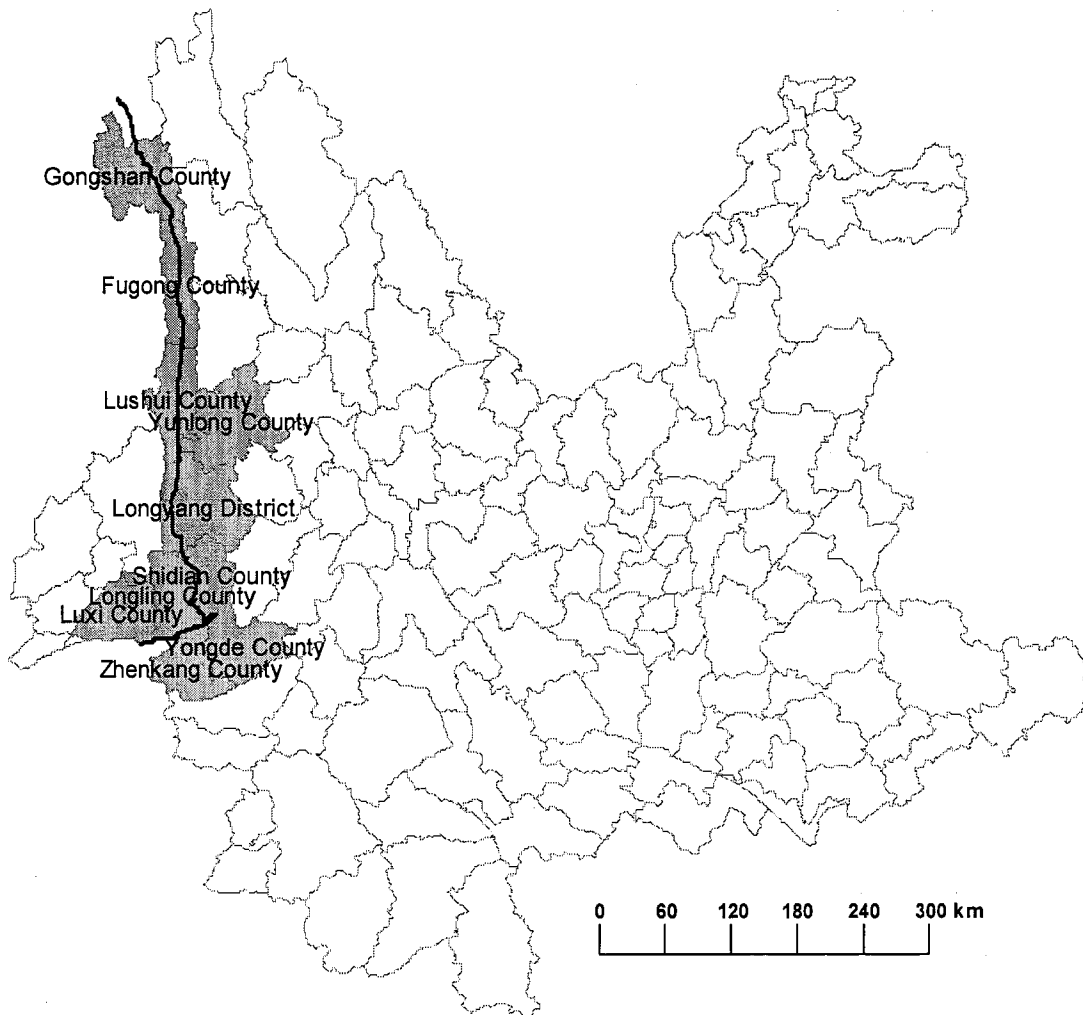
mm per year, with the northwesternmost county of Gongshan receiving upwards of 1,600 mm per year at times (Shengyue Wang, 2002, p. 633).<sup>105</sup>



**Map 5-1: Prefecture-level administrative areas along the Nu**

<sup>105</sup> The figures of 1,000 mm and 1,600 mm of annual precipitation are comparable to the 30-year precipitation averages for the U.S. cities of Washington, DC (999 mm) and West Palm Beach, Florida (1559 mm) receive, respectively. The 30-year average for Seattle is approximately 942 mm. For more information, see the National Oceanographic and Atmospheric Administration website at <http://www.ncdc.noaa.gov/oa/climate/online/ccd/nrmppcp.txt>.

The population of the Nu watershed within Yunnan is approximately four million (He, Yang, & Feng, 1999, p. 30), with some 492,000 in Nujiang Prefecture ("Sheng Zhengxie weiyuan," 2004). Like the Lancang watershed, most of the settlements are quite poor; in 2004, all four counties of Nujiang Prefecture were listed as national-level impoverished counties (*guojiaji pinkun xian*), and some 57,000 households were reported to be living in shelters made of straw and sticks ("Sheng Zhengxie weiyuan," 2004). Nujiang Prefecture alone is home to 22 ethnic minority groups, out of the total of 25



Map 5-2: County-level administrative areas along the Nu

represented in Yunnan and 55 in the whole country.<sup>106</sup> Mountains with slopes greater than 25 degrees make up some 75% of the prefecture's land area, leaving limited flat land available for cultivation. The Grain-for-Forest policy (*tuigeng huanlin*), a component of the Tenth Five-Year Plan that paid subsidies to villagers not to farm slopes greater than 25 degrees in order to reduce deforestation and erosion, has placed even greater pressures on area residents seeking livelihood security on the steep hillsides of Nujiang Prefecture. It is not surprising, then, that calls for large-scale hydropower in the area are justified first and foremost as a means – indeed, the only means – for alleviating poverty and changing the “centuries old” cycle of poverty, slash-and-burn agriculture, and environmental degradation. A 2003 report prepared by the Beijing Institute of Hydropower Survey and Design and the East China Institute of Hydropower Survey and Design (Zhejiang), which were given responsibility for planning the Nu cascade, claimed that the cascade and its economic spin-offs, including those stemming from “replacing firewood with electricity” (*yi dian dai chai*) would yield 440,000 to 450,000 long-term employment opportunities in Nujiang Prefecture alone (Yaohua He & Jianming Feng, 2004; “Toushi Nujiang shuidian,” 2004). This is quite an astonishing figure when compared to the prefecture's population of 492,000, and one journalist's interviews hinted at much greater degrees of skepticism among villagers about such claims (Y. Wang, 2006). In an internal document stemming from a closed conference on hydropower development and environmental

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<sup>106</sup> The figure of 26 ethnic minority groups for Yunnan only counts groups numbering more than 5,000 individuals in the province. If this constraint is removed, a full 51 of China's 55 recognized minorities are represented in Yunnan (Shengyue Wang, 2002, p. 281).

protection in the Three Rivers area,<sup>107</sup> one expert from the Chinese Academy of Social Sciences suggested that a portion of the displaced migrants be allowed to leave the fields, implying that they be resettled in urban areas. This would most likely require they be granted urban *hukou*<sup>108</sup> status. Claims of large-scale employment benefits<sup>109</sup> and urban residency status such as these are frequently deployed by supporters of hydropower in prefectural and provincial government circles, as well as by scholars who agree with the view that hydropower development is the only development path for the Nu River gorge.

As in discourses of China's western development as a whole, scientists and officials generally attribute the persistence of impoverished conditions to such factors as the poor quality (*di suzhi*), backward behaviors (*luohou xingwei*), and lagging scientific and cultural development (*kexue yu wenhua daihou*) of the ethnic minorities in the area. Slash-and-burn agriculture is also frequently implicated in the Nu River gorge case, but rarely does one find any attempt to engage with broader political economic processes and pressures that might have an impact on localized economic decisions.

### ***Details of the Nu Cascade***

According to original plans drawn up by the (then) State Planning Commission, hydropower survey and design for the Nu was to be undertaken jointly by two institutes,

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<sup>107</sup> This designation refers to the area in northwestern Yunnan through which the Nu, Lancang, and Jinsha (Yangtze) all pass within close proximity of each other. A 1.7 million ha portion of this area was awarded UNESCO World Heritage status in 2003 as the Three Parallel Rivers Protected Area. Concerns about the impact of dam development on this area are alternately raised by environmentalists and downplayed by hydropower proponents.

<sup>108</sup> A *hukou* is a household registration permit that functions as an internal passport and is used to monitor and control population movement. An urban *hukou* entitles the bearer to certain benefits such as education. For a rural resident, obtaining an urban *hukou* is almost impossible. For more information on the *hukou* system, see Chan (1994; 2001) and Chan & Zhang (1999).

<sup>109</sup> The ability of villagers with little or no formal training to qualify for these jobs is questionable.

the Beijing Institute of Hydropower Survey and Design and the East China Institute of Hydropower Survey and Design (Zhejiang). Whereas fairly detailed plans for the Lancang cascade had been drafted in the 1980s, similar plans for the Nu were not begun until 1995, and were completed only in July 2003 when they were submitted as the "Middle and Lower Nu River Hydropower Planning Report" ("Huanjing yali," 2006; "Nujiang zhongxiayou shuidian," 2003). Supporters cite several practical advantages of developing large-scale hydropower on the Nu River, most importantly the river's steepness and the relatively small number of people who will have to be resettled due to reservoir flooding, estimated at some 50,000 (Yaohua He & Jianming Feng, 2004; "Toushi Nujiang shuidian," 2004, p. 10). Development costs are also expected to be low relative to other large hydropower projects, which will then presumably result in low prices per kilowatt-hour of electricity sold to the grid and, in turn, to end users (Yaohua He & Jiankun Feng, 2004). Figure 5-1 at the end of this chapter shows the approximate layout of the Lancang cascade, including dam elevation (above sea level) and placement (linear distance) along the river. There remains a degree of uncertainty regarding exact siting of individual dams; a field report by journalist/activist Wang Yongchen in April 2006 cited interviews with engineers who said they had already tested and abandoned two potential sites for the 307-m-high Songta dam, the uppermost of the Nu cascade. Both sites had turned out to be geologically inadequate for such a large project due to the thick layer (up to 10 m) of debris in the gorge that had accumulated from millennia of landslides. (Y. Wang, 2006).

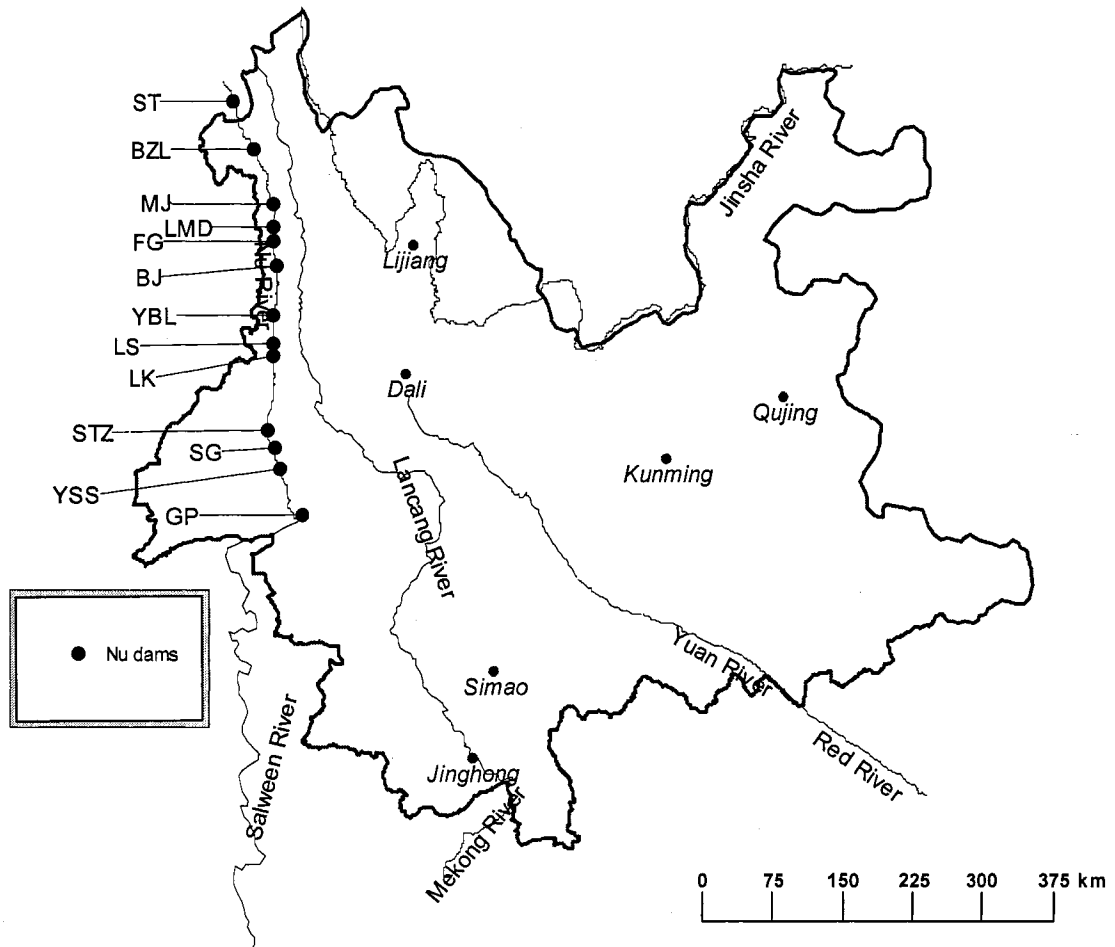
Since the Nu projects are much more recent than their Lancang predecessors, there is relatively less information publicly available regarding them. The sensitive and controversial nature of the projects is no doubt also partly responsible for the relative scarcity of data available. I attempt here to paint as complete a picture as currently possible about the 13-dam cascade, but it will be clear from the start that this section differs significantly from the section in Chapter Four detailing the Lancang projects. This is due partly to limited data availability, and partly to the fact that the organizational and institutional environment surrounding the Nu projects is in many ways simpler than that of the Lancang projects. From the time work first began on Manwan dam in the mid-1980s to the present, the Ministry of Electric Power was restructured into the State Power Corporation of China (1998), and then later (2002) into five mega-corporations responsible for developing large-scale hydropower around the country.<sup>110</sup> The planning, financing, and construction of the first three Lancang dams during that period each took place in a different institutional setting. Initial calls for a 13-step cascade project on the Nu came as early as 1995 (G. Wei, 2005). Yet serious planning work on the Nu cascade did not begin until 2001, and even though preliminary work such as substrate surveying and site identification has been underway for nearly two years, actual construction of the dams has not yet officially begun.<sup>111</sup> As a result, much of the rearrangement and restructuring that occurred over the early years of the Lancang projects has not occurred (and likely will not) over the course of the Nu projects.

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<sup>110</sup> More detail on industry restructuring is provided in Chapter Seven.

<sup>111</sup> In an interview in April 2006, I was told that some work had in fact begun on the abutments of the dams at Songta (on the Tibetan side) and several other projects, despite the fact that the projects have not officially been given approval to start construction.

Rather than proceed, then, by providing limited detail on each dam in its own subsection, I have chosen instead to divide this section into two subsections: one on the four dams that seem most likely to be approved, and another on the nine that are still under “cautious and careful study” (Qiping Chen et al., 2005; B. Cheng, 2004b). Map 5-3 indicates the approximate locations of the Nu hydrowater projects. Table 5-1 at the end of this chapter summarizes basic facts about each dam, including abbreviations.



Map 5-3: Approximate locations of Nu dams

It is important to note here that despite my grouping of the projects as “likely” and “still under consideration,” there is generally little consensus or certainty at this

moment as to the final fate of the Nu cascade. While it is fairly likely that Liuku (described below) will proceed, it is a relatively small project (compared to the rest of the cascade), and does not guarantee that the others will follow. In addition, reports from within the Nu gorge paint a picture of great uncertainty even among local officials, some of the strongest advocates and supporters of the dams. Ironically, the greatest degree of certitude thus far has come from a group of pseudo-experts like He Zuoxiu, Lu Youmei, and Fang Zhouzi. Aside from Lu Youmei, former general manager of the Three Gorges Project Corporation, none of these scholars has any particular expertise in hydropower development, ecological protection, poverty alleviation or other fields relevant to the Nu projects, but all have made a reputation for themselves in China as scholar-mercenaries with strong political connections in the central government, who are willing to “debunk” any science that does not agree with current policy directions or political leanings.<sup>112</sup>

### **Testing the Waters with Four Projects**

As noted above, detailed planning for the Nu River cascade did not begin until 2001, and was carried out jointly by two hydropower design institutes in eastern China rather than the Kunming Institute of Hydropower Survey and Design in Yunnan, which did most of the Lancang work. Survey and design, like all other facets of hydropower dam development and construction since industry reforms, is usually subject to a bidding process, though considerations other than “the bottom line” no doubt come into play just as they would in subcontractor bidding processes around the world. Premier Wen

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<sup>112</sup> He Zuoxiu and Lu Youmei are members of the prestigious Chinese Academy of Sciences and Chinese Academy of Engineering, respectively. Fang Zhouzi earned a doctorate in the United States and since his return to China has become a self-styled critic of what he calls junk science. I say more about such scholars, and the role of academic institutions more generally in decision making, in Chapter Seven.

Jiabao's call for the suspension of work on the Nu dams in early 2004, amidst highly vocal domestic and international opposition to the projects, came as a surprise to many and a cause for celebration for environmentalists and civil society organizations in China who had clamored for more transparent decision making and public release of the estimates of social and environmental impacts of the projects. While it is unlikely that any of the Chinese domestic groups opposing the projects truly felt they would be able to stop them completely, there was a clear atmosphere of optimism among environmentally-minded Chinese that the Nu projects might represent a turning point in the way "development" is pursued in China.

Now, of the 13 dams originally outlined for the middle and lower Nu, two are reported to have been approved in early March 2006, one of which was the cascade's smallest dam, Liuku (J. Ma, 2005). At 180 MW installed capacity, Liuku qualifies as a medium-sized dam by the power-based standards used in China, and will almost certainly be used for supplying power to local load centers in southern Nujiang Prefecture and northern Baoshan Municipality. The dam, the design for which was originally commissioned by the local government and carried out by the Kunming Institute of Hydropower Survey and Design,<sup>113</sup> is located 5 km north of the town of Liuku, the county seat of Nujiang's southernmost county Lushui. Since the announcement of the first two Nu projects' approval, which was apparently shared with news reporters by the Minister of Water Resources Wang Shucheng during a conference in Beijing, two other

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<sup>113</sup> Interview K20050126. As I discuss in Chapter Six, design for individual hydropower stations supposedly follows the development for the comprehensive plan for a river (done by the responsible basin/watershed commission). I regret that the interviewee did not clarify the meaning of "local," but I expect the intent was provincial rather than prefectural or below. I was unable to confirm this through follow-up communications.

Nu River projects seem to have gained tentative approval by the National Development and Reform Commission and the State Council, making it likely that work on four Nu dams – Liuku, Saige, Yabiluo,<sup>114</sup> and Maji will have begun by the end of 2006.<sup>115</sup>

According to Middle and Lower Nu River Hydropower Planning Report, submitted to the National Development and Reform Commission in July 2003, those four projects, along with Bijiang, Lushui, and Yansangshu are to be completed between 2015 and 2020 (Yaohua He & Jiankun Feng, 2004). The company responsible for Nu hydropower development recently made a visit to the Beijing-based Institute for Water Resources and Hydropower Research (IWHR) to discuss turbine design for the 1,000-MW Saige station in Baoshan Municipality, suggesting that it may soon be underway as well (IWHR Office, 2006).

The remaining two dams on which ground will most likely be broken in 2006 are Yabiluo and Maji, both located in Nujiang Prefecture. Planned installed capacities for the two dams are 1,800 MW and 4,200 MW, respectively. Given the size of the dams relative to the population and level of industrial development of Nujiang Prefecture, it is clear that these, like most of the Nu and Lancang projects, are destined to be major electric power sources for the Send Western Electricity East (*xidian dong song*) and Send Yunnan Electricity Out (*Yundian waisong*) projects. As shown in Chapter Six, official policy confirms this.

Two of the 13 Nu dams – Songta and Maji – were designed to have major reservoirs similar to Xiaowan and Nuozhadu. As with the Lancang cascade, the large

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<sup>114</sup> Sometimes spelled Abiluo.

<sup>115</sup> Confidential source on file with author.

reservoirs would enable yearly (multi-seasonal) regulation; that is, Songta and Maji would be able to store massive quantities of water during the rainy season that could be released during the dry season in order to guarantee near-continuous power generation by downstream dams even when flow volumes from rainfall runoff would otherwise be insufficient. The fact that Maji is among the four projects that have been given the tentative green light, while permanent work camps are already in place at the Songta site,<sup>116</sup> does not bode well for those who hope only the initial four projects will be developed. A report in late 2004 claimed that Songta would likely be one of the projects approved in a “slimmed-down version” of the Nu development plan (Cheung, 2004). Once Songta and Maji are built, the economic logic of filling in the gaps by building the smaller projects downstream of the two major reservoir dams will only be strengthened.

Yunnan Huadian Nujiang Hydropower Development Company,<sup>117</sup> a subsidiary of China Huadian Group, holds development rights on the Nu River. China Huadian Group is one of the five corporations split off from the former Ministry of Electric Power cum State Power Corporation of China. The Yunnan subsidiary was formed on June 14, 2003 through joint investment from four entities: China Huadian (51%), Yunnan Development Investment Corporation (20%), Yunnan Electric Power Group (19%), and Yunnan Nujiang Electric Power Group (10%) (“Huadian Jituan kaifa Nujiang,” 2004). The company’s registered capital upon its establishment was 200 million Yuan, a tiny fraction of the estimated 90-100 billion Yuan it will take to complete the entire cascade (Qiping Chen et al., 2005). In an interview, one Huadian executive told me that rumors alleging

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<sup>116</sup> Personal communication, April 1, 2006.

<sup>117</sup> *Zhongguo Huadian Nujiang Shuidian Kaifa Youxian Gongsi.*

the company would only pursue Nu development on an “all or nothing basis” were untrue, and that he expected that a small number would first be approved, and the others would likely follow.<sup>118</sup> Based on early expectations that Nu hydropower development would perhaps proceed as smoothly as had Lancang development, the Huadian Nujiang Company, only a month after its establishment, held an inaugural ceremony for Liuku Hydropower Station – in hindsight, probably two years early. The provincial vice-governor announced that the ceremony indicated “the formal launch of hydropower resource development in the Nu watershed” (P. Zhou, 2003).

The investment arrangement in which one of the five national corporations calved off of the former State Power Corporation of China hold majority stake in smaller, provincially-based and basin-scale development companies is similar to the pattern of Lancang investment following the second wave of industry reforms in 2002. This guarantees a high degree of central influence on “local” projects, despite a façade of “privatization” that in actuality is no more than capitalization of former state-owned enterprises through stock issues, in which the State Assets Supervision and Control (SASAC) Administration retains controlling interest. In addition, SASAC retains final say over appointment of senior executives, including those of the provincial subsidiary.<sup>119</sup>

With the Nu River projects, the oft-touted model of “rolling development,” a cornerstone of Lancang development in which profits and electricity generated by one dam are supposed to be used to finance the next, seems to be somewhat out of fashion; the reason cited by one company executive was the rapid pace of hydropower

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<sup>118</sup> Interview K20050814.

<sup>119</sup> Interview K20050517; Interview K20050129.

construction required to combat what he perceives as the present state of electricity shortages around the country.<sup>120</sup> The trend now is to borrow outright the bulk of funds (75-80%) necessary to finance development of a particular project, and leave responsibility for raising the remainder of funds (20-25%) to the parent company.<sup>121</sup> The formation of Yunnan Huadian Nujiang Company as described above, through capital contributions of the parent company (Huadian) and three other companies, is an example of such an arrangement. If the budget estimate of 90 billion Yuan to construct the entire cascade is accurate, one would expect that the jointly-invested Huadian Nujiang subsidiary would eventually be responsible for raising some 23.5 billion Yuan.

When I asked whether organizations aside from the parent company, state banks, and other state-owned entities might invest in such a development project, I was told that such schemes had only occurred with smaller, privately-owned hydropower development companies, the reason being that mega-projects such as the Nu and Lancang cascades require massive amounts of capital and up to a decade of construction time. The executive also told me that foreign investors have not been allowed to bid on Lancang and Nu projects up to now, since the expertise to build the projects already exists in China, and foreign bidders would only raise the costs of the projects. This seems to confirm a report that foreign firms are reducing direct investment in China's power sector ("Foreign firms quit," 2005). However, calls for "diversification" of funding sources for hydropower and other infrastructure projects are common; one internal report encouraged

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<sup>120</sup> Interview K20050517.

<sup>121</sup> Interview K20041123.

fully exploring financing options such as joint investment (*hezi*), transfer (*zhuanrang*),<sup>122</sup> auction (*paimai*), and public offerings (*shangshi*)(C. Wang & Chen, 2004, p. 45). In addition, foreign investors retain an interest in supplying components for hydropower projects such as turbines and transmission lines, but the technology for even the largest turbines and highest-capacity lines is increasingly available in China. Harbin Electric Machinery, for instance, in cooperation with France's Alstom, recently won a contract for supplying the six 700-MW turbines for the Xiaowan hydropower station, having previously won a similar contract for the right-bank generation units of the Three Gorges Project ("Qianyue Xiaowan shuidian zhan," 2005).

### **“Cautious and Scientific” Study on the Remaining Nine Projects**

Aside from the four projects that seem most likely to proceed in the near term, and with the possible exception of Songta on the Tibetan side of the Yunnan-Tibet border, nine Nu projects remain on the drawing board. Of those, all but three have planned installed capacities greater than 1,000 MW, meaning they will play an important role in electric power transfers out of Yunnan over the coming decades. According to the planning report submitted to the National Development and Reform Commission in July 2003, approximately half the dams are scheduled to come online between 2015 and 2020, with the remainder scheduled for completion by 2030. As noted in the previous subsection, a permanent work camp already exists at the Songta dam site, and a recent

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<sup>122</sup> BOT (Build-Operate-Transfer) and TOT (Transfer-Operate-Transfer). The latter scheme involves transfer of a publicly owned facility to a private operator for a limited period, after which the facility is transferred (without compensation) back to the original public owner.

series of interviews by investigative journalist Wang Yongchen<sup>123</sup> revealed that site surveying is fully underway, with engineers having already discarded two possible sites on grounds that the rock substrate was not sufficiently solid to support a 300-m high dam, which would be taller than any other in the world (Y. Wang, 2006).

One of the principal arguments against Nu hydropower development is that a large number of the dams – Liuku, Lushui, Yabiluo, Bijiang, Fugong, Lumadeng, Maji, Bingzhongluo, and Songta – all lie adjacent to the Gaoligong Mountain chain and the Three Parallel Rivers UNESCO World Cultural Heritage preserve. Activists and academics are concerned that the reservoirs from many if not all of these dams would encroach upon the preserve, which is suspected to be one of the greatest concentrations of plant and animal biodiversity in the world (X. Fan, 2005). Others, however, counter that the elevation of the reservoirs lies below that of the preserve, and therefore the impact of hydropower will be limited (Yaohua He & Jiankun Feng, 2004). According to one report, whereas the core protected areas all lie above 2,500 m in elevation, the highest elevation inundated by a Nu reservoir during normal storage period will be 1,950 m at Songta; Bingzhongluo and Maji, the second and third dams on the Nu from the upstream, will have normal storage reservoir elevations of 1,690 m and 1,570 m, respectively (Yuanqi Liu, 2004). The detailed plans for the projects have not been publicly disclosed, however, and we are left relying on secondhand information that, though often reliable, does not contain all relevant details of the projects. Moreover, since media outlets in China

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<sup>123</sup> Wang is also the founder of Beijing-based environmental organization Green Earth Volunteers (*Lüse Jiayuan Zhiyuanzhe*), which has in recent years taken on the Nu River projects as its *raison d'être*. I visited the Nu River gorge with Wang and a group of journalists, environmentalists, and outdoor enthusiasts from Beijing, Shanghai, Sichuan, and overseas in early spring of 2005, and say more about her group's approach to energy and environment issues in Chapter Seven.

admittedly have engaged in a fair bit of self-censorship in Yunnan and elsewhere in China regarding Nu development,<sup>124</sup> verifying claims about possible impacts or benefits of the projects is extremely difficult at this point.

### *Summary*

Table 5-1 summarizes the details of the Nu projects as best as possible with currently available data; unfortunately, there are no publicly available data on reservoir volumes for the projects. As this chapter has shown, the hydropower cascade planned for the Nu River, spearheaded by Yunnan Huadian Nujiang Hydropower Development Company, is every bit as significant – in terms of total installed capacity, projected annual output, and investment – as the cascade on the neighboring Lancang. One other set of figures makes the Nu cascade even more important in the eyes of prefectural and provincial officials: the revenues promised by the cascade’s developers once it is fully operational. In a report produced by the Beijing Institute of Hydropower Survey and Design at the behest of Huadian, annual revenues of the fully operational cascade with 21,320 MW of total installed capacity would be some 36 billion Yuan per year. Of that, 8 billion would go to national coffers; 2.7 billion to provincial coffers; and 1 billion would go to Nujiang Prefecture, nearly ten times the prefecture’s revenue of 105 million Yuan in 2002 (Qiping Chen et al., 2005).

Responding to arguments that the Nu-Salween is one of the few major rivers remaining in China (and indeed the world) that has yet to see large-scale hydropower development, or that the natural beauty of the area should be a reason not to develop it,

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<sup>124</sup> Personal communication with a newspaper employee in Yunnan, June 5, 2006.

local officials often respond that “you can’t eat the mountains and you can’t eat the water,” indicating their support for economic development opportunities. The Nu projects have indeed sustained a high level of surprisingly open debate over the past two years. In their opposition to the Nu projects, academics and activists frequently described the gorge as remote and pristine. Those supporting the projects counter that the gorge is, in fact, degraded and its inhabitants impoverished. One has only to make the voyage up the narrow, winding, and frequently washed-out road that follows the river to realize that in reality, while the gorge is far from industrialized, little of it can truly be classified as pristine. Likewise, many areas that have been subject to long periods of steep-slope farming can hardly fit the definition of “primitive ecology” (*yuanshi shengtai*). These tropes of remote, pristine, and unspoiled nature and cultures clash with those of backwardness, poverty, and abundant hydropower resources, making the Nu case, much more than the Lancang case, a textbook example of the importance of controlling discourse as a means of shaping economic development directions and priorities. Most observers, myself included, agree that the relative openness of the debate, the passing of the Environmental Impact Assessment Law (effective September 2003), the State Environmental Protection Agency’s new regulations on public participation in approval of environmental statements, and the increasing willingness and ability of social and academic organizations to take part in debate all suggest that the manner in which development does unfold on the Nu will differ in many ways from that of the Lancang or other major projects such as Three Gorges and Sanmenxia. In Chapter Six, I show how

the projects on the two rivers are intimately connected, however, though their fundamental importance to regional, national and international development policies.



Table 5-1: Details of middle and lower Nu cascade

Dam Name	Installed Capacity (MW)	Annual Output (Twh)	Start Date (Est)	End Date (Est)	Dam Height (m)	(Est.) Cost (Billion Yuan)	Reservoir Volume (billion m <sup>3</sup> )	Map Abbreviation (Map 5-3)
Songta 松塔	4,200	17.87	2006-2007	2020-2030	307	19.7		ST
Bingzhongluo 丙中洛	1,600	8.34	?	2020-2030	54.5	5.2		BZL
Maji 马吉	4,200	18.97	2006-2007	2015-2020	300	18.5		MJ
Lumadeng 鹿马登	2,000	10.09	?	2020-2030	165	9.1		LMD
Fugong 福贡	400	1.98	?	2020-2030	60	2.3		FG
Bijiang 碧江	1,500	1.18	?	2015-2020	71.4	5.9		BJ
Yabילו 亚碧罗	1,800	9.06	2006-2007	2015-2020	133	6.0		YBL
Lushui 泸水	2,400	12.74	?	2015-2020	175	8.8		LS
Liuku 六库	180	0.76	2006-2007	2015-2020	35.5	0.9		LK
Shitouzai 石头寨	440	2.29	?	2020-2030	59	2.3		STZ
Saige 赛格	1,000	5.37	2006-2007	2015-2020	79	3.6		SG
Yansangshu 岩桑树	1,000	5.2	?	2015-2020	84	4.4		YSS
Guangpo 光坡	600	3.15	?	2020-2030	58	2.9		GP

Source: Magee (2006b)

## Chapter Six: New Energy Geographies

### *Introduction*

The previous two chapters provided detailed empirical information about the Lancang and Nu River hydropower projects in and of themselves, also explaining the institutional contexts in which the projects were designed, financed, and in some cases, built. Before that, I outlined the powershed analytical framework. In this chapter, I demonstrate why that framework is useful by examining the new energy geographies that arise in conjunction with large-scale hydropower development in western Yunnan. It is important to note that these geographies are intentional, the result of new spatial imaginaries connecting load centers and generation centers that are hundreds of kilometers apart. These constructs are as real as the high-voltage lines that carry electric power from one place to the other, and they serve to legitimize and naturalize the transfer of resources in the name of comparative advantage, economic necessity, energy security, and global and regional competitiveness. Contrary to the claims of many Chinese officials and hydropower company staff, the Lancang and Nu projects are, first and foremost, national-scale projects with national-scale objectives;<sup>125</sup> they are designed above all to produce enough reliable electric power so that it can be sold outside Yunnan, whether to Guangdong Province, or to other countries such as Vietnam and Thailand. Local poverty alleviation and environmental protection objectives are secondary.

In lockstep with hydropower development on the two rivers (and on others such as the Jinsha in northern Yunnan) have come reforms in the power generation and

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<sup>125</sup> Naughton (2004, p. 289) makes the same point about the Western Development program in general and energy projects in particular.

distribution industries that facilitate marketization of electric power both domestically and internationally. Government controls remain fairly strict, however; the State Electricity Regulatory Commission (SERC), for instance, continues to specify prices at which power generation facilities can sell power to distribution grids, as well as the prices then used to sell power to end users.<sup>126</sup> The Chinese leadership's embrace of the so-called socialist market economy with Chinese characteristics has opened the floodgates for enterprise reforms in the electric power industry that, on paper at least, seek to maximize efficiency of generation and distribution through separation of government and party interests from bottom-line concerns about profit. Yet enterprise leaders and government officials alike are quick to point out that principal projects (*zhuyao gongcheng*) such as the Lancang and Nu dams are key to national energy and resource security, and that the five large hydropower development companies are still, in a very real sense, representatives of the party-state's interests. When I asked one interviewee, a hydropower company, whether this presented a contradiction, his immediate and emphatic response was "Of course!"<sup>127</sup> Another, this one an academic who fully supports large-scale hydropower development in Yunnan, simply assured me "not to worry about the role of the Party Committee, it's too complex a question." Instead, he said, I should focus on the Three Represents and other leading thought from central authorities.<sup>128</sup>

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<sup>126</sup> Interview K20050814.

<sup>127</sup> Interview K20050814.

<sup>128</sup> Interview B20050530. Former President and Central Party Secretary Jiang Zemin's "theory" of the Three Represents was that the Party should represent China's advanced productive forces, its advanced culture, and the interests of the Chinese people. Most China watchers see this is at least partly intended to legitimize inclusion of capitalist entrepreneurs into the Party.

In the following section, I discuss the various central government policy frameworks that lay the groundwork for southern China's new electric power geographies. I argue that one result of these policies is the naturalization of Yunnan as a key source of electrical energy for various parts of China and Mainland Southeast Asia, and that we may productively think of the resulting spatial configurations as powersheds of Guangdong and Hanoi, for instance. Next, I focus on electrical energy production and consumption trends in Guangdong and Yunnan, which provide further evidence of the importance of trans-local linkages between generation sites in Yunnan to load centers in Guangdong. Finally, I discuss the development of the electric power distribution grid, focusing on the China Southern Power Grid and one of its subsidiaries, the Yunnan Power Grid.<sup>129</sup> At issue here are the technical and transactional specifics of the power distribution network, in particular long-distance high-voltage transmission and grid interlinking within China and across international boundaries. I conclude this chapter by reiterating the importance of considering Yunnan hydropower as an example of how geographical constructs are created and morphed according to particular political economic agendas. Understanding the processes that underpin those agendas and their spatial manifestations is key to understanding economic development patterns in contemporary China.

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<sup>129</sup> *Zhongguo Nanfang Dianwang Gongsi* and *Yunnan Dianwang Gongsi*, respectively. The latter is a subsidiary of the former, and was previously known as the Yunnan Electric Power Group (*Yunnan Dianli Jituan Gongsi*) until it changed its name on November 1, 2004. The name change was said to reflect the power industry's reform goals of separating power generation from transmission (Wu, 2004).

### ***Policy Frameworks***

The notion that the processes of policy formulation and policy implementation in China can be at best loosely connected, at times even completely decoupled, is not new. Lampton (1987b) pointed out nearly two decades ago the need to understand that China's central authority is highly fragmented, clearly a call to disaggregate the state as I am attempting to do here with regard to water and electric power decisions. Lampton's idea of a feedback cycle in which policy formulation leads to implementation, which leads to effects, which can then in turn affect the (re)formulation of the original policy itself remains relevant today; as I showed last chapter, central policies promoting resource extraction in China's west, particularly on the Nu river, in order to fuel economic development in the east have been met with counter-proposals and resistance; that, in turn, has led to a rethinking of central policies, and to their implementation by central-state-controlled hydropower development companies such as Huadian. With this in mind, then, it seems most appropriate to begin with a discussion of the overarching policy that has been most important in guiding economic development planning and investment programs since the turn of the 21<sup>st</sup> century.

### **Go West, Young Han: the Western Development Campaign**

The Western Development campaign (*xibu da kaifa*), which began to coalesce in the 1990s and was officially launched in 2000, has become the centerpiece of China's Tenth Five-Year Plan (2001-2005). Earlier attempts at jump-starting western development can be traced back to the Third Front campaign in the 1960s, when the Chinese government, fearful of foreign attack, relocated much of its military-industrial complex to interior provinces. Later, in 1985, the central government hosted a first

conference on western development in Lanzhou (Gansu Province), which was then followed in 1993 by a “Demonstration Project for East-West Township Enterprise Cooperation” involving training exchanges for party cadres from eastern, central, and western China. In 1999, CPC Secretary Jiang Zemin on several occasions repeatedly alluded to western development as a strategic priority for China as a whole; by November of that same year, a CPC economics work group recommended that the Party adopt western development as its “major strategy for facing the new century.” In December, those words were put into action when the state-owned China Development Bank invested nearly 400 billion Yuan into major infrastructure projects in Gansu, Qinghai, and Ningxia. Finally, in March 2000, the State Council’s Western Development Leading Small Group officially began work on comprehensive plans for high-priority western development projects, many of which were launched later that year (“Xibu da kaifa dashiji,” 2000; “Zhongguo xibu kaifa dashiji,” 2003). One of the first “10 Great Projects,” the Zipingpu water resources development project in Sichuan, aimed at 100-year flood control and power production for the nearby capital city of Chengdu; the third and fourth generators of the 760-MW project came online in 2005 (“Zipingpu shuili,” 2005). Another focused on developing a 930-km-long oil pipeline from Sebei (Qinghai Province) to Lanzhou (Gansu Province). A list of all ten projects is included in Table 6-1.

Table 6-1: The first “Ten Great Projects” of the Western Development campaign

Project	Location
Ningxia-Tibet Railway	Ningxia Province to Tibet
Chongqing-Huaihua Railway	Chongqing Municipality to Huaihua City
Western regions road construction	Various areas
Western regions airport construction	Various areas
Chongqing light rail	Chongqing Municipality
Sebei-Xining-Lanzhou gas pipeline	Qinghai Province, Gansu Province
Qinghai 300,000-ton potash fertilizer factory	Qinghai Province
Grain-for-Green project	Various areas
Higher education basic infrastructure	Various areas
Zipingpu Water Conservancy	Sichuan

("Zhongguo xibu kaifa dashiji," 2003)

From its early days, the Western Development campaign has been touted as a “new regional economic policy” that differs markedly from past attempts to jump-start economic development in China’s interior regions (Xusheng Zhang & Zhu, 2001, p. 330). One strategy of the campaign is to increase direct fiscal transfers to western areas, particularly for projects involving basic infrastructure and so-called ecological construction (*shengtai jianshe*).<sup>130</sup> The strategy also calls for preferential loans for infrastructure construction projects in several key areas, namely railroads, highways, and large- and medium-scale energy projects, including electric power projects (Xusheng Zhang & Zhu, 2001, p. 333). Additionally, where the construction period is particularly long (as is the case of most large-scale hydropower projects), the policy further instructs banks to lengthen repayment periods for the loans. Such policies echo the suggestions by certain prominent scholars in China who have called for, among other things, rebuilding a

<sup>130</sup> The meaning of this term is somewhat ambiguous, but generally refers to projects that might be broadly labeled ecological restoration (albeit usually techno-centric) or “natural disaster” prevention. These might include initiatives such as reforestation or dike construction or repair.

system of interregional fiscal transfers and improving infrastructure in poor regions, and promoting factor mobility (Shaoguang Wang & Hu, 1999).<sup>131</sup>

As noted in Chapter Two, however, other Chinese scholars have long opposed continued reliance on central government fiscal transfers to poorer regions (Bai, 2000; X. Wang & Bai, 1991). Some scholars outside China, meanwhile, have recently argued that the Western Development campaign merely adds legitimacy and urgency to resource transfer schemes that date back to the height of central planning, and can even be seen as a type of internal colonization in which the key beneficiaries are the hydropower companies and eastern provinces now receiving cheaper electricity (D. S. G. Goodman, 2004; Oakes, 2004). Still others, stopping short of labeling the plan colonial, insist that adequate measures must be taken to ensure that the campaign does not inadvertently reinforce regional differentials it is trying to correct.<sup>132</sup> Clearly, there is by no means a consensus as to what type of macro-economic policies will best address uneven development patterns that are increasingly worrisome to the Chinese central leadership. One notion that remains constant throughout all the various policy suggestions, though, is that the abundant natural resources of China's western regions should be used to boost economic development in those areas and sustain it in China's already prosperous but energy-hungry coastal provinces in the east and southeast.

Hydropower development companies, caught halfway through a reform process that increasingly places responsibility for the self-financing of projects on the companies

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<sup>131</sup> Shaoguang Wang was trained in the United States and is currently a professor of political science at the Chinese University of Hong Kong.

<sup>132</sup> See chapters by Yu Li, Zhigang Lu and Shunfeng Song, and Namgyal in Lu & Neilson (2004).

themselves, are keen to find new capital sources. To be sure, there is continued heavy reliance on large loans at very favorable terms through the central banks, but executives in the companies seem to sense writing on the wall that signals such loans will not always be so readily available. One source, co-authored by a former high-level engineer at the Kunming Institute of Hydropower Survey and Design<sup>133</sup> now employed at one of the hydropower development companies, and a researcher at Kunming Institute of Science and Technology, noted that “resolving the contradiction between the vast amount of capital necessary for western development, and the insufficiency of government’s investment capacity” requires consideration of all possible types of financing and ownership arrangements for large-scale hydropower development (H. Lin & Chen, 2001). The authors argued that developing a securities market to facilitate investment in large-scale hydropower in Yunnan was key to ensuring the rapid development of hydropower into a “pillar industry” (*zhizhu chanye*) for the province. They also noted that the “6 trillion Yuan in savings of rural and urban residents” would be of great importance to the development of capital markets.<sup>134</sup>

The enthusiasm with which these two authors embrace the securities market as the solution for financing Yunnan’s large-scale hydropower development is surprising, and merits a minor digression here. The authors note the role of Deng Xiaoping, Jiang Zemin,

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<sup>133</sup> *Kunming shuili shuidian kance sheji yuan*. Before the dissolution of the State Power Corporation of China, this institute and its six other partner institutes around the country were all under the administration of SPCC. Now, they are all subsidiaries of the state-owned China Hydro Consulting (*Zhongguo shuidian gongcheng guwen jituan gongsi*).

<sup>134</sup> It is important to note that the savings the authors wish to tap make up a significant portion of the assets of China’s banking system. Interest rates on savings are low, yet there are few alternative investment vehicles. Those savings are frequently used to bail out or extend loans to struggling state-owned enterprises. Any system competing with the Chinese banks to attract savings deposits from Chinese citizens, then, risks reducing the assets available for such “maintenance” of the state-owned economy, with consequent effects on the economy potentially huge.

Zhu Rongji, and other senior leaders in overseeing the development of China's first stock markets in the 1990s. Next, they note that seven consecutive reductions of interests and a tax levied on interest collected in savings accounts means that the 6 trillion Yuan amassed in the personal savings of everyday Chinese citizens (they specifically reiterate the figure) "urgently needs to find a new investment path!" Huaneng, Huadian, and China Datang, three of the five power generation corporations formed from the former State Power Corporation of China, already have subsidiaries listed on international markets in Hong Kong and (in the case of Huaneng International) New York. The same is true for the Three Gorges Project Company. In an interview, a high-ranking engineer at one of the five generation corporations told me that his company's only power generation assets funded through stock issues at this point are thermal power plants. He did not, however, rule out the possibility of his company forming a hydropower-focused subsidiary to be listed on international markets in the near future. Given his position of influence in the industry, it seems reasonable to expect that Yunnan hydropower will soon become a vehicle for raising funds on domestic and international markets, a new regime of capital accumulation in China's socialist market economy.

The following subsections trace the lineage of the water and electric power infrastructure components of western development, focusing on several policies that have gained significant currency in recent years. Through constructing new geographies of electric power transfer – regions, corridors, and subregions, development zones – these policies provide the fundamental basis for the legitimacy of large-scale hydropower development on western Yunnan's rivers. The importance of large-scale hydropower

development in the modernization of the United States, particularly as it occurred in the western states of the US, has not been lost on Chinese policy-makers and scholars (Jianjun Wang, Xu, & Li, 2004). Indeed, that process is frequently cited as a key factor in the United States' rise to economic and political prominence, and justification that China should be allowed to exploit its own abundant hydropower resources as part of its "peaceful ascent" as a new world power.

### **Sending Western Electricity East**

A handful of other policies under the broad rubric of western development, some in existence since the early 1980s, further signal an attempt to institutionalize patterns of resource transfer from China's western, resource-rich areas to industrially developed and densely populated areas in the east. Most prominent among them is Send Western Electricity East<sup>135</sup> (*xidian dongsong*), which was first put forth in the 1980s by central party authorities as a way of tapping hydropower potential on Yunnan's Yuan<sup>136</sup> River. At the time, authorities noted that "developing the abundant hydropower resources of western China is a necessary choice for the economic and social development of the country" (Z. Zhang, 2000, p. 64). In June 1988 and April 1991, two meetings between Guangdong and Yunnan electric power authorities, along with Beijing planning authorities, resulted in the signing of the "Two Provinces, Four Sides Agreement" (*liangsheng sifang xieyi*). The agreement called for cooperation between Yunnan and Guangdong, along with central electric power authorities, in developing Xiaowan as a key engine for sending Yunnan electricity to south-central China, and then later using the

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<sup>135</sup> Some scholars and official publications refer to this policy simply as the West-East Electricity Transfer.

<sup>136</sup> The Yuan River flows through southeastern Yunnan and into Vietnam, where it is known as the Red River.

same cooperative model to develop Nuozhadu for the same purpose (X. Yang, 1998).

The first Send Western Electricity East transfer was not implemented, however, until June 1993 by the Yunnan Electric Power Group,<sup>137</sup> when it began seasonal transmission of electricity from Yunnan to Guangdong (Peng, 2004).

Later, following the official launch of the Western Development campaign in 2000, the Send Western Electricity East project was among the second set of major projects prioritized in 2001 ("Zhongguo xibu kaifa dashiji," 2003). According to one report, by the beginning of 2004 Yunnan alone had transmitted some 20 billion kWh to Guangdong and had increased generation capacity dedicated to Guangdong by 500% since 1993, from 300 MW to 1,800 MW (Peng, 2004).<sup>138</sup> Another cited a figure of 24 billion kWh transmitted from Yunnan to Guangdong over the 10<sup>th</sup> Five-Year Plan (2001-2005), with an annual increase over that period of 109.7% (Tang, 2005). Yuan Maozhen, chairman of the China Southern Power Grid Corporation, claimed that the Send Western Electricity East program as a whole, including transmissions from Guizhou and Guangxi in addition to those from Yunnan, had transmitted 52.3 billion kWh to Guangdong from the beginning of 1993 to the end of 2003 ("Xidian dongsong dongyou," 2004). Thus among the five provinces covered by the China Southern Power Grid (Yunnan, Guizhou, Guangxi, Hainan, and Guangdong) Yunnan was responsible for some 40% of electricity

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<sup>137</sup> This company later became the Yunnan Electric Power Grid Corporation, and is now a subsidiary of the China Southern Power Grid Corporation. More detail is provided in Chapter Seven.

<sup>138</sup> Generally, electric power purchase agreements (PPA) are based on capacity (kW, MW) or output (kWh). Capacity-based contracts might specify, for instance, that a certain portion of the seller's installed capacity be available for use by the buyer for a certain period of time, without specifying how much time the generating capacity will actually be used. Output-based contracts, on the other hand, might specify that the seller agrees to sell a certain amount of electricity – essentially, by agreeing to run generators of a certain capacity (kW) for a certain number of hours (h) to produce a specified output of electricity (kWh)).

sales to Guangdong during the Tenth Five-Year Plan. Table 6-2 compares existing hydropower capacity as of 2001 for four of these five provinces.

**Table 6-2: Existing hydropower capacity as of 2001 in southern grid area**

	Yunnan	Guizhou	Guangxi	Guangdong	Total
No. of Dams	145	81	56	41	323
Installed Capacity (MW)	88,200	14,663	14,515	2,680	20,058
Annual Output (Billion kWh)	437.3	65.64	64.4	9.68	577.07
Output as % of 4-Province Total	75.6	11.4	11.2	1.7	
Population (millions)	41.457	36.646	46.74	71.30	196.14
Per capita output (MWh/person)	10.55	1.79	1.38	0.136	2.94

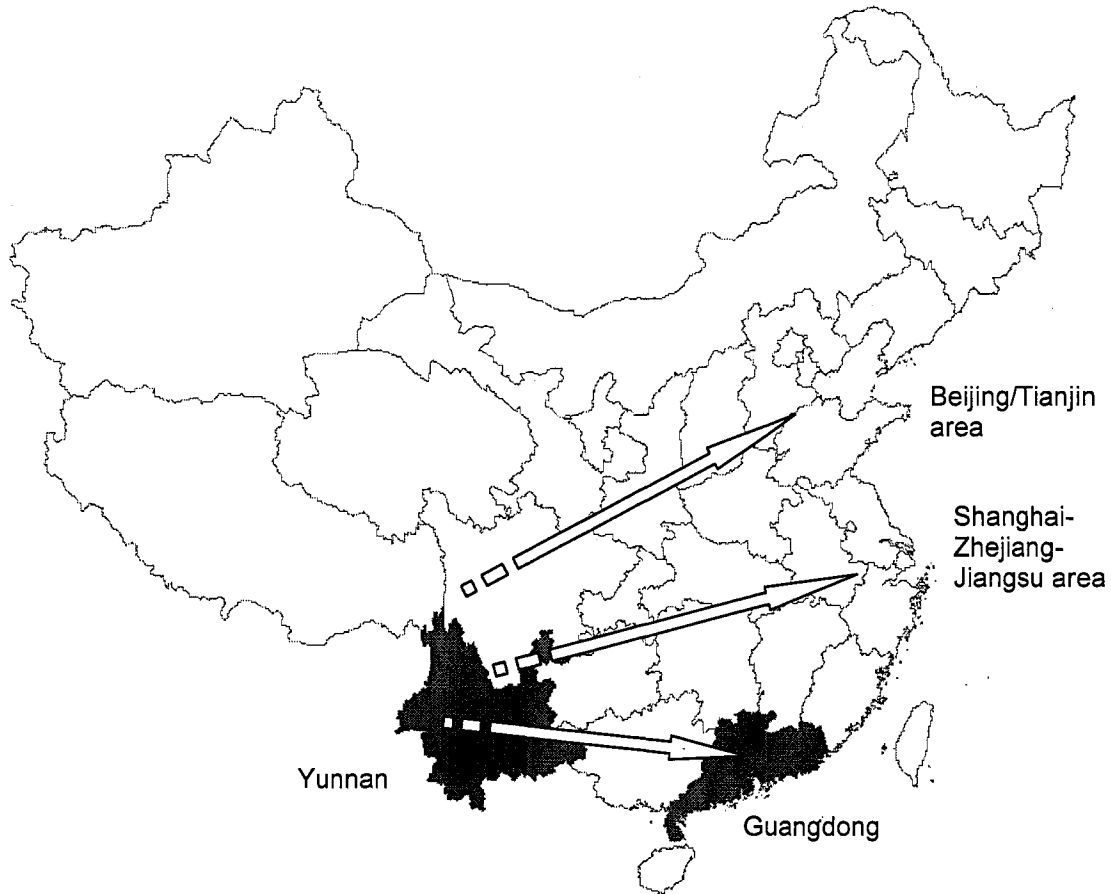
Source: (Ji & Duan, 2001)

The Send Western Electricity East program has three components, called corridors (*tongdao*), that define new trans-local linkages through which electric power flows (see Map 6-1). The Southern Corridor relies primarily on generation stations on the Lancang River in Yunnan, as well as the Wu River in Guizhou and the Nanpan-Beipan-Hong River system in Yunnan, Guizhou, and Guangxi. In Yunnan, much of the power generation called for will come from new facilities on the Lancang and Nu, along with a limited number of new thermal (coal-fired) plants and upgrades to existing ones. When all turbines of the 1,350-MW Dachaoshan hydropower station on the Lancang came online in 2003, it was feted as a “strong soldier” in the army of power plants providing electricity for the Send Western Electricity East program (H. Chen, 2003). The predicted electricity market in Guangdong was also justification early on for building Xiaowan (R. Yang, 2001; X. Yang, 1998). The new coal plants are expected to be mine-mouth power plants, located adjacent to coal mines in order to reduce transportation costs and avoid further straining an already busy rail network.

The middle corridor of the Send Western Electricity East program connects power stations on the Jinsha (upper Yangtze) in Yunnan and major tributaries in Sichuan, namely the Dadu and Yalong, to eastern coastal China. Early plans from the National Development and Reform Commission called for work on Xiluodu, with an installed capacity of 12,600 MW (more than twice that of the largest Lancang project) to begin after completion of the Three Gorges project downstream. Work on Xiluodu has already begun,<sup>139</sup> however, a primary justification being the need to control silt on the upper Yangtze (Jinsha) before it reaches the Three Gorges reservoir and reduces that dam's ability to generate power. Finally, the northern corridor will connect future hydropower stations on the upper Huang (Yellow) River, along with thermal stations in coal-rich Shanxi and Inner Mongolia, to load centers in and around Beijing and Tianjin (National Development and Reform Commission, 2001).

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<sup>139</sup> Personal communication, January 15, 2006.



**Map 6-1: Three corridors of Send Western Electricity East program**

### **West meets East: Sending Yunnan Electricity to Guangdong**

While the Send Western Electricity East project leaves open the possibility, at least in theory, that Yunnan electricity will be sold in any of the five provinces served by the China Southern Power Grid, a second policy is more specific about the main destination of kilowatt-hours from Yunnan. The Send Yunnan Electricity to Guangdong (*Dian dian song Yue*<sup>140</sup> or *Yun dian song Yue*) policy sets targets for power sales from the

<sup>140</sup> Here, the first “Dian” is the single-character name for Yunnan Province, whereas the second (pronounced in a different tone and represented by a different Chinese character) means electricity. “Yue” here is the single-character shorthand for Guangdong.

westernmost producer within the China Southern Power Grid's reach to its easternmost consumer. Not surprisingly, since the establishment of the Send Western Electricity East program, Guangdong has invested most in the program, and has likewise been the recipient of the greatest amount of electricity ("Xidian dongsong," 2002). Yunnan, meanwhile, is gradually becoming the main source of power; despite net positive (outward) flows of electricity from Guangxi to date, demand within that province is expected to soon outstrip its largely coal-based supply, leaving Yunnan the sole exporter of electricity for the foreseeable future.<sup>141</sup> Neighboring Guizhou currently boasts greater installed capacity dedicated to the Send Western Electricity East program than does Yunnan, but if projections for 2010 are met (including completion of Yunnan's Xiaowan hydropower station), that balance will likely shift.<sup>142</sup>

Guangdong authorities have been active in promoting the Send Western Electricity East program since its inception. As early as 1988, they became involved in planning west-east power transfers from Xiaowan and Nuozhadu (X. Yang, 1998). Beginning in 1990, Guangdong invested some 2.39 billion Yuan in the Tianshengqiao #2 (on the border of Guangxi and Guizhou) power station and the Qujing (Yunnan) Thermal power station. During that period, Guangdong also invested nearly 35 million Yuan in preliminary planning and design work for Xiaowan Hydropower Station (on Yunnan's Lancang River) and Changzhou Hydropower Station in Guangxi (Pang, 2001), demonstrating the interest of Guangdong authorities in the Lancang cascade from its

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<sup>141</sup> Interview K20060116a.

<sup>142</sup> The policy slogan for Guizhou's participation in the electrification of Guangdong is Qian dian song Yue, where Qian and Yue are the one-character names for Guizhou and Guangdong, respectively (Tang, 2005; "Xidian dongsong' liang jiao yi zhi," 2004).

earliest days of extensive and detailed planning. In summer 2001, a delegation from Guangdong visited southwestern provinces with the purpose of establishing electricity transfer agreements. The mission was successful: Yunnan and Guizhou agreed to provide 4 million kWh and 1.6 million kWh, respectively (Pang, 2001). Around that time, Li Changchun, Guangdong's Party Secretary, said in a memo that Guangdong authorities "must work night and day to grasp the work on improving the power grid to ensure that western electricity can reach the towns and countryside of Guangdong."

Guangdong currently receives approximately 30-40% of its electricity from sources outside the province.<sup>143</sup> One quarter of that amount, or 10% of Guangdong's total electric power consumption, is estimated to come from the Send Western Electricity East program, primarily from generation stations in Yunnan. During the 10<sup>th</sup> Five-Year Plan, electrical output transmitted from Yunnan to Guangdong totaled nearly 22 billion kWh (Tang, 2005). By the end of the 11<sup>th</sup> Five-Year Plan in 2010, generating capacity in Yunnan devoted to Guangdong is expected to reach 5,800 MW to 7,800 MW; this does not include electricity generated from Xiaowan station. Xiaowan is expected to be completed in 2009, and if a final agreement is reached between Guangdong and Yunnan, total capacity in Yunnan dedicated to powering Guangdong would be 10,000 MW, more than the 8,000 MW of capacity in neighboring Guizhou expected by 2010 (Tang, 2005). Interviews with representatives of the China Southern Power Grid Company confirm such estimates, and suggest that Yunnan's role as the principal southwestern "battery" for south-central and southeastern China is increasingly certain. As I discuss below, the

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<sup>143</sup> Interview K20060116b.

province is also expected to play a similar role for the increasingly interconnected mainland Southeast Asia region, specifically the so-called Greater Mekong Subregion.

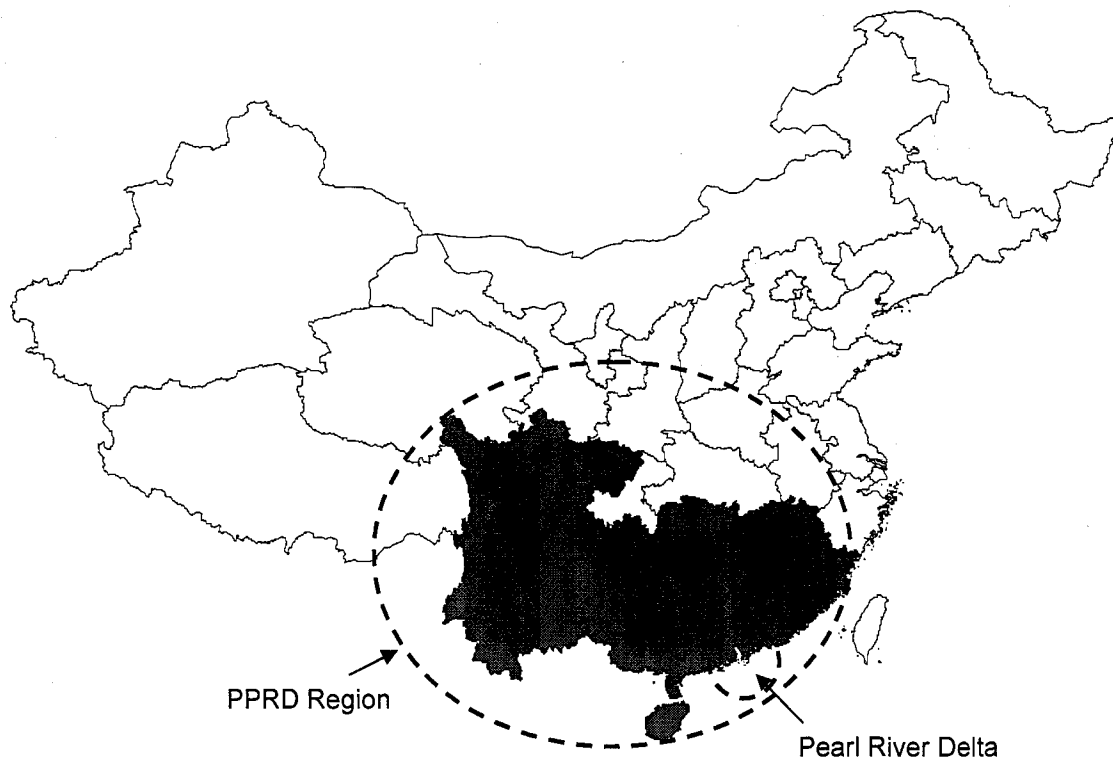
There is a perceived “happy coincides” between Guangdong’s peak power demand in summer and Yunnan’s monsoon season (R. Yang, 2001). In theory, this means that the season for peak hydropower generation coincides nicely with the season for peak demand. The problem with such a theory, however, is that many of the large dams – Xiaowan, Nuozhadu, Three Gorges, and Guangxi’s Longtan among them – were also designed with flood-control functions in mind. Thus during peak rainfall months, it is entirely possible – likely, even – that the dams will be operated more for flood-control priorities than for power generation priorities, meaning that sluice gates will not be opened as widely as they might be in a situation where maximum power generation is desired. The potential contradiction between Yunnan flood-control priorities and Guangdong power demands has already been noted (Zeng, Zhang, Chen, & Xiang, 2004).

The emphasis on electric power transfers from Yunnan to Guangdong through the southern corridor of the Send Western Electricity East program has resulted in the creation of a new geographic construct: the Pan-Pearl River Delta (Map 6-2).<sup>144</sup> The Pearl River (*Zhu Jiang*) flows through Guangdong and empties into the South China Sea. The Pearl River Delta region, a major economic powerhouse since the reform and opening period began in 1979, comprises Guangdong’s capital city of Guangzhou, along with Shenzhen, Dongguan, Zhuhai, Zhongshan, Foshan, Huizhou, Jiangmen, Zhaoqing; the

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<sup>144</sup> The Pan Pearl River Delta ((*Fan Zhu Sanjiao*) Region has its own website at <http://www.pprd.org.cn>

so-called Greater Pearl River Delta includes Hong Kong and Macao as well.<sup>145</sup> The PRD has developed into a major center of production and site for foreign investment, and has spearheaded China's double-digit growth for more than a decade. The term "Pan-Pearl River Delta" (PPRD) first came into use in June 2004 in conjunction with a conference entitled "Discussion Forum and Trade Negotiations on Greater Pearl River Delta



**Map 6-2: The Pan-Pearl River Delta**

Cooperation and Development. At the time, industrial and population centers in Guangdong were still smarting from the serious electricity shortages in Guangdong that year and in 2003, and officials were keen to hammer out agreements on west-east energy

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<sup>145</sup> Data retrieved from The Greater Pearl River Delta website at <http://www.thegprd.com/about/area.html>, April 19, 2006.

transfers. The name of the newly constructed region demonstrates once again the fluidity of geographic constructs and their connection to political economic processes they are designed to legitimate and naturalize. The PPRD covers nine provinces across southern China from Fujian to Yunnan and includes the Special Administrative Regions of Macao and Hong Kong; hence it is often referred to as the “9+2 Region” (PPRD Office, 2005).

In the first year of its existence on paper and on the map, the PPRD provided a basis for agreements regarding several types of “regional” cooperation. These included, of course, investment in industry and basic infrastructure, primarily power generation and transmission facilities and upgrades to transportation networks. The following table lists the categories on which cooperative agreements among PPRD members were signed.

**Table 6-3: PPRD cooperative agreements**

<b>Topic</b>	<b>Key Initiatives</b>
Industry investment and basic infrastructure	Science and technology, west-east electricity transmission, interprovincial highway construction
Market construction	Quality control, commodity prices, intellectual property, enterprise collaboration, market oversight, trademark protection
Agriculture	Agricultural technology, trade, key agro-industry promotion, specialized products, standardization of production bases, quality supervision and control
Regional environmental protection	Air quality monitoring in delta area, environmental monitoring network and reporting over PPRD area
Tourism, labor, science, education, culture, sanitation, and health	Tourism cooperation, educational exchange and resource sharing; food and medication security; infectious disease prevention and reporting
Create a convenient platform for information exchange and a PPRD information network	Information network interlinking and maintenance for government offices; website management groups

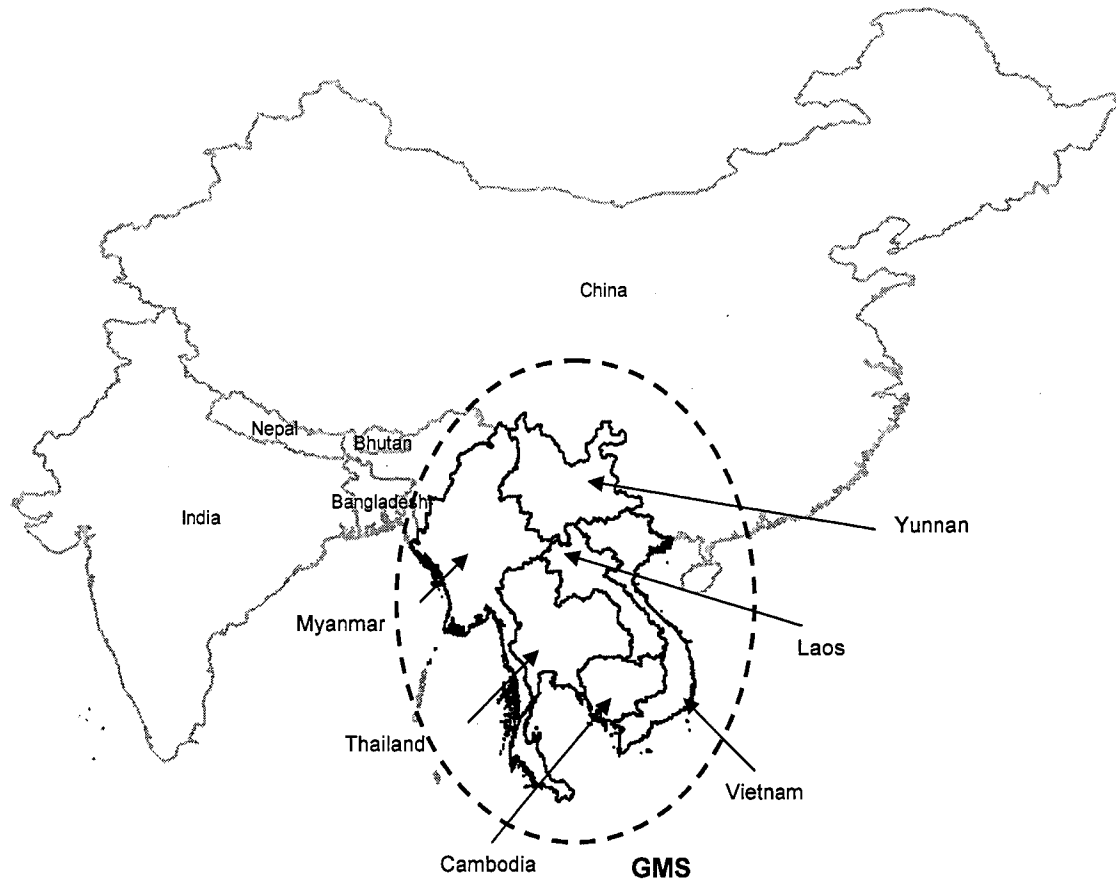
Source: PPRD Office (2005)

While the notion of the PPRD has not gained as much currency in common parlance in Yunnan, the same could be said about the Greater Mekong Subregion, discussed in the

following subsection, merely a year or two ago. Only when Kunming hosted the Second GMS Leaders Summit did the term truly gain a foothold in Kunming. In time the PPRD region may become cemented in the geographic imaginaries and language of politicians, academics, and everyday Chinese citizens in Yunnan, reified as a spatial construct as logical and natural as a nation-state or free-trade zone.

### **Going Outward: Sending Yunnan Electricity to Southeast Asia**

A final set of policy initiatives encourages the sale of Yunnan electricity to neighboring countries in mainland Southeast Asia, most importantly Vietnam and Thailand. These fall under the general rubric of “*zou chu qu*” (going out), a policy slogan that is often heard in conjunction with enterprise modernization (*qiye xiandaihua*) (P. Li et al., 2002). Thus alongside the multiple variations of “Send Western Electricity East” and “Send Yunnan Electricity to Guangdong,” one also hears frequent reference to “Send Yunnan Electricity Outside” (*Yun dian wai song*), which is trumpeted by officials and representatives of the generation and grid companies as one more solution to relieving electrical shortages in neighboring countries in exchange for hard currency (Yunnan Electric Power Network, 2004). Currency is key here; power sold to Vietnam so far has sold for a much higher tariff than it has to end users within China. Additionally, as I discussed earlier in Chapter Three, one of the principle areas targeted for cooperation within the Greater Mekong Subregion (GMS) is electricity generation and transmission through a regionally (GMS-wide) interconnected power grid. Map 6-3 shows the area defined as the Greater Mekong Subregion in the larger geographic context. Yunnan and Laos are expected to be the primary sites for power generation within the GMS.



**Map 6-3: The Greater Mekong Subregion (GMS)**

Thailand had already been identified as a promising market for Yunnan electricity in the late 1980s by planners at the Yunnan Electric Power Group (X. Yang, 1998). As mentioned in Chapter Four, an agreement in the late 1990s originally called for Thailand's participation in constructing the Jinghong hydropower station (Lancang River) in southern Yunnan, specifying that Thailand would begin purchasing power from the station in 2013. That agreement was later renegotiated due primarily to decreased Thai electricity demand following the Asian currency crisis in the late 1990s, along with the desire on the part of the Chinese developers (at the time, spearheaded by the Yunnan Electric Power Group and the Ministry of Electric Power) to accelerate Jinghong's

timeline. Now, the Sino-Thai agreement between Huaneng's Hydrolancang subsidiary and the Thai GMS Power Company calls for co-development of Jinghong and Nuozhadu together, with financing first coming from Chinese sources and power being first delivered to Chinese load centers through the China Southern Power Grid.<sup>146</sup> Later, based on patterns in Thailand's electricity demand, power purchase agreements may be negotiated. To date, no power has been sold from Yunnan to Thailand, but negotiations are underway between the China Southern Power Grid and grid companies there and in neighboring Cambodia.<sup>147</sup> The Yunnan Power Grid Company is currently seeking to negotiate long-term power purchase agreements, which would also involve the construction of a 500-kV high-voltage transmission line from Yunnan to Thailand via Laos ("Yunnan lizheng '11-5' qijian," 2005).

Despite initial interest in power sales to Thailand, the first significant quantities of Yunnan electricity transmitted abroad were to Vietnam beginning in 2004. These traveled through 110-kV circuits crossing the border at Hekou/Lao Cai in southeastern Yunnan's Yuan/Red River valley (Yunnan Electric Power Network, 2004). Beginning in January 2007, the China Southern Power Grid expects to begin transmission to Vietnam's six northern provinces via 220-kV circuits (H. Chen, 2005). The transfer agreement stipulated some 200 million kWh annually to be sold from the Yunnan Power Grid Company (a subsidiary of the China Southern Power Grid Co.) at a price of approximately US \$7 million. Based on my own interviews with representatives at the grid company, the major limiting factor on power transmissions to Vietnam to date has

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<sup>146</sup> Interview K20041123.

<sup>147</sup> Interview K20060116a.

been grid capacity rather than generation capacity. As I discuss later in this chapter, much financial and human capital is being invested by the China Southern Power Grid in developing high-efficiency, high-capacity transmission lines that are capable of traversing the great distances (often well over 1,000 km) between generation stations in China's "rural west" and faraway load centers. Transmissions across the border over the past two years, however, have traveled over fairly low-efficiency 110-kV circuitry. Beginning in October 2006, however, the first 220-kV circuit between the Southern China Power Grid and northern Vietnam's power grid is expected to begin functioning. A contract between Southern China Power Grid and Vietnam's state-owned Electricité du Vietnam called for 1.3 billion kWh to be sold to Vietnam beginning in October 2006, for a total price of US \$500 million (US \$0.38, or 3.08 Yuan per kWh, compared to the going rate of 1.4 to 1.8 Yuan per kWh).<sup>148</sup>

Ironically, power sales to Vietnam, as well as much larger ones to Guangdong, have occurred at the same time rolling blackouts passed through Kunming on a weekly basis, much to the frustration of residents and business owners. The same was true elsewhere in Yunnan. This suggests that electricity sales are indeed being seen increasingly as a means of capital accumulation by the China Southern Power Grid company. Further evidence of this is given by the fact that the grid company's plans for the 11<sup>th</sup> Five-Year Plan, which call for expanding infrastructure and increasing inter-connectivity with countries in the Greater Mekong Subregion (H. Chen, 2005). One interviewee noted that the economic impact of such blackouts in rural Yunnan is often

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<sup>148</sup> Additionally, the price of 3.08 Yuan/kWh is the price to the grid, not the price to the end users in Vietnam, whereas the price of 1.4 to 1.8 Yuan/kWh in China is the price to the end user.

greatly underestimated by scholars and policy-makers. The interviewee argued that blackouts decrease the efficiency of industrial operations producing commodities from cement to cooking oil, forcing the price to rise and straining the pocketbooks of rural residents with already limited incomes. As an example, the interviewee noted that the price of cement at a factory in Kaiyuan (southeastern Yunnan) had nearly doubled, going from 9 Yuan to 16.5 Yuan per 50 kg in the span of a year. The reason given was that the blackouts had raised factory operating costs, which were then passed on to customers.<sup>149</sup>

### ***Mapping Production and Consumption Trends***

In this section I analyze trends in electric power production and consumption across the new energy geographies I laid out in the first half of this chapter. As with all official statistics in China, a word of caution should go to anyone wishing to use them. That said, it is generally agreed that the data are valuable at least in comparative terms, and I believe here they can paint a meaningful picture of power consumption and production trends across the area covered by the Send Western Electricity East program. Given the prominence of Send Western Electricity East projects in the five provinces covered by the China Southern Power Grid, I choose to focus only on those provinces. Additionally, the power consumption data for Guangdong probably underestimate actual usage, since they cannot possibly account for the large number of micro-scale gasoline and diesel generators, highly polluting and illegal, said to be increasingly being used by factories in Guangdong in order to prevent production disruptions due to blackouts.

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<sup>149</sup> Interview HK20060111.

The goal of this section is to attempt to understand trends in production and consumption across the areas where the specters of electricity crises, power crunches, and rolling blackouts are so frequently deployed as justification for massive investment in hydropower (and to a lesser extent, thermal power) in southwestern China. Indeed, concerns have recently been raised about a potential oversupply of electricity generation capacity in coming years. One proponent of this viewpoint, an energy specialist at the Asian Development Bank, predicted that the surplus might be as much as 10% within the next few years (Z. Li, 2006). This argument was echoed by an academic familiar with hydropower development issues in Yunnan, but flatly denied by an executive of one of the Yunnan development companies, who argued that no country could accurately predict supply and demand so as to achieve perfect balance, and that it in any case it made sense to build in extra capacity.<sup>150</sup> The academic who agreed that a power surplus might loom in China's near future also noted, however, that an oversupply of electricity could lead to decreased prices, which in turn could promote development of new, energy intensive industries. One of the most likely would be mining, already attractive in Yunnan due to the large number of non-ferrous ores. Given the continued rapid growth of China's economy, the increasing consumer demand for electricity, and ongoing inefficiencies in electric power use, it seems hard to imagine an oversupply lasting for any length of time. What is more imaginable, however, is that bottlenecks in transmission and conversion facilities linking generation sites to load centers will persist.

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<sup>150</sup> Interviews K20050313 and K20060814, respectively.

Guangdong's power consumption is without question the highest in the China Southern Power Grid area and indeed all of China (National Bureau of Statistics, 2005, Chart 7-14). Figure 6-1 compares consumption trends in the area covered by the China Southern grid, with one line representing Guangdong alone, and the other representing the combined totals of the remaining four province-level units of Guangxi, Guizhou, Hainan, and Yunnan. Maps 6-4 and 6-5 are thematic maps of annual power consumption for the entire country. Low population in certain inland provinces yields high per capita figures, but it is clear that the centers of consumption are the industrialized coastal provinces of Guangdong, Zhejiang, Jiangsu, and to a lesser extent Fujian. In terms of total consumption, too, similar trends are visible. The creation of new regional constructs and energy geographies provides the basis for stretching the powershed of consumption centers far beyond the geographic boundaries that usually define those centers.

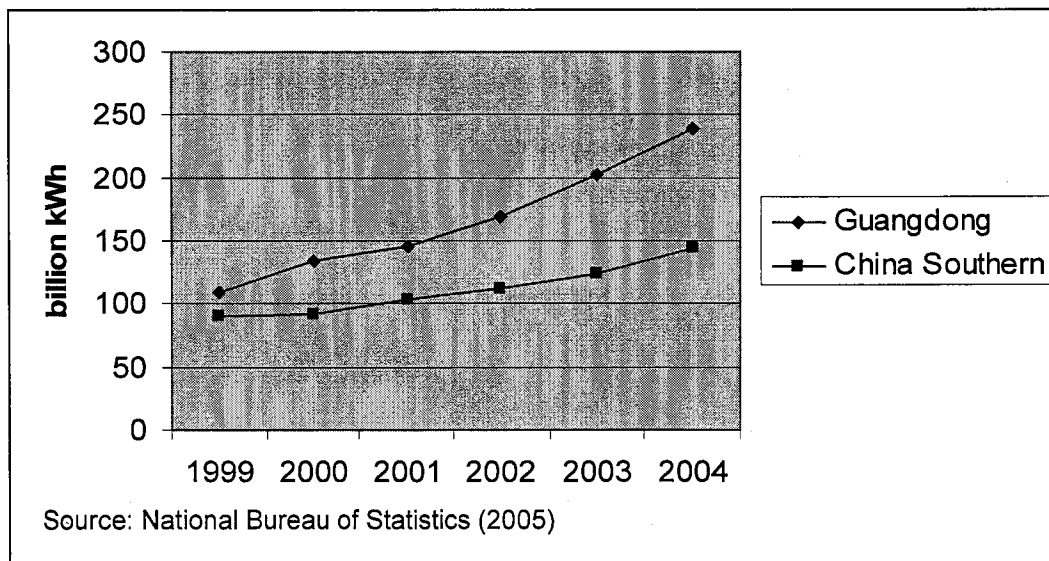
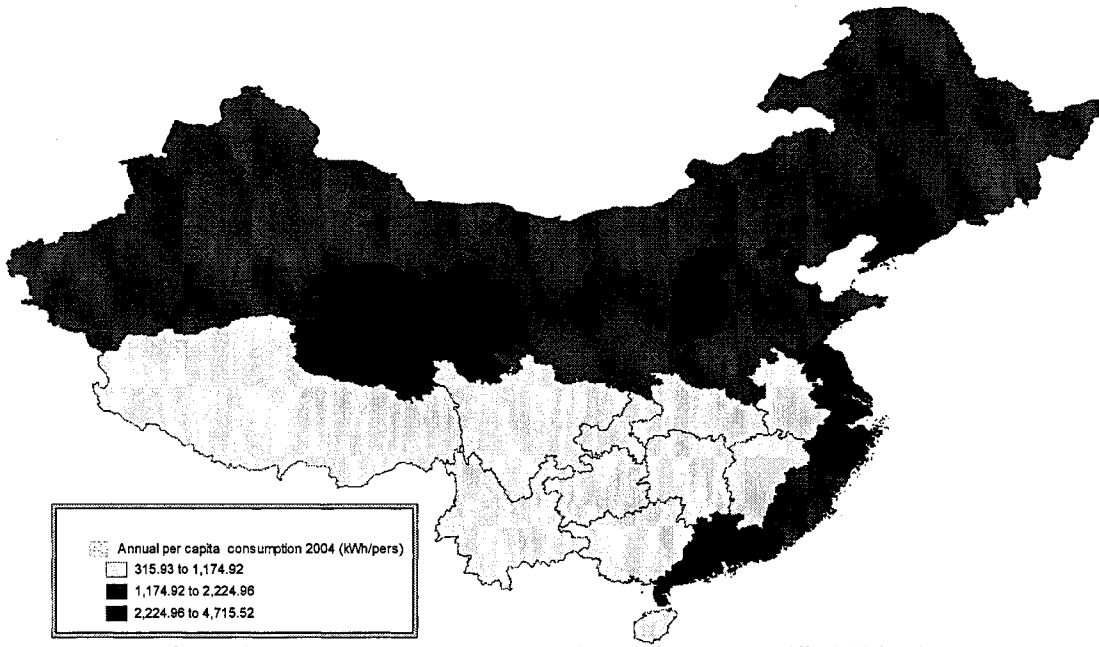
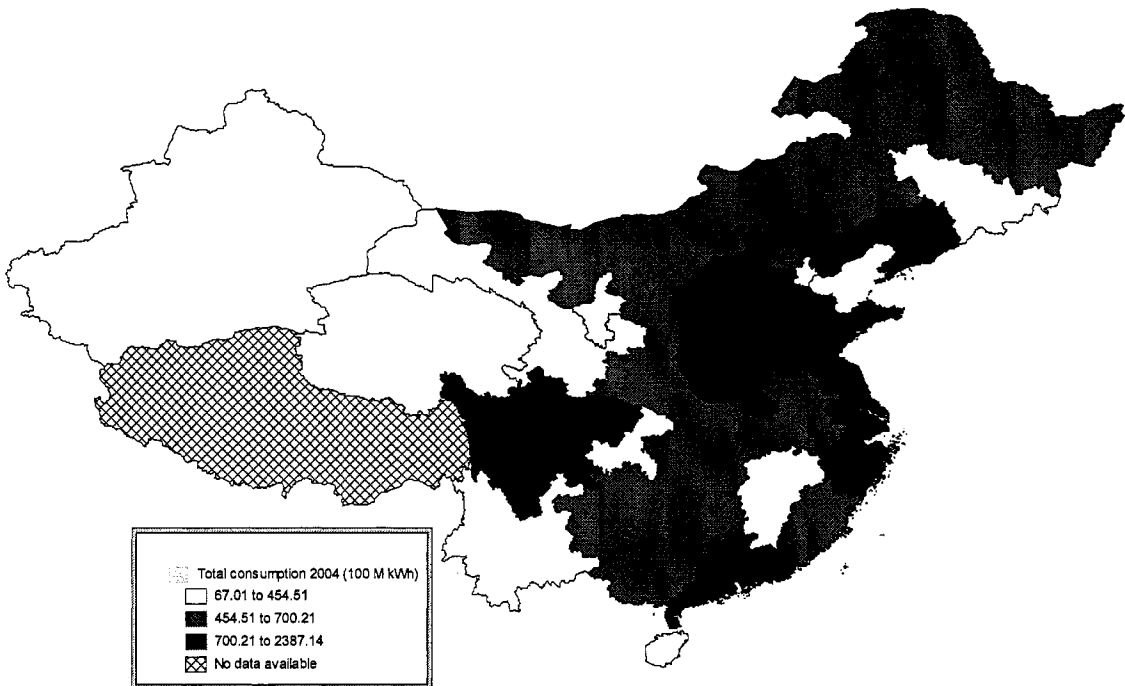


Figure 6-1: Trends in annual electricity consumption in the China Southern grid area



Data source: China Electric Power Yearbook Editorial Committee (Ed.) (2005)

Map 6-4: Thematic map of 2004 per capita annual power consumption by province



Data source: National Bureau of Statistics (2005)

Map 6-5: Thematic map of 2004 total annual power consumption by province

### ***Power Grid Development***

On November 1, 2004, the Yunnan Electric Power Group officially renamed itself to the Yunnan Power Grid Company (Wu, 2004). This was ostensibly done to reflect the company's newly limited focus on power distribution following the industry reform effort in late 2002 that attempted to separate generation and distribution assets and responsibilities, resulting in five national generating companies and two national grid companies.<sup>151</sup> Yunnan Electric Power Group was restructured as a subsidiary of China Southern Power Grid and given responsibility for consolidating, upgrading, and further developing the power grid within Yunnan. This task included purchasing smaller local 110-kV grids across Yunnan, generally operated as public utilities under the ownership of prefectural or municipal governments. As of January 2006, grids in 10 of the 16 municipalities and prefectures in the province had been purchased by the Yunnan Power Grid Company and connected to the provincial grid. The remaining six, according to an employee of the company, fell into two categories: those in poorer regions such as Diqing and Nujiang where grid infrastructure was poor overall and nonexistent in some areas; and those in wealthier areas where local grids coverage is extensive and power supplies sufficient. The interviewee noted that even in the latter case, however, conditions of self-sufficiency in electric power will probably not last long due to increasing consumer demands and projected economic growth.

China Southern Power Grid is responsible not only for facilitating interprovincial electric power trade agreements, but also for negotiating international agreements such as

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<sup>151</sup> The generation companies are China Guodian Corporation, China Huaneng Group, China Huadian Corporation, China Datang Corporation, and China Power Investment Corporation. The grid companies are China Power Grid Corporation and China Southern Power Grid Corporation.

those between Yunnan and Vietnam. Interprovincial transfers are negotiated on a province-to-province basis, with the grid company acting as the executor (*zhixing bumen*) responsible for ensuring that the grid infrastructure required to actualize the transfer is in place or gets built. The company has an international office responsible solely for such negotiations after they are passed upwards from the subsidiary office at Yunnan Power Grid Company in Kunming. Final authority for all international power sales agreements much still be approved by the State Council, though. Like the five power generation companies and its sister grid company, China Power Grid Company, which were all formed from the former State Power Corporation of China, the China Southern Power Grid is a stock company (*gufen gongsi*). Also like its generation and transmission siblings, however, the State Assets Supervision and Administration Commission retains a controlling number of the stock shares, estimated at some 80%.<sup>152</sup> Prices for power sales, whether interprovincial or international, must be approved by the State Electricity Regulatory Commission, a fact that one hydropower executive called emblematic of “imperfect marketization.”<sup>153</sup>

Grid inter-connectivity between Yunnan and Guangdong currently relies on several high-capacity “backbone” transmission lines, rather than a more evenly distributed network with many connecting nodes. The reason for this, according to an explanation by a grid company employee familiar with the technical aspects of power generation and transmission, is to prevent over-reliance on one set of transmission lines, which in the event of a failure could be catastrophic for Guangdong. Power generation

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<sup>152</sup> Interview K20060116a.

<sup>153</sup> Interview K20060814.

over long distances, though, has historically been a low-efficiency proposition. Since voltage varies directly with resistance and current, voltage losses are inevitable over long distances due to the cumulative resistance of transmission wires. For reasons far too technical to explain in this dissertation, AC (alternating current) electricity is much less stable at high voltages and over long distances, and much more susceptible to voltage losses, than is DC (direct current). As a result, current AC connections between Yunnan and Guangdong have to go through voltage regulation stations (*tiaodu zhan*)<sup>154</sup> so that line voltage can be stepped up accordingly to compensate for losses, or lowered to allow for connection to lower-voltage local grids. The key problem historically has been that the technology for transmitting high-voltage DC over long distances has not been economically feasible or technologically satisfactory, despite the fact that the basic technology has been well understood since the 1950s (L. Li, 2005).

In the past decade, high-voltage DC technology has become increasingly commonplace in China, with rapid and significant advances being made in both technology and cost-effectiveness. The Tianshengqiao-Guangzhou 500-kV DC transmission line is one example. Work on the line began in the mid-1990s, and the first phase of the system came online in December 2000, with the second phase following six months later (L. Li, 2005; State Power Information Network). The line connects the two Tianshengqiao hydropower stations, situated on the Nanpan River between Guizhou and Guangxi, to the municipal grid in Guangzhou, the capital of Guangdong Province. Other grid upgrades have connected the Dachaoshan hydropower station on Yunnan's Lancang

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<sup>154</sup> A *du* here refers to a kilowatt-hour (kWh).

to Tianshengqiao via substations in central Yunnan (National Development and Reform Commission, 2001). Work is ongoing on 800-kV DC systems, and South China Power Grid planners expect the technology will be available in China before 2010.<sup>155</sup> One report cited a China Southern Power Grid representative who confidently claimed that by 2010, the 800-kV Yunnan-Guangdong circuit would be the first ultra-high-voltage circuit of that distance in the world, and would be able to carry more four to five times the amount of power as a 500-kV circuit (H. Chen, 2005). In a sign of the increasing technical and innovative capacities of Chinese research and development engineers, most of the work on the 800-kV ultra-high-voltage systems is being carried out solely by Chinese engineers and scientists. The same is true for large power generation turbines; only in the past five years or so has China become able to domestically manufacture turbines with generating capacity greater than 600 MW.

Based on my discussions with technical experts familiar with grid development and operations in China, a debate is growing about the most effective and reliable basic architecture of the grid as regards interconnectivity among local, provincial, and regional grids, especially where very large “point-source” generating facilities such as Three Gorges, Xiaowan, Nuozhadu, and several of the Nu and Jinsha projects are concerned. One camp argues for grid-to-grid (*wang dui wang*) connections, where large-scale generation facilities are first connected directly to local grids, when are in turn linked with provincial and, eventually, national grids. Another camp argues for point-to-grid (*dian dui wang*) connections, where dedicated high-capacity, high-voltage lines such as those currently

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<sup>155</sup> Interview 20060116b.

being strung between Yunnan and the Pearl River Delta region take power directly to load centers rather than first passing through interconnected grids. An engineer at the Yunnan Power Grid Company noted that the direction and pace of technical advances over the coming years will clearly have a major impact on resolving such debates, but that is likely that by the end of the 12<sup>th</sup> Five-Year Plan (2015), some combination of the two architectures will be in place.

### *Summary*

Electricity is geography. In the most superficial and banal sense, power grids consist of nodes – generation sites, transformer stations, and load centers – linked together by high-voltage lines that tie falling water, expanding steam, blowing wind, or shining sun at one end to countless consumptive uses at the other. At the same time, those physical, tangible networks making up the electric power distribution system are underlain by less tangible, but no less real, networks of capital and influence that establish, perpetuate, and reassemble the trans-local relations embodied in the power grid. In this chapter, I have shown how three policy frameworks – Send Western Electricity East, Send Yunnan Electricity to Guangdong, and Send Yunnan Electricity Out – all center on the creation of new energy geographies that provide a rationale and basis for legitimacy for an electric power development agenda that envisions hydropower dams in western Yunnan as a “string of pearls”<sup>156</sup> adorning the Lancang, Nu, and Jinsha Rivers.

Additionally, these three policies are parts of a larger whole – the Western Development campaign – that naturalizes the transformation of Yunnan’s advantage in

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<sup>156</sup> See quote at beginning of Chapter One.

hydropower, mineral, and tourism “resources” (*ziyuan youshi*) into economic advantage (*jingji youshi*) that will ostensibly promote local economic development in Yunnan but, more importantly, ensure that the rapid economic development already underway in Guangdong continues. Deng Xianpei, Mayor of Zhaotong Municipality through which the lower reach of the Nu River and the middle reach of the Lancang River flow, said in an interview in 2005 that “Yunnan’s hope is in the mountains, its path lies in forestry; its potential is in the water, its path lies in electricity”<sup>157</sup> (X. Shen, Zhang, & Du, 2005). The optimism about forestry in this classically cryptic statement by a Chinese official seems somewhat misplaced given that logging in Yunnan, part of the Jinsha-Yangtze watershed, was banned following the disastrous Yangtze floods in 1998. The assessment of hydropower’s importance, however, is likely right on target. Yet in a testament to the plurality of viewpoints among officials in a system often assumed by outsiders to think with one mind, another Baoshan official recently expressed the hope that ecotourism activities such as whitewater rafting and kayaking might be developed into important local economic sectors.<sup>158</sup> This should happen before, he added somewhat wistfully, the hydropower projects turn the prime whitewater into placid lakes. In the next chapter, I build on this theme by picking apart decision making processes related to large-scale hydropower development in Yunnan.

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<sup>157</sup> “Yunnan de xiwang zai shan, chulu zai lin; qianli zai shui, chulu zai dian.”

<sup>158</sup> Personal communication, April 6, 2005.

## Chapter Seven: Analysis of Decision Making

### *Introduction*

Thus far, I have discussed the empirical details of the Nu and Lancang hydropower projects and analyzed the various policy frameworks that are constitutive of the projects themselves and the new energy geographies in which they are situated. This chapter goes one step further to analyze decision making processes related to Yunnan's large-scale hydropower development. When I first began this research, I told my then-potential host supervisor in China, Professor He Daming at Yunnan University's Asian International Rivers Center, that I was interested in the politics of large hydropower in southwestern China. He suggested that my topic was too broad and, as I had phrased it, far too sensitive to make any meaningful progress in my research. He then pushed me to define what I meant by "politics of hydropower," at which point I realized it was the decision making processes that intrigued me, the processes that lead from a dam being a blueprint to massive expanse of cement and rock blocking a river and generating electricity. I then approached my potential host once more with my revised project idea, at which point he welcomed me to undertake my research at his research center.

As I noted in the introduction to this dissertation, much of the criticism of hydropower development on the Lancang and Nu, two of Yunnan's four transnational rivers, has been leveled at a monolithic "China" that refuses to consider the concerns of social and ecological communities downstream from the dams. I found such criticisms deeply unsatisfactory, and set about to better understand the details of decision making about the dams projects, focusing particularly on which actors become involved at which

stages of the hydropower development process, and what the “rules of the game” are regarding each one’s engagement in the process. The long and confused history of large hydropower development in China and elsewhere in the world leaves little reason to believe that such processes or the actors who take part are always subject to rules, yet there is nevertheless value in understanding how the processes of hydropower development have played out in this particular socio-historical context; namely, on the Lancang and Nu Rivers, in an environment of general enterprise restructuring, electrical industry reforms, gradual loosening of political controls, and increasing engagement of the Chinese political economic machine with that of its neighbors and the world. While I do not expect this analysis to hold for all large hydropower in all parts of China at all times, I do feel it sheds light on how legal reforms, industry modernization, political restructuring, and an increasingly vocal environmental movement in China all interact to influence the shape and direction of hydropower development in Yunnan.

My analysis of decision-making processes does not begin, as one might expect, with the ministries, commissions, leading small groups, or other “usual suspects” whose role in key economic development decisions in China is ever-present. Those actors are by no means absent from the decision making, and at times wield the same kind of authority they did during the height of the planned economy. They are, however, increasingly bound up in a decision-making milieu constrained by several factors: a rapidly changing legal environment; growing recognition among all levels of Chinese society of the costs of rampant development without attention to the impacts on environment; and an increasingly vocal and empowered community of voices who are beginning to question

the old style of economic development with its “develop first, clean up later” mentality. Two sets of actors and groups make up that community: the so-called NGO sector and academic institutions. One might also include the State Environmental Protection Agency (SEPA) in this group, especially given the several cases in the past two years where SEPA officials have spoken out against “chaotic” (*luan*) development and called for, among other things, strict adherence to environmental impact assessments and increased public involvement in project approval. But for the purposes of this dissertation, I treat SEPA as part of the bureaucratic institutional apparatus.

The remainder of this chapter, then, is divided into four sections. First, I analyze how three “non-traditional” actors – what I call civil society organizations – are engaging in energy decision making processes from which they have historically been excluded. I then shift focus to the academic community, analyzing in particular one research center whose members have withstood some pressure for their work on large-scale hydropower development on the Lancang and Nu, which is far from radical or subversive, but who have also had an impact on that development as well. Next, I turn to an institutional analysis of the usual bureaucratic actors who have a say in large hydropower projects in China, first identifying those actors and situating them socio-historically, then tracing the progression of Lancang and Nu power projects from initial proposal to final approval. In drafting this schematic, I identify several leverage points in the process and show how they have been used by “newcomers” such as civil society organizations and academics. Finally, I conclude by pointing out the inconsistencies between legal requirements for

project approval and “institutional inertia,” or bureaucratic habits that change more slowly than do laws and regulations.

### ***Civil Society with Chinese Characteristics***

In this section I discuss some of the general characteristics and differences between NGOs outside China and what have been called quasi-NGOs in China. Next, I present brief overviews of four organizations: three Chinese quasi-NGOs and one academic research institute. All four are involved, broadly speaking, in energy, environmental, and cultural work in Yunnan, and the three non-academic entities could be roughly categorized as “environmental” organizations. All employ different tactics with varying degrees of success to promote certain viewpoints regarding environmental and social issues in Yunnan. My goal in examining these case studies is to understand the events and contexts that have been fundamental to their establishment, development, and engagement in energy- and environment-related advocacy, as well as the factors that have helped them overcome certain obstacles while leaving them stymied by others.

While the moniker “non-governmental organization” or NGO is frequently used to refer to Chinese social groups acting on behalf of any variety of causes, group leaders themselves point out that it is more a name of convenience than an actual representation of an organization’s relationship to the government. As the director of an organization classified as a non-enterprise entity (*fei qiye zuzhi*) told me: “In China, we’re non-enterprise organizations. Non-government doesn’t sound good to the government.”<sup>159</sup> Another insisted that while there is value in certain individuals or organizations pushing

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<sup>159</sup> Personal communication, December 13, 2003.

the envelope in terms of which causes they choose to undertake, or how far they push their activism, the situation in China currently favors a strategy of accommodation, rather than antagonism, on behalf of social organizations toward government. At the same time, the same interviewee noted that those on the cutting edge, frequently seen as radical, often pave the way for organizations with agendas perceived as more moderate (though perhaps radical in their own way) to carry forward their work.<sup>160</sup>

I focus here on local<sup>161</sup> Chinese organizations, not on internationally registered and recognized organizations such as The Nature Conservancy, World Wildlife Fund, or the World Conservation Union (IUCN), all of which have significant presence in China, including in Yunnan. In place of the cumbersome “quasi-NGO” and over-general “social organization,” I use the term civil society organization (CSO) to indicate organizations existing at the interstices of the Chinese party-state and the “old hundred-names” (*laobaixing*), a term used to refer to the common people. In China, these groups are often referred to as “people’s organizations” (*minjian zuzhi*) or “social groups” (*shehui tuanti*). Zhang & Baum (2004) choose to refer to them as “people’s NGOs,” out of concern that the normative connotations of “civil society” are too strong. I argue, however, that the “non” of non-governmental organization (NGO) carries equally strong normative connotations, and therefore I opt for the term “civil society organizations,” insisting at the same time on a functional, rather than structural definition of civil society. Even though I choose to focus on Chinese organizations, I in no way intend to discount the significance

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<sup>160</sup> Interview K20060115.

<sup>161</sup> I recognize that the term “local” is itself problematic, in that a claim to local-ness is usually also a claim to authenticity, legitimacy, and representational authority. Here, I intend “local” to mean organizations that were founded in China, do not have formalized partnership relations with organizations outside China, and may have questionable legal status in China.

of foreign funding, organizational alliances, or other linkages in shaping the character, tactics, or strategy of social organizations within China. Indeed, as I show below, such factors often have very direct and, at times, negative implications for local organizations.

The past fifteen years have seen a growing interest in the development of civil society in China. China watchers have held their breath, especially since the 1989 Tiananmen Square incident, in anticipation of what form China's civil society would eventually take (see, for instance, Wakeman, 1993 and others in the same volume). Implicit in such expectations, of course, is the assumption that China's "transition" from a repressive authoritarian system to a more pluralistic, open, liberal system is inevitable (Cooper, 2006; C. Li, 2001); the question for many is simply one of time, though Rowe (1993) early on critiqued such teleological assumptions. The Chinese party-state was taken by surprise by the rapidity with which the June 1989 complaints of disgruntled workers and students escalated into a confused yet massive demonstration drawing broad support from workers, students, intellectuals, and international audiences. In response, central authorities instituted strict measures to ensure that a similar incident did not recur. One step was to require that all organizations be first approved by the government, in particular the Ministry of Civil Affairs (*Minzheng Bu*), and that the Communist Party retain a presence in enterprises, especially large state-owned enterprises (Naughton, 1999). Now, all social organizations are required to have a government *danwei* ("unit," or office) as their sponsor, and recent changes in laws have tightened restrictions on the kinds of organizations that can legally register (Qiu, 2005).

Since the mid-1990s, there has been increasing evidence of the willingness and ability of social networks to form and persist in China outside the immediate control and supervision of the party-state. Such networks include grassroots organizations seeking to address very immediate concerns such as pollution or poverty through petitioning or other means, as well as international organizations (often grant-making) that have set up shop in China. The latter type frequently maintain close connections both to government offices and local organizations. Notwithstanding efforts to curb unauthorized organizations and demonstrations, activism on behalf of socio-environmental causes took off in the mid- to late-1990s in opposition to the Three Gorges Project (Padovani, 2004). The years 2004 and 2005 saw a significant number of public mobilizations around certain environmental and health causes. While the central government has insisted that those seeking to create disturbances will be dealt with according to the law (i.e., severely), there is clearly a willingness among the general populace and environmentally-focused social organizations to make their concerns heard, sometimes loudly, and at times ending in violence. Among the most visible manifestations were protests against insufficient compensation for land taken for hydropower plant construction, as in the case of a project in Hanyuan, Sichuan in the fall of 2004 ("Hu Jintao Wen Jiabao jiu Hanyuan," 2004).

There is a preponderance of international NGOs in China committed to environmental causes. The increasing spillover of language and strategies between them and the local groups with whom they work<sup>162</sup> prompted Khondker (2001) to underscore

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<sup>162</sup> Sundberg (2003) tells how local conservation organizations in Guatemala adopt "conservation's new vocabulary" as a strategy for establishing authenticity and privileging certain conservationist actions over others. Similar processes are occurring to a great extent among China's environmental organizations, with a key difference being that Chinese organizations must be selective in the vocabulary they adopt due to

the role of environmental consciousness and concern in fostering a global civil society.

The common understanding of civil society among western academics, however, assumes a high degree of separation between social organizations and government. Thus the cases of countries like Vietnam and China, where “hybrid” social organizations are increasingly numerous, active, and sophisticated, present unique difficulties as long as we hold to the strictures of traditional civil society definitions. At the same time, such cases present opportunities for us to reevaluate what we actually mean by civil society and to analyze it from a functional, rather than structural-normative, perspective.<sup>163</sup>

The overviews below are based on a year of participant observation research in China, along with numerous interviews and informal discussions with Chinese citizens and expatriates working in China’s so-called “third sector.” The goal of this component of my research was to understand the role of Chinese CSOs in decision-making processes regarding (a) the broad issues of environmental protection, natural resources exploitation, and cultural preservation, and (b) large-scale hydropower development in southwestern China. The need for ideological and analytical flexibility in understanding Chinese CSOs is underscored by a recent change in the law regarding how such organizations register with the government. In March 2005, a new law was promulgated stating that civil society organizations in China could no longer simply register with industrial and

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continued suspicion on behalf of the Chinese government of undue foreign influence. I say more about this below in the discussion of the case studies.

<sup>163</sup> I am grateful for many fruitful exchanges with my friend and colleague Joseph Hannah at the University of Washington Department of Geography, who has struggled similarly to understand the nature of civil society in contemporary Vietnam just as I have with China. Indeed, his forthcoming dissertation, “Local Non-Government Organizations in Vietnam: Development, Civil Society and State-society Relations,” is entirely devoted to the topic.

commercial bureaus as non-profit enterprises or “non-enterprise units,”<sup>164</sup> but must instead register (or re-register) with relevant civil affairs departments under the state council and local governments (Qiu, 2005). A year prior, a researcher at the Legal Research Center of the Chinese Academy of Social Sciences had estimated that 80% of *minjian zuzhi* in China were not registered and, as a result, were technically illegal (Xie, 2004). The law specifically targeted such unregistered organizations and those whose name contained the words “social science”, “research center” or “research institute,” and threatened to close down those organizations that did not register with the appropriate authorities within two weeks (by March 30, 2005). The effects of the new law are still unclear, but several existing environmental groups have remained actively involved in major debates regarding environmental impacts of industrial and energy projects, including those provoking international controversy such as the 2005 Songliao River pollution accident and the Nu hydropower cascade (Sun & Liu, 2006). In addition, aside from the usual disjuncture between legislation and enforcement, there are clear examples of avoidance behavior both on the part of CSOs and the governmental institutions charged with keeping tabs of them, as is shown below.

### **Green Watershed**

Green Watershed<sup>165</sup> was founded in 2002 by Yu Xiaogang, at the time an anthropologist at the Yunnan Academy of Social Sciences. In 2001, Yu took part in a

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<sup>164</sup> *Fei qiye zuzhi*.

<sup>165</sup> *Yunnan sheng dazhong liuyu guanli yanjiu ji tuiguang zhongxin* (roughly translated as Yunnan Province People’s Watershed Management Research and Outreach Center, or the Yunnan Center for Watershed Management, Research and Promotion by the Masses). Clearly, this name was selected to be politically palatable. Mr. Yu, the director, considers himself a model Communist Party member committed to representing and protecting the interests of the masses.

study of resettlement outcomes for residents in and around the reservoir of the Manwan dam, the first on the Lancang River. Yu analyzed the social impacts of the Manwan dam, while Professor He Daming,<sup>166</sup> a noted hydrologist and geographer, undertook the ecological impact study. Though Yu had never previously been involved in research or advocacy related to dams before, his work with Manwan convinced him that large dams, poorly built, could have immediate and long-lasting negative impacts on individuals whose livelihoods depended on the bottomlands that are frequently flooded by dams. Even though the Manwan is, relative to the other Lancang dams, considered to be a medium-sized dam, it nevertheless backs up a 70-km-long reservoir, and people who lived in areas flooded by the reservoir have suffered the most dramatic negative impacts to their ability to make a livelihood. While the official line is that the so-called “Manwan model”<sup>167</sup> represented a breakthrough in terms of institutional arrangements and financing, critics argue convincingly that the project was haphazardly constructed with minimal attention to ecological or social impacts, and that compensation to displaced locals was inadequate or simply never materialized. Manwan, therefore, has become a model for more reasons than one, and those involved in large-scale hydropower developments in Yunnan today are quick to recognize the need to better address socio-ecological problems in ongoing and future projects.

The work of Green Watershed and the history of the Manwan dam are inextricably intertwined. Once the organization’s *raison d’être* was galvanized by the plight of villagers around Manwan, Green Watershed quickly moved into the avant-garde

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<sup>166</sup> I say more on He’s role in Lancang-related work later in this chapter.

<sup>167</sup> See the discussion of Manwan in Chapter Four.

of Chinese civil society organizations. With financial support from foreign grant-makers, Yu and his staff organized monthly meetings in Kunming involving government officials, academics, representatives from other civil society organizations, and villagers residing near existing or future dam sites. The meetings were meant to be public fora where the costs and benefits of large-scale hydropower projects on Yunnan's rivers could be debated. Yu himself, claiming to be doing nothing more than upholding the ideals espoused by the Communist Party, continued to advocate in China and abroad on behalf of dam area residents. He accepted several invitations to speak at conferences and events in Thailand and the United States and quickly earned a reputation as one of the "must-see" people for anyone interested in the social impacts of natural resources exploitation.

In the fall of 2004, Yu pushed the advocacy envelope even further by organizing a group of villagers from the Nu River valley, whose villages would be flooded by the Liuku dam, to visit the Manwan dam area. Nu villagers met with Manwan villagers to discuss promises made, kept, and broken during planning and construction of the Manwan project, and to witness first-hand the lives of resettled Manwan villagers. Shortly thereafter, Green Watershed organized (and, importantly, paid for) a small group of the Nu villagers to travel to Beijing to attend a United Nations conference on hydropower held in November 2004.<sup>168</sup> During the conference, several villagers took the floor and voiced their concerns over the proposed Nu dams, much to the embarrassment of projects proponents in the hydropower companies and the government, particularly the

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<sup>168</sup> Journalist Josephine Ma wrote a piece for the *South China Morning Post* (J. Ma, 2004) recounting the experience of one villager from the area near Tiger Leaping Gorge on the Jinsha River in Yunnan who traveled with Yu to the conference in Beijing to voice concerns about hydropower development there.

Development and Reform Commissions at the provincial and national level. Yu himself used the opportunity to further expound on the need for China to make social impact assessments mandatory with development projects, just as the EIA Law of 2004 mandates environmental impact assessments. Upon his return to Kunming, Yu and his staff produced a video CD recounting the experience of the villagers' visits to Manwan and Beijing, which was distributed free of charge to anyone interested in the issue.

This, it seems, was the straw that eventually broke the camel's back. In November 2004, the Yunnan Development and Reform Commission ordered an investigation of Green Watershed's activities, claiming, in classic Cultural Revolution phraseology, that the organization had potentially been under undue influence from foreign political organizations and not simply a recipient of foreign grants. Around the same time, Yu's passport was revoked and he was prevented from traveling abroad. Green Watershed's monthly meetings, which had gone on for a little over a year at that time, were ordered halted by the Yunnan government, and Yu was ordered to distribute no more of the VCDs, on the grounds that, as a publication, the VCD had not gone through the proper channels of approval. The results of the investigation, much to the displeasure of many who had rallied behind Green Watershed and to the frustration of Mr. Yu himself, had yet to be released as of January 2006. Yu scaled back his advocacy related to the Nu dam projects, while remaining actively involved in watershed conservation projects, mostly around Lijiang Prefecture's Lashi Lake in northern Yunnan. Yu continued to grant interviews with researchers and journalists, and maintains active academic research collaborations with scholars and civil society/non-governmental organizations outside

China. All the while, he insists that his concern about the plight of “the little man” in China’s countryside makes him no wrongdoer, but rather a model Communist.

In the spring of 2006, I had the good fortune to go on a rafting and kayaking expedition on a stretch of the Lancang that will be flooded by the Xiaowan dam. Yu was among the 20-odd people on the expedition. Two weeks later, it was announced that Yu had been awarded the prestigious Goldman Award, a US \$120,000 prize awarded to six individuals around the world for their work on environmental causes. At the same time, I learned that Yu would be traveling to the United States to speak in Washington, DC and San Francisco on his work related to the Nu projects. When the time came for his departure from China, Yu was not turned back at this airport as he has been repeatedly over recent years, but instead was able to leave the country and accept the award. This turn of events may indicate that the investigation into Green Watershed yielded no cause for continued suspension of the organization’s activities or Yu’s travel.

### **Yunnan EcoNetwork**

The second CSO case study is Yunnan EcoNetwork (YEN). YEN was founded in 1998 and is led by Chen Yongsong, formerly a biomedical technician. In 2002, Chen was part of a five-member delegation selected to take part in an International Visitor Program on volunteerism and the work of U.S. non-profit organizations, funded by the State Department’s Bureau of Educational and Cultural Affairs. Since then he has become something of a figure among environmental NGO circles in China. YEN is a small and loosely run organization dedicated mainly to education and awareness about preservation of biological and cultural diversity in Yunnan. To date, the organization’s signature

program has involved the planting and long-term “adoption” of saplings in wetlands located in key watersheds such as the Jinsha (upper Yangtze). A second focus has been rural energy provision as a tool for rural sustainable development and poverty alleviation, where YEN has targeted its efforts at promoting biogas and micro-scale hydropower.

In both cases (watershed protection and energy/poverty work), YEN has taken a highly pragmatic approach and worked closely with government offices at all stages. Chen, quick to point out that the “N” of NGO frequently does not apply in the case of officially registered Chinese social organizations, prefers the term “civil society organization.” He recognizes that despite the limitations of working within the system in an “embedded” capacity, the arrangement does allow YEN to take a gradualist but effective approach to questions of energy, culture, and livelihood. Yet in spite of its middle-of-the-road tactics and careful selection of issues around which it advocates, YEN came onto the radar screen of the provincial Public Security Department in 2001 and was briefly scrutinized for its activities and its ties to funding sources outside China, demonstrating clearly that even what seem to be the safest and least politicized of topics (tree planting and biogas production) can still be seen as potential rallying points for discontents by those most paranoid about maintaining social stability.

YEN has not yet become involved in any advocacy or educational efforts related to large-scale hydropower development in Yunnan, and probably will not in the foreseeable future. The organization’s approach is illustrative, though, of how education – of the public and of officials – is the way in which Chinese social organizations seek to engage in decision making processes. In keeping with the theme of a Green Olympics,

promoted by Beijing officials as a goal for 2008, YEN and a Beijing affiliate have launched another innovative environmental education program on the trains that run between Kunming and Beijing. YEN and Global Village Beijing (GVB) volunteers and staff take advantage of the captive (and evidently receptive) audience to conduct outreach about issues such as conservation and pollution. In Yunnan, YEN frequently hosts foreign delegations of teachers, students, and corporate groups, and have even received foreign grant money for their watershed conservation efforts. The non-confrontational approach chosen by Chen and his staff have clearly facilitated the organization's effectiveness and ability to continue doing its work despite its shaky legal basis.

### **Green Earth Volunteers**

Green Earth Volunteers, founded in 1996 and led by journalist cum environmental activist Wang Yongchen, is a Beijing-based organization whose most recent and celebrated cause is opposition to dam construction on the Nu River in Yunnan. The organization's mission is poetic: To enter nature, get to know nature, and make friends with nature. Tactically, GEV focuses on building awareness and knowledge of socio-environmental concerns related broadly to development, and more specifically in recent years, to large hydropower infrastructure projects. While many of GEV's projects are in and around Beijing, the organization has become increasingly active in the Nu River hydropower debate. Thus far, the primary argument of Green Earth Volunteers regarding its Nu River anti-dam advocacy has been that construction of large dams in the narrow Nu valley threatens these areas unique cultural and biological diversity. Wang Yongchen, like Yu Xiaogang of Green Watershed, received an international award for her activism

related to the Nu, and the two have both been recognized as having likely played an important role in the Premier's decision in early 2004 to suspend the projects.

GEV's Nu River campaign strategy has two prongs. The first, raising awareness of the Nu gorge region among outsiders, is effected tactically by field trips involving middle-class Beijing residents, journalists, foreign visitors, and basically anyone able to pay the costs associated with the trip and interested in "off the beaten path" tourism with a social responsibility twist. The second, which occurs in conjunction with the first, involves visits to village schools in the Nu River area and donations of money, books, clothing, and computer equipment. I participated in one visit to the Nu organized by GEV, and our school visit quickly turned into a small-scale press conference and photo opportunity. Trip participants "adopted" students (i.e., paying their school fees) while GEV's banner was unfurled and Wang Yongchen gave a brief speech to those present (including local students, school officials, and villagers) about the importance of safeguarding education and cultural diversity while protecting the environment. So far, Green Earth Volunteers has relied on a fairly extensive network of journalists sympathetic to the organization's cause for much of this type of outreach work. One of Wang's friend and colleagues is Dai Qing, an outspoken journalist who jailed for ten months following the 1989 Tiananmen demonstrations, and who has been one of the most vocal critics of the Three Gorges Project. In what is perhaps a sign of some relaxation of concerns about "divisive elements," Dai Qing has recently (since 2005) held several small-scale public speaking engagements in China.<sup>169</sup>

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<sup>169</sup> Personal communication, January 9, 2006.

Green Earth Volunteers has not yet encountered any significant pressure from the government at any level, despite frequent field trips to the Nu gorge involving dozens of participants each time.<sup>170</sup> The main source of criticism of the organization, and especially of Ms. Wang, has been individuals on both sides of the dam debate who feel the organization lacks sufficient credible scientific research to support its arguments against the dams. Others, while not mentioning Green Earth Volunteers per se, have argued that the most vocal critics of the Nu projects are those who live in comfortable homes with dependable electricity and incomes, who fail to understand the poverty and daily livelihood challenges faced by the Nu gorge residents. Large-scale hydropower, they claim, is the key (and the only one) to raising the standard of living in remote areas of Yunnan while meeting surging electrical energy demand elsewhere in the country. Still other critics have lashed out at Wang individually for her opposition to the Nu River projects, claiming that as a journalist with no background in cultural anthropology or ecology, she has no standing in the argument. Ironically, this last criticism was voiced most loudly by a theoretical physicist!<sup>171</sup>

### ***Scholarly Input: The Asian International Rivers Center***<sup>172</sup>

Academic scholarship has had a somewhat tenuous existence since the

Communist Revolution in 1949. Mao saw academics as proponents of bourgeois ideology

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<sup>170</sup> Ms. Wang and GEV led three trips to the Nu River gorge from Beijing in spring 2005, including the one in which I participated. Most of the other participants in the field trip were journalists, academics, and activists. As of January 2006, the group had two trips to the Nu gorge planned for early spring, one of which was also to be a filmmaking expedition documenting land use patterns and the large number of sites where “preliminary work” related to hydropower dams is underway (mostly substrate testing by drilling and excavation).

<sup>171</sup> I say more about this in the following subsection on the Asian International Rivers Center.

<sup>172</sup> I was based at the AIRC for my year of dissertation fieldwork. Also, portions of this section appeared previously as part of the proceedings of a conference on the Role of Water Science in Transboundary Water Management (Magee, 2005b).

and a threat to establishing a dictatorship of the proletariat. The Hundred Flowers Campaign briefly allowed “a hundred flowers to bloom and a hundred schools of thought to contend” in an attempt to solicit scholarly input into how to redress the failed Great Leap Forward; yet when the advice proved too critical, Mao decried the scholars as counter-revolutionaries. Today’s climate for academic scholarship in China is obviously much freer, yet reluctance to be truly critical of the regime or of politically popular policies still persists among many scholars. Hydropower development on the Lancang, and to a lesser extent the Nu, has become the subject of a fair amount of Chinese scholarship, but much of the work published in academic journals such as the *Yunnan Hydropower Journal*<sup>173</sup> is written by engineers working for the design or development companies who can hardly be said to be disinterested.

Professor He Daming, director of the Asian International Rivers Center at Yunnan University in Kunming, and his colleagues have published widely on the Lancang and, to a lesser extent, western Yunnan’s other transboundary rivers. Trained first as a hydraulic and hydroelectric engineer, He later completed advanced degrees in geography and environmental science. He then worked as an engineer at the Kunming Institute of Hydropower Survey and Design in the early 1980s when the Manwan hydropower station was designed. He spent most of the 1990s at the Yunnan Institute of Geography in Kunming, where he and his colleagues published some of the earliest and most comprehensive physical geographic work on the Lancang watershed. A full issue of

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<sup>173</sup> *Yunnan Shuili Fadian*.

*Yunnan Geographic Environment Research*<sup>174</sup> in 1995 (Vol. 7, No. 1) was devoted to Lancang-Mekong work, as was a later issue of *Acta Geographica Sinica*<sup>175</sup> in 1999 (Vol. 54, Supplement).

Now director of the Asian International Rivers Center since its founding in 2000, He and his colleagues there have published widely on the hydrological characteristics of the Lancang (He, 1995), along with more policy- and economic development-oriented research (He, 1995; He and Chapman, 1995; He, Liu and Yang, 1999; He, Yang and Feng, 1999). AIRC researchers and affiliates at other universities have also published work on land coverage and usage using remote sensing and GIS data (Gan, 2001; He, Zhou and Liu, 2001), on Lancang-Mekong management in a global context of management and development trends in other transboundary rivers systems (Chen, 2002). Current work at the AIRC focuses on the linkages among globalization, ecosystem change, and poverty in Yunnan's transboundary river basins, along with mountain corridors biodiversity issues. With regard to the Lancang, neither He nor his colleagues, to my knowledge, have ever directly opposed the dams in writing. They have, however, based on many years of research and He's own background as a hydropower engineer, been publicly critical of the ecological and social impacts of hasty, disorderly hydropower development. For that have gained a degree of notoriety, especially He.

On April 8, 2005, an "academic" discussion of Nu River hydropower was organized by the Yunnan Province Development and Reform Commission. The discussion was hosted on the campus of Yunnan University, and all other talks scheduled

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<sup>174</sup> *Yunnan Dili Huanjing Yanjiu*.

<sup>175</sup> *Dili Xuebao*.

that day (including my own on the political economics of Yunnan hydropower) were cancelled in order to encourage attendance. Leading the “expert group” in charge of the discussion were two nationally renowned figures, He Zuoxiu and Lu Youmei.<sup>176</sup> Also in the group were Fang Zhouzi, a US-trained physicist who has made a name for himself with his sharp critiques of “sloppy” science and so-called pseudo-scientific practices such as Tai Chi and Qi Gong in China, as well as a handful of other academic “big guns.” Yunnan governor Xu Rongkai played the interlocutor for the expert group in their discussion. Yet what followed was neither academic nor a discussion, but instead something of a pep rally for Nu hydropower development, complete with a character assassination of He Daming (AIRC) and Wang Yongchen (Green Earth Volunteers). The expert group admonished He and Wang to remain focused on their disciplines and not wander astray to comment on topics they were supposedly little qualified to address; yet at the same time, the “expert group” included several individuals no better equipped professionally or academically to judge the pros and cons of Nu hydropower development. He Zuoxiu and Lu Youmei even vowed to go straight to the State Council upon their return to Beijing with the recommendation that Nu River hydropower should proceed as quickly as possible.<sup>177</sup>

The event at Yunnan University left a very strong impression that the “expert group” was more akin to a posse of academic mercenaries sent out on a bounty hunt to discredit one of the foremost experts on the ecology, hydrology, and geography of

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<sup>176</sup> He Zuoxiu is a theoretical physicist and a member of the Chinese Academy of Sciences. Lu Youmei is the former general manager of the Three Gorges Project Corporation and a member of the equally prestigious Chinese Academy of Engineering.

<sup>177</sup> The text of the discussion is available in Chinese online at <http://tech.sina.com/cn/d/2005-04-11/1357577996.shtml>. I have also retained a copy in the event the online version becomes unavailable.

southwestern China's river systems. Yet whereas a public denunciation such as this during the Cultural Revolution would have been devastating, perhaps deadly, neither He Daming nor his colleagues have been relegated to pariah status. Quite the contrary seems true, in fact. In December 2005, eight months after the university incident, He Daming and his colleagues hosted a conference on transboundary water issues in the central Yunnan city of Dali. Three years before, a similar meeting had been cancelled at the last minute by the provincial government as a sign to He that his calls for better science and more comprehensive impact assessments were, to say the least, unpopular with development-minded provincial officials. The December 2005 meeting, which drew scholars, officials, and even hydropower development company representatives from China, as well as numerous participants from the downstream Mekong riparian countries, Europe, Australia, and North America, was hailed as a breakthrough. Attendees cemented collaborative research projects and other professional linkages that have failed to materialize through official channels for more than a decade.

### ***Rewiring the Hydroelectric Industry*<sup>178</sup>**

This section analyzes the reforms in the hydroelectric industry from the late 1990s to the present. The goal of this section and the next is to clarify the institutional linkages and decision-making dynamics among local, provincial, and national government entities and hydropower companies regarding hydropower development on the Lancang and Nu. Data presented here were gleaned from interviews with officials in government ministries, executives in hydropower development companies (who also hold Party

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<sup>178</sup> Some of the information in this section was previously published as a journal article (Magee, 2006b).

positions), and published reports in the press and from government or company sources.

As the timeline below shows, administrative responsibility for hydroelectric power has shifted numerous times since the establishment of the People's Republic of China in 1949. The following two sections discuss how that responsibility is currently configured, revealing the ambiguities and overlaps in lines of authority.

Contrary to what one might assume, large-scale hydropower in China is not governed directly by the Ministry of Water Resources. In interviews, MWR

**Table 7-1: Timeline of hydroelectricity governance**

Year	Event
1949	Ministry of Fuels Industry created
1955	Ministry of Electric Power created
1958	Ministry of Water Resources & Electric Power formed
1979	Ministry of Water Resources & Electric Power separated;
1979	Ministry of Water Resources & Ministry of Electric Power Industry created
1980	State Energy Commission created
1982	State Energy Commission abolished
1982	Ministry of Water Resources and Electric Power again formed (Li Peng as Vice Minister)
1988	Ministry of Energy formed; Ministry of Water Resources remains separate
1993	Ministry of Energy replaced by Ministry of Coal and Ministry of Electric Power
1993	First Send Western Electricity East power transfer initiated
1996	State Council gives permission to Ministry of Electric Power to convert to corporate entity
1997	State Power Corporation of China created from assets of MEP
1998	Ministry of Electric Power abolished
2002	Five generation co's, two grid co's, and four service co's created from SPCC assets

Source: Xu (2002a); Zouxiang shichang de Zhongguo Dianli Ed. Committee (1999)

representatives told me that final decision-making authority about such projects, especially those on transnational rivers, lies with the State Council.<sup>179</sup> The MWR does have a say in issues *related* to hydropower construction, such as impacts on navigation,

<sup>179</sup> Interviews B20050404 and 20050405.

drinking water provision, soil erosion, forestry, and flooding. At the same time, the MWR is administratively “upstream” of seven basin (watershed) commissions. The largest of these is the Changjiang Water Resources Commission (CWRC), also commonly referred to as the Yangtze River Water Resources Commission.<sup>180</sup> The CWRC employs some 30,000 people and holds responsibility for comprehensive planning not only in the Yangtze Basin, but since 1999 has also been responsible for the rivers of China’s southwest, including the Lancang and Nu.<sup>181</sup>

Like the other six basin commissions, the CWRC is theoretically subordinate to the MWR, yet in actuality it has been delegated authority by the State Council to *approve or reject projects based on whether or not they meet the requirements of the comprehensive plan for a particular river basin*.<sup>182</sup> For instance, projects that abstract<sup>183</sup> more than 100,000 m<sup>3</sup> of water per day on the upper Yangtze (Jinsha) must all be approved by the CWRC, not by the government of the province in which the abstraction occurs, nor by authorities in the Ministry of Water Resources or the State Council. Hydropower, because it is not a consumptive use of water, is not subject to this rule,<sup>184</sup> but is governed by another that requires all hydropower projects with installed capacity greater than 250 MW should be weighed against the comprehensive basin plan for that

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<sup>180</sup> *Changjiang* (“Long River”) is the Chinese name for the Yangtze. Part of the upper reach of the Changjiang, the Jinsha (“Golden Sands”) River, lies in Yunnan. The others are the Yellow River Water Resources Commission, Huaihe River Water Resources Commission, Haihe River Water Resources Commission, Pearl River Water Resources Commission, Songliao River Water Resources Commission, and Taihu River Water Resources Commission.

<sup>181</sup> Personal communication, March 15, 2006.

<sup>182</sup> Interview W20060125a.

<sup>183</sup> Water abstraction is the removal of water from a stream for consumptive use such as drinking water or irrigation. That water may or may not be returned later at a point downstream.

<sup>184</sup> Some would differ with the view that hydropower is not an extractive use, particularly due to the high rates of evaporation from reservoirs backed up by dams, especially large ones like Xiaowan and Nuozhadu on the Lancang, and Songta and Maji on the Nu.

river.<sup>185</sup> As we shall see in the following section, CWRC's status as a delegated agency (*paichu jigou*), essentially a commission that is neither local nor central in administrative rank, has led to confusion and ambiguity in decision-making processes related to Yunnan's hydropower projects. Another problem is that while so-called comprehensive plans for the Yangtze watershed have been underway since 1958, it has not yet begun for the Lancang or the Nu (or any other of the key southwestern rivers).<sup>186</sup>

Reforms in the electric power industry over the past decade have had an important impact on the way large-scale hydropower development takes place. In December 1996 the State Council, in keeping with national goals of enterprise modernization (*qiye xiandaihua*) and corporatization (*jituanhua*), mandated that the Ministry of Electric Power reorganize itself into the State Power Corporation of China<sup>187</sup> (SPCC)(Xu, 2002a). SPCC remained a state-owned enterprise, and the State Council provided or authorized all funds necessary for electric power development projects. Over a year later, in March 1998, the Ministry of Electric Power ceased to exist on paper. As noted earlier, a primary motivation for breaking up the Ministry was to separate the facilities and responsibilities for power generation from power distribution (*changwang fenkai*), thereby eventually breaking up the monopoly that the Ministry of Electric Power had held on power generation and distribution. Importantly, these reforms did not affect the China Three

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<sup>185</sup> In the case of the Lancang and Nu projects, this would require all but two of the 21 dams slated for those rivers. If the six upper Lancang projects are included, the ratio is reduced to two out of 27.

<sup>186</sup> Interview W20060125b. The interviewee in this case was a retired planner with the Changjiang (Yangtze) Water Resources Commission who had deep knowledge of the comprehensive planning process.

<sup>187</sup> *Zhongguo Guojia Dianli Gongsi*, or *Zhongguo Guodian*. Enterprise naming in the electric power industry is a particular source of confusion, since one of the five corporations created from the former Ministry, later SPCC, is called China Guodian (*Zhongguo Guodian*). While in name it is the same, at least in short form, in actuality it is actually one of five companies among which the assets of SPCC were divided (one of seven if the two grid companies are included).

Gorges Project Corporation, which since the onset of work on the Yangtze River's Three Gorges project has been under the direct authority of the State Council.

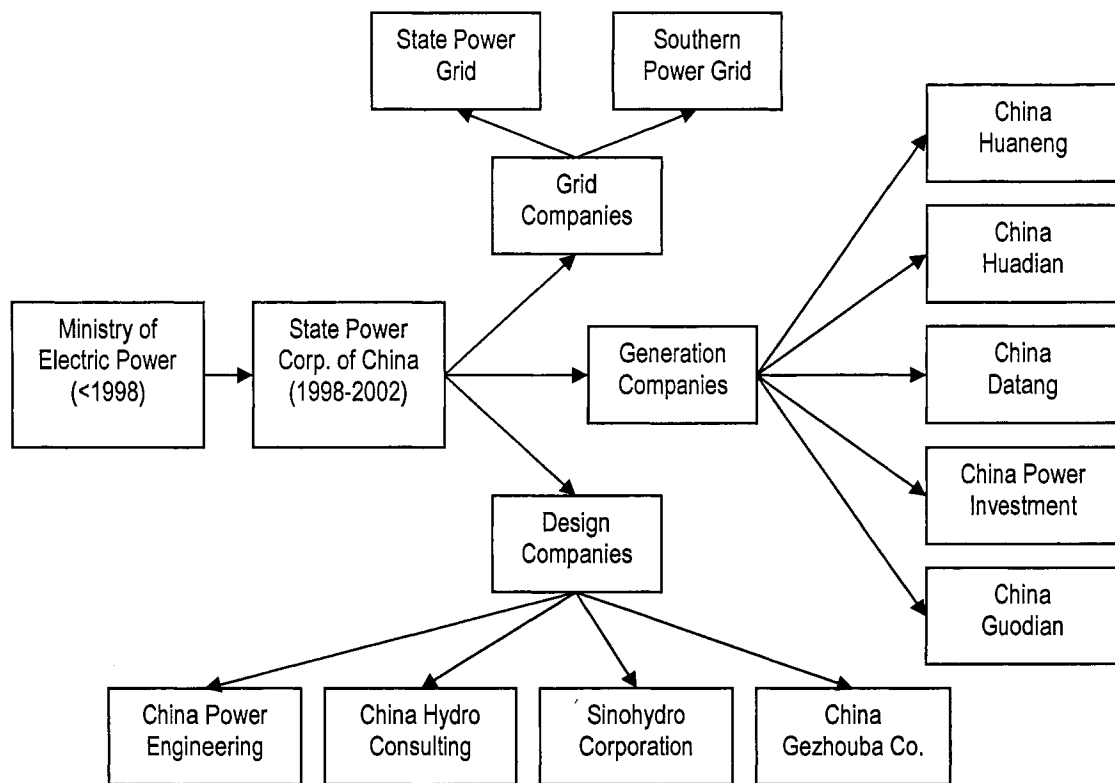
A second wave of reforms came in 2002, when the State Council approved the “Electric Power System Reform Program” and established a working group within the State Development Planning Commission (Z. Liu, 2002).<sup>188</sup> The working group soon proposed an asset reorganization plan that reallocated the assets of SPCC among five generation companies, two grid companies, and four so-called auxiliary companies (see Figure 7-1). The five generation companies, each labeled as a corporations or groups (*jituan gongsi*), were designated as China Huaneng,<sup>189</sup> China Datang, China Huadian, China Guodian, and China Power Investment.<sup>190</sup> The value of SPCC's power generation assets were assessed based on final accounting figures for 2000, and then divided in a supposedly rational and equitable fashion among the five generation companies. After the restructuring, each of the five controlled approximately 32,000 MW of installed capacity and held partial control over another 20,000 MW apiece. In addition, the plan called for each company to control no more than a 20% stake in each of the five regional power markets (northeast, northwest, east, southwest, and south-central). Again, this reorganization did not impact the Three Gorges Project Corporation.

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<sup>188</sup> Formerly the State Planning Commission (1952-1998), now the National Development and Reform Commission (2003-present). This commission has always held considerable authority over macro-economic decision making, and as I show later in this chapter, continues to do so.

<sup>189</sup> The general manager of Huaneng, Li Xiaopeng, is the son of former premier Li Peng, himself a hydraulic engineer who is often credited (or blamed) for being the one who made plans for the Three Gorges dam a reality.

<sup>190</sup> *Zhongguo Huaneng Jituan Gongsi*, *Zhongguo Datang Jituan Gongsi*, *Zhongguo Huadian Jituan Gongsi*, *Zhongguo Guodian Jituan Gongsi*, and *Zhongguo Dianli Touzi Jituan Gongsi*, respectively.



**Figure 7-1: From Ministry to stock corporations**

In Yunnan, the reorganization led to the assignment of the Lancang watershed to Huaneng and Nu watershed to Huadian. The asset reassignment effectuated by the working group also placed the assets of large watershed-based hydropower development companies such as the Lancang River Hydropower Development Company under the control of one of the five generation corporations; in the case of the Lancang company, as we saw in Chapter Four, this resulted in the formation of Hydrolancang<sup>191</sup> from the merger of Lancang River Hydropower Development Company and the Yunnan Manwan Power Generation Company. Meanwhile, the Jinsha River (upper Yangtze), with the

<sup>191</sup> The Chinese name shows the company's link to the Huaneng parent: Yunnan Huaneng Lancang River Hydropower Company (*Yunnan Huaneng Lancang Jiang Shuidian Youxian Gongsi*).

greatest hydropower potential of the three, remained under the control of the Three Gorges Project Corporation. Two years later, the Three Gorges Project Corporation entered into an agreement with the Yunnan government to develop the middle Jinsha into “the largest base for Sending Western Electricity East” (“Yunnan jiang jianshe,” 2004). Work is currently underway on two Jinsha projects in Yunnan, and a third near the famous Tiger Leaping Gorge has provoked domestic and international outcry over concerns it will negatively impact this renowned scenic site.

Distribution of grid assets was somewhat less geographically balanced. Due to the relatively strong intraprovincial grid infrastructure that was already developed in the south-central and southwestern areas, that region was carved out and handed over to the China Southern Power Grid Company. The remainder of the country’s power distribution network fell to the newly created State Grid Corporation of China.<sup>192</sup> As I discussed in Chapter Six, a major priority for China Southern Power Grid Company in terms of grid infrastructure development is eventual interconnectivity between its own grid assets and those of the State Grid Corporation. To some extent, this begs the question of why the state monopoly on grid infrastructure was broken up in the first place, if it only stands to be recreated under a different name in a few years.<sup>193</sup>

The final set of companies carved out of the erstwhile State Power Corporation of China can best be classified as engineering and design companies. Like their generation and distribution siblings, these four companies were restructured as stock companies, but

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<sup>192</sup> *Guojia Dianwang Gongsi*.

<sup>193</sup> I comment more on this in Chapter Eight, when I discuss the “natural monopoly” characteristics of electric power generation and distribution.

the central government (through the State Assets Supervision and Administration Commission) retains majority stake in each. The companies – China Power Engineering Consulting Group Corporation, China Hydro Consulting, Sinohydro Corporation, and China Gezhouba Company<sup>194</sup> – and their numerous subsidiaries play a fundamental role in the development of electric power projects development from the earliest planning and design stages. As the names suggest, China Hydro Consulting and Sinohydro are most relevant to this study. The former is essentially a holding company with nine subsidiaries that do the actual survey, design, and planning work for hydropower installations. One subsidiary – the Water Resources Hydropower Planning and Design General Institute<sup>195</sup> – is national in scope, seven are regional hydropower survey and design institutes (Beijing, East, Northwest, South-Central, Chengdu, Guiyang, and Kunming), and one is a state-subsidized project advisory company. As noted in Chapters Four and Five, the Kunming institute has undertaken the survey and design work for most of the Lancang projects, while the Beijing and East China institutes hold the contract for the Nu projects. Sinohydro, on the other hand, is primarily a construction company, with subsidiaries that handle construction of all aspects of hydropower projects, including the dams themselves along with related infrastructure such as roads and bridges.

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<sup>194</sup> *Zhongguo Dianli Gongcheng Guwen Jituan Gongsi, Zhongguo Shuidian Gongcheng Guwen Youxian Gongsi, Zhongguo Shuili Shuidian Jianshe Jituan Gongsi, and Zhongguo Gezhouba Jituan Gongsi.* Gezhouba is the name of the first large multi-purpose dam on the Yangtze, itself something of a boondoggle that took nearly two decades to complete and only functioned for a few years before requiring a major redesign of its sluice gates due to siltation, which drastically reduced the dam's power generation and flood control capacities.

<sup>195</sup> *Shuili Bu Shuili Shuidian Guihua Sheji Zongyuan.* Again the problem of naming confusion arises, for the first three characters of the Chinese name of this institute mean Ministry of Water Resources (*Shuili Bu*), indicating the institutes lineage as a former office of the MWR (and its later incarnations) since the early 1950s.

As Xu (2002a, p. 82) correctly observed in a study of the electric power industry in China, “changing direct government ownership into ownership by public corporations is as much a matter of government reform as enterprise restructuring.” Each of the corporations or groups formed from the break-up of the State Power Corporation of China is allegedly a model of new enterprise governance. On paper, each is governed by boards: directors, shareholders, managers, and supervisors. Yet each also has a Party Committee (*dangzu*), including its youth affiliate, the Communist Youth League (*gongqing tuan*), which gives the appearance at least that enterprise governance may not truly have changed from the days of traditional state-owned enterprises. Indeed, the general manager of each of the five power generation companies is also the chairman of the company’s Party committee. The same is true of the leadership of the watershed-based subsidiaries in Yunnan (Hydrolancang and Yunnan Huadian Nujiang Hydropower Development Company), and is most likely true of subsidiaries elsewhere throughout the country. When I asked a particular general manager what this meant in terms of company governance, and how the role of the Party Committee in today’s “modern” enterprises differs from its role before the enterprise was restructured, he assured me that the difference was real and significant. The role of the Party Committee, he said, is now simply focused on personnel issues (*ren shi*), rather than on actual management or direction of the company.<sup>196</sup> This perspective was echoed by a Ministry interviewee.<sup>197</sup>

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<sup>196</sup> Interview K20040814.

<sup>197</sup> Interview B20050404.

### ***Dams in the Decision Making Nexus***

This final section pieces together the various threads I have spun out through this chapter and the rest of the dissertation, focusing on how a large hydroelectric project on the Lancang or the Nu moves from an idea in a planner's head to a politically charged structure blocking a river. Clearly, in my analysis of this process over the past two or more years, I have no doubt missed certain nuances, and cannot begin to estimate all the "behind the scenes" maneuvering that may occur in the attempt to gain approval for a project. This is especially true on transnational rivers such as the two I have studied, due to the potential international security and regional stability repercussions of large hydropower projects on those rivers. Nevertheless, I believe I have correctly identified the key players and steps in the approval process. In the following paragraphs I explain the role of each institution or set of actors, then present a schematic diagram of the decision-making circuitry as I have come to understand it.

The first set of key actors comprises the hydropower development companies such as Huaneng and Huadian. These five corporations function as holding companies that oversee the financing, development, and operation of the dams, and which are the chief face of the projects in the halls of provincial and central party-state offices and to the media. Layer upon layer of subcontractors bid for various aspects of each project, ranging from initial road-building to access the dam sites (necessary at most of the Lancang and Nu sites due to their relative remoteness) to the dams themselves. Notwithstanding claims of allegiance to market forces and enterprise modernization, the leaders of these corporations are generally unapologetic about their view (and that of central authorities) that the companies represent party-state interests. Press releases and

company reports inevitably paint a favorable picture of the party-state's leadership at all levels and pay generous lip service to all the slogans of the day: the Three Represents, Western Development, coordinated development, scientific development, sustainable development, and people-oriented development. With promises of high returns on energy infrastructure investments, including generous earmarks for local development as well as tax revenues, these companies dangle a very attractive carrot and wield significant – if not decisive – influence in the face of officials under increasing pressure to guarantee revenue streams outside remissions from higher levels of government.

In principle, planning for large hydropower begins with the relevant basin commission, in this case the Changjiang (Yangtze) Water Resources Commission.<sup>198</sup> In the comprehensive planning for a river, based on the river's natural drop, the geology and geomorphology of its channel, and other factors such as flood control needs, Commission planners identify the theoretical and technically feasible<sup>199</sup> hydropower potential for a certain stretch of a river. An important concept in the comprehensive planning, one familiar to any student of Chinese politics, is that of “coordination” (*xietiao*), through which the needs and demands of various departments or interest groups (forestry, agriculture, navigation, hydropower, etc.) are weighed and a coordinated solution sought that theoretically best resolves competing interests.<sup>200</sup> The Ministry of Water Resources can provide input at this point, yet the watershed commissions, despite their partial subordination to the MWR, retain authority to approve the project. Once the

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<sup>198</sup> As noted earlier, the CWRC holds authority over the Lancang and Nu, as well as all other rivers west of the Mengsong (a tributary of the Lancang) in Yunnan.

<sup>199</sup> These two figures often vary quite significantly.

<sup>200</sup> Interview W20060125b.

comprehensive plan is completed, the hydropower development corporation that holds development rights for that river solicits bids from the planning institutes – China Hydro Consultants and its regional subsidiaries – to produce detailed plans for each dam in that stretch, including installed capacity, approximate dam site, type of turbines, and other technical features. Precise dam sites and installed capacities may vary somewhat at this point, but the big picture provided by the comprehensive plan is supposed to be followed.

As I noted earlier, however, no such comprehensive planning has been conducted for Yunnan's major rivers, making hydropower development planning there something of a "tail wagging the dog" process. In practice, then, this means that the initial steps of the approval process – in particular, the initial project idea – proceeds not from the comprehensive plan but rather from the comprehensive *hydropower* plan, drawn up by the hydropower development company in conjunction with one of the survey and design institutes. Herein lies the first point of divergence between the theory and practice of hydropower development on the Lancang and Nu. Once the idea for a dam is put on paper as a pre-proposal by the hydropower development company, the company submits it to the second key actor, the provincial Development and Planning Commission for initial approval. There is an important exception to this step, however, in the case of transboundary rivers, including those that cross international as well as provincial boundaries; they must be considered at the next higher administrative level, namely the National Development and Planning Commission. On top of that, and in accordance with the water law, the State Council reserves final authority to approve or veto a project on an international river.

Figures 7-2 and 7-3 present two different schematics of how the decision process is perceived to proceed by two different sets of actors. Figure 7-2 traces the process from the perspective of the hydropower development companies and provincial officials, based on my interviews with knowledgeable individuals in both groups. Figure 7-3 presents a slightly different process flow diagram from the perspective of the Changjiang Water Resources Commission, based on my interviews and discussions with relevant officials there. It is clear from the two diagrams that the principal difference lies in the role of the CWRC. In interviews with CWRC officials, I was told that the 50-year reputation of the Commission is as a technical entity and little more, whereas recent changes in the law (in particular the Water Law of 2002) delegate enforcement and regulatory authority to the Commission.<sup>201</sup> Thus whereas large-scale hydropower projects in the past would have needed to be approved by the Energy Office of the National Development and Reform Commission, now that authority resides within the CWRC. My interviewees at the CWRC noted with dismay that their image as a planning agency is hard to shake, and that one of the most severe consequences is that the CWRC's authority is continually skirted by hydropower development companies who go "straight to the top" and seek project approval directly from the National Development and Reform Commission. Their assessment fits with what I was told by representatives of the provincial government and hydropower companies. According to the CWRC officials, this situation needed to be combated through increased education and propaganda (*xuanchuan*) about the authority of the CWRC and the Water Law's requirement that hydropower development be in

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<sup>201</sup> An academic researcher at a leading Chinese university familiar with water governance in China confirmed this perception in an interview (Interview B20050530).

agreement with a river's comprehensive plan. They did not, however, specify how to address the current lack of a comprehensive plan for the Lancang and Nu.

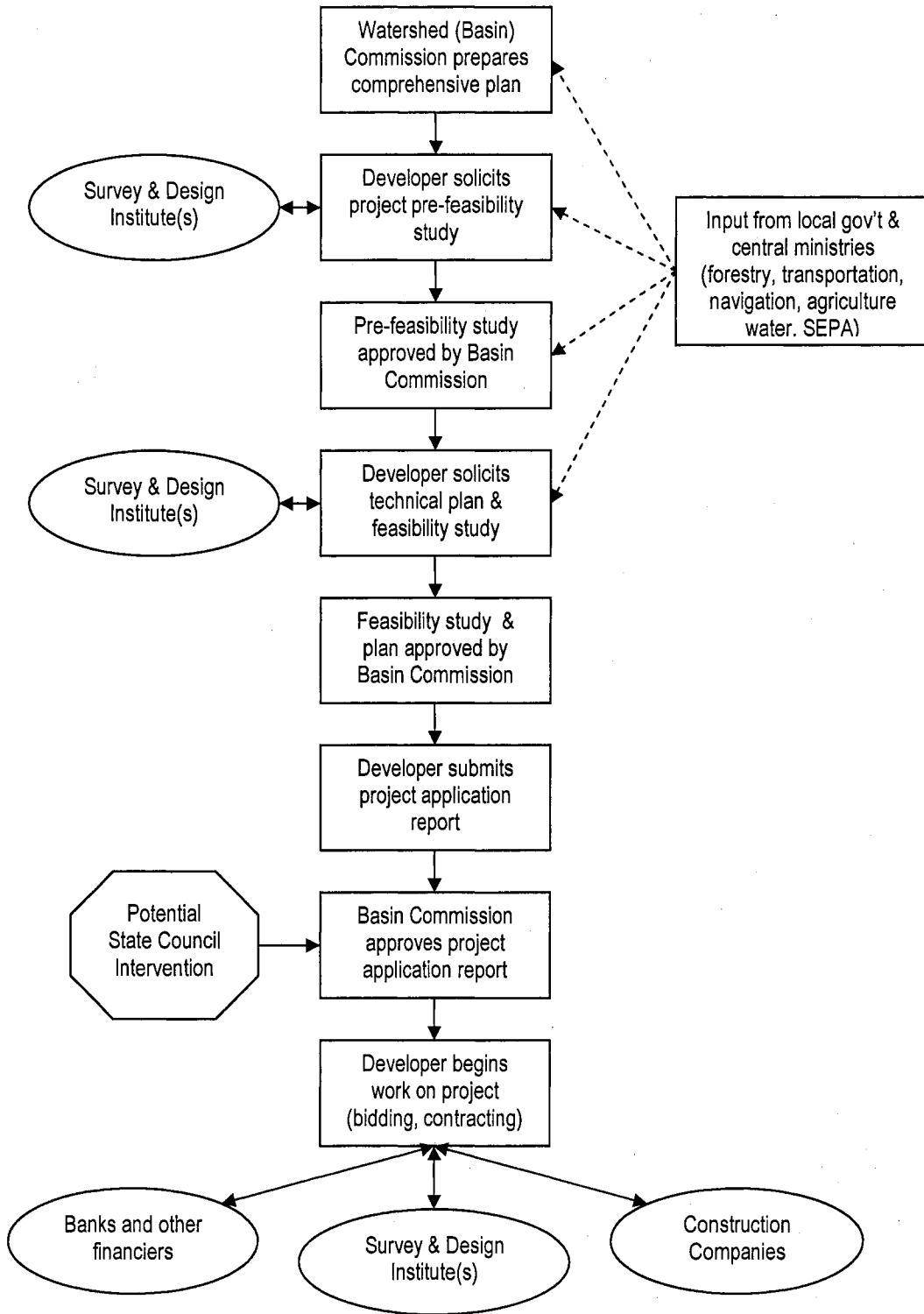


Figure 7-2: Schematic of decision-making process (CWRC perspective)

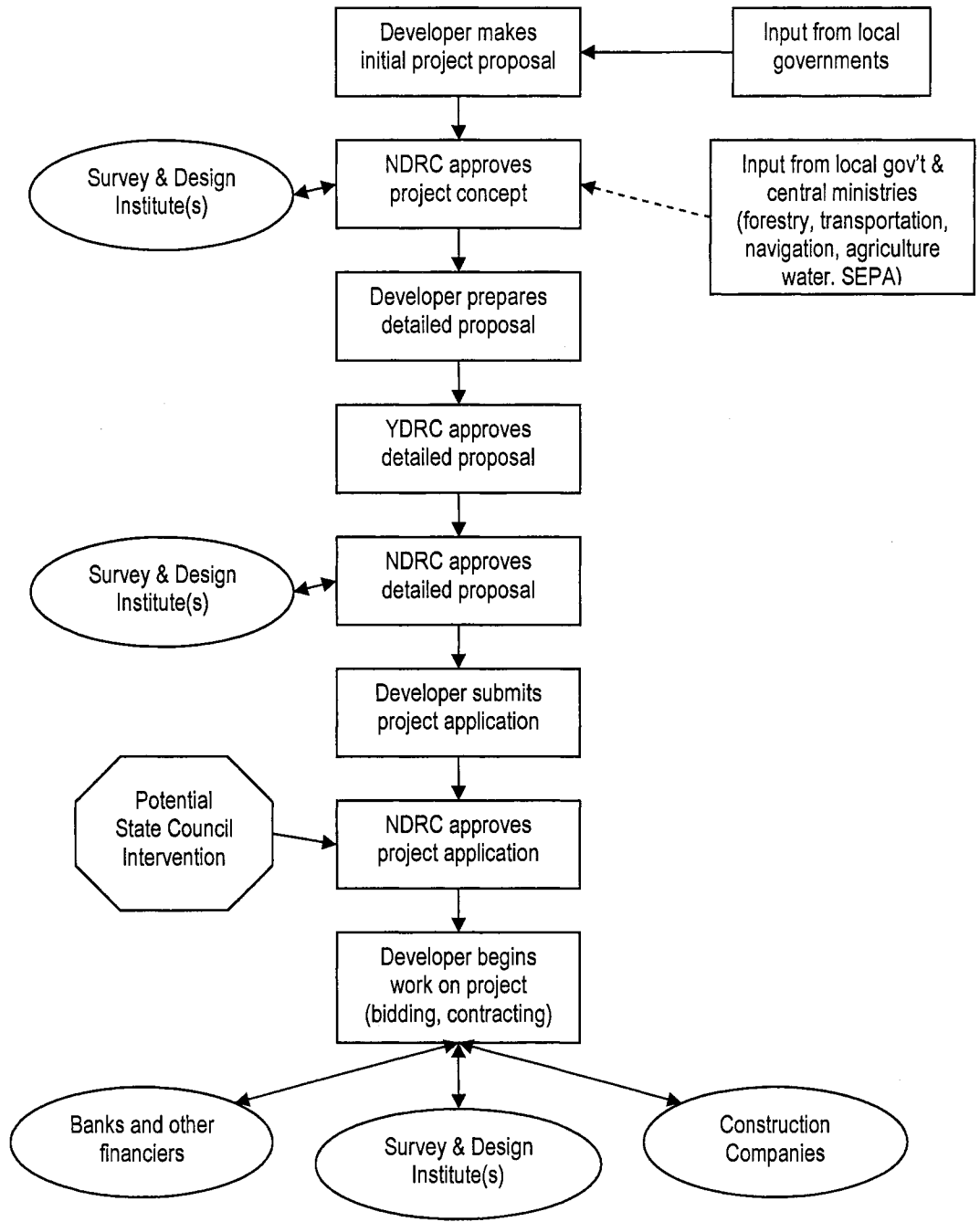


Figure 7-3: Schematic of decision-making process (company perspective)

Going “straight to the top” means that from the start, the development companies work with the Development and Reform Commission line rather than with the Changjiang Water Resources Commission. In some ways, this is not surprising. The Development and Reform Commissions, formerly the (State and Provincial) Planning Commissions and still frequently referred to as such, have historically wielded significant power over all macroeconomic decisions, and the National Development and Reform Commission’s Energy Office is apparently still quite willing to engage directly with developers in electric power decisions, bypassing the authority supposedly given the CWRC. The environmental impact assessment for a proposed water transfer project from the Jinsha in northern Yunnan to Kunming, which could also involve hydropower installations, was commissioned by the Yunnan Development and Reform Commission, rather than a development company or the CWRC. As a possible explanation for why this would happen on a “principal” (*zhuyao*) river like the Jinsha, where (as my other interviews suggested) the CWRC should take the lead in commissioning studies, an interviewee suggested that historical momentum was likely the reason.<sup>202</sup> Finally, according to one Ministry of Water Resources official, there is apparently one further systemic quirk: if the developer is able to completely self-finance the project without funding from the central government, then it can simply file a record (*bei an*) with the National Development and Reform Commission stating that the project is underway, without having to first await approval. Once filed, the project is then approved (*he zhun*) by the NDRC in what seems to be a rubber-stamp process.

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<sup>202</sup> Interview B20050722. I understood the interviewee’s comments to imply that the Development and Reform Commission’s (formerly the Planning Commission, and still frequently referred to as such) leading role on the project reflected that Commission’s historic legacy as a very powerful decision-making “line.”

The reader will by now have noticed that neither of the two decision schema offers any institutionalized node for input from civil society organizations like the ones I described above. Opportunities do exist for input by academics, but these are usually reserved for those commissioned to conduct certain aspects of the feasibility or technical studies.<sup>203</sup> Other channels of communication, whether academic journals, internal (*neibu*) reports to officials, or media outlets provide scholars and interested individuals a forum for making their opinions heard, and contrary or cautionary opinions do occasionally gain a foothold.<sup>204</sup> The Chinese National Science Foundation has instituted a monetary reward system for scholars who publish their work in the most influential journals at home and abroad, and there is increasing pressure to improve scholarship, as well as an optimism that one's views, especially when published in an internationally recognized journal, may have an impact on complex issues like development versus protection. A provincial official noted that social organizations, while perhaps still excluded from the actual decision-making process, will likely eventually have a place there, and right now clearly have a role in influencing the "theoretical development" related to various issues.<sup>205</sup> That is, such organizations are increasingly able to influence the discursive environment in which decisions are taken.

The legitimacy and legality of this type of influence may recently have been further bolstered. In early 2006, the State Environmental Protection Agency (SEPA) released a set of temporary measures (*zanshi banfa*) regarding public participation in

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<sup>203</sup> Interview B20050406.

<sup>204</sup> Interview K20050313.

<sup>205</sup> Interview K20050129.

environmental assessments (Sun & Liu, 2006). These measures follow a surprising – indeed, unprecedented – flexing of regulatory muscle by SEPA in early 2005 when it called a halt to 30 projects deemed non-compliant with environmental assessment regulations (L. Ma et al., 2005), in what the Chinese media referred to as an “environmentalism storm” (*huanbao fengbao*) (see Table 7-2). The 30 projects halted included several run by three of the five power generation companies, as well as the Xiluodu hydropower station on the Jinsha River, a project of the Three Gorges Project Corporation. The newly released SEPA measures claim that public participation at the early stages of project planning and design will help lower the costs of environmental assessments, such as those incurred during the project stoppages in early 2005. While lacking in detail at present, the temporary measures seem to signal the institutionalization of channels for input from non-academic, non-governmental groups. The extent to which this facilitates the inclusion of such input into the decision-making calculus remains to be seen, but it does seem to represent a step toward more pluralistic and open discussion of politically, ecologically, and socially sensitive development projects.

Finally, a news report in late June 2006 claimed that environmentalists in China were preparing an administrative lawsuit against SEPA and the National Development and Reform Commission regarding the Nu projects. According to the report, the suit would claim that the SEPA-NDRC favorable opinion in November 2004 of the Nu cascade’s environmental impact report (which has yet to be publicly released) is in violation of regulations concerning environmental protection and preservation of scenic spots. As a remedy, the suit, if filed would ask that the 2004 opinion be abandoned

("Huanbaozhe zu Nujiang," 2006). A more recent report, however, said that a favorable response from SEPA to a letter threatening the suit (dated June 18) promised that "no illegal projects" in the Nu area would be approved; SEPA also claimed that it had not yet approved *any* of the projects, though it "supported" the scaled-down version of the cascade in which four dams would be built (Shi, 2006).<sup>206</sup> For the time being, therefore, it appears that recourse to a lawsuit against SEPA and/or NDRC is unlikely. That said, it is clear that attorneys and civil society organizations in China are increasingly willing to couch their resistance to development projects in appeals to the law, and that the effectiveness of such appeals may be growing, if for nothing else than in their ability to push certain state agencies to be more transparent. It is noteworthy, however, that the report only mentions a response from SEPA, generally considered sympathetic to environmentalists' concerns, and not from NDRC.

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<sup>206</sup> See Chapter Five for more details on the Nu cascade.

Table 7-2: Projects halted for EIA non-compliance

Responsible Company	Project
Three Gorges Project Corp.	Jinsha R. Xiluodu Hydro Station (12600 MW)
Three Gorges Project Corp.	TGP Underground Power Gen. (4200 MW)
Three Gorges Project Corp.	TGP Power Supply station (100MW)*
Taicang Harbor Env. Prot. Power Gen. Co.	Jiangsu Taicang Harbor 4 <sup>th</sup> stage 2×600MW exp.
Xuzhou Huaxin Power Gen. Co.	Jiangsu Xuzhou 2×300 MW exp.
Jiangsu Xutang Power Gen. Co.	Jiangsu Xutang 2×300 MW exp.
Jiangyin Sulong Power Gen. Co.	Jiangyinxia Harbor 2×330 MW exp.
Jiangsu Huadian Yangzhou Power Gen. Co.	Thermal power & heat supply 2×300MW
Xiamen Huaxia Int'l Electric Power Dev Co.	Xiamen Songyu Stn. 2 <sup>nd</sup> Stage 2×300MW exp.
Baotou East China Thermal Power Co.	Thermal power & heat supply 2×300 MW
Qingyuan No. 1 Power Gen. Co.	Gansu Qingyuan Stn. 3 <sup>rd</sup> Stage 2×300 MW exp.
Ningxia Power Generation Group Co.	Ningxia Maliantai Stn. 2×330 MW
Jiangsu Xinhai Power Gen. Co.	Jiangsu Xinhai 2×300 MW Power & Heat Supply Exp.
Datang Int'l Stock Co.	Zhejiang Datang Wushashan Stn. 4×600 MW
Inner Mongolia Huolin River Power Gen. Co.	Inner Mongolia Huolin 2×300 MW
Qufu Shengcheng Thermal Power Co.	Qufu Shengcheng 2×200MW
Sichuan Electric Power Co.	Nanchong-Wanxian 500-kV transmission project
Sichuan Electric Power Co.	Guang'an-Nanchong 500-kV transmission project
Fujian Province Electric Power Co.	Fujian Power Grid Xiamen Hepu R. Transformer Stn. 500-kV power conversion & transmission project
China Guodian Group	Ningxia Shizuishan 2×330 MW tech upgrade
China Huadian Group	Guizhou Dafang 4×300 MW
Guodian Xuanwei Power Generation Co.	Yunnan Xuanwei Stn. 7 <sup>th</sup> Stage 2×300 MW exp.
Henan Zhongfu Industry Stock Co.	Henan Zhongfu 2×300 MW exp.
Inner Mongolia Xinfeng Thermal Power Co.	Xinfeng 2×300 MW power and heat supply
Inner Mong. Zhungeer Dafanpu Power Stn.	Dafanpu Power Stn. 2×300 MW
Nanjing Suyuan Thermal Power Co.	Suyuan Thermal Power Co. 2 <sup>nd</sup> stage 2×300 MW power & heat supply
China Nat'l Petroleum & Natural Gas Co.	Lanzhou Petrochem Stock Co. 1.2 Megaton/year delayed coking project
Foshan Huafeng Paper Industries Co.	Upgrade to 300 kiloton/year high-grade paper project
Inner Mongolia Transportation Bureau	Portion of Dandong-Lhasa highway project
Fuzhou City Development & Reform Comm.	Fujian Min R. North Harbor Southside Flood Prev. Project and South R. road construction project

\* Not the entire Three Gorges project, but a much smaller related project.

Source: Liu (2005).

### *Summary*

On more than one occasion, Yunnan officials whose work relates to hydropower development or water resources governance told me that policies and regulations have changed so quickly in recent years that officials themselves are often unsure of their authority versus that of the hydropower development companies, basin commissions, and other entities.<sup>207</sup> One noted that he felt like he worked for the hydropower development company rather than the provincial government.<sup>208</sup> Meanwhile, a Ministry of Water Resources employee told me that the seven watershed commissions, including the Changjiang (Yangtze) Water Resources Commission, are like “regional offices” of the Ministry,<sup>209</sup> while others (including Commission officials) argued that the Commissions have in fact been delegated authority over large-scale hydropower by the State Council and need not report to the Ministry on such issues. Still another complained that while the MWR should act as the guide for provincial water resources departments, in reality the provincial offices often take a much more proactive role under the leadership of the provincial governor/Party secretary.<sup>210</sup>

Comments like these by individuals involved in various aspects of water and electricity governance provide important insights into the climate in which Lancang and Nu hydropower development is unrolling, and underscore the importance of picking apart the various pieces of the decision-making puzzle rather than assuming simple and linear directionality. While I am confident that my analysis of hydropower decision making

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<sup>207</sup> Interviews K20050126 and K20050129.

<sup>208</sup> Interview K20050126b.

<sup>209</sup> Interview B20050404.

<sup>210</sup> Interview B20050505. In Yunnan, Governor and Party Secretary Xu Rongkai and his deputy Qin Guangrong favor of developing large-scale hydropower on the Nu and Lancang as quickly as possible.

captures many of the most important moments, nodes, and linkages in the processes, I do not pretend to have completely understood it. Interviewing officials and high-level executives about sensitive topics such as large-scale hydropower on transboundary rivers is not the easiest task in China or elsewhere, and in some of my interviews I was given information that had clearly been “processed” for my consumption and contained little information I could not have otherwise gleaned from second-hand reports.

As I have shown, the different perspectives on how the project approval process should proceed reflect the uncertainty about lines of authority in water and electricity governance. One might also argue that they are evidence of a willful uncertainty. Hydropower developers who, having gone to the National Development and Reform Commission’s Energy Office for project approval repeatedly in the past, and retaining the personal and bureaucratic connections to that office, might willfully decide to stick to what works rather than bother with going through the CWRC in what could be a more tedious process. I suspect that both viewpoints might be accurate; that the institutional and procedural uncertainty is at times willful, at other times not. In the following chapter, I conclude this study by synthesizing the empirical observations I have made about various processes involved in Lancang and Nu hydropower development – design, approval, finance, construction, and implementation – and using them to build on our theoretical understanding of water and energy governance in China, center-local relations, and enterprise reforms.

## Chapter Eight: Muddy Waters

### *Introduction*

This dissertation began as a study of hydropower development in western Yunnan, but as I have shown, quickly grew into something much larger. I set out to gain an understanding of the role of the Yunnan provincial government in negotiating relations with neighboring countries in the Lancang-Mekong watershed regarding the contentious issue of dam building on the Chinese side of the river. I was particularly interested in the latitude given the provincial state by the central state. I quickly realized, however, that the analytical boundaries I had drawn – most importantly, the one coincidental with the administrative boundary of Yunnan Province – were far too compact and static to encapsulate all the processes about hydropower decision making on transnational rivers I wished to understand. At the same time, I also suspected that despite the frequent reduction of the Lancang projects in particular to “China’s dams,” the processes that led from sketches at the drawing board to turbine installations and grid connections at the hydropower stations were in fact far more complex, pluralistic, and even contested than most observers had allowed.

Over the past seven chapters I have attempted to show how a geographic approach to understanding these processes – premised on a dynamic understanding of geographic scales and regions, an attention to the political and economic factors of environmental change and natural resource exploitation, and a sensitivity to socio-historical and geographic context – is useful for understanding large hydropower development on the Lancang and Nu. I have highlighted both the political economic and

biophysical reasons for which hydropower development on the Lancang and Nu Rivers is so attractive, and also so contested. In this concluding chapter, I synthesize and sharpen the arguments I have made, discuss their theoretical and methodological implications, and raise suggestions for further research. I begin in the following section by reviewing the main points of each chapter in its turn.

### ***Yunnan Hydro: More than Just Dams***

As I suggested in Chapter One, Yunnan hydropower projects can be thought of as residing at the nexus of a web of production relations that involves not only the production of electric power from falling water, but also the production of risk to dam-area villagers and (in a worst-case scenario) downstream inhabitants; of profit for hydropower developers and tax revenues for government offices; of scientific knowledge regarding the social and ecological impacts of the dams; of scientific, technical, and engineering knowledge necessary to construct a hydropower station. Most importantly, perhaps, is the web of institutional relations among enterprises and government offices – and the individuals who staff them – that are constantly reconfigured, and which provide the basis for the processes of design, finance, approval, construction, and implementation of hydropower projects. Additionally, as we have seen, it is inaccurate to refer to the Lancang and Nu projects as “Yunnan dams,” for in a very real sense they are regional (interprovincial), national, and transnational projects, part of the powersheds of Chiang Mai, Guangdong, Hanoi, and the Pearl River Delta.

In Chapter Two, I reviewed two major bodies of literature most relevant to this study. The first was the broad and rich political ecology literature, which informs my

assumptions about society-environment relations and was important in the construction of my analytical framework. As I showed in my review, political ecologists have, with a few notable exceptions, tended to steer clear of China, focusing more on Latin America, Southeast Asia, Africa, and to a lesser extent, the so-called First World. This is likely due to the difficulty, especially during the Maoist period (1949-1976) and the first decade or so of reforms (1978-1990) of conducting extended field research in rural China, particularly on topics that are frequently considered sensitive or potentially controversial. All in all, the breadth of the literature review reflects the multi-faceted nature of the topic at hand. The Lancang and Nu dams are at once instantiations of the complex and changing character of decision making regarding economic development in China, as well as prime examples of how humans interact with their environment in ways that break down the duality between nature and society.

I then moved to the China geography and area studies literature, which has been extremely important over the past half-century in providing an empirical basis for understanding the changes that have taken place in the world's most populous country. I reviewed contributions in four specific subsets of this literature: center-local and interprovincial relations; regional and uneven development; resources, energy, and environment; and civil society and decision making. I found that the China geography and area studies literature is primarily an urban literature, and that there is ample room for research into questions of resource development and rural-urban linkages, and into questions of geographic scale in a politicized sense. Additionally, only a few scholars outside China have systematically analyzed the Western Development campaign in ways

that assess the degree to which rhetoric and reality align in terms of investment, poverty alleviation, and other criteria. Finally, the literature on social organizations and quasi-NGOs in China, while at times dogged by western assumptions of state-society separation that may not be accurate or useful in China, has made major contributions since the early 1990s to our understanding of how non-state actors organize and function in contemporary China. As I showed in the review, part of this literature examines historical precedents for civil society in China, refusing to accept modern definitions based on European and American historical experience as definitive. Other scholars have contributed rich case studies examining the different ways Chinese organizations negotiate “the spaces in-between” in order to advocate for certain causes.

In Chapter Three I outlined an analytical framework called a powershed. I began by reviewing a third literature, the politics of scale literature in political economic geography. After reviewing the several important contributions regarding the notion of geographic scale as socially produced, politically laden, and contestable, I focused on ways China geographers have engaged the scale politics literature in recent years to analyze and theorize the spatial administrative hierarchy in the context of China’s particular political economic system. My motivation for developing this framework was the fact that, as I stated above, the Yunnan hydropower projects I set out to study are far more than Yunnan hydropower projects. Not only are they situated on transnational rivers, a fact that immediately lends them a certain import in international relations, but they also reflect a demand for tapping Yunnan’s electric power that reaches far beyond Yunnan’s borders. Urban areas around the world are dependent on their hinterlands for

water, food, waste disposal, and other “life support systems,” and the same is true of urban industrial centers in southern China, hundreds of kilometers from the Lancang and Nu. Whether the primary motivation for developing Yunnan’s hydropower potential originates within the National Development and Reform Commission, its provincial divisions in Guangdong or Yunnan, or within the hydropower development companies themselves may not be that important a question; it is plausible – likely, even, given the way in which officials rotate positions in China – that significant cross-pollination regarding such development plans occurs among the various institutions. What is important for this study is the manner in which those motivations become plans, and those plans then become projects. By beginning with a dynamic, flexible, and malleable analytical framework of a powershed, I was able to trace the steps in that process, along with the geographic constructs used as justification along the way, rather than limit the analysis to administrative boundaries and a priori frames of analysis that, in the end, would have told a less complete story.

Chapter Four provided detailed empirical information on each of the eight middle- and lower-Lancang River projects, as well as the institutional context in which they were designed, financed, and (in some cases) built and operated. Perhaps the most interesting aspect of the Lancang case is that the river not only crosses geopolitical boundaries, but the projects themselves also cross important socio-historical boundaries since they straddle the planned and market economy periods of China. As I showed, the Manwan Dam, the first dam across the main channel of the Lancang-Mekong in its 4,800-km journey, involved a ministry-province partnership that was hailed as

groundbreaking and innovative. Similarly, Dachaoshan, the second Lancang project, was partially financed through a four-way inter-industry partnership that supposedly signaled serious progress toward western-style enterprise modernization. Ground was broken on Xiaowan, the third dam and second-largest in the cascade, the same year the electric power industry went through a second wave of reforms that split the erstwhile Ministry of Electric Power into 11 subsidiaries. Xiaowan, then, became the first large hydropower project undertaken by Huaneng, one of the five power generation subsidiaries. Finally, the brief history of Jinghong and Nuozhadu has had as a central theme Sino-Thai cooperation that has progressed in fits and starts, and which to date holds an uncertain future.<sup>211</sup> Thus each of these projects in its own way is a novelty, at least superficially, in terms of the institutional arrangements in which it was (is) embedded. Yet as I showed in Chapter Seven, some of the novelty wears off once one considers the channels through which project approvals are sought and granted.

Chapter Five, primarily empirical like Chapter Four, focused on the Nu River projects. Over the past decade or so there have been numerous reports on the make-up of the Lancang and Nu cascades from news sources and non-governmental organizations around mainland Southeast Asia. Many, however, were based on secondhand information or were outdated since the details of some of the dams have changed. I therefore felt it important to include updated information, cross-checked wherever possible, about the status and makeup of the cascade plans for the two rivers. Unfortunately, due to the political sensitivity of the Nu projects and their relatively recent status compared to the

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<sup>211</sup> I have not included the smallest three Lancang dams – Ganlanba, Mengsong, and Gongguoqiao – in this summary, but provided details on those projects in Chapter Four.

Lancang, much less information is publicly available. I focused on the four projects most likely to be approved in the coming year or two – Liuku, Maji, Saige, and Yabiluo – and provided basic information on the remaining nine. I also discussed two key differences between the Lancang and Nu projects. First, since planning on the Nu projects began much later, the institutional environment in which they have matured has not gone through as many changes as that of the Lancang projects, making the Nu case potentially simpler in that regard. Second, the Nu projects have been much more openly contested by central government agencies – for instance, through Premier Wen Jiabao’s decision to suspend the projects, and the State Environmental Protection Administration’s attempt to require public participation in environmental assessments through its new draft law – as well as by social organizations such as Green Watershed and Green Earth Volunteers. This more open and pluralistic debate, while it has produced some casualties, nonetheless give cause for guarded optimism that hydropower development – or other energy and infrastructure projects – might eventually follow comprehensive plans and impact assessments rather than precede them.<sup>212</sup>

In Chapter Six I discussed the new energy geographies that have grown out of, and which at the same time are constitutive of, the Lancang and Nu hydropower cascades. I explained how three geographic regional constructs – China’s west, the Pan-Pearl River Delta, and the Greater Mekong Subregion – all play a role in legitimizing

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<sup>212</sup> This is not to say, of course, that a watershed-wide comprehensive plan is the remedy to all development-induced environmental and social ills in China, nor that environmental and social impact assessments can fairly or accurately capture the impacts in terms understandable (i.e., dollars or Yuan) in ways that are meaningful or acceptable to those planning, financing, and building the projects. I merely mean to say that the growing influence of the State Environmental Protection Administration and reliance on the legal system may provide gradual benefits in the long term by altering the “development as usual” paradigm in which impact assessments are an afterthought at best.

electricity transfers from power stations in western Yunnan to load centers in eastern China, primarily Guangdong. These three constructs are reified through policy, investment, power grid construction, and power consumption patterns, all of which naturalize and give urgency to plans to tap hydropower potential on Yunnan's major rivers. They also remind us of the necessity of considering geographic concepts such as region and scale in a dynamic, situation-specific fashion.

Finally, in Chapter Seven I analyzed the decision processes that lead from design to approval for large-scale hydropower projects. In addition to analyzing the role of the usual bureaucratic mechanisms one would logically expect to take part in hydropower decision making, this chapter also introduced one more important story line – that of civil society in China. In particular, I gave brief overviews of three different organizations, all of whose work relates to questions of energy and environment in Yunnan. I also discussed the case of an academic research center that has been particularly active in producing relevant research on Yunnan's transboundary watersheds that has been widely perceived as flowing counter to politically popular development projects on those rivers. My point in bringing these entities into the discussion was to analyze how they have been able to participate in decision making related to energy and environment in Yunnan – or at least in influencing the language and tenor of the debates – and what some of the impacts and repercussions of their participation have been. I also presented two schematics of decision processes as understood by two different groups of actors: one that arguably has an interest in seeing as many hydropower projects approved as possible (the development companies); the other that has a mandate to coordinate and balance the

benefits of hydropower along with the many other uses of a river (the Changjiang Water Resources Commission). The strategic nature of each process flow, based on the motivations of the key actors, is evident.

### ***Summary of Findings***

By approaching the Lancang and Nu hydropower projects using the powershed framework, we have seen how the dams form an integral part of a triangle of interdependence linking Yunnan, Guangdong, and Beijing.<sup>213</sup> Projections for electric power demands for Guangdong show it growing sharply with the province's continued breakneck economic growth. Meanwhile, Guangdong's "native" electric power generation capacity is constrained by a variety of factors, and central officials may be hesitant to grant permits for more nuclear power plants there. Such constraints can be seen as one way in which the hand of Guangdong authorities is forced.<sup>214</sup> By this logic, Guangdong's leaders have no choice but to participate in the Send Western Electricity East program, accepting the non-market prices set – for now, at least – by the State Electricity Regulatory Commission, as well as the seasonal uncertainty dictated by precipitation patterns and flooding concerns, of Yunnan hydropower.

We may be mistaken, however, in assigning such a passive role to Guangdong, and in particular to the individuals and agencies responsible for long-term economic and energy planning for the province. As I showed earlier, Guangdong funds helped support early work on the "dragon's head" of the Lancang power cascade, the Xiaowan

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<sup>213</sup> See Figure 8-1 and related discussion.

<sup>214</sup> Naughton (2004) notes how tighter interlinking of transportation and communications are seen by western development program planners as a means for enhancing national unity. I would argue that the same could be said for the energy linkages described in this study.

hydropower station, more than a decade before ground was broken on that project. My interviews with representatives of the grid company, the power generation companies, and provincial government officials in Yunnan all suggest that Guangdong is a key – if not deciding – factor in the “Yunnan” projects. Comparing power consumption trends in Guangdong and Yunnan (along with other provinces in the China Southern Power Grid network as well), along with recent investments in grid infrastructure confirm that the Yunnan projects must indeed be considered a factor – likely an increasingly important one – in Guangdong’s economic dynamism.

My second major finding involves the role of the supra-provincial basin commissions such as the Changjiang Water Resources Commission vis-à-vis central government bodies and the hydropower development companies. Water and electricity industry reforms over the past eight years or so have strengthened the *de jure* authority of the non-local, non-central watershed commissions such as the CWRC, giving them enforcement and regulatory authority rather in addition to their traditional technical and planning authority. At the same time, reforms have also created five very influential power generation companies that, as descendants of the former Ministry of Electric Power, have a direct connection to the Energy Office of the National Development and Reform Commission and to other central decision-makers. In the case of Lancang and Nu hydropower, these companies, out of habit or intent, tend to go “straight to the top” for project approval, rather than passing through the CWRC. Thus there exists a disconnect between policy (that CWRC should have near-final say on projects such as those on the Lancang and Nu) and implementation (that the NDRC does in actuality). This disconnect

is reinforced because the key reason for developers having to go through the CWRC is to make sure their projects fit with the comprehensive plan for that basin. If no comprehensive plan exists, then the hydropower development company authorities can in some sense not be blamed for skirting the CWRC. Interestingly, Lampton (1987a) noted a similar evasion of CWRC authority when Gezhouba, the first dam on the Yangtze, was first proposed. At the time, Hubei Province authorities went straight to Mao through the Ministry of Water Conservancy for approval and got it. Construction on Gezhouba began on Mao's birthday, December 26, 1970.

In my study, I derived two distinct decision paths resulting from the disconnect between policy and implementation regarding large-scale hydropower development. Thus despite the assertion by one expert that approval for large hydropower projects is a "formulaic process,"<sup>215</sup> there are apparently different formulas. The two development companies I studied – Huaneng and Huadian – were both at one time part of the same Ministry of Electric Power. As such, the leadership of those companies tended to rely on the same channels for decision authority, namely the National Development and Reform Commission and the State Council, as they had when the companies were part of a government ministry. On the other hand, officials at the Changjiang (Yangtze) Water Resources Commission reported finding that their agency's historical status as a technical and planning bureaucracy tends to hobble its recently-granted decision-making and enforcement legitimacy. In the case of the Lancang and Nu, the most immediate result of

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<sup>215</sup> Interview B20050404.

that seems to be that hydropower planning (initiated by the development companies) is outrunning comprehensive planning (initiated by the Commission).

In some ways, this tendency to “go to the top” is understandable, at least in the case of one of the development companies. The general manager of Huaneng, Li Xiaopeng, is the son of former premier Li Peng, himself long involved in the electric power sector and often credited for being the one who made plans for the Three Gorges dam a reality.<sup>216</sup> Similarly, Li Peng’s daughter, Li Xiaolin, is a vice president of China Power Investment, and general manager and Party secretary of CPI’s internationally listed subsidiary China Power International Holding, Ltd. Clearly, with this kind of personal connection to the pinnacle of China’s decision-making authority, it is not unreasonable to assume that decisions about large-scale hydropower development in Yunnan are, in the end, decided solely on the basis of personal relations, favoritism, and nepotism. I have argued in this dissertation, however, that to do so is to simultaneously reduce a vastly complex country and governing apparatus to a very simple formula, while eliminating all hope of having any influence on decision processes in ways that might make it more equitable to all parties involved.

A third finding of this study points to the importance of geographic imaginaries in formulating, legitimizing, implementing, and in some cases contesting development strategies, in this case natural resource exploitation programs. The U.S. west was constructed by policy makers as a place that needed to be tamed by civilized white

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<sup>216</sup> In their study of bureaucratic politics in Chinese energy policy formulation in the mid-1980s, Lieberthal and Oksenberg (1986) profiled Li Peng (pp. 27-34), and note that on several occasions in the late 1970s and early 1980s Li initially opposed the Three Gorges Project.

settlers. The same is true for the global south during the height of European colonialism, and such language and imagery persists today. Similarly, the image of China's west that is repeatedly set forth by central officials, and which has become indelibly engraved in the geographic imaginaries of most "eastern" Chinese citizens, is of a place rich in natural resources, backward in tradition and culture, and lagging in economic development and education. Logically, then, it is only "natural" that infrastructure and resource-transfer projects such as the Western Development campaign, Send Western Electricity East, and Send Yunnan Electricity to Guangdong should seek to maintain economic growth in eastern China while fostering it in the areas where the resources (in this case, swift, high-volume rivers) are plentiful. As I noted earlier, some scholars have been highly critical of the campaign, at times labeling it a colonial project that will only serve to widen the socioeconomic gap between China's western and eastern regions. Others see in the campaign a genuine desire on the part of central government planners to try to narrow that gap as a means of improving human livelihoods, ensuring social stability, and bolstering the Party-state's legitimacy. While the long-term impacts of the campaign and its related policies will not be clear for years to come, what is clear is that the characteristics embodied within the geographic imaginary of China's west have already been "solidified" and reconstructed in other region-based policies and imaginaries that overlap the west, most importantly the Pan Pearl River Development region and the Greater Mekong Subregion.

Several findings of my study strike me as particularly surprising. The first has to do with the degree to which the hydropower stock corporations, ostensibly restructured and

reoriented toward market incentives rather than political directives, remain tightly linked to national and (subnational) regional economic development plans. The willingness of company representatives to acknowledge the contradictions between allegiance to plan and allegiance to market, or between the role of the corporation's Party committee versus its board of directors,<sup>217</sup> underscores this tension. Given the importance of the energy sector in the economic development and social well-being of any country, it is perhaps less surprising that underneath the veneer of restructuring, corporatization, and market orientation, China's electric power sector remains fairly tightly controlled, with many features of a monopoly.<sup>218</sup> Much has been written on the dynamics of SOE restructuring in China (Hurst & O'Brien, 2002; Y.-m. Lin & Zhu, 2001; Naughton, 1999; Nee, 2002; Nee, Opper, & Wong, 2005; Opper et al., 2004; Rawski, 1999), including one study of coal industry restructuring that identified a give-and-take in center-local relations wherein the central government continued to rely on command instruments to control the industry at certain points, while seeking mutually beneficial arrangements through compromise at others (Su, 2004). One area for further research would be to compare changes in the hydropower sector to those in other sectors in order to determine which are unique to hydropower, which occur across the energy sector, and which are more systemic. (perhaps not so surprising given the special role of energy in overall economy)

A second surprising finding of this study regards the actual planning and surveying of the rivers, particularly the Nu. Hydropower surveys have been taken

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<sup>217</sup> One recent study of companies listed on the Shanghai stock exchange found the role of the companies' Party committees to be quite strong in all aspects of decision making, despite the *de jure* reduction in the power of the committees in recent years (Opper, Wong, & Hu, 2004).

<sup>218</sup> For further discussion on the extent to which China's electric power sector represents a spatial and/or natural monopoly, see p. 293 below.

periodically over the past century, and the general tendency of each has been to increase, both in terms of the country's theoretical hydropower reserves and its economically feasible, exploitable reserves. The first, taken by the People's Government Resource Commission of the KMT in 1943-44, estimated the theoretical potential for the country (not including Xinjiang or Tibet) to be some 232 million kW. By 1980 that figure had nearly tripled, to 676 GW, of which approximately 380 GW was expected to be exploitable (L. Zhang, 1998, p. 35).<sup>219</sup> These increases can be partly explained by improvements and changes in surveying methods and in the ability of surveyors to reach areas previously inaccessible. Advances in generation technology over time are also likely to be a factor. Nevertheless, there remain significant discrepancies even today between estimates by various entities of exploitable potential on, for instance, the Nu.

Third, I was surprised by the relationship between the Ministry of Water Resources and the Changjiang Water Resources Commission with respect to large hydropower development on southwestern China's river. That the CWRC should have authority over those river basins for comprehensive planning was not surprising. That the MWR, in principle the parent organization of the basin commissions (including CWRC), should *not* seem somewhat illogical from an institutional perspective, but reflects the kind of fragmentation of authority in the water and power sectors that Lieberthal and Oksenberg (1986) noted two decades ago. In the end, as I was told in numerous interviews, the Ministry of Water Resources is allowed to provide input into the approval process at various points, based on its ability to draw on expertise in other facets of water

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<sup>219</sup> It is unclear from the source whether the surveys included Outer Mongolia or Taiwan, but Xinjiang and Tibet were specifically mentioned as not included.

resources governance that relate to large dams such as navigation and flood control; yet the CWRC, in its comprehensive planning, is also responsible for such issues. Thus, as I note below, more research into inner workings of the CWRC and its articulation with the MWR is needed in order to clarify some of these issues.

Finally, the apparent strength of certain civil society organizations in China regarding society-environment topics, and the willingness of the Chinese government (at the central level, at least) to tolerate such organizations and their expressions of discontent, was greater than I had originally expected. The leaders of these organizations with whom I met were all optimistic about the potential impact of their work, realistic about the limitations (written and unwritten) placed on their advocacy, and confident that the primary obstacles remaining in the path toward a more socially and ecologically sustainable future had to do mostly with bureaucratic inefficiencies, lack of transparency, information limitations, and lack of access to decision processes (what political ecologists would call marginalization). Each organization, in its own way, is working to address these technical issues, all the while recognizing that it makes more sense to work within the system than against it. In the case of Green Watershed, Yu Xiaogang has worked to increase awareness about the potential impacts of large dams and to foster a sense of community “buy-in” through discussion forums and his decision, which turned out to be quite controversial, to bring Nu villagers to visit the Lancang resettlement areas and to attend the UN meeting on large hydropower in Beijing. Chen Yongsong at Yunnan EcoNetwork has become a key figure in the Chinese environmental and “NGO” circles due to his (and his organization’s) non-confrontational tactics and YEN’s “on the

ground” work to help government improve rural energy, health, and livelihoods. Wang Yongchen at Green Earth Volunteers, building on her journalistic background, love of nature, and wealth of connections in places like Beijing and Shanghai. That Green Earth Volunteers and Green Watershed both had something to do with the suspension of the Nu projects seems clear and, if true, quite surprising. What is unclear at this point is what role other factors, such as interpersonal agreements between members of China’s top leadership group, may have played in Premier Wen’s decision to suspend the projects in 2004. The details of such intrigue, if indeed there are any, may not be clear for years, so that present all that can be done is focus on the information that is available, namely that regarding the advocacy of China’s civil society organizations. This leads to my next point.

This study has shown that a functional approach to understanding what civil society might be in China leads to an appreciation of the role such civil society organizations are beginning to play in resource development and, broadly speaking, environmental issues there. While Chinese CSOs have yet, to my knowledge, to sit down with representatives of the National Development and Reform Commission’s Energy Bureau to discuss the specifics of which Nu or Lancang hydropower projects might be approved, they have succeeded in changing the tenor of the debate within China. To this end, their success has relied largely on media campaigns and appeals to newly enacted or revised laws such as the Water Law (2002) and the Environmental Impact Assessment Law (2003). Thus, whereas the lower- and middle-Lancang projects are, for the most part, a *fait accompli*, the same cannot (yet) be said for the entire 13-dam cascade planned for the Nu. Advocacy and outreach related to environmental issues in China has thus far

proven to be a fairly safe endeavor. Even though some, as I showed in Chapter Seven, have suffered a degree of personal pressure for their views on the Lancang and Nu projects, they have been careful to frame their opposition in politically palatable terms, appealing to laws already on the books and to notions such as good governance and decision transparency that are becoming increasingly common parlance in China.

An anecdote from my fieldwork is worth recounting here. In summer 2005, I interviewed a top executive of a hydropower company. While discussing the role of Chinese CSOs in large hydropower decision making, he argued that CSOs in China exist solely to make noise (*nao*) and attract media attention, and that they had no place in such decisions. I explained that NGOs in the U.S. are mechanisms for organizing interest groups and allowing their voices to be heard or their agendas advanced through raising public awareness, directly accessing government officials, or influencing legislation. He replied that, based on my functional definition, such organizations were unnecessary in China since their role is effectively played by the National People's Congress. "Yes, in theory," I responded, adding that one could say the same of the U.S. Congress. I continued, noting that even in representative democracies, not all voices or viewpoints are heard at higher levels of government, especially given the influence wielded by corporate money (through lobbies) in the U.S. My interviewee then concluded:

Here is an important difference. In the US, a group of people (*shehui tuanti*) devoted to a cause organize themselves into a civil society organization in order to promote that cause.

In China, a small group of activists (*shaoshu de jiji fenzi*) promoting a cause go out and seek members from society to support their cause.

Thus my interviewee's view was that CSO behavior in China is more about convincing "the people" of a certain perspective rather than helping express a perspective they had already reached on their own. His view was obviously influenced by his position with a company and an industry that has been embattled worldwide and, to a lesser extent within China, for hydropower development that is perceived as neglecting to honestly assess the negative social and ecological impacts of large hydropower stations. It is also no doubt colored by the work of people like Yu Xiaogang (Green Watershed) and Wang Yongchen (Green Earth Volunteers), whose advocacy surrounding dam issues must surely be an affront. Yet his view is not ubiquitous; officials in SEPA, forestry, and agriculture, and other departments who are not convinced that large-scale hydropower is the most "coordinated" tool for poverty alleviation and rural development, have begun to make public calls for increased participation by groups other than the "usual suspects" in decisions about resource management and economic development.

There is likely some validity to the criticism expressed by the development company executive, and it may be important for the way scholars outside China understand the development of civil society "with Chinese characteristics." Organizations perceived as extreme in China, may provide more room for others with more moderate programs to operate. In a representative democracy with a reasonable degree of press freedom, information availability, particularly from a diversity of sources and perspectives, provides a key impetus to the development and mobilization of civil society organizations designed to advocate around any given issue. Yet in China, and especially in areas such as the Nu River gorge, information channels are often limited, and locals

tend to rely on a very narrow spectrum of sources which, in this case, consists primarily of the prefectural government and the power companies. Much of the advocacy regarding energy development in rural areas in Yunnan is spearheaded by middle-class, relatively well educated elite, and underlain by their perspectives on what counts as acceptable development alternatives.

### ***Implications and Scholarly Contributions***

In this study I have endeavored to understand complex decision processes, institutional relations, and bureaucratic politics related to large-scale hydropower projects in southwestern China. A major factor in my decision to undertake this study was my dissatisfaction with simplistic condemnations of hydropower development in Yunnan that went no further than critiquing “China’s dams” as products of a hegemonic, monolithic Chinese state intent on controlling and exploiting Yunnan’s transnational rivers while ignoring potential impacts downstream. Through this study I have come to understand many – though certainly not all – of the intricacies of decision processes regarding hydropower projects of national significance. I have found it heartening that several of my Chinese interviewees (including officials), along with scholars from China and other countries, have repeatedly acknowledged the importance of this work.

Perhaps more important than any empirical or theoretical contributions, I have shown that a detailed, interview-based study of processes often assumed to occur in so-called black boxes inaccessible to foreign researchers is indeed feasible, even when the topic of study is controversial and contested, as is the case with Yunnan hydropower. Indeed, my sense from interactions with numerous government officials involved in

water management and energy work is that many harbor a strong desire to learn the “best practices” of resource development work – including how to minimize social and ecological impacts – through international exchanges and collaboration. I am therefore optimistic about the potential for continued work (by myself and others) on issues of energy and environment in China that explores not simply the directions “China” is pursuing with respect to such issues, but which also seeks to understand how discourses of development, poverty alleviation, energy security, and regional cooperation reflect create certain material consequences unique to modern-day China.

Anyone who has traveled to China in the past decade has likely witnessed the rapidity of change occurring there. Regardless of whether one visits the cities or the countryside, something as simple as the amount of earth being moved at any given time, in any given place, is enough to convey the magnitude and rate of change. In some places it is as if the left hand tears down what the right hand just built, and the process goes on ad infinitum, with a new work site around each corner in a city alleyway, or around each bend in a mountain highway. While hard to quantify, these changes have likely only accelerated since China’s accession to the World Trade Organization in 2002. The globalization of industrial production relies on a geographical division of labor, which for now has located much of the world’s factories in China. It is not surprising, then, that hand-in-hand with this globalization of production should come rapid environmental change, challenges to worker safety and well-being, and a host of other issues too often relegated to the category of externalities in economic accounting.

Upon arriving in any of China's major cities or visiting its rural areas, it is hard for an outside observer not to bluntly label what I called "environmental change" above as outright environmental degradation. The World Bank reported in 2001 that 16 of the world's 20 most polluted cities were in China (World Bank Group, 2001, cited in Economy, 2004). Reliance on coal for some 75% of its energy resources, much of which is burned in outdated, low-technology, and highly polluting power plants and factories, has darkened China's skies and soured its rain (Quan & Wang, 2005). According to a recent report by the State Environmental Protection Administration, only 142 of 340 cities monitored recorded average air quality of Grade II (Good) or better in 2003, though this represented an improvement over the previous year. During the same year, acid rain occurred in 265 (54.5%) of 487 cities and towns monitored (SEPA, 2004).<sup>220</sup> In terms of water, intensive agriculture, often relying on petroleum-derived fertilizers, has contributed to poisonous runoff that has blackened many of China's rivers and made them unsuitable for aquatic life or human contact. Industrial waste, often discharged untreated into waterways, only worsens the situation, with pollutants from paper mills, tanning factories, high-tech laboratories,<sup>221</sup> and countless other industries contributing to the poisoning of China's water and land. The same SEPA report noted that water at 37.7% of the 409 water quality stations monitored across the country met standards of suitability for human contact (Grades I-III), while averages at the remaining 62.3% of

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<sup>220</sup> The 5-tiered grading system for Air Pollution Index (API) in China matches that of the United States. For more information, see <http://www.sepa.gov.cn/english/airqualityinfo.htm>.

<sup>221</sup> Some of the particularly worrisome and persistent forms of water pollution, and highest levels of consumption of ultra-pure water, come from microchip manufacturing processes, many of which have relocated from Taiwan, Japan, and Korea to China in recent years. Many of the pollutants resulting from chip fabrication factories are suspected to be endocrine-disruptor compounds (EDCs), which have long-term and multi-generational effects.

stations did not. Thus China is witnessing a degree of environmental degradation that will require massive commitments of capital and political willpower to address.

With that environmental degradation comes the potential for degradation of human quality of life, extending at times to immediate threats to human life itself. It is here that the fallacy of the nature-society dichotomy becomes something more than an academic point. It is also here that academics, especially political ecologists and China geographers, stand to make the most important theoretical contributions regarding our understanding of the linkages between China's socio-economic development and environmental change, and the global political economic system. So much of the popular literature and media that lambastes China today for its environmental record stops at China's borders, failing to address what is, in my opinion, the fundamental question of levels of consumption in industrialized nations. So-called First World consumption drives the industrial machinery in places like China, forcing companies to seek low wages and lax environmental standards in order to keep shopping center shelves overseas well stocked. At the same time, those patterns of consumption set the standard by which other countries – including China – seek to measure socioeconomic success. During his recent visit to the United States, Chinese President Hu Jintao assured his American hosts, as he has done repeatedly over recent years, that instead of revaluing the Chinese currency to deal with massive US-China trade imbalance, the Chinese government seeks to expand China's own consumer market, thereby reducing China's producers' dependence on western (American) consumers.

Stepping outside China's political boundaries enables us to link consumption in the industrialized world first to industrial production in the developing world, and then to increasing demands for energy in places like China, and finally to heavy-handed programs to develop large-scale hydropower in western Yunnan. This is not a rigorous academic endeavor, and merely requires the analytical flexibility to accept, as many geographers have pointed out, the mutually constitutive and reinforcing nature of global and local dynamics. In this study I have shown how a political ecology approach, with its attentiveness to multi-scale analysis, discursive framings, and socio-ecological context, is well suited to picking apart oversimplified assessments of the reasons for environmental degradation and reckless resource exploitation in China. Countless other case studies suitable for political ecological analysis exist in China.

Political ecology's earliest roots lie in natural hazards research and in seeking explanations of land degradation. As I noted in Chapter Two, political ecology has seen limited application in China for a variety of reasons. One may be the Marxian bent in much political ecology work, and skepticism (warranted or not) of Marxian explanations about marginalization, environmental degradation, and access to resources in the China context. More plausible, though, is that the difficulty of conducting detailed, long-term ethnographic research in China, often in rural areas, has until recently precluded political ecologists from undertaking such inquiries. Unlike many other countries in the developing world where data are often published in at least one European language, this is frequently not the case in China, especially in rural areas. In addition, many data (including some hydrological data on transboundary rivers) are classified as internal

(*neibu*), and therefore off-limits to those lacking clearance to access them. Many of these data are considered state secrets in China, though such would not be the case in countries with more liberal political systems. Finally, foreign researchers must obtain the sponsorship of a Chinese institute (a governmental research institute or university) before conducting research projects. Potential sponsors are understandably wary of topics they perceive as sensitive or inflammatory, and questions regarding hydropower politics, resettled dam-area residents, or environmental degradation could easily be construed as such, especially given the increased willingness over recent years of Chinese citizens to file complaints, petitions, or take to the streets to protest dislocation or perceived environmental wrongdoing ("Construction of Chinese dam suspended after protests," 2004; "Ethnic riots left 7 dead, China says, as unrest seethes," 2004; Quan & Wang, 2005).<sup>222</sup>

This study contributes, therefore, to the fairly limited body of political ecology work focused on China, and is one of the few to move from the traditional political ecology paradigm of land degradation to focus on water. I have shown how the processes of marginalization related to hydropower development occur at several levels. First, political marginalization tends to give those most affected by dam construction the least amount of access to decision-making processes regarding those projects. Second, and consequently, geographic marginalization impacts villagers who are forced to resettle, often from already economically marginal lands, to other areas to make way for dam construction and reservoir filling. The ability and legal grounds for dam-affected

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<sup>222</sup> One report (Quan & Wang, 2005) notes that complaints received by China's environmental departments across the country have increased by 30% annually since 2002.

individuals, social organizations, and academics to influence the debate surrounding large hydropower projects seems to be growing incrementally, and is likely facilitated by the transformation of the power development authority from central government ministry to quasi-privatized corporation. This has changed the discursive milieu in which those projects are debated, opening a space in which resistance to the projects can be decoupled from resistance to the state, thereby increasing the legitimacy (or at least decreasing the criminality) of such resistance.

As a further contribution to the political ecology literature, this study offers an example of how institutional ethnography, process-tracing, and discourse analysis can serve as the basis for political ecologists to creatively (re-)engage with the scalar politics literature, treating (as many geographers have urged) scalar constructs themselves as part of the object of analysis, rather than a mere container in which other processes take place. My example of a powershed as an analytical framework grew out of an analysis of the various geographic constructs that are deployed by proponents and opponents of Lancang and Nu hydropower development. While a powershed is simply one more geographic construct like all the others, my goal was to create an analytical framework that was dynamic and provided a means for thinking outside the scalar boxes of counties, prefectures, provinces, and regions in which development projects are more commonly (and statically) framed.

Some of my findings regarding large dam construction in China echo those of similar studies in other countries. As I noted in Chapter Two, several studies have identified certain themes common to large dam development around the world. Large

dams often result in the geographic, political, and economic marginalization of residents in the vicinity of the dam, while failing to meet projections in terms of power generation efficiency, construction budget, or effective lifetime. They are frequently the result of political priorities as much as irrigation, flood control, or power generation priorities, and embody modernist notions about the supremacy of science and technology for controlling and harnessing nature. Based on my study, I believe one can easily argue that these criticisms all apply, to varying degrees, to Chinese dams such as the Three Gorges Project and the most massive of the Lancang and Nu projects such as Xiaowan and Nuozhadu.

At the same time, other findings of my study reflect the uniqueness of the Chinese case. First, in contrast to many of the large dams built in the rest of the developing world, the Lancang and Nu projects are financed not by international development bank loans, but rather by the Chinese government and the development corporations themselves. On the one hand, this potentially means they are subject to fewer reporting requirements than they would be if financed by international development banks. On the other hand, the apparent effectiveness of international and domestic pressure to render the planning, approval, and construction process more transparent seems to have demonstrated the ability of social organizations, media, and academic organizations to at least influence the terms of the debate about large-scale hydropower. This, in turn, might lay the groundwork for an increasingly solid (and enforceable) legal basis for insisting that social and environmental assessment protocols be followed, including those regarding compensation of dam-area residents who must be resettled. Sporadic attempts to quell

opposition to dam projects, through increased restrictions on civil society organizations or other means, underscore the degree to which the Chinese leadership at various levels is undecided on how much open debate and discussion regarding the direction and nature of China's "development" is acceptable. In addition, the Chinese dams (and related generation and transmission infrastructure) appear to be increasingly reliant on Chinese, as opposed to imported, technological expertise and equipment. These advances in technology are unfolding against a decidedly Chinese political economic backdrop of institutional reforms that includes the halting transformation of Soviet-style state-owned industrial behemoths into modernized, market-oriented quasi-privatized corporations. Thus the need for further scholarship that seeks to understand large-scale hydropower development in the particular Chinese context, while recognizing the similarities it shares with such development around the world, becomes clear.

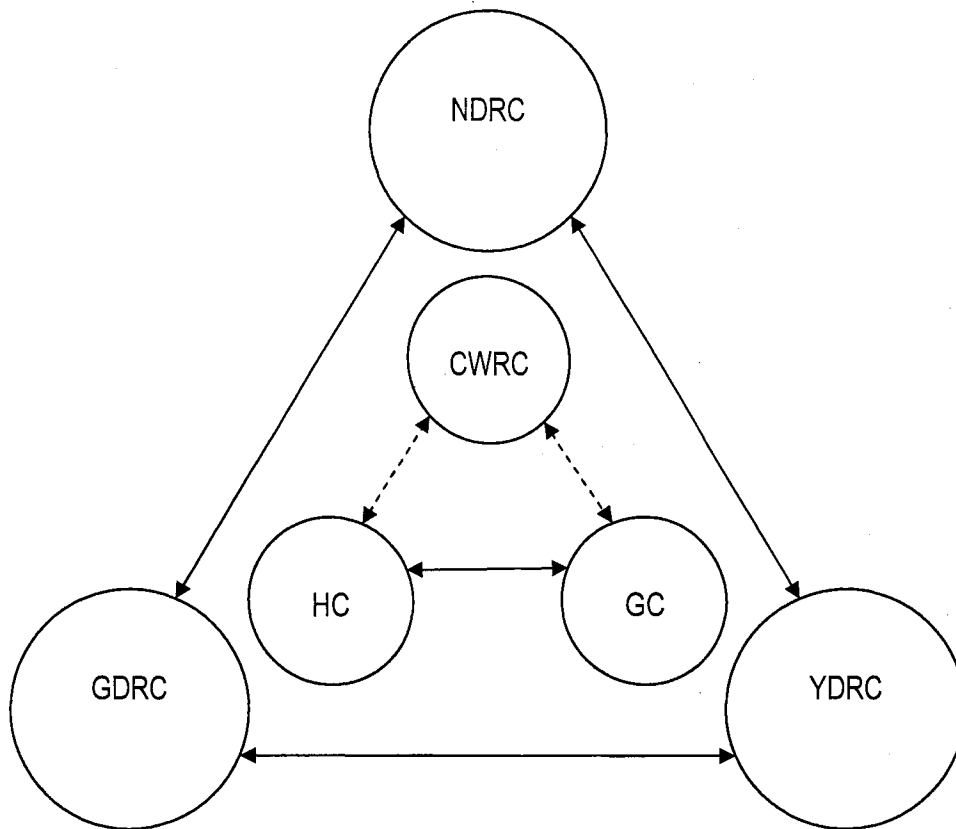
There is an interesting parallel between the findings of this study and those of Swyngedouw's (2003) study of water management in Spain. Swyngedouw noted the role of the watershed commissions in Spain at the turn of the 20<sup>th</sup> century as a tool for reformists to capture power from the traditionalists. This was enacted through a redrawing of the lines on which water governance was based, insisting that it should follow physical geographic boundaries (i.e., watersheds) rather than political administrative ones. A similar struggle seems to be underway in China between the Ministry cum hydroelectric companies and provincial governments on the one hand, and the basin commissions on the other. In both instances, discourses of scientific management, development, and respect for natural laws and fluvial geography have lent

legitimacy to the case of the basin commissions. To what extent basin commissions in China such as the Changjiang Water Resources Commission, with its half-century of history, qualify as reformists remains a key question. Nevertheless, the similarities between the centrality of water in Spain's modernization drive a century ago and China's at present merit further exploration.

In terms of China geography and area studies, this study has provided one more example of the necessity of unpacking the Chinese state, which is often assumed to be monolithic and reducible to two convenient syllables: Beijing. The Chinese Party-state is without doubt a Leninist apparatus. Perceptions of it as monolithic are, therefore, to some degree understandable due to the importance of central government directives and policy statements in determining the overall direction of political, social, and economic development of the country. My study, however, has shown that decision-making processes regarding large-scale hydraulic projects, while not equitable or democratic, are neither an example of Wittfogel's (1957) infamous "despotism" through which the leaders of Chinese and other ancient societies mobilized masses of laborers and created new bureaucracies in order to undertake large-scale hydraulic projects. Indeed, my analysis of the Yunnan projects reveals a Chinese state with many internal conflicts even at the highest levels of what could be called the hydraulic bureaucracy (in Wittfogel's terms), and an apparent willingness to allow those conflicts to be played out in a semi-transparent sense in ways that hardly qualify as despotic. The same will likely be true of the South-North Water Transfer Project, a truly massive hydraulic infrastructure project.

I have shown how the triangular relationship among key actors in Beijing, Guangdong, and Yunnan has resulted in the hydropower development paradigm currently unfolding in Yunnan and across southern China. This triangular relationship is actually two-tiered, with the outer tier consisting of the former planning commissions, namely the National Development and Reform Commission, as well two of its provincial line commissions, the Guangdong Development and Reform Commission and the Yunnan Development and Reform Commission. The importance of the broad policy directions and continued macro-economic planning undertaken by these commissions in the so-called market transition should not be underestimated. Inside this outer tier is a second tier that consists of the hydropower development companies, the grid companies, and the watershed commissions such as the Changjiang Water Resources Commission. Based on my analysis, these three sets of actors are key in determining the manner in which broad policies of resource transfer and regional development are implemented. The important caveat, once again, is that actual implementation of policy does not always fully reflect the policy's original intent, as evidenced by the incomplete linkage between the CWRC and the other two sets of actors, the development companies and grid companies. These relationships are shown in Figure 8-1, with the dashed lines reflecting a weaker, less institutionalized (at this point) linkage and the solid lines reflecting stronger linkages. This relationship suggests that center-local relations in China, at least as regards large-scale hydropower development, are mediated by quasi-corporatized entities whose leaders balance mixed loyalties to politics and profit. Large hydropower projects have traditionally relied heavily on government or development bank financing due to their

high capital costs, long construction period, and delayed returns on investment. China plans to slowly release the estimated US\$300 billion in non-tradable assets held by the government as a way of moving from the current shareholding, where many SOEs are still essentially under government control since the state holds the majority of shares, to fully privatized companies ("Four listed firms," 2005). For fear of market instability upon being flooded with massive numbers of new shares, however, this process will be slow. As financing methods for such projects diversify through, for instance, public stock offerings on international markets, and as enterprise governance based on boards of directors and stockholders becomes more institutionalized, we might expect to see an intensification of tensions within firms due to conflicting political and market loyalties of enterprise leaders. What the possible impact of such intensified conflict might be is hard to say at this point; as my interviews showed, the "contradiction" (*maodun*) between loyalty to Party-state and loyalty to market is already on the minds of some enterprise leaders in pillar industries like hydropower.



**Figure 8-1: Nested triangular relation (Beijing, Guangdong, Yunnan)**

As I suggested in the previous section, the Lancang and Nu hydropower projects are key moments in a Yunnan-Guangdong-Beijing triangle of inter-dependence. One goal of this triangular relationship, at least in the eyes of China's central leadership, may be to counter perceived localist tendencies in economically advanced provinces like Guangdong, as well as separatist tendencies in economically "backward" and ethnically diverse provinces like Xinjiang. By promoting policies that bind Guangdong's industrial and population centers to Yunnan hydropower generation stations, central authorities may seek to curb Guangdong's independence and its ability to unilaterally

participate in the global market.<sup>223</sup> The irony is that at the same time, policy incentives such as Send Yunnan Electricity Outward are designed precisely to increase the economic linkages between Yunnan and its southeast Asian neighbors.

Scholars of bureaucratic politics in China may question whether or not the decision-making dynamics I have analyzed in this study constitute a departure from the past or rather a continuation of it. How, for instance, are interpersonal politics in the hydropower sector different now than they were at the time of the approval of the Gezhouba project on the Yangtze (Lampton, 1987a)? Despite the repeated aggregation, separation, and finally dissolution of the ministry body that formerly governed large projects, final administrative decision-making authority for such projects, especially those on principal (*zhuyao*) river, still seems to reside with the National Development and Reform Commission's Energy Bureau and the State Council. Does this mean little has changed in the two decades since Lieberthal and Oksenberg (1986) performed their study of energy policy formulation in the first decade of reforms? In my discussion of energy geographies as a legitimizing strategy in Chapter Six, I did not intend to imply that the discursive and material creation of regions such as the Pan Pearl River Delta and China's West were *necessary* for the promotion of large hydropower development in Yunnan; clearly, the top decision makers in the central government would retain the ability to push through projects with or without such constructs. My point was simply that the constructs

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<sup>223</sup> I admit that I was not able to explore the specifics of Guangdong's involvement in the Yunnan projects as much as I would have liked to, primarily since the bulk of my fieldwork was conducted in Yunnan. In the future I hope to spend more time in Guangdong to better understand Guangdong's electrical power situation and the Yunnan-Guangdong linkage from that perspective.

legitimize and naturalize transfers of resources – in this case, hydropower – from relatively resource-rich areas to relatively resource-poor areas.

This dissertation has also helped solidify the theoretical linkage between the geographic scale politics literature and the more recent and focused debates within China geography about how to approach the notion of scale in a China context. As I noted in Chapter Three, China scholars have begun discussing the notion of a spatial administrative hierarchy as a product of China's particular sociohistorical context through which the periodic restructuring of administrative boundaries serves certain political economic ends.<sup>224</sup> In the spatial administrative paradigm, the (central) Chinese state is the primary agent in defining and deploying the new geographic constructs, whereas in the broader scale politics literature, this can be done by virtually any group, individual, or state entity. In my study I showed how a variety of agents, ranging from central state economic planning bodies and quasi-state hydropower development companies to international development banks and NGOs/CSOs, have fabricated and deployed particular geographic constructs to promote or resist the legitimacy of the Lancang and Nu hydropower projects. In examining these various geographically informed strategies, we have seen that assertion that geographic scale is socially constructed – that is, scalar constructions are defined in certain ways by actors with various political economic motivations – is not simply an opaque bit of academic jargon, but rather an accurate descriptor of the politics of place as it can occur in China or elsewhere.

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<sup>224</sup> One might argue that election redistricting in the United States is yet another example.

Finally, this study may hold important implications with regard to the application of Regulation Theory in so-called transitional economies that are not the normal analytical domain of regulation theorists. The theory attempts to explain capitalist economies through two key principles: a regime of accumulation and a mode of regulation (Boyer, 1990). Boyer defines these two terms as follows:

Regime of accumulation: set of regularities that ensure the general and relatively coherent progress of capital accumulation, that is, that allow for the resolution or postponement of the distortions and disequilibria to which the process continually gives rise (p. 35-36);

Mode of regulation: any set of procedures and individual and collective behaviors that serve to: reproduce fundamental social relations through the combination of historically determined institutional forms; support and ‘steer’ the prevailing regime of accumulation; and ensure the compatibility over time of a set of decentralized decisions, without the economic actors themselves having to internalize the adjustment principles governing the overall system (p. 43).

If we take a Regulation Theory approach to understanding the Lancang and Nu dams, we can see hydropower development in southwestern China as a new regime of capital accumulation. By arguing that Yunnan’s “resource superiority” (*ziyuan youshi*) be converted into “economic superiority” (*jingji youshi*), policies such as Send Yunnan Electricity Out and Send Western Electricity East construct a regulatory framework along the lines of that set forth by Boyer. Here “historically determined institutional forms” such as the hydropower development companies (reincarnations of the Ministry of Electric Power) ensure that decisions about hydropower development taken by generation and distribution companies accord with central state priorities for maintaining economic

growth, political stability, and territorial integrity. Thus while the traditional domain of Regulation Theory analysis is capitalist economies, this study suggests that the theory might prove useful in analyzing China's socialist market economy as it is embedded in the global political economic system.

At the same time, it is worthwhile to think about the Yunnan hydropower projects, and indeed other large-scale energy projects in China, in terms of modernization and capitalism.<sup>225</sup> Few would challenge the notion that the Chinese Party-state is clearly a modernist state. As I have already noted, central government discourse has essentially equated the notions of "sustainable" and "scientific" development, and the Chinese press regularly touts the fact that institutions from corporations to the military to power grids are undergoing processes of modernization (*xiandaihua*) ("Jichu sheshi jianshe," 2006; National Development and Reform Commission, 2002; Pang, 2001; Wu, 2004). Other scholars have long recognized the importance of large hydraulic projects such as hydroelectric dams as important symbols of modernity and "man's" conquest over nature (Goldsmith & Hildyard, 1986; Kaika, 2006; McCully, 1996; Scudder, 2005), and the fact that the Three Gorges Project has been an aspiration of China's leadership since the early years of the 20<sup>th</sup> century supports the thesis that today's three rivers projects in Yunnan may also be understood, at least partly, as symbols of China's modernization. Thus my

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<sup>225</sup> Here, I intend modernization to mean an ideology that prioritizes scientific and technological expertise, industry over agriculture, and a host of other socio-cultural transformations I will not repeat here, which is premised on a progression from "less developed" to "more developed" seen as natural and desirable (see Johnston, Gregory, Pratt, & Watts, 2000, pp. 516-518). While modernization generally assumes a capitalist economic development model as its underlying engine, the economic engine in China, labeled by the Party-state as a "socialist market economy with Chinese characteristics) shares many characteristics assumed by geographic modernization theory (diffusion of innovation and "development" through urban growth poles, reliance on scientific and technical expertise, etc.).

arguments in this study should in no way be understood to discount the modernizing implications of the Yunnan dams; skyscraper-high concrete and steel structures harnessing “wild” and “galloping” rivers may indeed be the Great Walls of contemporary China, just as they represented the seemingly boundless reach of scientific and technological expertise not so long ago in places like Egypt and the United States. And as elsewhere, the results of China’s large dams – and of its modernizing project as a whole – will be mixed. Stability of power supplies will probably increase, and towns near the dam sites may see positive, though perhaps temporary, benefits from local economic development, especially during the construction phases of the projects. At the same time, villagers near the dam sites will likely suffer socially and economically from forced relocations to areas where the land, climate, language, and customs may be unfamiliar, while ecological communities upstream and downstream of the dam itself will no doubt see changes, which themselves will bring about further social repercussions.

### ***Limitations of this Study and Suggestions for Further Research***

While this study has made several contributions, it also suffers from some important limitations. The first and most glaring is that, as a political ecological study, it fails to engage with “people on the ground” in the villages along the rivers, most importantly those whose lives have been or will be immediately impacted by dam construction on the Lancang and Nu. Nor has it examined in any satisfying depth the ecological processes most relevant to the Lancang and Nu projects, despite my desire to work against nature-society dualisms in this study. Two sets of processes at this end of the political-ecological spectrum that are particularly relevant to the study Yunnan

hydropower are sedimentation and seismic activity.<sup>226</sup> My intent from the start, however, was to conduct more of an institutional ethnography in order to understand decision-making processes that lead to those dams becoming a reality in the first place. As justification for this, I argue that before one can hope to have an impact on decision processes – by making them, say, more transparent and pluralistic – it is important to first understand those processes in order to recognize potential leverage points. My relatively top-heavy approach to Yunnan hydropower development, while illustrative of what I believe are the key processes driving that development, obviously does not tell the entire story, and more work is needed to understand the strategies of negotiation, adaptation, and resistance used by individuals and communities facing displacement and resettlement due to hydropower dam development, and the access those individuals have (or lack) to decision processes.

A second and related area for further study would involve how such strategies, primarily those of negotiation and resistance, are translated into action. Here we once again touch upon the role of social organizations. As formerly public goods such as water become commodified, access is reduced and certain would-be users are excluded. While the water in the rivers in China is still theoretically the property of the country (and, by extension, all people), there is no doubt that conversion of flowing rivers into electric power sources by enterprises with an eye to eventual privatization creates exclusion and uneven development. In the case of hydropower development, however, the processes of

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<sup>226</sup> Several fault lines cut across Yunnan, and the province has historically witnessed numerous significantly strong earthquakes, making questions of dam stability especially salient. In terms of sedimentation, much of northwestern Yunnan has suffered from severe deforestation that, coupled with monsoonal rains, produces large inflows of sediment into rivers such as the Lancang, Nu and Jinsha. Sedimentation behind dams reduces reservoir storage capacity and, as a result, power generation capability.

corporatization<sup>227</sup> may in fact enable protest and resistance, for protesting a hydropower project developed by a public corporation is no longer equivalent to protesting the state, as when the Ministry of Electric Power was spearheading hydroelectric dam development. The role of CSOs in this process will likely only grow in importance as they continue to maintain a clear distinction between challenging state authority (politically suspect) and seeking redress or compensation for development that deprives dam-area residents of their livelihoods (politically acceptable).

At the same time, a more detailed understanding of the evolving role of the watershed commissions would also be worthwhile. In particular, an ethnography of the Changjiang Water Resources Commission would likely yield tremendous insight into the linkages among the Commission, the Ministry of Water Resources, the development companies, and provincial government offices. In addition, such a project might not be as difficult as one might expect. The CWRC was extremely accommodating when I visited, and spoke at length about exchange opportunities they have underway. To date, those exchanges have mostly involved sending Chinese academics and engineers working at the CWRC overseas to learn about watershed management. CWRC has also hosted one international forum on watershed management, and intends to host a second one in 2007. Given the level of support for such exchanges and the interest in learning of ways other countries have handled such complex issues as water rights trading systems, it seems plausible that someone with the right combination of language skills and relevant

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<sup>227</sup> Again, I hasten to note that what has occurred thus far with the five large hydropower development companies in China is not a case of privatization, but rather capitalization and corporatization at best, since the controlling share of the new corporation's shares are still held by central government authorities.

expertise, and a carefully crafted proposal, could carry out such an institutional study and make a valuable contribution to scholarship on water resources development and management in contemporary China.

It is also worth examining the extent to which the electric power industry in China may be a case of a spatial and/or natural monopoly.<sup>228</sup> The 2002 reforms were ostensibly intended to spur competitive practices and break up the power generation and distribution monopoly as it existed under the Ministry of Electric Power. Yet now, one of the main priorities of the grid companies is to create a national grid. This begs the question of whether or not the electric power industry as a whole, in the particular manner in which it has evolved in China, is a natural monopoly. Similarly, the necessary geographic fixity of large-scale hydropower generation facilities, and the granting of exclusive development rights based on individual watersheds, could be understood as characteristic of a spatial monopoly in the case of the hydropower generation corporations. Related to this would be a more detailed examination of the system whereby electrical power generation and transmission facilities are taxed, and of how tax revenues are shared among the various administrative levels of government.

Still another area for further research relates directly to the mechanics of power generation and distribution. In my study I have focused primarily on the political economic processes of large hydropower development, but I have arguably neglected one

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<sup>228</sup> A spatial monopoly arises when “distance from competitors or ways of bounding space give a producer monopolistic control over a section of the market,” and may result from “collusion between otherwise competing firms who may agree to a ‘carve up’ of the market among themselves.” A natural monopoly is a specific type of monopoly “where the market in question is best served by a single firm because of the nature of the production process. Some public utilities are of this kind.” (Johnston et al., 2000, p. 777)

key process that plays a decisive role: that of technological development. I devoted one section of Chapter Six to a discussion of power grid design, construction, and interlinking activities, and mentioned in passing the fact that much of the technology for generation (e.g., large-capacity turbines and generators) and distribution (e.g., ultra-high-voltage AC and DC transmission lines) is now being developed and produced in China, rather than imported from abroad. A deeper inquiry into the dynamics of the development of such technologies (including technology transfer from abroad), and into the broader research and development side of the energy sector, might have implications for the conclusions I have drawn from this project, including the timing and financing characteristics of the current Yunnan hydropower boom.

Finally, a more thorough and systematic analysis of the legal changes relevant to water and electric power governance would not go amiss. Shen (2004), employed at the Institute of Water Resources and Hydropower Research of the Ministry of Water Resources, points out some of the shortcomings and ambiguities of the 2002 Water Law. Particularly relevant would be a line-by-line analysis of the law itself, as well as of the 2003 Environmental Impact Assessment Law and the 1998 Law on Organizations, which governs the registration and role of civil society organizations such as those I have described in this study. Additionally, research into the extent to which these laws are enforced would further contribute to the literature on policy and implementation in China. Though the court system in China is still far from independent, the growing willingness of state- and non-state entities alike to raise conflicting viewpoints couched in appeals to the law suggests that a thorough understanding of these laws most would

benefit those seeking to understand the intersections of water, energy, environment, and advocacy in contemporary China.

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As I noted in the conclusion of Chapter Six, electricity is geography. In a very real way, electric power networks embody much that geography stands for. While on the surface they are about transmitting electric power over space, they are indisputably about creating and reshaping political economic power over space as well. The Chinese leadership's greatest concerns are the maintenance of social stability and territorial integrity. Power grid development has a direct and, the administration no doubt hopes, positive impact on both. Electricity consumption is a key indicator worldwide of a well-off population. Providing reliable and affordable electricity to the millions of Chinese who still lack it is without doubt a central concern of Chinese leaders at all levels of government and Party administration, given their continued emphasis on building a "relatively well-off society" (*xiaokang shehui*) and growing worries about social unrest bubbling up from the grassroots level. At the same time, promoting an energy policy that relies on development of a national grid, along with direct "backbone" linkages between places as far away as Yunnan's Lancang River and the Pearl River Delta's industrial centers, binds the disparate provinces together in ways that might counterbalance more independent tendencies of some provincial leaders.

Water, too, is a fundamentally geographic topic. Its fluidity challenges the very fixity of arbitrary, socio-historically produced political and administrative borders. Plans for new hydropower construction in seemingly remote areas of Yunnan are based on

trends and projections of electricity consumption and economic development hundreds, even thousands of kilometers away in China and neighboring countries. This is not to say, of course, that large-scale Yunnan hydropower development is based solely on a rational, unbiased, and disinterested assessment of such trends; nor could the same be said about the rush to develop large hydropower in the western United States or other parts of the world. Damming the rivers, spinning the turbines, and preventing the “wasteful” flow of water unimpeded into the sea is, in the end, a modernist project that reflects a desire to control nature and bend it to human use. Chinese President Hu’s emphasis on “taking people as the root” or “people-oriented development” (*yi ren wei ben*) echoes this, and is contrasted against more eco-centric views (*yi daziran wei ben*), which are derided as pseudo-science by politically correct academic heavyweights in China. Yet the conversion of water into wattage breaks down once more the false dichotomy of humans and nature, reaffirming the importance of critical scholarship that seeks to understand and explain issues of environmental change and resource exploitation as situated in specific socio-ecological contexts that are anything but fixed.

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## Appendix A: Notes on Names and Measurements

In this dissertation I have adopted the commonly recognized Pinyin Romanization system for transliterating Chinese names and words, except in cases where other Romanizations are commonly recognized (such as *Yangtze*). Additionally, since Chinese surnames (family name, or *xing*) precede given names (*ming*), I have chosen to maintain this order when naming individuals in the text. I have not done this in the bibliography, or in the in-text parenthetical citations, however.

Below is a guide to several units of measurement used throughout the text.

Currency: *Yuan* (RMB), where 1 Yuan  $\approx$  US \$0.125, or US \$1  $\approx$  8.02 *Yuan*

Volume: 1 m<sup>3</sup>  $\approx$  0.0008107 acre-feet, or 1 acre-foot  $\approx$  1,233 m<sup>3</sup>

Power: 1 kilowatt (kW) = 1,000 watts (W)

1 Megawatt (MW) = 1,000 kW

1 Gigawatt (GW) = 1,000 MW

1 Terawatt (TW) = 1,000 GW

Voltage: 1 kilovolt (kV) = 1,000 Volts

## Appendix B: Upper Lancang Cascade

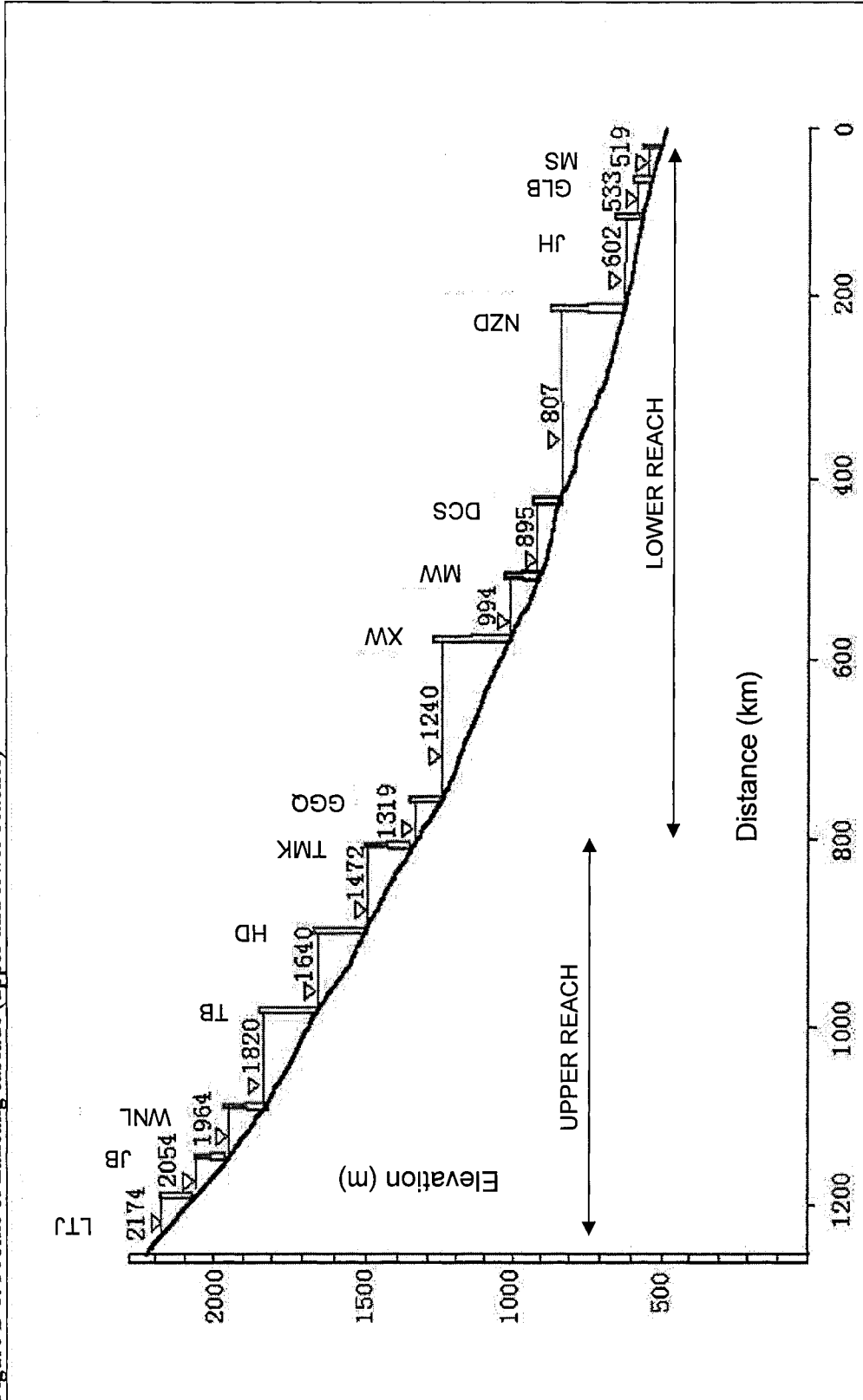
The following table provides basic information on the six upper Lancang dams that have been proposed and are, at the time of writing, in various stages of planning and preliminary development. Since details about hydropower projects on this stretch of the river is hard to obtain, I chose not to include them in the discussion of the middle- and lower-Lancang dams in Chapter Four. This also means that not all the figures for installed capacity and other dam characteristics are completely reliable, as it is difficult to cross-check them at this point. The data should, however, provide a generalized idea of the scope of development envisioned for the upper stretch of the Lancang in Yunnan.

**Table B-1: Details of upper Lancang cascade**

Dam Name	Installed Capacity (MW)	Annual Output (Twh)	Dam Height (m)	Reservoir Volume (billion m <sup>3</sup> )	Abbreviation (Fig. B-1)
Liutongjiang 溜筒江	550	3.454	130	0.5	LTJ
Jiabi 佳碧	430	2.683	292	0.32	JB
Wunonglong 乌弄龙	800	4.874	132	0.98	WNL
Tuoba 托巴	1640	8.050	120.5	5.15	TB
Huangdeng 黄登	1860	9.208	260	2.29	HD
Tiemenkan 铁门坎	1780	8.858	107	2.15	TMK

Source: Y. Li et al. (2001). NB: This table is not definitive, as other sources may cite different figures and may even differ in terms of dam names and locations. See Table 4-1 for abbreviations for lower Lancang dam names.

Figure B-1: Profile of Lancang cascade (upper and lower reaches)



Source: China Hydropower Engineering Consulting Group (n.d.-a), adapted.

## Appendix C: Online Resources for Further Study

The following is a list of online resources where information about China's water and electric power sectors can be found. Most are Chinese-language sites, though some have links to English-language versions.

### Generation & Distribution Companies

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China Datang Corporation 中国大唐集团公司	<a href="http://www.china-cdt.com">www.china-cdt.com</a>
China Guodian Corporation 中国国电集团公司	<a href="http://www.cgdc.com.cn">http://www.cgdc.com.cn</a>
China Electricity Council 中国电力企业联合会	<a href="http://www.cec.org.cn">http://www.cec.org.cn</a>
China Huadian Corporation 中国华电集团公司	<a href="http://www.chd.com.cn">http://www.chd.com.cn</a>
China Huaneng Group 中国华能集团公司	<a href="http://www.chng.com.cn">http://www.chng.com.cn</a>
China Power Investment Corporation 中国电力投资集团公司	<a href="http://www.zdt.com.cn">http://www.zdt.com.cn</a>
China Southern Power Grid 中国南方电网	<a href="http://www.csg.net.cn">http://www.csg.net.cn</a>
China Three Gorges Project Corporation 中国长江三峡工程开发总公司	<a href="http://www.ctgpc.com.cn">http://www.ctgpc.com.cn</a>
Guangdong Power Grid Group Co., Ltd. 广东省广电集团有限公司	<a href="http://www.gpgc.com.cn">http://www.gpgc.com.cn</a>
State Grid Corporation of China 国家电网公司	<a href="http://www.sgcc.com.cn">http://www.sgcc.com.cn</a>
Yunnan Dachaoshan Hydropower 云南省大朝山水电有限责任公司	<a href="http://www.yndcs.com.cn">http://www.yndcs.com.cn</a>
Yunnan Electric Power Grid 云南电网	<a href="http://www.yepg.yn.cn">http://www.yepg.yn.cn</a>
Yunnan Huaneng Lancang Hydro Co (Hydrolancang) 云南华能澜沧江水电有限公司	<a href="http://www.ylc.com.cn">http://www.ylc.com.cn</a>

### Ministries, Institutes, Commissions

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China Hydro Consulting 中国水电工程顾问集团公司	<a href="http://www.checc.cn">http://www.checc.cn</a>
China Institute of Water Resources & Hydro Research 中国水利水电科学研究院	<a href="http://www.iwhr.com">http://www.iwhr.com</a>
East China Investigation and Design Institute	<a href="http://www.ecidi.com">http://www.ecidi.com</a>

华东勘测设计研究院

Ministry of Water Resources

中华人民共和国水利部

State Council Three Gorges Project Construction Committee

国务院三峡工程建设委员会

<http://www.mwr.gov.cn>

<http://www.3g.gov.cn>

State Electricity Regulatory Commission 国家电力监管委员会	<a href="http://www.serc.gov.cn">http://www.serc.gov.cn</a>
State Environmental Protection Administration 国家环境保护总局	<a href="http://www.sepa.gov.cn">http://www.sepa.gov.cn</a>
Water Resources & Hydro Planning General Institute 中国水利水电勘测设计总院	<a href="http://www.giwp.org.cn">http://www.giwp.org.cn</a>
Western Development Research Office 中国西部大开发网	<a href="http://www.developwest.gov.cn">http://www.developwest.gov.cn</a>
Yangtze (Changjiang) River Watershed Commission 长江水利委员会	<a href="http://www.cjw.com.cn">http://www.cjw.com.cn</a>

**News, Statistics, and Data**

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China Electric Power News Network 中国电力新闻网	<a href="http://www.zdxw.com.cn">http://www.zdxw.com.cn</a>
China National Committee on Large Dams 中国大坝委员会	<a href="http://www.icold-cigb.org.cn">http://www.icold-cigb.org.cn</a>
China Power (Information, News, Yearbooks) 中国电力	<a href="http://www.chinapower.com.cn">http://www.chinapower.com.cn</a>
China State Power Corp Information Network 国家电力公司	<a href="http://www.sp.com.cn">http://www.sp.com.cn</a>
Chinese Hydraulic Engineering Society 中国水力发电工程学会	<a href="http://www.ches.org.cn">http://www.ches.org.cn</a>
Chinese Hydrological Information Network 中国水文信息网	<a href="http://www.hydroinfo.gov.cn">http://www.hydroinfo.gov.cn</a>

**Vita**

Darrin Magee attended Louisiana State University as an undergraduate, where he obtained a Bachelor of Science in Mathematics and a Bachelor of Arts in French, with a minor in Italian. As a sophomore he spent a year studying abroad in Lausanne, Switzerland. Upon his return to Louisiana, he began studying Chinese, and later was awarded a National Security Education Program fellowship for Chinese language study in Tainan, Taiwan, followed by Rotary Foundation Ambassadorial Scholarship for Italian and Chinese study in Venice, Italy. He then completed his Master of Arts in International Studies at the University of Washington's Jackson School of International Studies, focusing on domestic politics and international relations of Taiwan. He returned to the University of Washington Geography Department for his Ph.D. in 2002 after teaching high school for one year and working in non-profit science education for four years. He earned his doctorate degree in 2006.