Powershed Politics: Yunnan Hydropower under Great Western Development*

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ABSTRACT This article uses hydropower development on the Lancang (upper Mekong River) and Nu (upper Salween River) as a lens for exploring institutional change and decision-making processes among governmental units and hydropower companies under the Great Western Development campaign. Scholars of the campaign tend to focus on central government policies and individual provinces' responses, and on the campaign's role as a central-state-strengthening project aimed at curbing regionalist tendencies. Large-scale hydropower development in Yunnan, however, is a complex affair involving national and provincial power companies, regional grids and governmental units at many levels. Conceptualizing Yunnan as the "powershed" of Guangdong, I argue that the Western Development campaign paves the way for increasingly strong interprovincial linkages between Guangdong and Yunnan that are not necessarily central-state-strengthening, and that consideration of such linkages should be fundamental to any attempt to understand the impacts of China's western development.

China is home to half the world's 40,000 large dams, up from a few dozen in 1949. Over the past decade, China's hydropower has attracted significant attention as a result of the massive Three Gorges project. Meanwhile, a series of eight smaller (not small) projects has been under way on the Lancang River, the upper stretch of the Mekong in Yunnan province, which until recently failed to attract more than a smattering of attention. The Lancang projects and plans to construct a 13-dam cascade on the Nu Jiang (upper Salween) have come under fire from organizations and individuals concerned about the impacts of dam development on transnational rivers. Even hydropower officials admit the Nu is the last "virgin" river in China, while arguing that hydropower will bring modernization and poverty alleviation to some of China's poorest regions.[1] Construction on the Nu is currently suspended, following an order from Premier Wen Jiabao in March 2004,[2] but a scaled-down version may win approval from the National Development and Reform Commission.[3]

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1. Pingyang Zhou, "Liuku shuidianzhan jiepai" ("Inauguration of Liuku Hydropower Station"), *Yunnan ribao*, 19 July 2003 (cited 3 November 2004), available from http://www.xb.yn.gov.cn/new/15.htm.

2. Jim Yardley, "China's premier orders halt to a dam project threatening a lost Eden," *New York Times*, 8 April 2004.

3. Ray Cheung, "Beijing to approve Yunnan dams plan," *South China Morning Post*, 2 November 2004, available from http://chinastudygroup.org/index.php?action=news&type=view&id=7509.

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Local and company officials claim no final decision has been made,[4] insisting that construction will proceed even if only one is approved.[5]

Dam building in Yunnan is supported by the Open Up the West campaign (*xibu da kaifa*). It also comes during a period of electrical industry transformation, projections of increased power demand throughout the Mekong region, and frequent electricity shortages around China. Industrialized and populous eastern areas such as Guangdong, Beijing and Shanghai, important links to the global economy, have been severely affected.[6] Guangdong has stretched its thermal electrical production capacity to its limit, and congested rail networks increase the difficulty of transporting fuel. While preliminary approval has been given by the State Council for new nuclear plants in Guangdong, these will not come online for years. Officials in areas affected by blackouts or planned outages are eager to find solutions, and connecting to more capacity, rather than improving efficiency, is the prevailing strategy.[7] Under the Western Development campaign, resource-rich areas of western China are supposed to fuel the economic engines of eastern China, which in turn will pull "backward" western areas forward. The restructuring of the electrical power industry, the break-up of the Ministry of Electric Power, and the increasing role of academics and social organizations in development decisions are also important factors influencing the evolution of linkages among government and business entities.

This article has three purposes. The first is to provide updated information on Lancang-Mekong and Nu-Salween projects. The second is to analyse industrial reforms and decision-making surrounding Yunnan hydropower. To date, little Western scholarship exists regarding Yunnan hydropower, resulting in a lack of analysis of the political-economic and institutional context in which its development occurs.[8] An early report by Daming He and E. C. Chapman provided the basis for much of the sparse scholarship.[9] He and other colleagues have also published numerous

4. "China's premier reportedly orders restudy of controversial dam, but officials say they know of no change," Associated Press, 9 April 2004 (cited 10 April 2004), available from http://asia.news.yahoo.com/040409/ap/d81r314g4.html; " 'No conclusion drawn' regarding dams on Nu River," *Newswire*, Interfax-China, 13 April 2004 (cited 13 April 2004).

5. Interview, 14 August 2005.

6. "Chang san jiao quedian dao shenme chengdu" ("How severe is the electrical shortage in the Yangtze Delta region?"), *Xinwen wanbao*, 20 July 2004 (cited 16 August 2004), available from http://china.com.cn/chinese/zhuanti/zydh/614965.htm.

7. In an interview, one expert noted that blaming outages on capacity shortage suggests that the solution is to increase capacity. Such a solution directly benefits those with an interest in dams, specifically dam companies and governments awaiting taxes on electricity.

8. Important exceptions include John Dore and Xiaogang Yu, *Yunnan Hydropower Expansion: Update on China's Energy Industry Reforms and the Nu, Lancang and Jinsha Hydropower Dams* (Chiang Mai and Kunming: Chiang Mai University and Green Watershed, 2004); Gavan McCormack, "Water margins – competing paradigms in China," *Critical Asian Studies*, Vol. 33, No. 1 (2001), pp. 5–30. For a recent and thorough analysis of China's power industry reforms as a whole in historical and political economic context, see Emily T. Yeh and Joanna I. Lewis, "State power and the logic of reform in China's electricity sector," *Pacific Affairs*, Vol. 77, No. 3 (2004), pp. 437–465.

9. E. C. Chapman and Daming He, "Downstream implications of China's dams on the Lancang jiang (upper Mekong) and their potential significance for greater regional

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Chinese articles about water allocation, land use, basin planning, legal norms and international co-operation on Lancang-Mekong development,[10] but scholars outside China seem largely to have ignored these publications. Finally, I argue that new spatial configurations – "powersheds" – help legitimize electricity transfers and provide a lens for understanding scalar politics of electricity in a dynamic, processual sense.

This article first provides background on the Western Development campaign, specifically as related to hydropower. It then describes the projects on the Lancang and Nu rivers, two international rivers in Yunnan expected to play a fundamental role in fulfilling the campaign's energy goals. The article then outlines the industrial reforms and institutional dynamics most relevant to understanding Yunnan's hydropower development. The conclusion argues that these "western" projects are a fundamental component of development in eastern China, and that understanding issues such as urban development, globalization and enterprise reform in eastern, "modern" and urban China requires a dynamic, multi-scalar approach that recognizes the role played by energy projects in western, "backward" and rural China.[11]

Politics of Scale in Western Development

The Western Development campaign, officially launched in 1999, has become the centrepiece of China's Tenth Five-Year Plan (2001–2005). Many components, however, have a much longer lineage. Send Western Electricity East (*xi dian dong song*), for instance, was first promulgated in the 1980s as a way of tapping hydropower potential on Yunnan's Yuan River.[12] The first project was implemented in June 1993 by the Yunnan Electric Power Group Company (*Yunnan diali jituan gongsi*), when it began seasonal transmission of electricity from Yunnan to Guangdong.[13]

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footnote continued

cooperation, basin-wide," 1996 (cited 15 November 2002), available from http://www.anu.edu.au/asianstudies/mekong/dams.html.

10. See Feng Yan and He Daming, "Guoji shuifa de fazhan qushi yu Zhongguo shuifa tixi de duibi fenxi yanjiu" ("A comparative study on the developing tendencies of international water law and Chinese water law system"), *Dili xuebao* (*Acta Geographica Sinica*), Vol. 54 (Supplement) (1999), pp. 165–172; Daming He, Changming Liu and Zhifeng Yang, "Zhongguo guoji heliu kechixu fazhan yanjiu" ("Study for the sustainability of international rivers in China"), *Dili xuebao*, Vol. 54 (Supplement) (1999), pp. 1–10; He Daming, Yang Ming and Feng Yan, "Xi'nan guoji heliu shuiziyuan de heli liyong yu guoji hezuo yanjiu" ("Study on reasonable utilization of water resources in international rivers and international region co-operation in south-west China"), *Dili xuebao*, Vol. 54 (Supplement) (1999), pp. 29–37. Other articles in the same issue address issues of development on China's transnational rivers.

11. Clearly these linkages are not limited to Yunnan and Guangdong. See Tim Oakes, "Building a southern dynamo: Guizhou and state power," *The China Quarterly*, No. 178 (2004), pp. 467–487.

12. Zhang Zerong (ed.), *Zhongguo xibu tese jingji* (*Western China's Distinctive Economy*) (Chengdu: Sichuan cishu chubanshe, 2000).

13. Peng Bo, " 'Yun dian song Yue' 12 nian leiji song dian 200 yi qianwashi" (" 'Send western electricity east' reaches 20B kWh over 12 years"), *Chuncheng wanbao*, 24 September 2004 (cited 20 January 2005).

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Other policies under the rubric of western development, some in existence since the early 1980s, signal an institutionalization of resource transfer patterns and underscore the importance of geographic scalar configurations in legitimizing such transfers.[14] China's west is constructed as resource-rich yet economically (and often culturally) backward, and electricity transfer schemes are trumpeted as key to relieving eastern electrical shortages and providing rural electrification and poverty alleviation near the dams. Similarly, Yunnan is framed as an electricity provider in the ADB's Greater Mekong Subregion, evidenced by the emphasis on regional grid construction at the Second GMS Summit in July 2005 in Kunming. In summer 2001, a delegation from Guangdong visited south-western provinces with the purpose of establishing electricity transfer agreements. The mission succeeded: Yunnan and Guizhou agreed to provide 4 million and 1.6 million kWh, respectively.[15] Several scholars have argued that Western Development adds legitimacy and urgency to resource transfer schemes that date to the height of central planning, and can be seen as a type of internal colonization in which the key beneficiaries are hydropower companies and eastern provinces set to receive cheaper electricity.[16] Others insist that adequate measures be taken to ensure the campaign does not inadvertently reinforce those regional differentials it ostensibly seeks to correct.[17]

The notion of a powershed provides a useful analytical framework for capturing the complexity of China's interprovincial power dynamics. I use the term in a way somewhat analogous to a watershed,[18] in that it represents a space over which a portable resource (water or electricity) is collected and concentrated for use, with use frequently occurring far from the site of collection (or in the case of electricity, generation). The term simultaneously encourages an analysis of political economic power over space, including through more Foucaultian means based on discourses of (under)development, livelihood improvement and energy security, as well as through policy and fiscal pressures. Understanding the exercise of power over space is a fundamentally geographic task. A particularly important point here is that the spatial framework put forward is not confined by traditional political demarcations, but rather a hybrid incorporating bio-geophysical and political realities.

14. These include *xi dian dong song* (send western electricity east), *Dian dian song Yue* (send Yunnan electricity to Guangdong), *Yun dian song Yue* (send Yunnan electricity to Guangdong), *Qian dian song Yue* (send Guizhou electricity to Guangdong), and *Yun dian wai song* (send Yunnan electricity outside).

15. Pang Caixia, "Guangdong changkai shichang ying 'xi dian', jiezhi qunian leiji jieshou erbaisishi yi qianwate, zhifu liushiwu yi yuan" ("Guangdong opens market to welcome power transfer from west"), *Jingji ribao* (*Economic Daily*), 24 August 2001, available from http://www.enviroinfo.org.cn/Energy/Energy_Supply_Demand/d082712_en.htm.

16. Oakes, "Building a southern dynamo"; David S. G. Goodman, "The campaign to 'open up the west': national, provincial-level and local perspectives," *The China Quarterly*, No. 158 (2004), pp. 317–334.

17. See chapters by Yu Li, Zhigang Lu and Shunfeng Song, and Namgyal in Ding Lu and William A. W. Neilson (eds.), *China's West Region Development: Domestic Strategies and Global Implications* (River Edge, NJ: World Scientific Publishing Co., Inc., 2004).

18. Generally understood as the land area drained by a river or stream.

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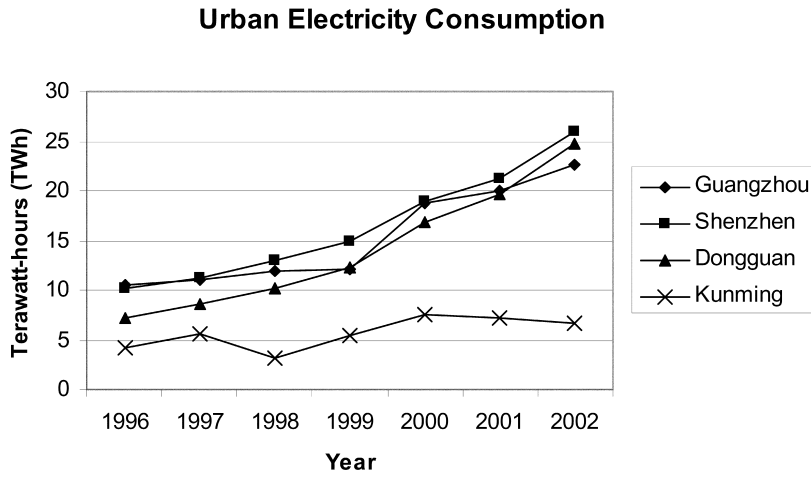


Figure 1: **Urban Electricity Consumption in Guangdong and Yunnan**

Source:
China City Statistics at China Data Online, available at http://chinadataonline.org.

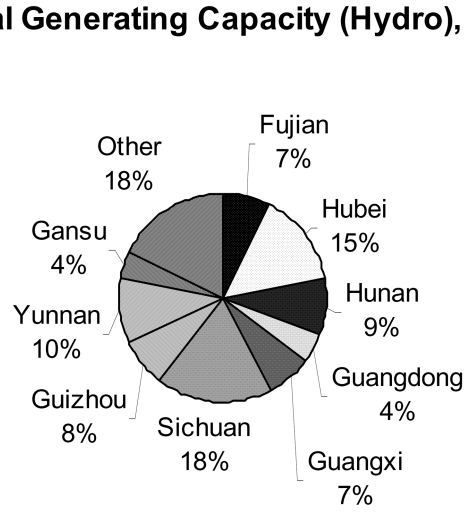


Figure 2: **Geographic Breakdown of Annual Generating Capacity**

Source:
China City Statistics in China Data Online, available at http://chinadataonline.org.

Figure 1 shows trends in urban electricity consumption over the past decade for Kunming and three industrial centres in Guangdong. Units are in terawatt-hours (1 TWh = 1 billion kilowatt-hours). Figure 2 shows Yunnan's annual hydroelectric generation capacity in a national context. Consumption is generally measured in terms of power-time (kilowatt-hour or terawatt-hour); installed capacity is measured in terms of power (kilowatt or megawatt).

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Controversial Cascades

Yunnan's hydropower potential is significant, and it is easy to understand interest in hastening its development. According to one publication, yearly theoretical hydropower potential stands at more than 900 billion kWh, or 15.3 per cent of China's total. Actual exploitable yearly generating potential is estimated to be significantly lower at almost 400 billion kWh, 20.5 per cent of China's total.[19] Since the break-up of the Ministry of Electric Power in 1998 and subsequent break-up of its successor, China State Power Corporation,[20] in 2002 into five companies, the offspring companies have staked claims on major rivers in Yunnan and throughout China in order to develop large hydropower stations.[21]

Hydropower development on the Lancang-Mekong. The Lancang begins its 4,800-kilometre journey to the South China Sea at 5,500 m on the Qinghai-Tibet Plateau (*Qing–Zang gaoyuan*), dropping 5,000 m by the

Table 1: **Hydropower Potential on Yunnan's Major Rivers**

	Hydropower potential		*Exploitable hydropower resources*	
Watershed	*Theoretical potential (MW)*	*Theoretical generation (TWh/year)*	*Exploitable potential (MW)*	*Exploitable generation (TWh/year)*
Jinsha (Yangtze)	40,282.5	352.87	35,435.3	195.491
Nanpan (Xi jiang/Zhu jiang)	4,246.5	37.2	1,870.2	9.283
HongYuan (Red)	9,800	85.85	3,575.1	20.124
Lancang (Mekong)	25,500.9	223.39	19,686.0	106.33
Nu (Salween)	19,740.1	172.92	10,306.3	61.505
Irawaddy	4,102	35.93	295.0	1.72
Provincial total	103,672	908.16	71,167.9	394.453

Note:
These numbers are estimates and vary significantly from source to source. As noted below, the company holding development rights on the Nu estimates theoretical potential to be some 36,000 MW, with exploitable potential at more than 20,000 MW.
Source:
Li Xuezhong (ed.), *Yunnan sheng zhi: shuili zhi* (*Yunnan Provincial Almanac: Water Resources Volume*) (Kunming: Yunnan renmin chubanshe, 1998), p. 156.

19. Li Xuezhong (ed.), *Yunnan sheng zhi: shuili zhi* (*Yunnan Provincial Almanac: Water Resources Volume*) (Kunming: Yunnan renmin chubanshe, 1998), p. 155.
20. *Zhongguo guojia dianli gongsi.*
21. The power-based standards for hydropower classification in China are: less than 50 MW (small); 50 to 250 MW (medium); and over 250 MW (large).

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time it leaves China.[22] As it flows through Yunnan the river loses 1,780 m in elevation,[23] yielding a theoretical hydroelectric potential of 25,000 MW.[24] As a comparison, the Three Gorges dam will have an installed capacity of 18,200 MW. Leaving Yunnan after 1,227 km,[25] the Mekong (as it is known outside Yunnan) forms the border between Myanmar and China, then flows through Laos, Thailand, Cambodia and Vietnam before emptying into the sea. The Lancang-Mekong ranks among the world's most important rivers according to various criteria: watershed population, sediment discharge, flow volume, channel length and fisheries richness, to name a few. The drainage area, some 810,000 km^2, is home to over 60 million people, many of whom depend on the river for their livelihoods. The Lancang's annual hydropower generating capacity within Yunnan is estimated to be more than 100 TWh, slightly more than that of Laos, and between two and 20 times more than that of the other four Mekong countries.[26] For comparison, 80 TWh per year would be enough to power Guangzhou, Shenzhen, Dongguan and Kunming combined.[27]

While the Chinese government has only relatively recently (since the early 1980s) solidified plans for the Lancang,[28] the first surveys were begun in the 1950s.[29] Plans for development on the lower Mekong date to the Mekong Consultative Committee for Co-ordinated Development, established by the United States and UN in 1957. The committee carried out numerous surveys in the late 1950s, but no plans were implemented because of the political upheaval that destabilized the region for the second half of the 20th century, leading to Cambodia's withdrawal from the committee for nearly 20 years. Cambodia reapplied for admission in 1991, and after a period of restructuring, the committee was re-established 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.[30]

22. Chen Lihui (ed.), *Guoji heliu liuyu zhengti kaifa he guanli* (*Integrated Development and Management of International River Watersheds*) (Kunming: Scientific Press of Yunnan, 2002).

23. Xiao Qian, "Lancang jiang: shudian zhi jiang" ("Lancang River: hydropower river"), *Zhongguo dianli bao*, 22 January 2002.

24. "Lancang River: energy base for China, Southeast Asia," Xinhua News Agency, 31 January 2002 (cited 10 November 2002), available from http://www.comtexnews.com (Article A82356616).

25. Statistical Bureau of Yunnan Province (ed.), *Yunnan tongji nianjian* (*Yunnan Statistical Yearbook*) (Beijing: China Statistical Press, 2004), p. 11.

26. *Ibid*.; Fan Yezheng, "Lancang jiang–Meigong he ci quyu nengyuan fenbu ji peizhi" ("The distribution and disposition of energy in Lancang–Mekong River subregion"), *Dili xuebao* (*Acta Geographica Sinica*), Vol. 54 (Supplement) (1999), pp. 110–18, at p. 111.

27. See Figure 1.

28. Chen Lihui, *Integrated Development and Management.*

29. "Lancang Jiang shuidian kaifa licheng" ("The course of Lancang River hydropower development") (Internet news source), Xinhua, 20 January 2002 (cited 2 February 2005), available from http://big5.xinhuanet.com/gate/big5/news.xinhuanet.com/fortune/2002–01/20/content_245846.htm.

30. For a historical overview of the MRC, see Greg Browder and Leonard Ortolano, "The evolution of an international water resources management regime in the Mekong river basin," *Natural Resources Journal*, Vol. 40, No. 3 (2000), pp. 499–531. For a more critical perspective written from a security angle, see chapter 6 of Alan Dupont, *East Asia Imperiled – Transnational Challenges to Security* (Cambridge: Cambridge University Press, 2001).

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Work on the first dam on the main channel of the Lancang-Mekong, the Manwan, began in 1985. The first turbine came online in 1992, the final one in 1995. The dam, on the border of Simao and Lincang, was financed through a partnership between the (then) Ministry of Water Resources and Electric Power and the Yunnan government, the first such arrangement.[31] The "Manwan model" is cited as one example of the creativity of officials and enterprise leaders in financing large-scale hydropower. Following Manwan, other projects proceeded apace, benefiting from a favourable policy environment and a river-wide development monopoly. Ground was broken on Dachaoshan in 1997. The first turbine came online in 2001, with all six functioning by October 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.[32] As with Manwan, the financing and institutional arrangements of Dachaoshan were credited as groundbreaking.

The third and fourth Lancang dams are under construction. Work on Xiaowan, in Dali Bai Nationality Autonomous Prefecture upstream of Dachaoshan and Manwan, began in January 2002.[33] Described as a symbol of Yunnan's realization of western development, it will be the highest arch dam in the world at 292 m, with a reservoir of 15.132 billion m^3.[34] Apart from generating electricity, Xiaowan's other purpose is to regulate flows downstream. According to the chief engineer of the development company, regulation reduces the difference between rainy- and dry-season flows and will "help with irrigation and navigation in the lower reaches" and improve flood diversion work downstream.[35] Regularized flows will also guarantee the ability of downstream dams to generate electricity in times of peak demand.[36] The fourth Lancang

31. Chen Hanhui, "Dachaoshan shuidian zhan tiqian yi nian fadian, xidian dongsong tian shenglijun" ("Dachaoshan hydropower station starts production a year early, Send Western Electricity East bears a strong soldier") (online), 21 November 2003 (cited 25 October 2004), available from http://www.eph.com.cn/power/eph/news/newsdetail.jsp?Type = 1&newsid=7569.

32. "Xi dian dong song gugan dianzhan Dachaoshan dianzhan quanbu jizu touchan fadian" ("Dachaoshao hydropower station, backbone station of Send Western Electricity East, comes online at full capacity") (Internet news source), Xinhua Net, 20 October 2003 (cited 25 October 2004), available from http://www.eph.com.cn/power/eph/news/newsdetail.jsp?Type=1&newsid=7203.

33. Dali Baizu zizhizhou difangzhi bianzuan weiyuanhui bangongshi (ed.), *Dali Zhou nianjian* (*Yearbook of Dali Prefecture*) (Kunming: Yunnan minzu chubanshe, 2003), p. 47.

34. "2003 nian yi jian, zai jian 100 mi yishang daba tongji biao" ("Large dams over 100 m high already built or under construction as of 2003") (Internet website), Chinese National Committee on Large Dams, 2003 (cited 1 December 2004), available from http://www.icold-cigb.org.cn/zt/dams/zg2003-b1.xls.

35. Liang Chen, "Xiaowan dam: a reservoir for progress," *China Daily*, 16 September 2002.

36. According to engineers at Yunnan Electric Power 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 Yang Xiangze, "Cong dianli shichang kan Xiaowan dianzhan jianshe de biyaoxing" ("An electricity market perspective on the necessity of constructing Xiaowan Hydropower Station"), *Yunnan shuili fadian*, Vol. 14, No. 4 (1998), pp. 11–14. See also "Lanchang (sic) river blocked for power project," Xinhua News Agency, 10 November 1997.

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project, Jinghong, lies four kilometres north of the capital of Xishuangbanna Dai Nationality Autonomous Prefecture. Jinghong was originally a joint project involving majority investment from the Energy Generating Authority of Thailand, whereby all power generated for the first two years would be transmitted to northern Thailand.[37] The project is now being built without Thai funding as a result of a speedier timeline than originally specified and decreased projections in Thai electrical demand. Now, as with the other three dams described above, the power generated will be transmitted to Guangdong by 500-kV high-voltage lines that will eventually connect to the Southern China Power Grid (*Zhongguo nanfang dianwang*).[38] According to one company representative, despite having pulled out of Jinghong, Thai authorities have committed to jointly developing Nuozhadu. The first agreement was made before the Jinghong arrangement was cancelled, and called for a three-way division of the proposed 5,500 MW capacity of Nuozhadu: 3,000 MW for Guangdong, 1,500 MW for Thailand and 1,000 MW for Yunnan.[39]

Table 2 provides information about the Lancang cascade, with dams listed from north to south. The plan described here calls for eight dams, with Xiaowan and Nuozhadu having significant reservoirs. A more ambitious plan called for 14 dams, including six on the river's upper stretch.[40] It seems unlikely the upstream six will be built, however, due to limited infrastructure and uncertainty about electricity demand. A meeting to discuss the draft environmental impact assessment (EIA) for the eight projects was held in Kunming in November 2004 involving company representatives, government officials, scientists and engineers.[41] Cancelling the southernmost two dams, Ganlanba and Mengsong, in order to minimize trans-border impacts was suggested in the mid-1990s and broached again in the meeting. The draft EIA was not approved, and while this will probably have little impact on Xiaowan, Jinghong and Nuozhadu, the fate of the other dams remains unclear. One factor is likely to be the role of the last two dams in flow re-regulation, to counteract daily flow changes caused by upstream dams. This would reduce fluctuations in downstream flows, possibly easing ecological and social impacts.

37. "PRC, Thailand agree to build Jinghong power station on Lancang River," Xinhua News Agency, 7 June 2000.

38. "China's State Council approved Jinghong dam project," *Dianchi chenbao*, 27 April 2004.

39. Taiguo kan hao Yunnan shuidian zhan jianshe shichang" ("Thailand looks favourably on hydropower construction market in Yunnan"), *Dianqi gongye hangye gongzuo shishi* (*China Electrical Equipment Industry*), No. 8 (2002), p. 42.

40. Lancang jiang shangyou shuidian kaifa qianqi gongzuo quanmian qidong" ("Comprehensive preliminary work begins on Upper Lancang River hydropower") (Company website), *Yunnan dianli xinxi wang*, 22 July 2004 (cited 24 January 2005), available from http://www.yndcs.com.cn/display.asp?fileid=1842.

41. Cheng Qiping, "San jiang shuineng ziyuan kaifa yantaohui zai Kun juxing" ("Conference on Three Rivers development held in Kunming"), *Yunnan ribao*, 2 December 2004 (cited 2 December 2004), available from http://www.yndaily.com.cn/html/20041202/news_83_97552.html.

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Table 2: **Details of Lancang Dams**

Dam	*Installed capacity (MW)*	*Start date*	*End date*	*Estimated cost (billion yuan)*	*Map abbre-viation*
Gongguoqiao[a]	750	unsure	unsure	3.8	GGQ
Xiaowan[b]	4,200	January 2002	2012	22.3	XW
Manwan[c]	1,500	May 1986	1995	3.4[d]	MW
Dachaoshan[e]	1,350	August 1997	October 2003	8.9	DCS
Nuozhadu[b]	5,850	End of 2005	2017	35.3	NZD
Jinghong[b]	1,750	2004	2009	17	JH
Ganlanba[a]	150	unsure	unsure	0.6	GLB
Mengsong[a]	600	unsure	unsure	2.2	MS

Source:
(a) Chen Lihui (ed.), *Guoji heliu liuyu zhengti kaifa he guanli* (*Integrated Development and Management of International River Watersheds*) (Kunming: Scientific Press of Yunnan, 2002), p. 89. (b) Hydrolancang Website, http://www.hnlcj.cn/defaultnew.asp; (c) *Manwan Hydropower Station* (Internet Technical Data Site). Chinese National Committee on Large Dams, 2000 (cited 2 February 2005), available from http://www.icold-cigb.org.cn/icold2000/st-a5-03.html; (d) Yang Rongduan, "Yunnan shuidian jidi zai guojia shishi 'xi dian dong song' zhong de zhuli zuoyong" ("Yunnan's hydropower base as the fundamental force in national implementation of 'send western electricity east'"), *Yunnan shuili fadian*, Vol. 17, No. 4 (2001), pp. 1-6; (e) "Yunnan: 'Dachaoshan zhidu' chuang zhuduo di yi" ("The Dachaoshan model creates many firsts"), *Chuncheng wanbao*, 20 November 2003.

Much like Three Gorges, the Lancang projects have been criticized for disorganized resettlement of residents near the dams.[42] For Manwan, promises of affordable electricity to local communities have not been kept, a result evidently of the high cost of infrastructure necessary to connect high-voltage output from power stations to lower-voltage local grids.[43] Additionally, resettled residents complain that promises of compensation have been broken, even though the Manwan dam has been functioning since 1993.[44]

Planned hydropower development on the Nu-Salween. Like the Lancang, the Nu begins in the Qinghai-Tibet plateau and flows southward. The Yunnan stretch of the river extends 618 kilometres[45] and drops

42. Li Peng is usually credited (or blamed) for being the primary motivation behind Three Gorges. By referring to themselves as Li Peng's migrants, resettled villagers seek 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. See Florence Padovani, "Les effets sociopolitiques des migrations forcées en Chine liées aux grands travaux hydrauliques: l'exemple du barrage des Trois-Gorges," *Les Etudes du CERI*, Vol. 103 (2004).
43. Interview, 23 December 2004.
44. Bizhong Cheng, "Xibu 'quan shui' yundong: nan yi yuyue de shengtai kaoyan" (" 'Encircling the waters' activities in western development: a difficult ecological test") (Internet news source), Xinhua, 21 July 2004 (cited 13 November 2004).
45. Statistical Bureau of Yunnan Province, *Yunnan Statistical Yearbook*, p. 11.

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Table 3: **Details of Nu Dams**

Dam	*Installed (MW)*	*Estimated cost (billion yuan)*	*Map abbreviation*
Songta	4,200	19.7	ST
Bingzhongluo	1,600	5.2	BZL
Maji	4,200	18.5	MJ
Lumadeng	2,000	9.1	LMD
Fugong	400	2.3	FG
Bijiang	1,500	5.9	BJ
Yabiluo	1,800	6.0	YBL
Lushui	2,400	8.8	LS
Liuku	180	0.9	LK
Shitouzai	440	2.3	STZ
Saige	1,000	3.6	SG
Yansangshu	1,000	4.3	YSS
Guangpo	600	2.9	GP

Note:
Cost computed from cost per kilowatt (kW) multiplied by installed capacity. Since the projects are in early planning stages and have not been approved, start and end dates are currently unavailable.
Source:
More controversy surrounds Nu River hydropower project (Internet news source). Interfax-China, 6 December 2004 (cited 7 December 2004), available from http://www.interfax.com/com?item=Chin&pg=0&id=5775664&req=.

1,578 m in elevation.[46] Total estimated theoretical hydropower potential of the river in China is 36,400 MW, of which Yunnan Huadian Nujiang Hydropower Development Company (*Yunnan huadian nujiang shuidian kaifa youxian gongsi*) expects 21,000 MW to be exploitable in Yunnan.[47] After leaving Yunnan, the river flows through Myanmar as the Salween and empties into the Gulf of Martaban. The watershed, part of which lies in a UNESCO World Heritage Site, is home to some of the poorest counties in China. In Nu Jiang Lisu Nationality Autonomous Prefecture alone nearly half the 492,000 residents live below the national poverty line.[48]

46. Zhang Kejia, "Nu Jiang shang yaobuyao jian 13 zuo daba zhi sheng shengji, da kaifa yu shengtai baohu ruhe bingxing" ("Should a series of 13 large dams on the Nu Jiang be built? How can western development and ecological protection coexist?"), *Zhongguo qingnian bao*, 5 January 2004, available from http://www.bupt.edu.cn/news/dangjian/content/d04/jd/002.htm.
47. Zhou Pingyang, "Inauguration of Liuku Hydropower Station."
48. "Sheng Zhengxie weiyuan: Nujiang shuidian kaifa ying chuli hao huanjing he qunzhong liyi de guanxi" ("Yunnan Political Consultative Conference: hydroelectric development on Nu Jiang should benefit the environment and the masses") (Internet news source), 26 October 2004 (cited 10 December 2004), available from http://www.yn.xinhuanet.com/gov/2004–11/08/content_3180040.htm.

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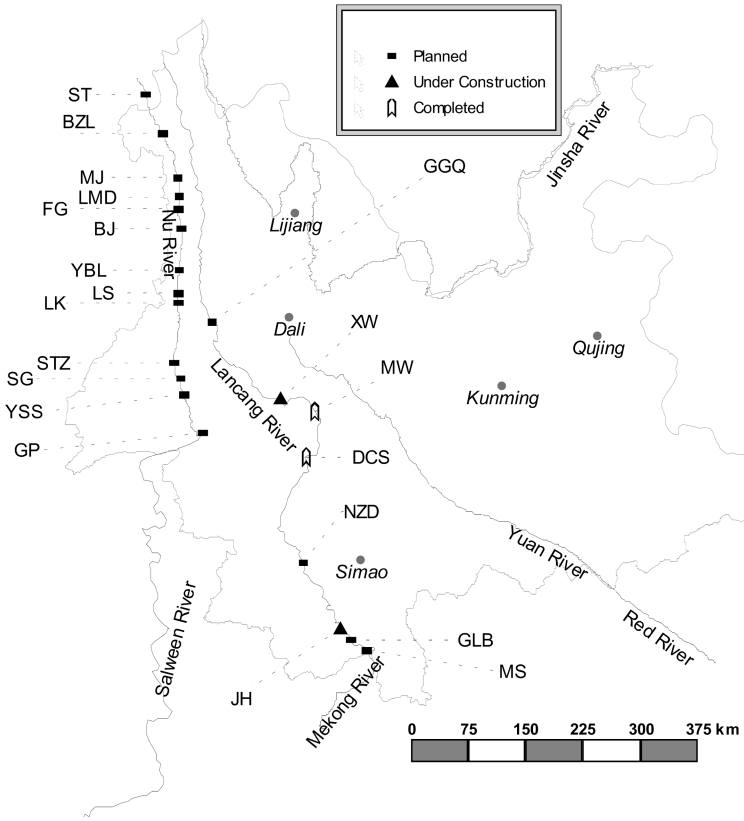


Figure 3: **Nu and Lancang Dams**

Nu River hydropower plans are a relatively recent phenomenon, primarily because of poor infrastructure in the area. Hydropower companies, local officials and other supporters tout hydropower as a tool for poverty alleviation, criticizing opponents as urbanites opposing dams on aesthetic grounds while ignoring villagers' poverty.[49] During a visit by Provincial People's Consultative Committee representatives in October 2004, prefecture officials claimed the projects were necessary to help alleviate poverty in an area with few other options.[50] Indeed, "to build or not to build" has become the key question. One newspaper, citing the variety of voices in the debate (scientists, engineers, citizen groups and local government), suggested that the projects have become a symbol of the challenges in balancing development and ecological protection.[51] Though the projects are suspended, a field visit in February 2005 indicated that geological substrata surveying is under way.

49. "Subsistence top priority," *China Business Weekly*, 15 December 2004, available from http://www.chinadaily.com.cn/english/doc/2004–12/16/content_400622.htm.
50. "Yunnan Political Consultative Conference" (see n. 48).
51. Zhang Kejia, "Should a series of 13 large dams on the Nu Jiang be built?"

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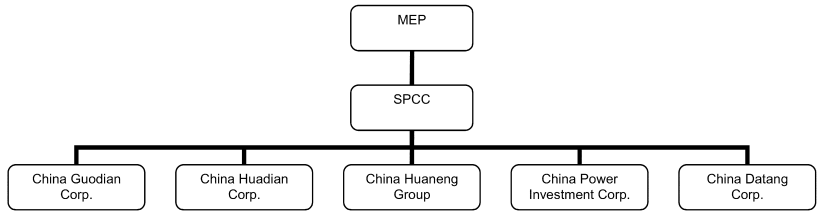


Figure 4: **Partial Schematic of Electricity Generation Restructuring**

How the Waters Were Divided

This section details electrical industry reforms from the late 1990s to the present, focusing on aspects most relevant to understanding Yunnan hydropower. The goal is both to complicate and to clarify the institutional linkages and decision-making dynamics among local, provincial and national government entities and hydropower companies. This brief exploration of the institutional landscape of Yunnan hydropower, which should be understood in the larger context outlined by other scholars,[52] illustrates the challenges industry restructuring presents to governmental norms in China and to those seeking to understand the changing relationship between industry and government.

As a first step in corporatizing[53] the electric power industry, the State Council authorized the Ministry of Electric Power to reorganize into the State Power Corporation of China (*Zhongguo guojia dianli gongsi*, SPCC) in December 1996.[54] All investment came from the State Council,[55] and the ministry was disbanded in March 1998. Two goals of corporatization were to separate generation from distribution and to modernize management of the industry. This, in theory, would realign company priorities in terms of profit and market rather than political incentives. Yet as one author noted, "changing direct government ownership into ownership by public corporations is as much a matter of government reform as enterprise restructuring."[56] Another pointed out the importance of understanding the extent of various parties' participation in decision-making, including national governments, development banks, other international investors and donors, and non-government

52. Yi-Chong Xu, *Powering China: Reforming the Electric Power Industry in China* (Aldershot: Ashgate, 2002); Yeh and Lewis, "State power and the logic of reform in China's electricity sector."

53. Yeh and Lewis speak of the "privatization" of China's power industry. Given that the central government, through the States Assets Commission's ownership of non-tradeable shares, retains majority stake in these companies, however, privatization may be a bit of a misnomer.

54. Yi-Chong Xu, *Powering China*, p. 110. For details, see chapter 4 of the same volume.

55. State Power Information Network website, http://www.sp-china.com/aboutsp/mespre.htm.

56. Yi-Chong Xu, *Powering China*, p. 82.

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organizations.[57] Absent from this list, however, are sub-national governments and hydropower companies.

A second wave of reforms came in late 2002 when the SPCC was broken into five power generation corporations, each a stock company in which the central government (through the State-owned Assets Supervision and Administration Commission) retained majority stake: China Guodian Corporation (*Zhongguo guodian jituan gongsi*), China Huadian Corporation (*Zhongguo huadian jituan gongsi*), China Huaneng Group (*Zhongguo huaneng jituan gongsi*), China Power Investment Corporation (*Zhongguo dianli touzi jituan gongsi*) and China Datang Corporation (*Zhongguo datang jituan gongsi*).[58] Each was given development rights on major watersheds by the State Council in a process that critics who perceive dam development as disorganized, near-sighted and under-regulated describe as "riding a horse to encircle the waters" (*paoma quanshui*).[59] A sixth company, China Three Gorges Project Corporation (*Zhongguo Chang jiang sanxia gongcheng kaifa gongsi*),[60] exists parallel to these five but directly under the State Council. Huadian and Huaneng are particularly relevant to this article. Huadian holds development rights on the Nu through its subsidiary Yunnan Huadian Nujiang Hydropower Development Company,[61] while Huaneng holds rights on the Lancang through its subsidiary, Yunnan Huaneng Lancang River Hydropower Company (*Yunnan huaneng Lancang jiang shuidian youxian gongsi*, also known as Hydrolancang).[62] Both have subsidiaries listed on the Hong Kong, Shanghai and New York stock exchanges. Yunnan hydropower development has involved several innovations in financing and institutional structuring, and merits closer examination here.

The Manwan hydropower station, the first dam on the main channel of the Lancang-Mekong, was initially a project of the Yunnan government and (then) Ministry of Water Resources and Electric Power. The project was launched in 1986 and completed in 1995.[63] The ministry–province

57. Chen Lihui, *Integrated Development and Management*, p. 109.

58. See Cheng Bizhong, " 'Encircling the waters' activities in western development" (cited).

59. The reference apparently recalls a custom in the Qing Dynasty whereby local leaders were given control over all lands they could encircle on horseback in one day. For a favourable assessment of *pao ma quan shui* activities on over 70 hydropower projects in Yunnan's six watersheds from a pro-dam perspective, see Zhang Peiyuan, "Chengshi fenjin zuoda zuoqiang Yunnan dianli zhizhu" ("Seize the opportunity to advance boldly, enlarging and strengthening Yunnan's electrical power pillar industry"), *Yunnan ribao*, 24 September 2003 (cited 23 January 2005).

60. This company holds development rights in Yunnan on the Jinsha (Yangtze).

61. See "Huadian jituan kaifa Nu jiang" ("Huadian Corporation develops Nu jiang") (Internet news source), *Zhongguo xibu wang*, 8 January 2004 (cited 31 January 2005), available from http://www.china-west.cn/gb/westnews/xbkf/jt/ljkf/userobject1ai181963.html.

62. *Yunnan Huaneng Lancang jiang shuidian youxian gongsi*.

63. Xinan diqu zuida de shuidian zhan – Yunnan Manwan shuidian zhan dong gong xingjian" ("South-west region's largest hydroelectric station – construction begins on Yunnan Manwan Hydropower Station"), *Renmin ribao* (*People's Daily*), 2 May 1986.

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partnership was reorganized into a stock company, the Yunnan Manwan Electric Power Generation Company (*Yunnan Manwan fadian youxian zeren gongsi*), in February 1998, with Yunnan Electric Power Group Company (*Yunnan dianli jituan gongsi*) holding 56 per cent of the stock and Yunnan Province Development Investment Company (*Yunnan sheng fazhan touzi youxian gongsi*) the remaining 44 per cent.[64] The reorganization involved a low-price transfer of the provincial government's shares to the company. Following the second wave of reorganization, and in keeping with the basin-wide monopoly granted Huaneng by the State Council, Yunnan Manwan Electric Power Generation Company became part of Huaneng's subsidiary, Hydrolancang.

Dachaoshan was built by the (state-invested) Yunnan Dachaoshan Hydropower Company (*Yunnan Dachaoshan shuidian youxian zeren gongsi*), heralded as the first large-scale hydropower company in China organized according to modern corporate standards.[65] Established as a stock company in November 1994, the company was the result of a four-way inter-industry partnership, also a first, involving the State Development Investment Corporation (*guojia kaifa touzi gongsi*), Yunnan Hongta Investment Company (*Yunnan hongta shiye youxian zeren gongsi*), Yunnan Province Development Investment Company and the Yunnan Electric Power Group Company, with shares in the ratio of 5:3:1:1.[66] According to the company's website, the initial registered capital of Yunnan Dachaoshan Hydropower Company was 1.77 billion *yuan*. The State Development Bank granted the company a loan of some 4 billion *yuan* for the project in 1997. All the company's leaders are Party members and most, like the majority of workers, were involved with Manwan. Company governance consists of boards of stockholders, directors, supervisors and managers, 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.

Hydrolancang, the legal entity responsible for Lancang hydropower development, is a product of a merger and reorganization of the former Yunnan Lancang River Hydropower Development Company (*Yunnan Lancang jiang shuidian kaifa youxian gongsi*) and Yunnan Manwan Electric Power Generation Company (*Yunnan Manwan fadian youxian zeren gongsi*). The former was established in February 2002 through investments from State Power Corporation (27 per cent), Yunnan Electric

64. "Xiaowan shuidian zhan" ("Xiaowan hydropower station") (Internet news source), *Guojia dianli xinxi wang* (*State Power Information Network*) (cited 23 January 2005), available from http://www.sp.com.cn/chinawp/zjgc/xiaowan.htm.

65. "Loans granted for Yunnan hydropower station construction," Xinhua News Agency, 22 October 1997, available from World News Connection.

66. "Dachaoshan shuidian zhan dashiji" ("Dachaoshan dam main events timeline") (Company website), Yunnan Dachaoshan Hydropower Co., Ltd, 23 October 2003 (cited 23 January 2005), available from http://www.yndcs.com.cn/display.asp?fileid=1263.

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Power Group Company (29 per cent),[67] Yunnan Province Development Investment Company (24 per cent) and Yunnan Hongta Group (20 per cent). The newly reorganized company is jointly invested by Huaneng Group (56 per cent), Yunnan Province Development Investment Company (31.4 per cent) and Yunnan Hongta Investment Company (12.6 per cent).[68] According to its website, Hydrolancang's model for hydropower development is based on four themes: watershed (*liuyu*), cascade or stair-step hydropower model (*tiji*), rolling (*gundong*) and comprehensiveness (*zonghe*). Specifically, it should involve watershed-wide planning and a stair-step dam cascade, and should take place in a "rolling" sequential fashion such that income and electricity generated from one station support development of the next.[69] Hydrolancang's corporate structure and financing model, applied first to Xiaowan, is touted as a sign of China's commitment to modern enterprise structure and practices, a departure from other financing arrangements that were innovations in their own time: Lubuge, the first large hydropower dam in China financed with World Bank loans; Manwan; and Dachaoshan.[70] Like the other five generation companies, however, Huaneng remains a state-owned enterprise, and thus it is unlikely that political considerations are absent from planning, financing and operating parameters.[71]

Decision-making on large-scale hydropower projects on international rivers involves a complicated process requiring final approval from the State Council.[72] The schematic below is simplified, and as one former provincial official noted, policies and regulations have changed so quickly in recent years that officials are often unsure of their authority vis-à-vis hydropower companies.[73] Once the initial project concept is introduced, provincial-level units are allowed input that may or may not be taken into consideration at this point. If the National Development and Reform Commission (NDRC) gives preliminary approval, the hydropower company proceeds with developing a detailed proposal, which is submitted to the *provincial* Development and Reform Commission. The latter then appoints various committees to evaluate the feasibility (econ-

67. On 1 November 2004, Yunnan Electric Power Group Co. Ltd changed its name to Yunnan Electric Power Grid Co. See Wu Chunyan, *Yunnan dianli jituan gongsi zhengshi bianming wei Yunnan dianwang gongsi* (*Yunnan Electrical Power Group officially changes its name to Yunnan Electric Power Grid*) (Internet news source), 5 November 2004 (cited 13 January 2005), available from http://www.xddl.org/ReadNews.asp?NewsID=189.

68. See "Gongsi jianjie" ("Company introduction") (Company website), Yunnan Huaneng Lancang jiang shuidian youxian gongsi (Hydrolancang) (cited 18 January 2005), available from http://www.hnlcj.cn/newweb/gsjs01.asp.

69. See also Shan Sichao, "Lancang Jiang liuyu shuidian kaifa moshi xuanze chutan" ("Discussions on the selection of hydropower development modes for the Lancang River Basin"), *Shuili fadian* (*Water Power*), Vol. 29, No. 9 (2004), pp. 5–6, 26. The author of this piece is a Hydrolancang employee.

70. "South-west region's largest hydroelectric station."

71. Yeh and Lewis underscore the tight linkages between electric and political power exemplified by leaders such as Li Peng and Hu Jintao. See Yeh and Lewis, "State power and the logic of reform in China's electricity sector."

72. This section is based on interviews with company representatives and academics familiar with the approval process.

73. Interview, 26 January 2005.

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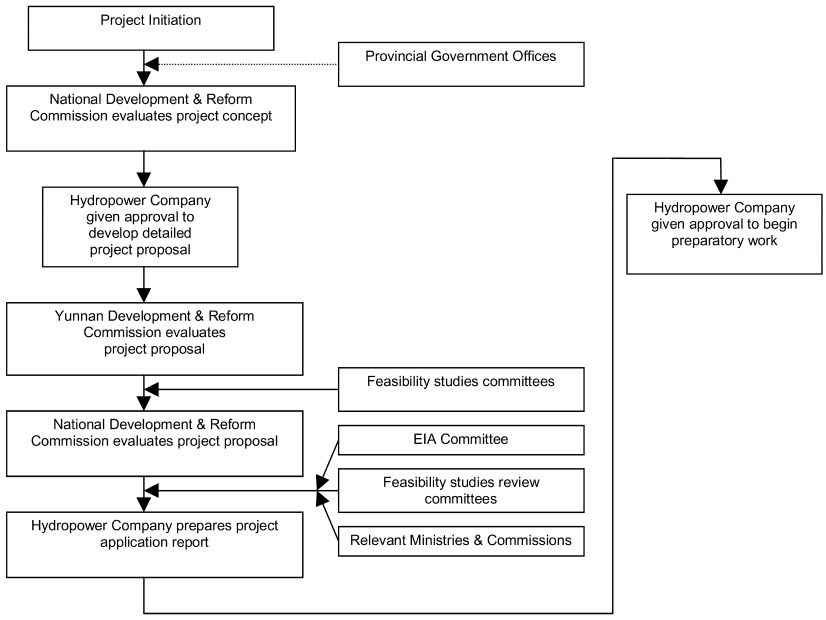


Figure 5: **Schematic of Decision-making**

omic, technical and social) of the project. If the provincial commission and committees deem the proposal feasible, the commission grants the company the right to escalate the proposal to the NDRC. Following approval at this stage, the company is allowed to proceed with a project application, submitted again to the NDRC, and upon approval may proceed with preliminary work. If the projects are particularly large[74] or situated on an international river, further approval from the State Council or the National People's Congress is required.

Technical and "internal" issues such as feasibility and profitability are generally evaluated at the provincial level, while "external" issues such as environmental and social impacts are considered at the central level. According to one company representative, the responsibilities of central government fall under six categories: protecting national economic security; guaranteeing rational resource development; protecting the ecological environment; conforming to national economic development principles; guaranteeing public benefit; and preventing monopolies and unhealthy competition. In cases where the impacts of a project are deemed particularly significant, the NDRC can require a hearing for further consultation. A recent example of this type of intensified review is a list published on 18 January 2005 by the State Environmental Protection Agency (SEPA) of 30 projects in 13 provinces and regions which were ordered to be

74. The criteria for "large" are unclear.

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suspended for beginning work before EIA approval.[75] This is the first time China's EIA law has been used to suspend projects already under way and the first time such a list has been publicized. The order met with resistance,[76] and while the projects were eventually restarted, this nevertheless represents an increase in the "teeth" of the SEPA.

Conclusion: Processes, Powersheds and Multi-scalar Analysis

In a 2004 article, David Goodman noted the importance of sub-provincial analysis for understanding the dynamics and impacts of the Open Up the West campaign.[77] He suggested that the apparently simple goals of the campaign – to ensure greater equality, increase state capacity and assist in nation-building – are actually complex and imprecise due to the complexity of decision-making in China. Both scholars and policy makers must question assertions that western China development based on resource exports to eastern China will reduce regional disparities. This article has underscored the importance of an *inter-provincial* perspective for understanding the impact and implementation of western development, specifically in terms of decision-making. In particular, the article has demonstrated the importance of two factors.

First, it is essential to understand the role played by energy enterprises in China in project implementation. These enterprises retain various degrees of political motivations, and their role as influential third parties in decision-making processes often assumed to be bilateral (that is, central and local governments) must not be overlooked. As shown in the above analysis of Lancang hydropower, institutional dynamics and enterprise–government relations are vastly complex, with many entities involved in planning, approval, finance, construction, operation and management. Additionally, given Yunnan's proximity to mainland Southeast Asia's electricity export market, Yunnan hydropower may have different outcomes from those noted by Tim Oakes in Guizhou. At the very least, the role of Huaneng, Huadian and the Yunnan Development and Reform Commission in promoting mega-projects merits further exploration, particularly with regard to Oakes' assertion that restructuring "doesn't really constitute a significant change in the state's relationship to the power sector."[78] Picking apart the monolithic "party-state apparatus"

75. Liu Yi, "30 ge weifa kaigong xiangmu mingdan gongbu 'huanping fengbao' guajing huanbao xian" ("List published of 30 projects illegally begun, 'environmental impact assessment storm' tightens the strings on environmental protection") (Internet news source), *Renmin wang*, 18 January 2005 (cited 19 January 2005), available from http://politics.people.com.cn/GB/1027/3127491.html.

76. China firm flouts edict to suspend dam work," Agence France-Presse, 2 February 2005 (cited 2 February 2005), available from http://www.iht.com/articles/2005/02/01/news/gorges.html; "Sanxia san da dianzhan xianru huanbao zhengyi tinggong dengdai huanjing shenpi" ("Three large hydropower stations of Three Gorges Co. caught up in environmental debate, suspended and waiting for EIA approval") (Internet news source), *Xinjing bao*, 3 February 2005 (cited 3 February 2005), available from http://news.sina.com.cn/c/2005–02–03/02485026221s.shtml.

77. Goodman, "The campaign to 'open up the west'."

78. Oakes, "Building a southern dynamo," at p. 481.

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is not simply an exercise in academic deconstruction; it stands to elucidate important dynamics such as competition between Huaneng and Huadian to get mega-projects approved in an environment of increasing scrutiny by state and quasi-state actors and concerns about looming electrical capacity surpluses. In addition, understanding the dynamics of Yunnan hydropower, whether from the perspective of its impact on the stated goals of western development or from an international perspective stressing co-operative development on international rivers, requires attention not only to interactions between actors in Yunnan and Beijing but also to the triangular relationship among Beijing, Guangdong and Yunnan. More research is needed concerning the role Guangdong-based actors play in negotiating energy transfer arrangements that are vitally important to relieving energy shortages threatening Guangdong's economic dynamism.

Secondly, this article has demonstrated the importance of considering geographic scale in a dynamic, relational and constructed sense. Many geographers have pushed for an understanding of scale that transcends the obvious meanings of map scale and analytical frame. Indeed, the notion of a politics of scale rests on the idea that different geographic configurations and their boundaries embody and enable certain power relations while restricting others. Thus a logic that is more than Cartesian motivates locating Yunnan in China's "west," thereby enabling and justifying certain government policies. Another motivates the naming of Yunnan as part of the ADB's Greater Mekong Subregion, legitimizing discourses of regional power grid development in which Yunnan will play a key role. Focusing on processes rather than a priori analytic containers makes it easier to capture this dynamic. Just as studying erosion in the Mekong delta requires attention to hydrologic and socio-economic processes throughout the entire Lancang-Mekong watershed, so does understanding economic development in Guangdong necessitate consideration of one of the primary driving forces behind that development, namely electricity provision. Processes related to Guangdong's quest to procure reliable energy, including inter-governmental negotiation, inter-firm agreements, financing and operation arrangements, all suggest an analytical framework, which I call a powershed, that transcends and intersects numerous more apparent analytical "boxes." Mapping such powersheds, both in terms of institutional interrelations and linkages through which capital and influence flow, as well as the physical linkages through which electricity flows, will improve current understandings of China's reforms, and of policies such as the Western Development campaign.

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