

Yunnan Hydropower Expansion

***Update on
China's energy industry reforms
& the
Nu, Lancang & Jinsha hydropower dams***

WORKING PAPER

***Chiang Mai University's Unit for Social & Environmental Research
&
Green Watershed, Kunming, PR of China***

March 2004



Dore, J and Yu Xiaogang (2004) Yunnan Hydropower Expansion: Update on China's energy industry reforms and the Nu, Lancang and Jinsha hydropower dams. Working Paper from Chiang Mai University's Unit for Social and Environmental Research, and Green Watershed.

Authors

John Dore

Chiang Mai University – Unit for Social and Environmental Research (CMU-USER)

PO Box 144, Faculty of Social Sciences, Chiang Mai University, 50202, THAILAND

Telephone: 66 53 85-4347

Facsimile: 66 53 85-4347

Mobile: 66 148-64436

Email: johndore@loxinfo.co.th, john@sea-user.org

Web: www.sea-user.org

Yu Xiaogang

Green Watershed

7th floor, 133 Qixiang Road, Kunming 650034, Yunnan, CHINA

Telephone: 86 871 418-2395

Facsimile: 86 871 418-2396

Mobile: 86 13888-505121

Email: yxg@greenwatershed.org

Acknowledgement

Financial support for research provided by Swedish Environment Secretariat in Asia (SENSA)

C/o Swedish International Development Agency (Sida), Embassy of Sweden

17th floor One Pacific Place, 140 Sukhumvit Road, Bangkok, THAILAND

Telephone: 66 2 263-7200

Facsimile: 66 2 263-7260

Disclaimer

The opinions expressed in this report are those of the authors who alone are responsible for errors which may remain. The report does not necessarily represent the views of SENSA or Sida. Our purpose is to provide a brief update on happenings in Yunnan, within the wider context of China's energy policy, energy industry reforms and changing political economy.

Summary

There are two key messages this report seeks to deliver. First, there is a need for China to **revisit the energy policy**, including the hydropower component, in the light of the new direction signalled by the New and Scientific Development Concept announced in 2003 by China's new political leadership, and reinforced by President Hu Jintao at the 10th National People's Congress (NPC) meeting in March 2004. Second, there is a need to **overhaul energy development governance processes** including: option formulation, debate, evaluation, negotiation and monitoring. The approval and impact assessment processes are two key areas requiring strengthening.

Energy sector reforms in China, in combination with other factors, have triggered an explosion in power industry development proposals across the country. Nation-wide there is an intention to almost double hydropower capacity by 2010. Nowhere are dam builders' aspirations greater than in the south-west, especially Yunnan Province.

Yunnan has over 600 rivers forming 6 major river basin systems: Dulong (Irrawaddy), Nu (Salween), Lancang (Mekong), Jinsha (Yangtze), Zhu (Pearl), Yuan and Lixian (both flow into the Red in Vietnam). The province has 24% of China's hydropower potential. The Nu, Lancang and Jinsha are each in China's top 6 rivers for hydropower potential. The province already provides about 10% of China's hydropower, but a large increase in generation is planned to feed into national and regional grids.

The recent energy reforms have led to a nation-wide surge in competition between corporate generators to secure actual and potential power-producing 'assets'. Nowhere is there more action than in Yunnan. The purpose of this research paper is to provide a brief update on what is happening in Yunnan – looking at the Nu, Lancang and Jinsha rivers – and then situate this within the wider context of China's changing political economy.

Key drivers for Yunnan hydropower expansion include the ongoing push for and direction of economic growth, China's associated energy security concerns, the Western Region Development Strategy and a political environment in which energy entrepreneurs have strong incentives to push ahead with expansion plans.

Many important issues have arisen. There is a blurring of roles in public-private partnerships (PPPs) which makes it difficult to determine or separate public and private interest. There is increasing dissatisfaction with the non-transparency of decision making, approvals and compliance processes which makes accountability difficult. There are concerns about the interests and types of knowledge which are being privileged and the process limitations which hinder presentation of alternative viewpoints. Moreover, many social and ecological costs are externalised from 'return on investment' equations, and the competitive need for companies – in the new business operating environment – to retain market share and steadily expand generating capacity.

The future of the Nu River is uncertain. The Huadian corporation, in partnership with the Nu prefecture government, have submitted, and have received initial approval for a cascade of up to 13 dams on the middle and lower Chinese reaches which, if built, would profoundly alter this presently undammed, near to pristine river. There are three other dams being promoted downstream of China. The Ta Sang dam site is within Myanmar and the other two are planned for further downstream where the Nu/Salween forms the border between Myanmar and Thailand. As the plans have entered the public domain, broader civil society – beyond the usual, officials, business operatives and 'experts' – have become very involved.

Despite increased debate and the presentation of alternative values and development perspectives, the spheres of Chinese government – with the exception of some parties convened by State Environment Protection Administration (SEPA) – and the developers still seem firmly committed to the cascade, with only peripheral changes to the July 2003 plan being countenanced. However, resistance to the proposal and the decision making rationale and process is surprisingly strong and has rapidly gained momentum. The development of the Nu is now a national issue.

The Lancang cascade is no longer speculation, but a fact. Regardless of whether all eight (8) proposed dams are built, Manwan and Dachoashan are already operating, Xiaowan's is well-advanced and construction at Jinghong commenced in 2003. Huaneng is the main corporate player having been granted the majority of the operation and further development rights on the Lancang, and the upper and middle reaches of the Jinsha. Manwan and Dachoashan are already operated by Huaneng. When completed, Xiaowan will also be under Huaneng's management.

Whilst the hydropower potential of the Lancang cascade is unquestioned, there is huge concern about the impacts of the dams on riverine ecosystems and local livelihoods. There are major worries about altering the natural regime of the river in a way which will increase flow fluctuations, increase average downstream dry-season flows and decrease the normal flow downstream of nutritious sediments crucial for fisheries and agriculture production.

New dams are also proposed for the Jinsha. There are eight (8) dams proposed for the middle reach. Four (4) more dams are planned for the lower Jinsha by the China Yangtze Three Gorges Project Development Corporation (CYTGPDC). These huge stations on the lower Jinsha are planned to have an installed capacity of 38,500 MW, which would be twice as much as the existing Three Gorges project.

Hydropower development is politically sensitive in the Mekong Region. Numerous projects have become the subject of national, and in some cases regional and international controversies. Examples include: Vietnam's Se San, Sre Pok and Son La dams; Lao PDR's Theun Hinboun and Nam Theun 2 dams; Thailand's Pak Mun dam; the Yunnan dams, and those further downstream on the Nu/Salween into Myanmar. Advocates of hydropower tout its positive features: renewable energy, pollution-free, relatively low generating cost, flood reducing, navigation improving and increased irrigation opportunities. However, performance is variable, with many dams falling short of economic expectations and most having large impacts, more negative than positive, on rivers, watersheds and aquatic ecosystems. In the Mekong Region, as elsewhere, it seems that many costs of hydropower development are ignored or externalised from analysis and debate.

There is a groundswell of opinion challenging the wisdom of the present massive push to increase hydropower production. Current controversy over proposed Nu river development provides opportunity to enhance the quality of decision making. Further Nu analyses and assessments would, if undertaken and widely shared, contribute sorely needed new elements to China and Mekong Region governance forums. Similar Lancang and Jinsha analysis would also be beneficial. Individual river/project analysis and assessment needs to be framed within the broader public policy, business and downstream context that this report attempts to introduce.

In addition to the two key messages relating to a review of China energy policy and energy development governance, there is a specific need to improve Yunnan hydropower governance. A review is required of the decision making processes within the context of the rapidly changing political economy of the province. In addition, more analysis and assessment is required of economic assumptions and justifications, social and cultural impacts, ecological and natural heritage values and risks, cumulative and multiplier effects and transboundary impacts.

John Dore and Yu Xiaogang, March 2004

Contents

INTRODUCTION	1
YUNNAN.....	2
HYDROPOWER AND WORLD NATURAL HERITAGE AND LOCAL LIVELIHOODS.....	3
DRIVING FORCES FOR HYDROPOWER EXPANSION.....	6
GLOBALISATION.....	6
INTERNATIONAL ECONOMIC INTEGRATION & INVESTORS LOOKING TO CHINA	6
MORE THAN A SHIFT TO A ‘MARKET ECONOMY’	7
ENERGY DEMAND, TRADE & SECURITY	7
WESTERN REGION SEEN AS KEY TO INCREASED ENERGY PRODUCTION	9
CHINA’S ENERGY INDUSTRY REFORMS	11
BUSINESS COMPETITION	11
HYDROPOWER STATUS OF THE ‘THREE RIVERS’	16
NU.....	16
LANCANG.....	19
JINSHA.....	23
ISSUES	24
RECOMMENDATIONS	29
FIRST ORDER – CHINA ENERGY POLICY AND ENERGY DEVELOPMENT GOVERNANCE	29
SECOND ORDER – YUNNAN HYDROPOWER GOVERNANCE	29
<i>Decision making process assessment</i>	<i>29</i>
<i>Political economy assessment</i>	<i>29</i>
<i>Economic assessment</i>	<i>29</i>
<i>Social/cultural impact assessment.....</i>	<i>29</i>
<i>Ecological/natural heritage risk assessment.....</i>	<i>29</i>
<i>Transboundary, cumulative and multiplier effects assessment.....</i>	<i>29</i>
REFERENCES	30

FIGURE 1	MAP OF MEKONG REGION.....	1
FIGURE 2	MAP OF CHINA	2
FIGURE 3	MAP OF YUNNAN'S MAJOR RIVERS.....	3
FIGURE 4	NU RIVER.....	16
FIGURE 5	MANWAN DAM.....	19
TABLE 1	HYDROPOWER POTENTIAL OF MAJOR RIVERS IN CHINA.....	4
TABLE 2	HYDROPOWER PRODUCTION VERSUS POTENTIAL: CHINA, WESTERN REGION, YUNNAN.....	4
TABLE 3	MEKONG REGION HYDROPOWER POTENTIAL.....	5
TABLE 4	CHINA'S PROJECTED SUPPLY OF PRIMARY ENERGY 2000-2020	5
TABLE 5	PROJECTED SUPPLY OF PRIMARY ENERGY 2000-2020	10
TABLE 6	ENERGY PRODUCTION 1999.....	10
TABLE 7	HYDROPOWER DAM PLANS – NU, LANCANG & JINSHA	14
BOX 1	ENERGY DEMAND MANAGEMENT OPTIONS FOR CHINA.....	8
BOX 2	CHINA ENERGY INDUSTRY REFORMS: RECENT MILESTONES	13
BOX 3	HUANENG.....	20
BOX 4	FISH AND CAMBODIA'S TONLE SAP.....	23
BOX 5	FINANCING THE THREE GORGES PROJECT	24
BOX 6	CENTRAL ISSUES IN THE DAMS DEBATE: PAST AND PRESENT	26
BOX 7	A NEW FRAMEWORK FOR LARGE DAMS DECISION MAKING.....	28

Introduction

Energy sector reforms in China have unleashed an explosion in power industry development proposals across the country. Nation-wide there is an intention to almost **double hydropower capacity** by 2010. The reforms have led to a nation-wide surge in competition between corporate generators to secure actual and potential power-producing ‘assets’, and nowhere are dam builders aspirations’ greater than in the south-west, especially Yunnan Province.

Mekong Region is taken to encompass the territory, ecosystems, people, economies and politics of Cambodia, Lao PDR, Myanmar, Thailand, Vietnam and China’s Yunnan Province (Mingsarn Kaosa-ard and Dore 2003). In the past Yunnan has been seen as a peripheral province – both geographically and sociopolitically. However, in terms of both the Mekong Region and China, Yunnan is increasingly important.

The purpose of this research paper is to provide a brief update on what is happening in Yunnan – looking at the Nu, Lancang and Jinsha rivers – and then situate this within the wider context of China’s changing political economy.

Figure 1 Map of Mekong Region

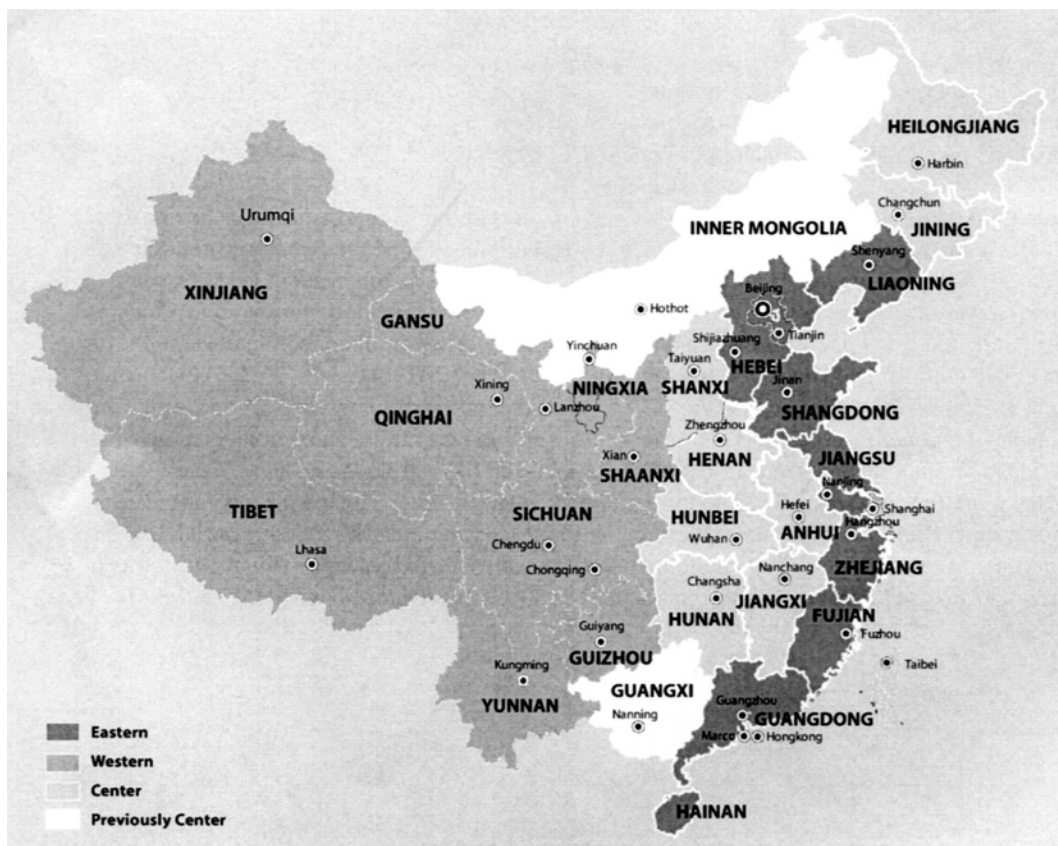


Source: United Nations map number 4112, July 1999.

Yunnan

Yunnan has a population of approx. 43 million people (the 2000 population census). It is one of three Chinese provinces with an ethnic minority population of over 10 million people. In 1990, of China's officially recognised 55 ethnic groups, 51 were living in Yunnan, accounting for a third of the province's population. Of these, 25 ethnic groups were living in 'compact communities' with a population of >5,000. It is China's most culturally diverse province, with 15 of the ethnic groups being indigenous to Yunnan – the Bai, Hani, Dai, Lisu, Wa, Lahu, Naxi, Jingpo, Bulang, Pumi, Nu, Deang, Dulong and Jinuo. It is the 8th largest province in China, covering an area of 394,100 km² which is 4.1% of the country's mainland area. Yunnan shares 4,060 km of border with Myanmar, Lao PDR and Vietnam. It is divided administratively into 16 prefectures and 126 counties. Eight of the prefectures have the status of ethnic minority autonomous prefectures – including the Nujiang Lisu Nationality Autonomous Prefecture.

Figure 2 Map of China



Source: Asian Development Bank (2002:4) map showing province allocation into eastern, central and western regions. Note: Inner Mongolia and Guangxi are now considered part of the Western Region.

In recent years Yunnan has rapidly industrialised, with the formal economy increasing markedly during the 1990s. Core industries are tobacco, machinery, metallurgy, agricultural products, chemicals and building materials. The main border trade partner is Myanmar – recently estimated as accounting for 80% of crossborder trade. In 2002 crossborder trade was valued at USD 371 million. However, overall imports and exports were USD 2.23 billion, 80% of which was with ASEAN economies (Kwanchai Rungfapaisarn 2003).

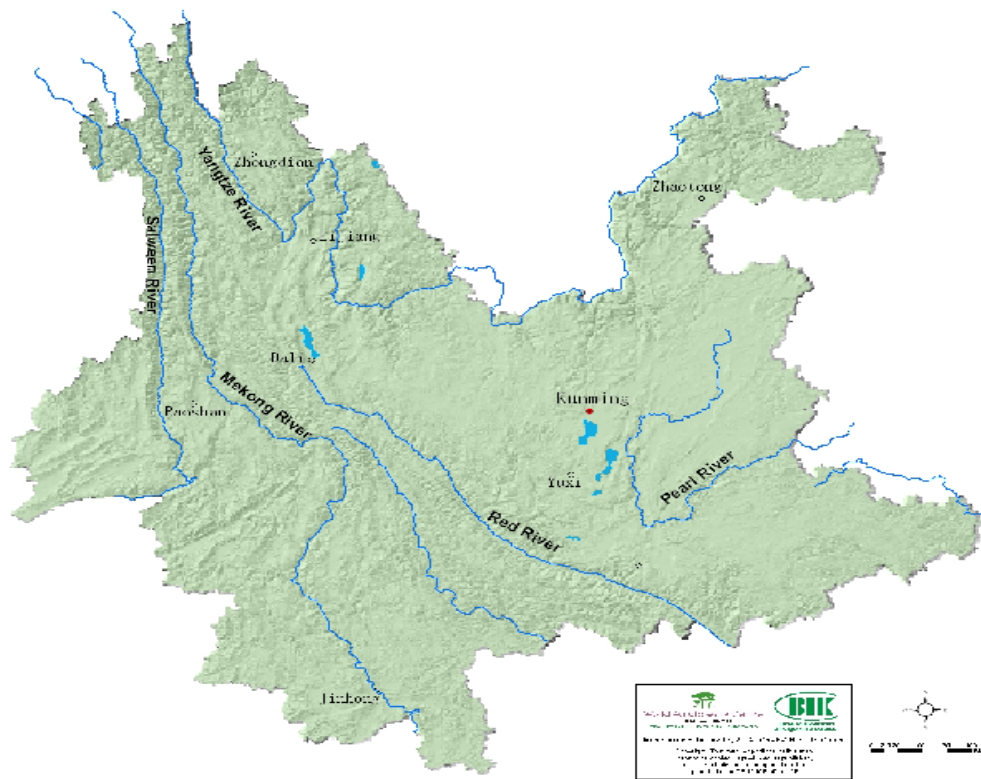
Agricultural production, whether for trade or subsistence, is still the dominant livelihood base of the provincial economy. Whilst the economy is growing fast, in 1997 36% of the population was still classified by China's government as living in poverty (annual income less than USD 77). Despite the recent transformation in Yunnan, the economic gap between China's eastern and coastal regions, and the more western parts of the country has increased. This is for many reasons, including the coast's more attractive geographic location for investors and the willingness of the State to cede some control and encourage private sector-led economic development in eastern and coastal provinces.

As part of a general effort to reduce this gap, the national government is promoting the **Western Region Development Strategy** (ADB 2002), which includes Yunnan. The provincial government is promoting its cultural diversity, biodiversity, mineral endowments and strategic location as a 'gateway to South East Asia'. Boosting production of 'clean green' hydropower is seen as a strategically vital sunrise industry to aid development of the province and country.

Hydropower and World Natural Heritage and Local Livelihoods

Yunnan has over 600 rivers forming 6 major river basin systems: Dulong (Irrawaddy), Nu (Salween), Lancang (Mekong), Jinsha (Yangtze), Zhu (Pearl), Honghe/Lixian Jiang (flows into the Red in Vietnam). Rivers have multiple uses and are valued for many different reasons. In this section we wish to introduce the Yunnan hydropower context, but also make mention of World Natural Heritage and local livelihoods.

Figure 3 Map of Yunnan's major rivers



Source: World Agroforestry Centre (ICRAF) & Centre for Biodiversity & Indigenous Knowledge (CBIK), Kunming.

By one method of calculation, Yunnan is seen as having **24% of China's hydropower potential** for 'medium' and 'large' sized projects. In terms of pure hydropower potential, Yunnan has more than any of the other five countries of the Mekong Region. Each of the Nu, Lancang and Jinsha are in China's 'top 6 hydropower rivers' (Tables 1, 2 and 3).

Substantial hydropower expansion is part of national planning and Yunnan's role is key. One industry source claims that "*China has planned to construct over 50 large and super large hydropower stations in the next 20 years*" (Alexanders Oil and Gas Connections 2003). A deputy-director of the State Power Corporation, Chen Dongping, is reported as saying that China intends to spend nearly USD 40 billion by 2010 to double its hydroelectric capacity (China Economic Review 2002). This would involve increasing capacity to 150,000 MW by constructing the equivalent of another four Three Gorges dams. Chen Dongping assumes this is necessary to reduce current dependence on coal and to thereby "*improve the environment*". This remark is, to some extent, understandable given that one-third of China's territory is reported as being affected by sulphur dioxide (SO₂) related 'acid rain' and about 40% of the contributing SO₂ emissions comes from coal-fired power plants (He Jing 2002). The seriousness of the acid rain problem was acknowledged in 1994 when the national government launched a seven-year spending initiative aimed at keeping SO₂ emissions at or below 15 million tonnes per annum. It was recognised that up to 3,000 highly polluting plants would need to be closed, with their output replaced by more efficient generation units (World Bank 1998).

Table 1 Hydropower potential of major rivers in China

	<i>River</i>	<i>Potential installed capacity (MW)</i>	<i>% of the 'top 18' Chinese rivers</i>
1	Jinsha/Yangtze	210,810	49
2	Yalung Zangbo	54,960	13
3	Yellow	35,770	8
4	Lancang (Mekong)	28,930	7
5	Zhu (Pearl)	25,760	6
6	Nu (Salween)	30,410	7
7	Heilong (in China)	11,530	3
	Subtotal	398,170	
	Rivers 8-18	30,440	7
	Rivers 1-18	428,610	100
	Yunnan	103,130	24

Source: State Power Corporation data for "*medium- and large-sized hydropower projects*" (He Jing 2002).

Table 2 Hydropower production versus potential: China, Western Region, Yunnan

	<i>Actual (TWh)</i>	<i>Potential (TWh)</i>	<i>Exploitable (GW)</i>
China	73	1,923.3	378.5
Western Region	38.4	1,567.8	290.9
Yunnan	6.9	394.5	71.2
Western Region as % of China	52.6%	81.5%	76.9%
Yunnan % of Western Region	18.0%	25.2%	24.5%
Yunnan as % of China	9.5%	20.5%	18.8%

Source: Data for 1999 from ADB report analysing Western Region Development Strategy (ADB 2002: Table 7-4).

Table 3 Mekong Region hydropower potential

	<i>Developed (TWh/year)</i>	<i>Potential (TWh/year)</i>	<i>% of potential already developed</i>
Yunnan	7.9	450	1.8%
Cambodia	0	41	0.0%
Lao PDR	1.1	102	1.1%
Myanmar	1.1	366	0.3%
Thailand	4.6	49	9.4%
Vietnam	5.8	82	7.1%
Total	20.5	1,090	

Source: (Plinston and He Daming 1999:26). The figure for Yunnan is higher than the figure in Table 2. The dataset used in Table 3 is older and from an ADB GMS energy sector study published in 1995. It refers to what is theoretically possible and is indicative only. What is practically and economically feasible is somewhat less.

Table 4 China's projected supply of primary energy 2000-2020

	<i>2000</i>	<i>2005</i>	<i>2010</i>	<i>2015</i>	<i>2020</i>
Total (Mt, coal equivalent)	1092.7	1277.6	1481.1	1727.9	2016.4
Hydro & nuclear (TWh)	227.8	320.2	435.1	544.1	682.0
% hydro & nuclear	20.8%	25.1%	29.4%	31.5%	33.8%
% growth from 2000 levels		16.9%	35.5%	58.1%	84.5%
% growth in hydro & nuclear		40.6%	91.0%	138.8%	199.4%

Source: Data from 1999 in Asian Development Bank report analysing the Western Region Development Strategy (ADB 2002: Extract from Tables 7-7 7-8 7-9). Another source (He Jing 2002) notes the share of hydropower in 2000 had reached 24.8%.

Although there is a new surge for national and Yunnan hydropower-related dam building, there was already ample demonstration throughout China of commitment to a water resources development paradigm which sees large dams as integral (McCormack 2001). Elsewhere in the world this approach is being seriously challenged, most publicly in the outputs of the World Commission on Dams (WCD 2000). However, this paradigm is still thriving in 21st century China where about 280 large dams were under construction in the late 1990s (WCD 2000:10), against a national backdrop of about 80,000 large and medium dams, most of which were built since the success of the Mao-led revolutionaries in 1949 (Kattoulas 2001). Hydropower has long been a component of China's energy strategy and the new surge should be seen as an up-scaling rather than as a new policy emphasis.

However, rivers are more than just flows of water with hydropower generation potential. For example, the San Jiang or Three Rivers region is part of the upper watersheds of the Nu, Lancang and Jinsha. In July 2003 it was declared a UNESCO **World Natural Heritage** site in recognition of its rarity, beauty and inherent ecological values. Of course, rivers are also resources for local communities, dependent upon them – to a greater and lesser extent – to meet their immediate needs. Conceivably, both hydropower development and UNESCO listing could provide a boost for **local livelihoods** but it does not automatically follow in either instance, unless specific priority is attached to local rights and development aspirations. Yunnan's hydropower development could provide increased local opportunities and prosperity, however, the threat to the livelihoods of millions in river dependent communities, mostly downstream, are also real. Recognition of opportunities and threats, and a more cautious approach is required.

Driving forces for hydropower expansion

Key drivers for Yunnan hydropower expansion include the push for and direction of economic growth, China's associated energy security concerns, the Western Region Development Strategy and a political environment in which energy entrepreneurs have strong incentives to push ahead with expansion plans. This section provides a brief context about these and some other drivers.

Globalisation

The extensive medium and large dam building throughout China, especially in the past 50 years, and the new surge in Yunnan dam building can be seen as a byproduct of the 'globalisation'¹ context in which it has and is taking place. Jan Aart Scholte (2000) argues that 'full-scale globalisation' from 1960s-present has been grounded in four co-dependent primary causes. First, the ascendancy of **rationalism** as the dominant form of knowledge. This has privileged people over nature, science and solutions-seeking. Second, **capitalism**. Scholte agrees with the Marxist analysis that capitalism, defined as structures of production focused on surplus accumulation, is the basic engine of globalisation. As capitalist impulses have been given more freedoms, so the rate of globalisation has increased. Third, **technological advances**. Undeniably there have been continued extraordinary improvements in engineering, transport, communications and data processing which have provided the infrastructure, or the 'hardware', for globalisation. Fourth, **specific policy and regulation choices**. The dominance of arguments for removing business restraints, encouraging trade, and focusing on exports have shaped the form of globalisation. To a significant extent, these have been due to decisions taken by States, often willingly, but sometimes because they have perceived there were no plausible policy alternatives. Each of these 'causes' also apply to China and have impacted on the focus and directions of 'development'.

International economic integration & investors looking to China

International economic integration – just one part of 'globalisation' – is a highly significant factor, particularly in relation to providing the capital necessary for expensive hydropower development. A report publicised in August 2003 by the United Nations Committee on the Development of Trade noted that between 1980 and 2002 the world 'stock' of Foreign Direct Investment (FDI)² increased more than 10-fold to USD 7.1 trillion. Of this amount, in 2002 the Chinese mainland share was reported as being USD 448 billion (Beijing Review 2003b). This places China 4th world wide in terms of 'receiving' external investment, whether it be relatively fixed direct investment, or relatively mobile portfolio investment. In 2002 it 'absorbed' USD 52.7 billion in FDI (Beijing Review 2003c). Chinese capital appears to have funded most of the large dams around the country. However, **domestic and foreign investors** are now more easily found to finance large hydropower. This is an important trend because by some predictions, China will 'need' to invest USD 800 billion for new power generating capacity over the next 30 years (IEA 2002b).

¹ Globalisation is used here in the sense of a compression of space and time in a new era of interconnectedness, where there is less local control (Giddens 1992).

² The method of reporting foreign direct investment (FDI) still differs between countries and organisations. According to Dunning (1988) FDI comprises activities controlled or organised by firms (or groups of firms) outside of the nation in which they are headquartered and the principal decisionmakers are located. When reporting *foreign investment* Asian Development Bank (ADB) datasets separate *direct investment* (what Dunning calls FDI) and *portfolio investment*. This is not and has not always been done at the country level. To an extent *direct investment* is fixed, and hence considered more likely to be productive capital investment. *Portfolio investment* refers to supplying capital and/or taking a shareholding, but with debatably less control/fixed stake and more investment mobility. Portfolio

More than a shift to a 'market economy'

The most recent wave of international economic integration wave, from 1980 to the present, has been an era dominated by the neoliberal agenda, and Beijing's policies are no exception. Two significant elements include:

- ❑ **Corporatisation/privatisation** of public utilities implemented vigorously wherever possible due to a fundamental belief in greater business efficiency of the private sector. For privatisation zealots, a first step by public utilities of corporatising would almost invariably proceed to partial or full privatisation of ownership and management. Many countries which have embraced the neoliberal agenda – either willingly or reluctantly due to a shortage of other options – have proceeded rapidly to privatise many public utilities.
- ❑ **Deregulation**, in the sense of removing impediments to business. Neoliberal regimes around the world have implemented 'competition policies' which have invariably focused on economic issues such as: limiting anti-competitive conduct of firms, reforming monopolies to facilitate competition (for example, by restructuring energy utilities), compulsory competitive tendering of government contracts etc...

This type of agenda has rapidly lead to the emergence of very new types of **public-private partnerships** being shaped, at least in part, by the activities of agents such as the World Bank's Public-Private Infrastructure Advisory Facility (PPIAF). In recent times PPIAF activities in China have focused on telecommunications reform, natural gas reforms and electricity generation. In each instance, the focus is on exploring ways in which the role of the private sector can be significantly expanded.³ Chinese public policy makers remain wary of unbridled privatisations, and hence efforts to retain State ownership and regulatory control. However, traditional conceptions of what constitutes 'public' and 'private' are becoming blurry and it is no easy matter for the State to find efficient and effective mechanisms for regulatory control.

Energy demand, trade & security

A key driver of Chinese government energy policy are the **domestic demand** estimates of key organisations such as the State Reform and Development Commission (SRDC). The SRDC's Energy Research Institute (SRDC-ERI) has released analysis in 2003 of three different scenarios. Coal demand is forecast to rise to somewhere between 2.1 to 2.9 billion tonnes per annum with the upper limit almost twice the current production capacity.⁴ Oil demand is predicted to rise to 450 million tonnes of oil equivalent. Natural gas consumption is forecast to increase 5-fold current levels, rising to 160 billion m³ (China People's Daily Online 2003b). Domestic energy demand is entwined with energy imports and exports. Imports are mostly oil, and more recently gas. Exports are mostly coal, but have an increasing hydropower component.

Earlier SRDC-ERI data published by Asian Development Bank presented a less nuanced picture portraying only one scenario. Domestic energy supply was projected to increase by 85% by 2020 (ADB 2002). Even if such massive increases in production are achieved, further **imports** would be necessary.

investment can be seen as potentially more speculative. The 'FDI' figures quoted here for China represent direct investment plus portfolio investment in China-based, exchange listed companies, such as Huaneng and Huadian.

³ In November 2003, there was a workshop held in Kunming on Private Sector Participation (PSP) Options in Water and Electricity. The workshop was jointly organised by the World Bank and the Yunnan Provincial Government and paid for with a USD 120,650 grant from the Bank's Public-Private Infrastructure Advisory Facility (PPIAF).

⁴ About 80% of China's known coal reserves are buried in the north and northwest (Jia Mulan 2003).

The International Energy Agency (IEA), working in cooperation with SRDC, expects that China will become an even greater importer of oil and gas – “By 2030 Chinese oil imports will equal the imports of the United States today, while imports will meet 30% of the country’s gas demands” (IEA 2002b). China is already a major actor in the global energy market as the largest oil importer outside the OECD. After the United States and Japan, it is the third largest consumer of oil (IEA 2002a). On the other hand, some parts of the country will continue and expand their international energy **exports**. It should be remembered that China is now the second largest coal exporter in the world, whereas only ten years ago it was primarily focused on supplying its domestic market (Ball et al. 2003)⁵. And, as the plans for Yunnan’s energy development come to fruition, the province will become a significant exporter of hydropower to other parts of China, Southeast Asia, and possibly South Asia. Entrepreneurs producing energy will sell to purchasers either inside or outside the country.

In addition, **energy security** for China, as for all other countries, remains an important influence on national policy (for still-relevant discussions see, Medlock and Soligo 1999, Gao Shixian 2000, Stares 2000). The point being made is that not all of the planned increases in energy production are to meet domestic demand.

Box 1 Energy demand management options for China⁶

1. Imposing environmental taxes on dirty fuels
2. Further promoting electricity time-of-use tariffs
3. Reforming 2-tiered pricing system for natural gas
4. Further regulation, upgrading and/or closure of inefficient power plants and coal mines
5. Promotion of clean coal technologies
6. Using advanced, combined-cycle technology in power generation
7. Promoting co-generation
8. Promoting renewable energy resources and technologies (including wind, geothermal and solar)
9. Promoting energy conservation
10. Encouraging more research and development in the energy industry
11. Phasing out hidden subsidies

Given its significance as a policy driver to those concerned about energy security and continued economic growth, it is important that the demand projections data is independently interrogated. The data are based on assumptions which need to be more widely scrutinised. For example, does the data reflect the successful implementation of any **demand management policy measures**, or the development or wider adoption of **new technologies**?⁷ It is important to clarify whether demand estimates are unnecessarily ‘high’ and being used as justification to permit headlong expansion of energy production, perhaps with an over-emphasis on soon to be surpassed technology.

⁵ China both imports and exports coal. In 2002, China imported 10.8 million tonnes, nearly 1.0% of its total consumption. In the same year it exported 84 million tonnes, mainly to Korea, Japan and Taiwan (Ball et al. 2003:42-43).

⁶ The demand management suggestions for China policy makers (Box 1) are taken from an ADB report which overviews the Western Region Development Strategy (ADB 2002).

⁷ The evocatively named ‘Power to the People’ (Vaitheeswaran 2003) provides an inspiring analysis of the impending ‘energy revolution’. The author argues that promising new technologies, such as fuel cells and microturbines, will lead the way to a revolution in micropower – putting small clean power plants close to homes and factories – which will

Western Region seen as key to increased energy production

Evident is the importance of the Western Region to this proposed rapid and vast expansion of China's energy production. In short, "*Rising demand for energy is a very significant factor in the economic development of the PRC, especially the Western Region*" (ADB 2002:147). The Western Region is intended to become an increasingly significant energy **supplier**.

The Western Region comprises the provinces of Sichuan, Guizhou, Yunnan, Shaanxi, Qinghai and Gansu; the autonomous regions of Tibet, Ningxia, Inner Mongolia, Guangxi and Xinjiang; the municipality of Chongqing. In 1999 the Western Region contained 28.8% of China's population, 61.9% of total land area, but accounted for only 15.8% of gross domestic product (ADB 2002).

The Western Region Development Strategy 2000-2020 was adopted by the national government in February 2000 and forms a component of the 10th Five Year Plan (2001-2005). Its stated aims are to combat poverty, industrialise the western provinces, including all mountain areas, and promote the transfer of science and technology from the centre to the periphery (ADB 2002). It is focused on conventional economic development. The strategy stresses the need for infrastructure investment in the middle and western provinces of China with special emphasis on transport, telecommunications, pipelines, electricity and the national power grid and water conservation. In particular, transport investment is expected to focus on better economic integration between western, central and eastern China, and also on improving economic linkages with Southeast Asia.

Energy exports from the Western Region to the Eastern Region are projected to **quadruple** between 2000-2020, with coal accounting for 91% of the increase. Electricity will be a much smaller, but still significant, component of the exports. After allowing for more than a doubling of electricity demand within the Western Region from 394 to 878 TWh, it is still projected that exportable electricity supply would increase from 102 to 365 TWh (ADB 2002:155).

The dual objectives of the Western Region Development Strategy are '**development**' (of the West) and '**transfer**' (to the East). An example of what is proposed is that authorities intend to be transmitting 8 GW of power per annum from Yunnan to Guangdong by 2015, derived from both coal-fired plants and hydropower from various sites.

As the data being produced by SRDC-ERI shows, the planned energy production and transfer from West to East is significant. Already one quarter of China's energy derived from coal and half from natural gas comes from the Western Region. These proportions are to be increased as policy makers search for the energy believed required to sustain China's (primarily eastern and coastal) economic growth.

rapidly displace grids which deliver power from big plants to often distant consumers. This recent addition to the literature, builds on other work which reports on promising progress with new energy technologies for developing countries (for example, see Forsyth 1999).

It is within this context that Yunnan hydropower production is being **pushed** along by national policy makers, local authorities, designers, construction groups, lenders and business entrepreneurs. The province already provides about 10% of China's hydropower but exploitable reserves are considered to be ten times larger than current generation. If this potential is exploited, Yunnan could eventually supply closer to 20% of national hydropower production, to be fed into national or regional grids. In summary, China's economic reforms, coupled with the development/transfer priority being attached to the Western Region, have catalysed a substantial increase in the dam building aspirations of 'developers' in southwest China. This is being enabled by wide-ranging reforms to the power industry, to which we now turn.

Table 5 Projected supply of primary energy 2000-2020

	2000	2005	2010	2015	2020
China					
PRC total (Mt, coal equivalent)	1092.7	1277.6	1481.1	1727.9	2016.4
PRC hydro & nuclear power (TWh)	227.8	320.2	435.1	544.1	682.0
% hydro & nuclear ⁸	20.8%	25.1%	29.4%	31.5%	33.8%
Total production growth from 2000		16.9%	35.5%	58.1%	84.5%
Hydro & nuclear growth from 2000		40.6%	91.0%	138.8%	199.4%
Western Region					
W Region (Mt, coal equivalent)	286.4	392.7	539.0	696.0	889.7
W Region hydro & nuclear (TWh)	104.0	165.0	260.0	342.0	446.0
% hydro & nuclear	36.3%	42.0%	48.2%	49.1%	50.1%
Total production growth from 2000		37.1%	88.2%	143.0%	210.6%
Hydro & nuclear growth from 2000		58.7%	150.0%	228.8%	328.8%
Shares of primary energy supply from Western Region					
Coal	66.6%	59.4%	55.3%	52.7%	49.4%
Oil	13.8%	12.7%	11.8%	11.9%	12.4%
Gas	6.2%	12.1%	14.0%	14.0%	12.7%
Hydro & nuclear	13.3%	15.3%	17.9%	17.9%	18.3%
Renewable	0.1%	0.4%	1.4%	3.5%	7.1%
	100%	100%	100%	100%	100%
Projected electricity supply					
PRC	1233.1	1729.3	2292.4	2995.5	3822.5
Western Region	281.1	495	693	956.3	1242.2
Western Region as % of PRC	22.8%	28.6%	30.2%	31.9%	32.5%

Source: Energy Research Institute data published by Asian Development Bank (2002 Extract from Tables 7-7, 7-8, 7-9, 7-11).

Table 6 Energy production 1999

	Coal (Mt)	Oil (Mt)	Gas (GL)	Hydro (TWh)	Total Power (TWh)
--	--------------	-------------	-------------	----------------	----------------------

⁸ China has been constructing nuclear power plants for more than 20 years. The China Atomic Energy Agency plans that by 2005, with capacity set to increase to 8.7 million kilowatts, nuclear plants will be providing 3% of the total national energy output (China People's Daily Online 2003a).

China	1,045	160	25.2	196.6	1,239.3
Western Region	267	27.7	13.4	103.6	278.6
Yunnan	26.6	0	0.1	18.5	29.8
Western Region % of China	25.6%	17.3%	53.2%	52.7%	22.5%
Yunnan % of Western Region	10.0%	0.0%	0.7%	17.9%	10.7%
Yunnan % of China	2.5%	0.0%	0.4%	9.4%	2.4%

Source: Data in Asian Development Bank report analysing the Western Region Development Strategy (ADB 2002: Extract from Table 7-2).

China's energy industry reforms

China's energy industry reforms are the result of the government policy put in place to foster competition and marketisation, via corporatisation which, especially for the power generation companies, is almost indistinguishable from privatisation. The formation of the State Power Corporation (SPC) was the first main step. With registered capital of USD 20 billion, it was a giant monopoly, one of the 100 largest businesses in the world. By 2000 it was working as a consulting company in more than 40 countries. At the time its breakup was announced in late 2002, SPC had in the vicinity of 2 million employees, and 'owned' 46% of the nation's electricity generation and 90% of the electricity supply assets (Alexanders Oil and Gas Connections 2003)

The start of the SPC reorganisation has involved separation of SPC's **actual and potential** (such as the Nu river) generation and distribution assets and designation of 11 enterprises to 'acquire' these assets (Box 2). The next step involves creating a competitive market, which includes pooling and pricing reforms, plus grid creation. To keep oversight of the reform process, the State Electricity Regulation Commission (SERC) has been formed, responsible for making proposals on power price; and issuing and managing power service licenses.

Business competition

Prior to the current reforms, large-scale hydropower development had already become characterised by complex ownership and financing arrangements. Examples from Huaneng and Three Gorges and Huaneng (Boxes 3 and 5) illustrate the scale of the business operations, diversity of funding sources and aspirations of their corporate leaders.

Since the major energy industry reforms were announced late 2002 there has been a stampede by the 'big 5 + 1' – not forgetting the Three Gorges development group – to secure their assets, principally coal-related, and move to develop their new assets, including 'rivers for hydro' in various types of partnership with local authorities. In the words of Business Weekly "*newly established power conglomerates are scrambling to construct generating plants across China*" (2003). Entrepreneurial dam developers are in **hot competition**. For example: Huadian, Guodian, Datang and China Power Investment Company have, in partnership with Hong Kong's CLP Power Asia Limited, announced new investment of USD 4.89 billion to build thermal and hydropower plants in the southern China region of Guangxi (China Daily 2003b).

Why the current scramble? The past increases in energy demand and projections for further huge requirements are acknowledged. State policy support and sector reform has also been mentioned. But, the rush into hydropower is also being fuelled by the relative ease with which many social and environmental costs can be externalised from ‘return on investment’ equations, and the competitive need for companies – in the new business operating environment – to retain market share and steadily expand generating capacity.⁹ Whilst some in government, such as the Chairman of the State Electricity Regulation Commission (SERC) are reported as having “*hinted that the government is considering slowing down the building boom in power plants*” and noting that government should have a clearer overall plan for power plant construction (China People's Daily Online 2003d), thus far there is no evidence of either. The authority of the SERC is limited to promoting market competition, endeavouring to ensure transparency and supervising service licences. Decisionmaking about electricity prices and approving construction and expansion of power plants remains with the State Reform and Development Commission (SRDC).

⁹ The economic argument of analysts Guotai Junan Securities Co (discussed in Business Weekly 2003), and others, is that as electricity price drops generating capacity must increase if company profits are to remain stable. In an example they worked through, for a 3.55% price drop, based on an average national tariff of 3.4 US cents per kilowatt hour, generating capacity needs to increase 5% to maintain profit-levels.

Box 2 China energy industry reforms: recent milestones

1996		Electric Power Law passed which required reforms, including the creation of separated power producers and retailers in a competitive market. The law also stipulated that power prices should reflect all production costs, profit, tax and contribute to transmission costs and situations where some subsidy may be necessary to ensure supply. Part of the rationale was to ensure that the industry would become attractive to non-State investors.
1997	16-Jan	Establishment of State Power Corporation (SPC) to represent the State as owner of government-owned assets. This occurred around the same time as the passage of the Electricity Law and the abolition of the Ministry of Electric Power, dividing its functions between existing agencies.
2002	11-Apr	Announcement by what is now the State Reform and Development Commission (SRDC) of next phase of energy industry reforms.
2002	29-Dec	End of SPC monopoly with announcement that SPC assets are to be acquired/transferred to 5 independent electricity generating, 2 transmission & 4 consultant/construction companies. The impending creation of an industry regulator was also signalled. Not all energy assets were included in this restructure.
<i>Power generation companies:</i>		
➤ Huaneng, Datang, Huadian, Guodian, China Power Investment Company		
<i>Distribution (grid) companies:</i>		
◆ State Power Grid Company which controls the operation of 5 regional power grid companies in the North, Northeast, East, Central and Northwest.		
State Power Grid Company was also authorised to oversee the orderly transfer of 500 power plants under the management of provincial power corporations as part of the reform commitment to separate generation from distribution (see below).		
◆ Southern Power Grid Company which controls the operation of the 'Southern Power Grid' formerly controlled by SPC, plus the formerly Province-controlled Guangxi, Guizhou, Yunnan, Hainan and Guangdong grids.		
Between 2011 and 2030, Southern Power Grid is prioritising hydropower development on the Nu, Lancang, Jinsha, Wu; and aiming to expand connections with surrounding grids (eg. China's central and north, also the proposed Mekong Region grid).		
<i>Consultant/construction companies:</i>		
• Hydraulic Power Designing Institute		
• Electric Power Designing Institute		
• China Water Conservancy & Hydropower Construction Group		
• China Gezhouba Group		
<i>Regulator:</i>		
□ State Electricity Regulatory Commission (SERC).		
2003	31-Jul	SERC announces its intention to create 6 competitive regional power markets across China within 3 years in the East, North, Northeast, Central, Northwest and South.
	3-Sep	<i>Example:</i> Signing of MoU to transfer power plants in Jiangsu Province to Guodian.
	19-Sep	<i>Example:</i> Connection of the north and central China power grids (now world's largest). The grid spans 4600 km across 14 provinces and municipalities, with a combined installed capacity of 140 million kilowatts.
	23-Sep	<i>Example:</i> Signing of MoU to transfer to State shares to Huaneng in 13 power plants (total capacity 4,640 MW). Huaneng becomes major shareholder in 12 of the 13.

Sources: (China Daily 2002, Alexanders Oil and Gas Connections 2003, China Daily 2003a, China People's Daily Online 2003c, 2003d, 2003e, Freshfields Bruckhaus Deringer 2003, Xinhua News Agency 2003)

Table 7 Hydropower dam plans – Nu, Lancang & Jinsha

Notes: 1/ Details of dams remain subject to negotiation, redesign and variation. Different figures are used by sources for many variables, especially total energy and displaced people; but also for dam height and area to be inundated etc... For example, the developer of Jinghong is seeking approval to increase the installed capacity from 1,500 MW to 2,000 MW. The information has been pieced together from multiple sources, including developer proposals, researchers documents and media reports. The foundations are: for Nu data, the Huadian proposal; for Lancang, the published work of Plinston and He Daming (1999) and McCormack (2001); for Jinsha, the Three Gorges and Huaneng development company documents. 2/ Total energy data is intended to refer to hydropower potential as part of the full cascade eg. Dachao Shan's output can rise from about 5,900 GWh/year to 7,021 GWh/year once the Xiaowan reservoir is completed. 3/ Not all of the Jinsha figure is 'in Yunnan' due to border sharing, and for a period traversing entirely through Sichuan Province. 4/ Both the Nu and Lancang are international rivers flowing into other Mekong Region countries. Some data for three Salween (Nu) dams downstream is included: Ta Sarng within Myanmar (Choolit Vatcharasinthu and Babel 1999), and two on the Thai/Myanmar border (Rajesh 2003). There are no plans by other countries for mainstream dams on the Mekong (Lancang), but extensive dam-building on tributaries is proceeding. 4/ na = not available, or not available to authors, when finalising this report.

	Elevation asl m	Watershed area km ²	Average inflow m ³ /second	Average inflow mcm	Total storage mcm	Installed capacity MW	Annual energy GWh	Inundated area ha	Locally displaced people	Wall height m	Status
<u>Nu</u>											
Song Ta	1,950	103,500	1,200	-	6,312	6,200	17,870	312	3,633	307	Designed
Bin Zhong Luo	1,690	103,700	1,200	-	14	1,600	8,340	0	na	55	Designed
Ma Ji	1,570	106,100	1,270	-	4,696	4,200	18,970	1,654	19,830	300	Designed
Lu Ma Deng	1,325	107,200	1,330	-	664	2,000	10,080	441	6,092	165	Designed
Fu Gong	1,200	107,500	1,340	-	18	400	19,800	59	682	60	Designed
Bi Jiang	1,155	108,400	1,390	-	280	1,500	7,140	322	5,186	118	Designed
Ya Bi Luo	1,060	109,300	1,430	-	344	1,800	9,060	178	3,982	133	Designed
Lu Shui	955	110,400	1,500	-	1,288	2,400	13,740	395	6,190	175	Designed
Liu Ku	818	112,500	1,610	-	8	180	760	11	411	36	Site prepar'n 2003
Shi Tou Zhai	780	112,000	1,580	-	700	440	2,290	66	687	59	Designed
Sai Ge	730	114,000	1,700	-	270	1,000	5,360	207	1,882	79	Designed
Yan Sang Shu	666	116,500	1,770	-	391	1,000	6,200	286	2,470	84	Designed
Guang Po	609	124,400	1,890	-	124	600	3,160	4	34	58	Designed
						23,320	122,770	3,934	51,079		
<i>'downstream' of China – the Salween</i>											
Ta Sarng	na	207,000	na	na	36,100	3,600	23,006	na	na	188	Building 2004+
Upper Salween	na	293,200	-	118,600	21,000	4,540	29,271	na	na	168	Building 2007-12
Lower Salween	na	294,500	-	119,200	245	792	5,422	na	na	49	Building 2007-12

	Elevation asl m	Watershed km ²	Average inflow m ³ /second	Average inflow mcm	Total storage mcm	Installed capacity MW	Annual energy GWh	Inundated area ha	Locally displaced people	Wall height m	Status
<u>Lancang</u>											
Gonguoqiao	1,319	97,200	-	31,060	510	750	4,060	343	4,596	130	Designed
Xiaowan	1,236	113,300	-	38,470	14,560	4,200	18,990	3,712	32,737	300	Building 2001-10
Manwan	994	114,500	-	38,790	920	1,500	7,805	415	3,513	126	Built 1986-96
Dachaoshan	895	121,000	-	42,260	890	1,350	7,021	826	6,100	118	Built 1996-2003
Nuozhadu	807	144,700	-	55,190	22,400	5,500	23,777	4,508	23,826	254	Designed
Jinghong	602	149,100	-	58,030	1,233	1,500	8,059	510	2,264	118	Building 2003-10
Ganlanba	533	151,800	-	59,290	na	250	780	12	58	na	Designed
Mengsong	519	160,000	-	63,700	na	600	3,380	58	230	na	Designed
						15,650	73,872	10,384	73,324		
<u>Jinsha</u>											
Upper Hu Tiao Xia	1,950	na	na	na	18,345	2,800	10,523	10,413	100,000	216	Designed
Liang Jia Ren	1,810	na	na	na	43	4,000	16,314	2	10	99.5	Designed
Li Yuan	1,620	na	na	na	891	2,280	10,292	190	1,300	155	Designed
A hai	1,504	na	na	na	840	2,100	9,371	333	2,400	139	Designed
Jing An Qiao	1,410	na	na	na	663	2,500	11,411	140	2,000	156	Designed
Long Kai Kou	1,297	na	na	na	657	1,800	7,893	293	2,000	113	Designed
Lu di La	1,221	na	na	na	2,099	2,100	9,350	2,087	16,900	120	Designed
Guan Ying Yan	1,132	na	na	na	1,973	3,000	13,138	940	8,810	183	Designed
Wu Dong De	na	na	na	na	na	7,400	33,900	na	na	na	na
Bai He Tan	na	na	na	na	na	12,500	55,000	na	na	na	na
Xi Luo Du	610	454,000	na	na	12,960	12,600	57,600	8,933	50,000	na	Building 2004+
Xiang Jia Ba	380	458,000	na	na	5,060	6,000	29,300	na	118,000	na	Designed
						59,080	264,092	23,331	301,420		

Hydropower status of the ‘Three Rivers’

It is the Nu river dams which, at time of writing, are the most controversial both within and outside of China. Nu decision making is happening now. The Lancang dams are being built. The planned Jinsha dams are extra dams on an already significantly modified Chinese river. Our scope is restricted to the Nu, Lancang and Jinsha rivers. These are only a part of the Yunnan transformation, and we stress that Yunnan needs to be seen as part of the larger Chinese picture.

Nu

The future of the Nu River remains in the balance. In the last months of 2003 and early 2004 much more information has filtered into the public domain outlining the extensive hydropower development proposed for the Chinese section of this river which – upper, lower and middle – extends for 2,018 km. There are advanced plans for a cascade of up to 13 dams¹⁰ on the middle and lower Chinese reaches which, if built, would profoundly alter this presently undammed, near to pristine river. Some supporters of the dams are focused on local development needs, which they hope the dams will assist. Others are focused more on the energy production and income potential for other people and places. Opponents of the dam are doubtful about the need for such radical development and fear the irreversible changes which a cascade will have on the current, mostly undeveloped area. There are many different ‘positions’ in the debate. The total installed capacity of these dams would be 23,320 MW. A site office is operating, and road building has already commenced to facilitate the construction of the Liu Ku dam.

Figure 4 Nu river



¹⁰ The Bing Zhong Luo component of the cascade does not actually involve a ‘dam’, being designed as run-of-river, hence there is no inundation area.

There are also three dams being promoted for the river, downstream of China. The Ta Sarng site is within Myanmar and the other two are planned for further downstream where the Nu/Salween forms the border between Myanmar and Thailand (For a review featuring concerns, see Rajesh 2003).¹¹

The chief promoter of the proposed Nu River development in Yunnan is the **China Huadian Corporation**, a wholly State-owned enterprise, and the controlling shareholder of the Hong Kong stock exchange listed Huadian Power International Corporation Limited. It is one of the 'big 5' power generation companies receiving 'assets' from 2003 onwards, which were previously 'owned' by the State Power Corporation (SPC). The 'right to develop' the Nu River is seen by Huadian as one of the transferred assets now in their '**portfolio**'.

Pre-2003 the Chinese central government has funded preparatory planning and design work by the Kunming Hydropower Design and Planning Institute. But the real action has taken place since the major energy industry reforms were announced late December 2002. By mid-June 2003 Huadian was able to announce the formation of the construction entity Yunnan Huadian Hydropower Development Company, with registered startup capital of 200 million yuan (approx. USD 24 million). At this time, the shares were split between China Huadian Corporation (51%), Yunnan Development Investment Co (20%), Yunnan Electricity Group's Hydropower Construction Co (19%) and the Yunnan Nu River Electricity Group (10%).

A development proposal was submitted to the State Reform and Development Commission (SRDC) in Beijing. SRDC convened a meeting, attended by about 140 people from various Ministries and elsewhere, which reviewed the proposal and gave it 'in principle' approval in mid August. This was just prior to the new Chinese Environment Impact Assessment (EIA) law taking effect on 1 September. Since then, the proponents have been vigorously promoting the proposal.

The Beijing-based State Environment Protection Administration (SEPA) convened an expert panel, reviewed the proposal in more detail, and in early September 2003 announced that it had serious reservations related to: the world class canyon which would be irreversibly altered, threats to the largely unexplored rich biodiversity, the loss of an extremely valuable wild rice gene pool, and geological instability which raise serious safety concerns. More general concerns related to the expected cultural disruption, a lack of faith that promised poverty alleviation will necessarily result from dam construction, and disappointment that alternatives to hydropower, such as ecotourism, are not being genuinely considered. Nevertheless, the Yunnan and prefecture governments are keen to proceed and attempted to counter the SEPA opposition via a provincially-convened 'Yunnan experts' meeting late September. Given the pre-meeting attendee selection process and the general pressure being brought to bear, it was unsurprising when this group found that concerns were manageable and damming should proceed. SEPA has since had further field visits whilst being courted by Yunnan provincial and prefecture officials. Further expert meetings took place in Beijing and Yunnan, prior to a joint meeting held in Kunming 20-21 October. In the week before this meeting, Yunnan newspapers were used to actively promote the scheme, putting additional pressure on the SEPA opposers.

¹¹ During October 2003, the Electricity Generating Authority of Thailand (EGAT) was told by the Thai Ministry of Energy to suspend talks on this delicate subject until after the APEC show had exited Bangkok (Watcharapong Thongrungs 2003). However, EGAT confirmed in November 2003 that it is prepared to finance the entire project, although it would prefer to explore some form of partnership with the Myanmar and China governments (Nareerat Wiriyapong 2003).

As the plans enter the public domain, broader civil society – beyond the usual, officials, business operatives and ‘experts’ – have become very involved. For example, in Beijing a public petition calling for the protection of the Nu was organised in October 2003 by the China Environmental Culture Association. This was signed by 62 people – including prominent artists, journalists, environmentalists and well-known public figures – and widely circulated. This was a small, early sign of a resistance which has grown. In November 2003 in Kunming, the NGO Green Watershed¹² used their regular Environment Dialogue forum to share information and stimulate wider public awareness and debate. Discussions of alternative development pathways are also being held within the Nujiang Lisu Nationality Autonomous Prefecture. In December a 45 minute television documentary was prepared by Central China Television (CCTV) which has presented ‘both sides’ of the debate. At the time of writing this documentary has been shown nationally three times, including in Saturday and Sunday morning prime time in early March 2004. China universities in Chongqing and Kunming have become involved in ‘Save the Nu’ campaigning. In sum, there is now significant media attention, which is fostering a much wider public debate.

Meanwhile in Bangkok, the Chinese Ambassador was petitioned on 16 December 2003 by more than 80 environmental, human rights and ethnic groups from Thailand and Myanmar voicing their concerns and calling for the inclusion of downstream country perspectives in the decision making process. This effort was coordinated by the South East Asia Rivers Network (SEARIN, a Mekong Region NGO based in Chiang Mai). A wider international petition was organised in January 2004, coordinated by the International Rivers Network (an international NGO based in California). Learning exchanges between Thai, Burmese and Chinese NGOs have also taken place.

The various spheres of Chinese government – with the exception of some of the perspectives convened by SEPA – and the developers remain firmly committed to the cascade, with only peripheral changes to the July 2003 plan being countenanced. However, it is now clear to the developer that more detailed impact assessment work will need to be done, and resettlement plans prepared and made public. This already represents a considerable achievement by SEPA and others who are yet to be convinced of the wisdom of the proposal. Resistance to the plan, the decision making rationale and the original governance process has been surprisingly strong and has rapidly gained momentum.

¹² Green Watershed has contributed to lifting the standard and inclusiveness of the Nu debate in several ways, via its own hosting of public meetings and discussion with officials in Kunming and Nujiang Prefecture, support to the TV documentary makers, radio spots, and co-organising with the Centre for Environment and Development and others, under the China Academy of Social Sciences (CASS), a Beijing symposium 8-9 January 2004 focused on reconsidering the place of dams in national development. The authors have also jointly presented the substance of this research paper in Kunming, and in November 2003 to the Southeast Asia Water Forum held in Chiang Mai, and a meeting of development agencies in Bangkok.

Lancang

The Lancang river flows for nearly 800 km in Tibet before entering Yunnan where it flows for another 1,247 km. The Lancang cascade is a mega-project designed to take advantage of an 800 metre drop over a 750 kilometre river section in the middle and lower sections of the Yunnan stretch (Plinston and He Daming 1999). For dam builders this part of the river has been described as a “*rich, rare hydropower mine for its prominent natural advantages in abundant and well-distributed runoff, large drops and less flooding losses of the reservoirs*” (ICOLD 2001). The cascade is no longer speculation, but rather a fact. Regardless of whether all eight (8) proposed dams are built, Manwan and Dachaoshan are already constructed, Xiaowan is under construction and Jinghong is soon to commence.

Proponents argue that the dams have the potential to offer limited flood control, more assured dry-season flows, increased navigation options, reduced saline intrusion and create extra irrigation opportunities for downstream countries like Thailand. In addition to the rapidly expanding grid system within China, the electricity produced will be able to enter the Mekong Region electricity grid.¹³ A particularly sanguine view is that “*upstream development of hydropower will not sharpen the conflict of multi-objective competitive uses and will give benefits to downstream for the development of irrigation, navigation, and hydropower, and for flooding control*” (Plinston and He Daming 1999). The naïve conclusion that the cascade will not ‘sharpen the conflict’ between upstream and downstream users is completely wrong. For example, there is significant tension in the first months of 2004 in northern Thailand river-dependent communities who are concerned at the very low flow in the river, and apparent fluctuations. There is a drought and so natural flows are low, but the Thais are also unsure as to what effect the river flow is being altered by China’s upstream dam managers. More information exchange is essential if crossborder understanding and trust is to be built.

The first dam constructed on the Lancang mainstream was Manwan, finished in 1996. As of October 2003, the second dam, Dachaoshan, is in full operation, with each of its six 225 MW generators now installed. The third dam being constructed is Xiaowan, seen as an iconic project for the Western Region Development Strategy. The power production from Xiaowan is considered an essential element of the ‘West to East’ energy transfer. It is the second largest dam in China after Three Gorges. When completed and filled, scheduled for 2013, its reservoir will stretch back 169 km from its 292 m high wall.

Figure 5 Manwan Dam

¹³ At the Phnom Penh 2002 GMS leaders’ summit Mekong Region governments signed an inter-government agreement which paves the way for regional power trading. This should also be considered within the context of the so-called ASEAN grid being promoted by the Electricity Generating Authority of Thailand (EGAT).



Huaneng is the dominant actor, having been granted the majority of the development rights on the Lancang, and the upper and middle reaches of the Jinsha. Manwan and Dachoashan are already being operated by Huaneng. Xiaowan will also be under Huaneng's management.

Box 3 Huaneng

In November 2001, Huaneng Power International (HPI) – at the time China's largest independent power generator – announced it intended to list on China's domestic sharemarket. The parent Huaneng International Power Development Company had incorporated as a Sino-foreign joint venture in 1985. The HPI offspring had already been listed on the New York exchange after incorporation in 1994, followed by a listing on the Hong Kong exchange in 1998. In July 2003, the parent HIPDC held 43% of the shares. As at 12 September 2003, the share price had increased 115% from the previous year. A recent valuation (02/01/2004) listed HPI as the 38th largest company on the Hong Kong exchange, with its H-class shares being valued at HKD 20 billion. Li XiaoPeng, Chairman of the Huaneng Group, wants Huaneng to be the world's leading electricity producer, aiming to double its generating capacity by 2010 to 60,000 megawatts, and make it into the Fortune 500 list of the world's largest companies (China Daily 2003c).

The dominant developing entity for the remainder of the construction is the Yunnan Huaneng Lancangjiang Hydropower Company (YHLHC) Limited. In February 2003 the shareholders were Huaneng (56%), Yunnan Development Investment Company (31.4%) and Yunnan Hongta Investment (12.4%).¹⁴ The predecessor to YHLHC was Yunnan Lancang River Hydropower Development Company Limited, created in February 2001. The original shareholders were State Power Corporation (27%)¹⁵, Yunnan Electric Power Group Company Limited (29%), Yunnan Provincial Development & Investment Company Limited (24%) and Yunnan Hongta Investment 20%. As the numbers show, the shareholding has changed, with Huaneng now the major player.

¹⁴ The original Yuxi Tobacco Factory in Yunnan Province was established in 1956. A major reorganisation in 1995 led to the creation of the Yuxi-Hongta Tobacco Group (Hongta), which is China's biggest tobacco grower and cigarette producer. As part of its WTO obligations, from 2003 China has begun opening its tobacco market to foreign firms by abolishing special retail licences and reducing import taxes. Since its formation, Hongta has diversified into many different areas, including power production. Hence, it was no surprise to see it take an initial 20% stake in the original Yunnan Lancang Jiang hydropower development company when it formed in 2001. With the advent of Huaneng and

To fund Xiaowan's construction, in February 2003 YHLHC borrowed 25 billion yuan (USD 3 billion) from several banks: China Development Bank 15 billion yuan (USD 1.8 billion) (CDB 2003), Construction Bank of China 6 billion yuan (USD 725.5 million), and Industrial & Commercial Bank of China 4 billion yuan (USD 483.6 million). Effectively this fully funds Xiaowan as the total investment is expected to be 27.7 billion yuan (USD 3.3 billion) (China West News 2003b).

The next dam is Jinghong, which commenced construction in 2003, albeit without yet having been fully approved by State authorities. Both Chinese and Thai officials and experts have been involved in all stages of planning since the early 1990s. It is expected to be built by YHLHC at a cost of about USD 1.2 billion and be fully operational within 7 years. The Electricity Generating Authority of Thailand (EGAT) has already entered into agreements to purchase power from the station. The Jinghong dam is yet to receive official approval to do anything more than 'site preparation' (road building, communications establishment, water and electricity supply), but regardless it has already commenced dam construction earthworks.

Gonguoquiao, Nuozechadu, Ganlanba and Mengsong are designed but yet to commence – the last three would also be Huaneng dams. The Gonguoquiao, or 'Dali', dam is particularly interesting. As the most upstream dam in the cascade, its synchronous operation with those downstream is obviously important. A private company believes it has already negotiated prior development rights which are being contested by Huaneng. The dispute highlights the problems which could arise on any river if there are different ownership/operation regimes in place, each seeking to maximise their revenue in the new competitive era.

Whilst the hydropower potential is unquestioned, there are also huge concerns about the impacts of the dams on riverine ecosystems and local livelihoods (Roberts 2001, IRN 2002). There are major worries about altering the natural regime of the river in a way which will increase flow fluctuations, increase average downstream dry-season flows and decrease the normal flow downstream of nutritious sediments crucial for fisheries and agriculture production. When the cascade is completed, it has been suggested that dry season flows may increase downstream by up to 90% at Chiang Saen, 80% in Luang Prabang, 70% in Vientiane and more than 1600 km from the cascade, 40% at Mukdahan. Predicting impacts in a complex system is difficult, but obviously this will flood large reaches of rapids, integral to fisheries and radically alter the normal regime of seasonally flooded forests (Blake 2001, TERRA 2002). Large amounts of sediment will be trapped by the new dams, depriving the lower Mekong of its normal load. Negative impacts may also include increased downstream erosion, serious disturbance to fisheries ecology and the devastation of annual river bank gardening enterprises. Those who stand to lose out include millions of people downstream – mostly beyond the Chinese border – reliant on fishing and river bank farming (Box 4).

the morphing into the Yunnan Huaneng Lancangjiang Hydropower Company Limited, Hongta reduced its share to 12.6% (as at 18 February 2003).

¹⁵ The assets transferred from the State Power Grid Company to Huaneng on 23 September 2003 include their 27% share in the Yunnan Huaneng Lancangjiang Hydropower Company Limited.

Whilst an international river, inter-State actors of many different types were unable to ensure anything approaching a thorough discussion of the project alternatives and likely impacts. It was linkages between Chinese and international academics, particularly from the mid 1990s (Chapman and He Daming 1996), which first brought project information into the wider public arena, although the rosiness of the possible scenarios they presented were greeted with wry suspicion by some (Hinton 2000). An International Rivers Symposium in Kunming in 1999 also aided an exchange of perspectives (He Daming et al. 2001). An ADB project on the sustainable development of the Yunnan part of the Lancang-Mekong Basin was also provocative and put new information into the public domain (Landcare Research New Zealand 2000).

Transboundary Environment Assessment (EA) protocols, and the *UN Convention on the Law of the Non-Navigational Uses of International Watercourses* have been ineffective in either fostering or forcing more extensive ‘cooperation’ or ‘dialogue’. Thus far, other inter-government forums such as the ASEAN-China dialogues have also ignored the issue. The concerns of downstream nations do not seem to have been taken into account but “*this is no surprise given the reticence of any of the downstream government elites to make any serious representations to their more powerful upstream neighbour, and in several cases, increasingly important patron*” (Dore 2003). Moreover, in the case of Thailand, EGAT and government officials have been participating in at least a part of the cascade development for about a decade, signing various Memorandums of Understanding (MoUs).

For related reasons, the regional member States have rendered the Mekong River Commission relatively impotent as an inter-government forum for addressing crossborder disputes. However, it should be acknowledged that in the ‘Kristensen era 1999-2003’ of the MRC, the secretariat tried harder than previously, for example via carefully worded indirect appeals through the international and regional media. Others have also noted the general silence of the neighbouring State leaders in raising any objections to China’s Lancang dam building program.

Challenging the rationale and speculating about the possible negative consequences has been left to Thai, Cambodian and international NGOs and policy research groups. This has greatly enhanced knowledge and awareness, but has had no substantive impact on the implementation of the scheme.

Box 4 Fish and Cambodia's Tonle Sap

There is a rich diversity of fish in the Mekong system. Whilst the taxonomy is still being sorted out, most experts agreeing there are more than 1,000 freshwater species. Fisheries are vital to the livelihoods of most of the 12 million rural households in the lower Mekong (MRC 2003). Current estimates are that almost 2 million tonnes are harvested each year from the Lancang/Mekong fishery – 1.75 million tonnes from the 'capture fisheries' valued at USD 1.45 billion, plus another 250,000 tonnes from aquaculture (MRC 2002). It is assumed the cascade will harm the fishery due to the new flow regime, migration disruption, temperature and sediment load changes. The Tonle Sap – Great Lake (TS-GL) area includes the largest freshwater lake in South East Asia. The functioning of this unique hydrological and ecological system is critical to the fisheries and rice fields production – and therefore the livelihoods and economy – of Cambodia and southern Vietnam. The area also has other ecological values which are deemed to be of national, regional and international importance. The depth varies from 1-2 meters in the dry season to 9-11 meters in the flood and its surface area varies from 250,000-300,000 hectares in the dry to 900,000-1,600,000 hectares depending on the extent of the wet season. At high water level the TS-GL covers up to about 7% of the area of Cambodia. The lake is connected to the Mekong river at Phnom Penh by the TS-GL river. In the dry season the TS-GL river empties into the Mekong river, whereas in the wet season the river reverses direction and flows back towards the lake. More than 60% of the floodwater of the TS-GL comes from the Mekong river, the remainder from the catchment areas of the lake. At full flood the TS-GL temporarily stores about 72 billion m³ of water, which equates to 16% of the average annual discharge of the Mekong river (MRC et al. 1998). The present annual fish catch from TS-GL is estimated at 235,000 tonnes, depending on the season (van Zalinge et al. 2001).

What might be the impact of the Lancang dams on the Tonle Sap fishery?

The Lancang/Mekong provides 70% of the sediment load received by the TS-GL. The closure of the Manwan dam in 1993 halved the sediment load in the Mekong river water at Chiang Saen in northern Thailand. It is uncertain as to the extent to which sediment loads will be further reduced when Xiaowan and others in the cascade are completed, and how far downstream these effects will be measured. The relationship between source of sediment and nutrient availability is also unclear. However, the researchers producing this data are convinced of the threat. They summarise: *“regional developments utilising the Mekong water, such as extensive damming of tributaries and the main river (in China), as well as irrigation, may lead to lower downstream flood levels and extensive trapping of sediments, and thereby have a negative effect on the fertility of the Tonle Sap system, which appears to depend on high flood levels with a high sediment load”* (Sarkkula et al. 2003:45).

Jinsha

The Jinsha is the largest river in Yunnan and refers to a stretch of about 2,300 km from Yushu in Qinghai Province to Yibing in Sichuan Province. More loosely, it refers to the 'Yangtze' upstream of the Three Gorges Dam project. The upper Jinsha refers to the 994 km reach from Yushu down to Shigu in Yunnan's Lijiang Prefecture. The last 360 km are within Yunnan. Before the famous 'first bend of the Yangtze'¹⁶ at Shigu the river heads south in parallel with the Nu and the Lancang, thereafter it winds its way generally eastwards, splitting China in two between *“the wheat-growing North and the rice-growing South”* (Winchester 1996). There are no serious plans for hydropower in the upper Jinsha but plans for the middle and lower reaches have been worked up over the past ten years.

¹⁶ Winchester (1996) provides a brief account of the significance and mythology of the rock barrier (Yun Ling or 'Cloud Mountain) which changes the course of the river, at the beginning of his book 'The River at the Centre of the World'.

Box 5 Financing the Three Gorges project

The Three Gorges project is a flagship, national project costing USD 22 billion. The China Yangtze Three Gorges Project Development Corporation (CYTGPDC) is responsible for the construction phase, which began in 1994 and is scheduled for completion in 2021. Finance has been found from a range of sources. In 1992 the Beijing government imposed a levy on power producers across the country of between 0.004-0.007 yuan per Kwh. The project was also granted the revenues from the Gezhouba power plant. Over an extended period, China Development Bank has thus far contributed USD 3.6 billion. With rising confidence in the project over time, the managers have been able to raise USD 2.3 billion from bond issues on the domestic market for periods of 15, 20 and 30 years. A further USD 1.3 billion has been borrowed from commercial banks including the China Construction Bank, the Industrial and Commercial Bank of China, and the the Bank of Communications (Beijing Review 2003a). The managers are confident that future funds will be found as required, with all options – domestic or international – open to consideration.

Not content with waiting to finish this gigantic project before starting any other, CTGPC has already announced plans to build four new hydropower plants further upstream on the Jinsha which will provide twice as much generating capacity as the existing Three Gorges. To manage power generation, sales and management, the China Yangtze Electric Power Corporation (CYEPC) has been created. This entity was ‘gifted’ assets of the aforementioned Gezhouba to aid in its start-up. It obtained permission from the government’s corporate regulator to list on the domestic stock market in November 2003. 29.6% of the company was ‘sold’ with the share price rising 44% on the first day from the initial offering price. The offering was heavily over-subscribed and raised USD 1.2 billion.

From Shigu to the junction with the Yalong river is the 563 km middle Jinsha, most of which runs through north-western Yunnan Province. There are major development plans for this stretch, with eight dams proposed. Huaneng is the main player, having effectively been allocated the ‘concession’ for this section of the river, which is considered ideal for hydropower development. They are intending to develop seven of the proposed dams. An eighth is planned by the private company Huari, which had commenced negotiating with Lijiang prefecture and Yunnan provincial governments prior to the SPC break-up and asset distribution.

The lower Jinsha runs for 768 km to Yibing. Most of this section forms the border between Sichuan Province and Yunnan Province. A further four dams are planned for the lower Jinsha by the China Yangtze Three Gorges Project Development Corporation (CYTGPDC). These huge stations are reportedly planned to have an installed capacity 38,500 MW, which would be twice as much as the existing Three Gorges project (China West News 2003a).

So, it would seem that there will be one river with three different ‘owners’, potentially making flow management more complex.

Issues

Particular dam projects in Yunnan appear to have taken on a life of their own, well beyond the visions/strategies emanating directly from the Beijing or Yunnan governments. The momentum now acquired makes it difficult to modify the development agenda, partly because government is now ‘less empowered’ and/or compromised by its linkages with private investment. The lines between public and private have become extremely **blurred**, whether via formal or informal public-private partnerships. New forces for development are pushing projects, such as: international financiers and the increasingly empowered natural-assets rich ‘State-controlled’ power companies. The political economy has **shifted**. Formal State policy and planning may no longer be the key driver as capitalist forces have been substantially unleashed. In such a situation, the regulatory role played by State and civil society becomes critical.

Consider the following statement – “*In the view of some experts, repetitive construction is a natural problem occurring in the development of a market economy, so it should be dealt with by the market itself, rather than through administrative interference such as loan suspensions and banning projects*” (Feng Jianhua 2003). Whilst made with particular reference to the electrolytic aluminium and iron and steel industries, reflect for a moment on its relevance to the hydropower industry. Imagine the consequences of unrestrained, over-zealous ‘repetitive construction’ in the hydropower industry. Imperfect markets can be wasteful and destructive.

Investment driven by competition, supported by easily accessible finance and almost free access to public land and water assets may not yield ‘net’ public benefit (regardless of how it is defined). It would seem that there is a **dangerous brew** of unrestrained competition policy, confusion about the regulatory role of the State, freely available investment funds and easy access to rivers that could lead to unnecessary and irreversible damage to ecosystems, natural and cultural heritage and local livelihoods. Many within China are concerned about this current headlong pursuit of hydropower development. Other values are being discussed, other decision making processes suggested, and the sensibility of hyper-competition between energy business giants is being challenged.

Several key questions require revisiting.¹⁷

What type of development is preferred? This strikes at the heart of development directions – the ‘conventional’ economic development of modernity, or more sustainability-oriented conceptions where different values are prized? Whilst pursuing economic growth for job creation and poverty reduction is still paramount, the ‘New and Scientific Concept of Development’ being actively promoted by President Hu Jintao explicitly acknowledges other goals – human development, more efficient resource use and less pollution (China Daily 2004a). Within this new context a review of national energy policy, including the hydropower component, would be appropriate.

How are development goals to be achieved? This is essentially about modalities and roles which should be taken by the State, business and general citizens. The current phenomenon where capitalist entities are assuming monopoly control over State-owned natural resources requires rapid review and adjustment. More detailed analysis is required of the impacts of China’s energy reform policies and the related surge for substantial Yunnan hydropower expansion. There seem to be many risks associated with these recent policy changes. There are serious concerns about the impact of the policies which have led to the current competition between the ‘big 5 + 1’. It is not simply a case of healthy competition between business competitors within a framework which guarantees overall public benefit. Water resources are being monopolised by the large companies via the partnerships being negotiated with various national and local authorities. The wisdom of policy which permits this degree of control and exploitation by profit-driven entities is now being challenged.

How are decisions about setting and striving for these goals to be made? This is about the concept of governance which “*encompasses the complex and open network of authorities by which the life of society – its institutions, bodies, souls, canons, knowledge, news – is monitored and managed*”.^{18 19} When thinking about the directions taken by society, the governance processes by which we deal with conflict are what really matter. Are they adequate?

¹⁷ These were triggered by and adapted from similar questions posed by a journalist (China Power News 2004).

¹⁸ Lambropoulos V (1996) ‘Nomoscopic analysis’, *South Atlantic Quarterly* 95:4, 855-879.

¹⁹ A narrow conception may focus on: administration, business practice, legal formalities or government.

Hydropower development is a sensitive issue, not just in China, but throughout the Mekong Region. Numerous projects have become the subject of national, and in some cases regional and international controversies. Examples include: Vietnam's Se San, Sre Pok and Son La dams; Lao PDR's Theun Hinboun and Nam Theun 2 dams; Thailand's Pak Mun dam; the Yunnan dams, and those further downstream on the Nu/Salween into Myanmar. In the Mekong Region, as elsewhere, it seems that many costs of hydropower development are ignored or externalised from analysis and debate.

Advocates of hydropower tout its positive features: renewable energy, pollution-free, relatively low generating cost, flood reducing, navigation improving and increased irrigation opportunities. However, an assessment of large dams by the World Commission on Dams found that performance is very variable, with many dams falling short of economic expectations and most having large impacts, more negative than positive, on rivers, watersheds and aquatic ecosystems. They also found that resettlement and compensation schemes had often been inadequate, impoverishing millions of people. Moreover, they noted that *"Since the environmental and social costs of large dams have been poorly accounted for in economic terms, the true profitability of these schemes remains elusive"* (WCD 2000:xxxix).

In China and the other Mekong countries, the large dam paradigm remains a respected pillar of the energy industry and key offices within government. New construction is deemed essential to meet national and regional energy demands. Nevertheless, there is a series of key issues which have emerged around the world, which should also be considered by Mekong Region decision makers (Box 6). There was an initial expectation world wide that Impact Assessment (IA) would be a key mechanism to 'solve' development project problems and address many of these issues. However, as practiced, it has not met expectations.

Box 6 Central issues in the dams debate: past and present

Performance: costs and benefits....much depends on how completely costs are internalised, and who bears particular costs compared to how the benefits are shared.

Environmental impacts and sustainability...fundamental controversy centres on how environmental considerations are valued against immediate human development needs.

Social impacts and equity...much concern about the basis on which trade-offs, such as potential benefits to many at the cost of hardship for a few, are invoked and decided.

Economics and finance...controversy also surrounds the limits and the ability of methods for economic assessment to fully capture and reflect the various social and environmental impacts and values.

Governance and participation...at the heart of debate is the degree of involvement of affected people and wider groups of stakeholders in needs assessment and project-level decision making.

Wider development impact of dams...controversial issues go beyond the impact of the project itself and touch upon wider regional or national development choices.

Alternatives to dams...are alternatives to large dams genuinely considered?

Cross-cutting issues...which actors are the most powerful and most influential in decision making processes? what and whose rights are prioritised?

Source: Dams and Development (WCD 2000)

Hydropower governance should be inherently inter-disciplinary and perspectives from the social and physical sciences, government and civil societies should all have a place. China's highest political leadership has endorsed more participatory forms of governance (China Daily 2004b). Therefore it would seem that a necessary national review of hydropower governance, presently rooted in a closed rather than open network, whilst difficult, is politically possible.

Impact assessment is only one **component** of governance, but due to the attention it receives, for good reasons, some comment is required here. There are standard issues raised in criticism of EIA, as it is usually undertaken. Most EIA tends to focus on individual projects and is therefore relatively narrow in its scope. Impact zone analyses often stop at national borders.²⁰ EIA often occurs at a relatively late stage in the decision making process, when choice of alternatives has already been limited and significant project investment has taken place. EIA often occurs when there has already been significant positions taken in terms of project advocacy or opposition. EIA often occurs after political decisions have already been taken to proceed. The project-EIA then becomes an exercise in ameliorating negative impacts rather than an exploration of possibly more suitable alternatives. Moreover, 'environment' is used in a more and less encompassing way in different countries – sometimes excluding social and economic issues, sometimes including one or other of these realms.

These standard criticisms resonate when reflecting on the current EIA process proposed for the Nu river development. There have been Chinese regulations about environmental protection since the late 1970s. A framework has evolved, the latest step being the law on EIA, which came into effect on 1 September 2003. Effort has also been put into Environmental Impact Assessment (EIA) by other Mekong Region countries, with the exception of Myanmar.

The overarching term of Impact Assessment (IA) is conceptually preferable, as it reduces the likelihood of externalising important factors. IA may involve evaluation of economic, social, cultural, political, environmental/biophysical/ecological, transboundary and cumulative impacts. But key to being truly useful is that IA occurs before final decision making, and at a time when alternative options can be genuinely considered.

A suggestion voiced by experts attending the ground breaking January 2004 Beijing hydropower forum was that *“like everything else, hydroelectric plants and dams have their pros and cons...only when the comprehensive impact in economic, social and cultural terms is calculated objectively can assessment be made”* (Chen Hong 2004). This ideal has not yet been evident in Yunnan's massive hydropower expansion push. Neither has it been common in other parts of the Mekong Region. It is not proposed to list here views about all of these types of 'impact'. Some examples will suffice to show that IA needs to be more rigorous.

Economic impacts of Yunnan's hydropower development are unclear and may have been substantially over-estimated by information used in decision making. The useful life of the dams may be much less than has been (presumably) expected and factored into economic calculations. Whilst estimated construction and operating costs per unit of power produced may be attractive, sedimentation inflows into the first-completed Manwan dam are much higher than anticipated (Plinston and He Daming 2000). There are now concerns that without drastic corrective landcare measures, it may only be able to function as a power-producer for less than 20 years (Roberts 2001:150). Without the upstream construction of the sediment-trapping Xiaowan, the Manwan dam would have a very brief working life. The economics of the Yunnan dams need to be properly evaluated, and that evaluation widely shared.

Cross border social and environmental impacts in downstream Myanmar, Lao PDR, Thailand, Cambodia and Vietnam have yet to be factored into China's plans. Crossborder cooperation protocols for dam operation will be necessary for ecological damage to be minimised. Almost inevitably this would require energy production to be less than the pure economic optimum. How will this be **negotiated**?

²⁰ The four lower Mekong countries are slowly developing a transboundary EIA protocol, based on the European Espoo Convention. The process is being facilitated by the Mekong River Commission secretariat.

One new approach has been presented in the report by the Commissioners which they released at the end of the World Commission on Dams (WCD) process (WCD 2000, Dubash et al. 2001). The WCD was a multi-stakeholder dialogue process which heard many different opinions. Ultimately, the Commissioners wrote their own opinion and have offered it as their contribution to the large dams debate and to those with responsibility for influencing or making large dam decisions (Box 7).

Box 7 A new framework for large dams decision making

The World Commission on Dams (WCD) process and the report are continuing to make a significant contribution to world-wide large dams debates. A key conclusion of the Commissioners was that it is imperative *“to bring new voices, perspectives and criteria into decision making”* (WCD 2000:197), hence their advocacy for a process which *“gives all key stakeholders a voice and a full opportunity to participate in decision making, seeks the broadest reasonable consensus, and is transparent in the criteria used for reaching a decision”* (2000:209).

The Commissioners advocated, as a starting point, clarifying the rights context by undertaking a transparent assessment of the constitutional, customary, international, human, ecological etc. rights held by interested and affected parties. They pointed out that this is best undertaken in tandem with a substantial assessment of the risks borne voluntarily by ‘risk takers’ and involuntarily by ‘risk bearers’. They continued on to propose a decision making framework which pays close attention to the following priority areas:

1. **Gaining public acceptance** which advocates genuinely participatory decision making processes
2. **Comprehensive options assessment** which advocates genuine consideration of alternatives, rather than just focusing on impact assessment and amelioration/mitigation of negatives.
3. **Addressing existing dams** acknowledging that there are many decisions which have to be made about managing existing dams.
4. **Sustaining rivers and livelihoods** is primarily concerned with protecting ecosystems.
5. **Recognising entitlements and sharing benefits** is primarily concerned with human justice.
6. **Ensuring compliance** concentrates on checking that all commitments made in negotiations are subsequently adhered to.
7. **Sharing rivers for peace, development and security** is endeavouring to see that transboundary, crossborder or ‘between country’ issues are acknowledged, recognising that all riparian States and their peoples may be stakeholders.

Source: Dams and Development (WCD 2000)

The WCD framework is a useful guide being increasingly considered by different groups within China. Translation and dissemination of the WCD report is ensuring that the issues raised in the WCD process are being more widely discussed. This is a positive step forward, and could greatly aid any review of existing Chinese dam decision making processes.

The rapid Yunnan hydropower expansion is already having a major impact on the national and provincial economy, the finance sector, the rivers and the people of the province. A detailed review and debate is urgently needed of the rationale, the processes, the options and the implications for the entire Mekong Region.

Recommendations

First order – China Energy Policy and Energy Development Governance

There are two key messages this report seeks to deliver. First, there is a need for China to **revisit the energy policy**, including the hydropower component, in the light of the new direction signalled in the New and Scientific Development Concept announced in 2003 by China's political leadership, and reinforced by President Hu Jintao at the 10th National People's Congress (NPC) meeting in March 2004. Second, there is a need to **overhaul energy development governance processes** including: option formulation, debate, evaluation, negotiation and monitoring. The approvals and impact assessment processes are key areas requiring strengthening.

Second order – Yunnan Hydropower Governance

Current controversy over proposed Nu river development provides opportunity to enhance the quality of Yunnan hydropower governance. The following Nu analyses and assessments would, if undertaken and widely shared, contribute sorely needed new elements to China and Mekong Region governance forums. Similar Lancang and Jinsha analysis would also be beneficial.

Decision making process assessment

It is nothing new to note that Impact Assessment processes should contribute to decision making and Approvals processes, rather than follow afterwards as a 'rubber stamp' to legitimise a decision already taken, perhaps making minor changes to implementation plans. The influence exerted when selecting and using 'expert panels' also needs examination. Possibilities for more participatory, informed and informing processes should also be explored. Closed processes which have to be painstakingly prised open are surely not the best way to go. Detailed analysis of the current Nu development decision making process would be instructive.

Political economy assessment

Further clarification of the substantial shift in the political economy of Yunnan hydropower is required. Research should particularly focus on the relative power relationships between and within States; and between States, business and civil society. Production and public debate of this analysis is necessary for more informed and equitable and decision making.

Economic assessment

The economics of Yunnan dams need proper evaluation from different perspectives, but in a way which takes account of the reality of the new and fierce competition between developers, and improves upon past analytical approaches which have regularly externalised many costs and benefits, and hidden or ignored particular winners and losers.

Social/cultural impact assessment

Social and cultural impact assessment is not common in China or the rest of the Mekong Region, but has been done recently (albeit only retrospectively) for Manwan dam. Entrenching this type of analysis before committing to particular development pathways would be a step forward.

Ecological/natural heritage risk assessment

There are conflicting arguments presented by Yunnan dam proponents and critics about the risks to ecosystems and the natural heritage of affected areas. Clarification of the risks is required.

Transboundary, cumulative and multiplier effects assessment

More consideration needs to be given to transboundary effects. Impact assessment should not stop at national borders. Consideration should also be given to cumulative and multiplier effects.

References

- ADB (2002) 'The 2020 project', Comprehensive report describing the Western Region Development Strategy. Asian Development Bank, Manila.
- Alexanders Oil and Gas Connections (2003) 'Profile of China's electric power industry', *News and Trends: East and Southeast Asia* 8:2.
- Ball A, Hansard A, Curtotti R and Schneider K (2003) 'China's Changing Coal Industry', ABARE eReport 03.3. Australian Bureau of Agricultural Economics, Canberra.
- Beijing Review, 'Beyond Three Gorges', 3 September 2003.
- Beijing Review, 'China No. 4 in FDI stock', 4 September 2003.
- Beijing Review, 'Makeover for takeovers', 28 August 2003.
- Blake D (2001) 'Proposed Mekong dam scheme in China threatens millions in downstream countries', *World Rivers Review*, June 2001, 4-5.
- Business Weekly, 'Power companies rushing to build new plants', 26 March 2003.
- CDB (2003) China Development Bank offers loan of RMB 15 billion in support of the construction of the Xiaowan hydraulic power station, [14 October 2003, Downloaded web-<http://www.cdb.com.cn>]
- Chapman EC and He Daming (1996) 'Downstream implications of China's dams on the Lancang Jiang (Upper Mekong) and their potential significance for greater regional cooperation, basin-wide' in B Stensholt (ed.) *Development Dilemmas in the Mekong Subregion*. Monash Asia Institute, Melbourne, 16-24.
- Chen Hong (2004) 'Hydropower generates debates', *China Daily*, 15 January 2004.
- China Daily, 'Power monopoly broken down, electricity regulatory commission to set up', 30 December 2002.
- China Daily, 'State run power grid reforms underway', 4 September 2003.
- China Daily, 'CLP Power to invest in thermopower plants in Guangxi', 15 October 2003.
- China Daily, 'Monopoly grid switches to private firm', 24 September 2003.
- China Daily, 'Leaders stress development', 6 March 2004.
- China Daily, 'New way of thinking bodes well for the future', 6 March 2004.
- China Economic Review, 'China's hydro capacity to double', December 2002/January 2003, 6.
- China People's Daily Online, 'Nuclear energy to take 3 per cent of China's total by 2005', 10 April 2003.
- China People's Daily Online, 'Energy demand set to double by 2020', 19 November 2003.
- China People's Daily Online, 'China's grid giant gives shares to Huaneng company', 24 September 2003.
- China People's Daily Online, 'Regulator sets target for China's power sector reform', 26 March 2003.
- China People's Daily Online, 'China steps up development of southern power grid', 27 March 2003.
- China Power News (translated by Kevin Li), 'Economic vision: hydropower faces dilemma again in China', 10 February 2004.
- China West News, 'China plans four hydropower plants on Dri Chu source', 1 February 2003.
- China West News, 'Loan for key hydropower project', 19 February 2003.
- Choolit Vatcharasinthu and Babel MS (1999) 'Hydropower potential and water diversion from the Salween Basin', in Workshop on Transboundary Waters: The Salween Basin. Organised by AIT Regional Environmental Management Centre, Oregon State University, University of Victoria, Chiang Mai, 13-16 September 1999.
- Dore J (2003) 'The governance of increasing Mekong regionalism' in Mingsarn Kaosa-ard and J Dore (eds.) *Social Challenges for the Mekong Region*. White Lotus, Bangkok.
- Dubash NK, Dupar M, Kothari S and Lissu T (2001) *A Watershed in Global Governance? An Independent Assessment of the World Commission on Dams*. World Resources Institute, Lokayan and Lawyer's Environmental Action Team.
- Dunning JH (1988) *Explaining International Production*. Unwin Hyman, London.
- Feng Jianhua (2003) 'What a waste', *Beijing Review* 46:36, 12-15.

- Forsyth T (1999) *International Investment and Climate Change: Energy Technologies for Developing Countries*. Royal Institute of International Affairs, London.
- Freshfields Bruckhaus Deringer (2003) 'Restructuring China's power sector', China Notes, March 2003.
- Gao Shixian (2000) 'China' in PB Stares (ed.) *Rethinking Energy Security in East Asia*. Japan Centre for International Exchange, Tokyo.
- Giddens A (1992) *Modernity and Self Identity: Self and Society in the Late Modern Age*. Polity Press, Cambridge.
- He Daming, Zhang Guoyou and Hsiang-te Kung (eds.) (2001) *Towards Cooperative Utilisation and Coordinated Management of International Rivers* Proceedings of International Symposium 25-30 June 1999 Kunming, China. Science Press & United Nations University, New York & Tokyo.
- He Jing (2002) 'A research on the development strategy of the 21st century's hydropower in China', *Electricity* 13:1.
- Hinton P (2000) 'Where nothing is as it seems: between Southeast China and mainland Southeast Asia in the "post-socialist" era' in G Evans, C Hutton and KK Eng (eds.) *Where China Meets Southeast Asia: Social & Cultural Change in the Border Regions*. White Lotus, Bangkok, 7-27.
- ICOLD (2001) A brief Introduction to Dachaoshan hydropower project, [15 December 2001, International Commission on Large Dams website]
- International Energy Agency, 'Press release (02)32 on China's oil needs', 12 December 2002.
- International Energy Agency, 'Press release (02)24 on China's energy purchases and infrastructure needs to 2030', 26 September 2002.
- IRN (2002) 'China's Upper Mekong dams endanger millions downstream', Briefing paper 3. International Rivers Network, Berkely.
- Jia Mulan (2003) 'Overview of power industry', *tdctrade.com*, 10 March 2003.
- Kattoulas V (2001) 'Witnesses to a crisis', *Far Eastern Economic Review*, 27 September 2001.
- Kwanchai Rungfapaisarn (2003) 'Yunnan eyes SE Asia trade & investment', *The Nation*, 22 October 2003.
- Landcare Research New Zealand (2000) 'Policies and Strategies for the Sustainable Development of the Lancang River Basin. Final Report of ADB TA 3139-PRC'. Landcare Research New Zealand for the Asian Development Bank, Manila.
- McCormack G (2001) 'Water margins: competing paradigms in China', *Critical Asian Studies* 33:1, 5-30.
- Medlock KB and Soligo R (1999) 'China and long-range Asia energy securities: An analysis of political, economic and technological factors shaping Asian energy markets'. Rice University's James A Baker Institute for Public Policy.
- Mingsarn Kaosa-ard and Dore J (eds.) (2003) *Social Challenges for the Mekong Region*. White Lotus, Bangkok.
- MRC (2002) *Annual Report 2001*. Mekong River Commission, Phnom Penh.
- MRC (2003) *State of the Basin Report*. Mekong River Commission, Phnom Penh.
- MRC, UNDP, CNMC, NEDECO and MIDAS (1998) 'Natural resources-based development strategy for the Tonle Sap area, Cambodia: Final Report, Volumes 1-3'. Mekong River Commission, Phnom Penh.
- Nareerat Wiriyaopong (2003) 'Egat wants China and Burma to join in huge hydropower project', *The Nation*, 16 November 2003.
- Plinston D and He Daming (1999) 'Water resources and hydropower', Report for ADB TA-3139 Policies and Strategies for Sustainable Development of the Lancang River Basin. Asian Development Bank, Manila.
- Plinston D and He Daming (2000) 'Water resources and hydropower in the Lancang river basin', Final report of ADB TA-3139 Policies and Strategies for Sustainable Development of the Lancang River Basin. Asian Development Bank, Manila.
- Rajesh N (2003) 'Thailand's Salween dams to fuel Southeast Asian regional power grid at the cost to ethnic communities forests and rivers', *Watershed* 9:1, TERRA.
- Roberts TR (2001) 'Killing the Mekong: China's fluvicidal hydropower-cum-navigation development scheme', *Natural History Bulletin of the Siam Society* 49, 143-159.

- Sarkkula J, Koponen J and others (2003) 'Modelling Tonle Sap for environmental impact assessment and management support', Final report. Finnish Environment Institute and EIA Ltd., Helsinki and Espoo.
- Scholte JA (2000) *Globalisation: A Critical Introduction*. Palgrave.
- Stares PB (ed.) (2000) *Rethinking Energy Security in East Asia*. Japan Centre for International Exchange, Tokyo.
- TERRA (2002) 'Creating catastrophe: China and its dams on the Mekong', *Watershed* 8:2, Towards Ecological Recovery and Regional Alliance.
- Vaitheeswaran V (2003) *Power to the People: How the coming energy revolution will transform an industry, change our lives, and maybe even save the planet*. Farrar Straus and Giroux.
- van Zalinge N, Nao Thuok and Sam Nuov (2001) 'Status of the Cambodian inland capture fisheries with special reference to the Tonle Sap Great Lak', Cambodia Fisheries Technical Paper Series Volume III. Inland Fisheries Research & Development Institute of Cambodia, Phnom Penh.
- Watcharapong Thongrungs (2003) 'EGAT told to suspend dam talks', The Nation, 27 October 2003.
- WCD (2000) *Dams and Development: A New Framework for Decision Making*. World Commission on Dams, Cape Town.
- Winchester S (1996) *The River at the Centre of the World: A Journey up the Yangtze and Back in Chinese Time*. Penguin Books.
- World Bank (1998) China-East China (Jiangsu) 500kV Transmission Project, [2 January 2004, World Bank Infoshop web-<http://www.worldbank.org.cn/Chinese/content/81811198523>]
- Xinhua News Agency, 'World's biggest power grid built in China', 23 September 2003.

Acknowledgement

The writers are grateful to many people who assisted us with information for this report. We would also like to thank reviewers of a draft document – Louis Lebel, Jesse Manuta, Jorma Koponen, Juha Sarkkula, Noel Rajesh and Masao Imumura – who offered helpful suggestions. John Dore would also like to acknowledge the support of colleagues at the Australian National University's School of Resources Environment & Society, plus two research organisations: Land & Water Australia, and the National Research Council of Thailand.