

# Hydropower Development and Resettlement Policy on China's Nu River

Philip H Brown<sup>\*</sup>, Yilin Xu<sup>†</sup>

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## Abstract

Hydropower represents an important alternative form of energy in China, a country that currently uses coal to supply 78% of its electricity. However, evidence from large hydropower projects in China show that the socio-economic and environmental costs of hydropower development are substantial. Construction on the first of the 13 planned dams on the Nu River began in the summer of 2008, and villages are already beginning to be displaced. Based on fieldwork in the area, we find that the local resettlement policies infringe upon the national regulations governing resettlement caused by major infrastructure development. This infringement includes high prices for resettlement homes, forcing villagers to leave agricultural production, a lack of programs for long-term economic development, and a lack of transparency in decision-making processes.

Keywords: dams; hydropower; population displacement; water policy; Nu River

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<sup>\*</sup> Colby College Department of Economics; E-mail: phbrown@colby.edu (corresponding author)

<sup>†</sup> Colby College Department of Economics; E-mail: kevinsh@gmail.com

## **I. Introduction**

Growth in energy demand in China has been commensurate with the country's rapid economic growth. As a relatively clean form of energy, hydropower represents an important alternative to coal for electricity production since China is rich in water resources and already has advanced technical expertise in building large hydropower stations (Brown, Magee, and Xu 2008). The 13-dam cascade comprising the Nu River Project is one of biggest hydropower development projects yet conceived in China, and once completed, will have a larger generating capacity than the Three Gorges Dam (Tullos 2009). As such, the Project has attracted substantial investment in the form of energy infrastructure and heavy industry to the Nujiang Lisu Autonomous Prefecture,<sup>1</sup> and will likely be a large stimulus to local economic development.

After much deliberation and amid the on-going controversy surrounding the Nu River Project, infrastructure for the Liuku Dam began construction in June 2008. As one of the first dams to be built in the cascade, the project has already caused the resettlement of Xiaoshaba village, and if the dam is completed, the rising waters will displace residents in two other villages as well. The resettlement experience at Liuku will undoubtedly be watched carefully by residents likely to be affected by the other 12 dams, as well as both proponents and opponents of the Nu River Project. Because of the precedent it sets for the remaining dams on the Nu River, Liuku provides a vital case study of the resettlement process.

One of the authors traveled to Nujiang Prefecture in late spring 2008 to conduct semi-structured interviews and to learn about resettlement procedures in the three villages that will be most directly affected by the Liuku Dam. During fieldwork, several violations of the "Regulations on Land Acquisition Compensation and Resettlement of Migrants for Construction of Large and Medium Scale Water Conservancy and Hydropower Project" adopted by the central

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<sup>1</sup> Hereafter, "Nujiang Prefecture"

government in 2006 (the year preceding the resettlement of Xiaoshaba Village) were noted, including the size and cost of resettlement housing, the lack of provisions to enable residents to continue farming after resettlement, the lack of long-term training and support programs for off-farm activities, and the lack of input regarding the resettlement process from the villagers themselves. We argue that better oversight is needed in order to minimize the negative economic consequences of displacement.

This paper first provides a detailed account of the geography and ecology of the Nu River. We then describe the socioeconomic situation of the Nu River valley as well as the recent influx of investment following news of the Nu River Project. Next, we describe the proposed 13-dam cascade and progression on its construction in detail. Then, we describe national policies governing the resettlement and compensation processes for infrastructure development in China. Finally, we present findings from the fieldwork conducted in Liuku and identify apparent violations of the national policy. A brief conclusion ensues.

## **II. Geography and Ecology of the Nu River Area**

”*Nu*” is a phonetic approximation of the Lisu name for the river, which is “Nong,” meaning “angry” (Mertha 2008). With its source located on Jiangmeier Mountain in the Tanggula mountain range in Naqu Prefecture, Tibet Autonomous Region,<sup>2</sup> the Nu flows through Naqu, Changdu, and Linzhi prefectures of Tibet before entering Yunnan. In Yunnan, it passes through Gongshan, Fugong, and Lushui counties in Nujiang Prefecture and Longyang District, Shidian County, and Longling County of Baoshan City. The river then flows out of China and enters Myanmar, where it is referred to as the Salween. The Nu River has a total length of 2018 km,

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<sup>2</sup> Prior to 1997, the Nu was believed to originate from melting ice on the 6,070-meter Jiregepa peak in the Tanggula mountain range in Tibet (Huang 2004).

with 600 km in Tibet and 618 km in Yunnan Province. The river drops 640 meters over the course of its run in China, or 2.03 meters/km. The total drainage area is 103,330 km<sup>2</sup> in Tibet (Tibet Bureau of Statistics 2007) and 33,366 km<sup>2</sup> in Yunnan (Yunnan Bureau of Statistics 2007),<sup>3</sup> and the average flow volume is 1,664 meters<sup>3</sup> per second. The river is steep and narrow, with an average width of just 100 to 130 meters and a valley slope that varies between 35 and 50 degrees. As such, the river is very attractive for hydropower development (Wang et al. 2005). Indeed, with a theoretical hydroelectricity potential of 36,400 MW (Lin and Zhang 2005), the Nu River Basin is the sixth largest in China in terms of exploitable capacity (Xiang and Zhang 2005).

The Nu River region is home to a rich collection of flora and fauna. Among the estimated 6,000 species of plants and animals found in the region, 1397 are listed as protected species (Huang 2003), including 20 “first degree” protected animal species and 40 “second degree” protected animal species (Luo, Bao, and Li 2005).<sup>4</sup> There are 48 known species of fish in the Nu River, 70% of which are endemic and four of which are listed as endangered (Magee and McDonald 2009). The Nu River region is part of the Three Parallel Rivers World Heritage Site designated by UNESCO in 2003, which is composed of eight geographic clusters (UNESCO 2008), including Gaoligong Mountain, Laowo Mountain, and Yunling Mountain. At the request of the Yunnan provincial authorities, the Three Parallel Rivers World Heritage area is restricted to areas above 2,000 meters in elevation, and as such, the World Heritage site excludes the river itself (Mertha 2008). Conservation International refers to this area as a “biodiversity hotspot”<sup>5</sup> for its rich flora and fauna (Conservation International 2008). Although the impacts of dam

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<sup>3</sup> The drainage in Nujiang Prefecture totals 7906 km<sup>2</sup> while that in Baoshan City totals 25,460 km<sup>2</sup>.

<sup>4</sup> These terms refer to the status of animal species in the wild, with “first degree” species in the greatest danger of extinction. These ratings were coined in the “Wild Animals Protection Act” of 1989, and are updated annually by the State Council (Xinhua 2004).

<sup>5</sup> There are two criteria for a region to be designated as a “biodiversity hotspot.” Specifically, it must contain at least 1,500 species of vascular plants and it must have lost at least 70 percent of its original habitat (Conservation International 2007).

construction in the Nu River Valley on flora and fauna are likely to be substantial, this paper is primarily concerned with human outcomes.

The Nu River runs through one of the most ethnically diverse regions of China. Twenty-two of China's 55 officially recognized ethnicities are represented in Nujiang Prefecture, including Lisu, Bai, Nu, Pumi, and Dulong. Over half of the people in Nujiang Prefecture are of Lisu ethnicity and ethnic minorities account for over 92% of the total population (Yunnan Bureau of Statistics 2007). By contrast, 90.3% of the Baoshan City residents are ethnic Han (Yunnan Bureau of Statistics 2007), and most people residing in the Naqu, Changdu, and Linzhi regions of the Tibet autonomous Region are ethnic Tibetan (Tibet Bureau of Statistics 2007). Nevertheless, the Nu River area has a relatively low population density (Table 1), suggesting that population displacement arising from any dam building will be considerably less severe than elsewhere in population-dense China.

### **III. Economy of the Nu River Area**

The socio-economic status of the prefecture-level regions along the Nu River is summarized in Table 1. All five prefecture-level entities through which the Nu River flows have per capita GDP below the national average, and with the exception of Linzhi Prefecture, all other regions have per capita GDP below the average for the respective provinces. All five regions also depend heavily on subsidies from upper levels of government for fiscal resources.

Linzhi Prefecture, home of the proposed Songta Dam, is the second richest region in Tibet after the capital region of Lhasa (Tibet Bureau of Statistics 2007). Linzhi has a growing economy based on tourism and forestry resources (Yu and Zhang 2008), making the region a transportation hub for Eastern Tibet. Moreover, Tibet has the greatest theoretical hydropower

potential of any administrative entity in China at 201,000 MW, some 70% of which is concentrated in Linzhi Prefecture (Wang 2003). With a population density of just 1.2/km<sup>2</sup>, displacement is unlikely to be a serious concern of dam construction in this area. As such, hydropower development is at the core of Linzhi's economic development strategy.

Yunnan is the third-poorest province in China in per-capita GDP terms, and Nujiang Prefecture is ranked seventh out of 16 prefecture-level regions in terms of per-capita GDP (Yunnan Bureau of Statistics 2007). All four counties in Nujiang Prefecture are still designated as "national key poverty counties"<sup>6</sup> and Nujiang Prefecture remains one of the poorest ethnic minority autonomous prefectures in China (Nujiang Prefecture National Land Resources Bureau 2008). Industrial output accounts for 59.6% of Nujiang Prefecture's total GDP, and 98.3% of industrial output in the prefecture comes from heavy industry (Yunnan Bureau of Statistics 2007). Nujiang Prefecture is thereby especially reliant on heavy industry for its income, surpassing traditional industrial hubs such as Yuxi and Kunming. Such reliance on heavy industry is likely to increase in the future as hydropower stations become operational because new dam construction will spark demand for industrial inputs. Indeed, Nujiang Prefecture has already seen rapid increases in mining and refining in recent years, largely on expectations that hydropower will be developed (Liu 2008).

Not surprisingly, the proposed dams have also attracted a large amount of investment into the energy production sectors in Nujiang Prefecture. In 2006, for example, urban collective-owned and rural collective-owned enterprises invested a total of RMB 354.45 million in the production and supply of electricity, gas, and water in Yunnan Province, 62.64% of which was

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<sup>6</sup> The Central Government of China first designated a total of 592 counties as "National Key Poverty Counties" in 1986, with the goal of concentrating financial resources to combat poverty in the poorest regions of China. The list of counties was updated in 1994. Yunnan has a total of 73 "National Key Poverty Counties," the largest number among all provinces in China (State Council Leading Group Office of Poverty Alleviation and Development 2006).

allocated to Nujiang Prefecture (Yunnan Bureau of Statistics 2007). Indeed, literally all investment made by both urban collective-owned and rural collective-owned enterprises in Nujiang Prefecture that year was directed towards the production and supply of electricity, gas, and water (Yunnan Bureau of Statistics 2007).

The development of these energy-intensive industries and the influx of infrastructure investment have contributed to the rapid growth of per capita GDP in the prefecture. Since the official launch of the Nu River Project in 2003, the per capita GDP of Nujiang Prefecture has grown at 40.1% per year, compared to 16.6% for Yunnan Province as a whole (Yunnan Bureau of Statistics 2004; Yunnan Bureau of Statistics 2007). Indeed, per-capita GDP in Nujiang Prefecture grew 65.5% between 2005 and 2006, the highest growth rate among all regions of Yunnan.

Nevertheless, there is evidence that rural residents of Nujiang Prefecture, who comprise over 85% of the prefectural population, have not benefited from the heavy industrial development. For example, the net income of farmers in Nujiang Prefecture grew only 5.0% between 2003 and 2006, compared to 9.9% for Yunnan as a whole (Yunnan Bureau of Statistics 2004; Yunnan Bureau of Statistics 2007). Indeed, net farm incomes in Nujiang Prefecture rank last in Yunnan Province. Moreover, farm incomes grew more slowly between 2003 and 2006 than in the preceding five years, suggesting that many farmers are being left behind by economic development in southwestern China. As such, growing income inequality in Nujiang Prefecture poses a challenge to the notion that hydropower development in Nujiang will be help to reduce poverty through a greater provision of public goods. On the other hand, population density in Nujiang Prefecture is just 35.8/km<sup>2</sup> (26% of the average for China as a whole), suggesting that

displacement associated with hydropower development would be less severe in Nujiang Prefecture than in many other places in China.

In contrast to industrial Nujiang Prefecture, Baoshan City's economy relies mostly on agriculture and the service industry, which accounted for 33.75% and 39.66% of GDP in 2006, respectively (Yunnan Bureau of Statistics 2007).<sup>7</sup> Per-capita GDP in Baoshan was among the lowest in the province in 2003, yet it also grew at a lower rate than the provincial average over the subsequent three years, suggesting that the city is falling farther behind. Nevertheless, Baoshan City is rich in both mineral resources and hydropower potential along the Nu and the Lancang Rivers, so as with Nujiang Prefecture, Baoshan will depend on the energy sector and mining industries in trying to meet the objectives of China's eleventh Five-Year Plan (Yang 2006). However, the population density in Baoshan approaches that of China as a whole, suggesting that displacement associated with hydropower development in this area may be higher.

#### **IV. The Nu River Project**

As early as the 1970s, the Chinese government started conducting preliminary studies on the feasibility of building dams on the main stem of the Nu River. In the National Energy Survey conducted in the 1980s, the government collected information pertaining to dam development on the Nu River. These survey data were later incorporated into the Nu River development plan of 1989, which determined the number of cascades to be constructed on the river. The "China Hydropower Photo and Figures Collection," published in 1991 by the Hydroelectricity Bureau of the Department of Energy, tentatively identified six dams with a total generating capacity of 10,900 MW for development on the Nu (Cao and Zhang 2004). In 1999, China's National Development and Reform Commission (NDRC) solicited detailed plans for the development of

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<sup>7</sup>By contrast, agriculture and services accounted for 11.35% and 29.02% of GDP in Nujiang Prefecture, respectively.

hydropower in the middle and lower reaches of the Nu River in Yunnan province, which eventually led to the proposal for the 13-dam cascade (Cao and Zhang 2004).<sup>8</sup>

The Yunnan provincial government signed an agreement to develop hydroelectric stations on the Nu River with Huadian Corporation on 14 March 2003. The Yunnan Huadian Nujiang Hydroelectricity Development Corporation was formed on 14 June 2003 to oversee the project, and the first dam at Liuku Township in Lushui County, Nujiang Prefecture was announced on 18 July 2003. Actual construction on the Liuku Dam was to start on 20 September 2003 with a goal of completing the dam before the 2007 flood season (Zhou 2003). Engineering design for the Maji, Bijiang, Yabiluo, Lushui, Saige, and Yansangshu dams were also to start in 2003 (Beijing News 2003). Plans for hydropower development in Nujiang prefecture were approved by the NDRC on 14 August 2003.

However, the Nu River Project started to face obstacles when the National Environmental Protection Bureau organized the “Conference on the Nujiang Middle Lower Reach Hydropower Development and Ecological and Environmental Protection,” during which experts split on the merit of hydropower development relative to keeping the Nu as a “primitive ecological river” (Beijing News 2003). Despite three more rounds of conferences during September and October 2003, no consensus was reached on this issue.

Xie Yi (Chairman of the Nujiang CPC Committee) and Ou Zhiming (Governor of Nujiang Prefecture) traveled to Beijing on 22 October to advance the case for dam construction with officials from the NDRC, the Environmental Protection Bureau, the Ministry of Water Resources, the Water Resources Planning Academy, the Ministry of Transportation, and the State Ethical Affairs Commission. This trip gave a major boost to the prospect of the Nu River

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<sup>8</sup> Initial plans for the cascade were developed by the Beijing Investigation and Design Institute and the East China Investigation and Design Institute

Project. On 12 November, the National Environmental Protection Bureau again sent a fact-finding team to the Nu River area to hammer out the details on the dam cascade (Beijing News 2003). These discussions led to Xiaoshaba, a village 4.5 km north of the Liuku Township, being identified as the site of the Liuku Dam on 3 November 2003 (Beijing News 2003). However, the debate on the Nu cascade continued unabated until 18 February 2004, when Premier Wen Jiabao halted any further development of the Nu River Project until such a time that the project could be “carefully studied, and a scientific decision [could] be made” (Chen 2006).

In response to Premier Wen’s concerns, the NDRC and the National Environmental Protection Agency organized a committee to review hydropower development on the Nu River (Chen 2006). After more than one year of review, Wenweipo (2006) reported that the committee decided to proceed with construction of four proposed dams, namely Maji, Liuku, Yabiluo, and Saige, on 11 January 2006. The environmental assessments on the four dams were concluded at that time, but because the Nu is a trans-boundary river, the results of the assessment were kept confidential (Wenweipo 2006).

On 18 March 2008, the NDRC issued “The Plan on the Development of Renewable Energy during the ‘Eleventh Five Year Plan Period,’” which officially announced that the Liuku and Saige dams would start construction before 2010 (Shi 2008).<sup>9</sup> The exclusion of the other 11 initially proposed dams also indicate that construction will most likely not start on these projects within the eleventh Five-Year Plan period (2006-2010).

The technical details of the 13 dams and the investment levels of the individual projects are summarized in Table 2. If completed, the 13-dam cascade would have a total installed capacity of 21,320 MW – 58.6% of the river’s theoretical potential – producing 131.4 billion

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<sup>9</sup> Field visits by the authors in June 2008 confirmed that roads and other support infrastructure for the Liuku dam had indeed begun. Brown et al. (2008) report that site work was evident at Songta, Maji, Yabiluo, and Saige as well as Liuku in 2005.

kw.h of electricity per year.<sup>10</sup> The height of the 13 dams ranges from the 35.5-meter Liuku Dam to the 307-meter Songta Dam in Zhayu County, Tibet. He and Feng (2004a) estimate that the 13 dams would attract an estimated total investment of RMB 93.71 billion (\$13.58 billion), approximately 30% (RMB 28.1 billion) of which would be injected directly into the local economy in the form of construction material, material processing, transportation, labor, and logistics support (Wu 2005). Luo, Bao, and Li (2005) estimate that 56,009 people will be resettled as a result of the cascade, 42,468 of whom hold rural *hukou*, or household registrations. The Bingzhongluo Dam would require the lowest level of investment per unit of electricity produced, would displace no population, and would inundate no farmland. The dam at Saige also requires low levels of investment per unit of electricity, in contrast the dam at Liuku, which is the most expensive among the 13 in terms of cost per kilowatt hour. However, both Liuku and Saige would displace relatively few people relative to other dams in the cascade; overall, Wang, Yu, and Li (2005) estimate that the proposed cascade would necessitate the displacement of only about 12% of the number of people displaced by similar projects elsewhere in China.

## **V. National Policy on Resettlement Related to Hydropower Development**

China's State Council adopted the "Regulations on Land Acquisition Compensation and Resettlement of Migrants for Construction of Large and Medium Scale Water Conservancy and Hydropower Project" on 1 September 1 2006 (Central Government of PRC 2006b). The new policy was a revision of a 1991 set of standards for compensation associated with displacement arising from hydropower development, but with generally higher remuneration levels. Moreover,

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<sup>10</sup> Notably, there were already 48 small hydropower stations, each with below 25 MW in power generation, built one the confluence of the Nu and various tributaries in Nujiang Prefecture by 2002. The total installed capacity of these dams is 43,231 KW per year (Xiang and Zhang 2005), yet it is unclear how dams along the main stem might affect hydropower production in these stations.

the regulations set out to clearly establish the rights and responsibilities of both evacuees and various levels of government in the resettlement process.

Appendix 1 provides a summary of the most pertinent sections of the regulations. For example, the compensation standard for inundated land is 16 times the value of average annual production. In contrast to the 1991 regulations, houses and trees that belong to the evacuees were to be compensated regardless of whether they were to be inundated because households would lose access to their use after resettlement. Third, local governments are charged with ensuring that living standards do not deteriorate as a result of resettlement by ensuring that farmers have the same amount of land and other factors of production as people already residing in the resettlement area. These processes are to be supervised by upper levels of government. Moreover, the national policy requires that the local government take into consideration the opinions of local residents. One manifestation of this is that houses for resettled rural residents are to be built by the farmers themselves, and the law specifically bans local governments from mandating construction standards. Finally, the regulations also stipulate that local governments establish long-term economic support programs to help resettled people quickly achieve economic enfranchisement.

## **VI. Case Study of the Liuku Dam**

At 35.5 meters and 180MW of installed capacity, the Liuku Dam is the smallest proposed dam in the cascade. The Liuku project will cost RMB 940 million (Magee and McDonald 2009), approximately 30% of which will be injected into the local economy in the form of labor compensation, raw material purchases, and temporary worksite construction (Wu 2005). Projected local spending on the project represents approximately 10% of the total GDP of

Nujiang Prefecture (Yunnan Bureau of Statistics 2007). Although both He and Feng (2004a) and NDRC (2003) suggest that just over 400 people will be displaced by dam construction, private estimates suggest that the number could reach as high as 2000 (Lou 2005). Construction on the dam 4.5 km north of Liuku Township in Lushui County, Nujiang Prefecture started during the spring of 2008.

The construction area will fall entirely within the left bank of the river, affecting three natural villages<sup>11</sup> in Xiaoshaba Village in Liuku Township, parts of Xin Village in Liuku Township, and the Denggeng Village Suodao Bridge area in Luzhang Township (Map 1). One of the authors visited all three of these villages during late spring in 2008.<sup>12</sup> Semi-structured interviews pertaining to the resettlement process, compensation system, and the socio-economic status of local residents were conducted in 40 households. Xiaoshaba Village was almost completely resettled in January 2007, although a handful of households had refused to move as of June 2008; for Xiaoshaba, interviews were thus conducted in both the old village and the resettled village.

Xin Village is typical of the area. The predominant crops grown in the village include corn and rice (Table 3). At the end of collective farming, each resident of Xin Village was allocated approximately one mu of dry land and 0.85 mu of paddy land.<sup>13</sup> Given the marginal quality of much of the land, fertilizer represents a major expense. Coupled with marginal marketing opportunities, per capita farming incomes vary between RMB 1000 and RMB 2000 depending on the year.<sup>14</sup>

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<sup>11</sup> Like many villages in China, Xiaoshaba consists of several “natural villages.” The natural villages that will be affected by the Liuku Dam are called “Group One,” “Group Two,” and “Group Three.”

<sup>12</sup> The authors gratefully acknowledge the Goldfarb Center for Civic Affairs and Public Engagement for underwriting the data collection.

<sup>13</sup> One mu is just under 1/6 acre.

<sup>14</sup> At the time of the survey, US\$ 1 = RMB 6.8 at official exchange rates.

Households in Xin Village and other affected areas will be impacted by the Liuku Dam in two ways. First, households that have property in the “inundated area” will permanently lose access to their land. Second, households that have property in the “construction area” will lose access to the land during the two-year construction process. Land in the construction area will be used for producing and transporting construction materials, such as stones and sand. This land will also be used for sheltering construction workers.

The detailed compensation scheme for construction area land was publicly posted in Xin Village by the Lushui County government. Compensation for land lost to construction purposes depends on current land use, i.e., whether the land is used to cultivate vegetables, rice, or corn (Table 4). Initially, farmers were to be compensated RMB 1990 annually per mu of land suitable for growing vegetables, RMB 1660 annually per mu of paddy land, and RMB 980 annually per mu of dry land. However, the county government revised the compensation upward by 25% regardless of land type effective 1 November 2007. Therefore, land appropriated for construction purposes prior to 1 November 2007 (which was widespread in Xiaoshaba Village) was compensated at a lower price than land appropriated after this date. Compensation is to be paid over time (Green SOS 2008), although the exact schedule remains unclear.

As of June 2008, no official announcement regarding the compensation for inundation land had been made. In addition to compensation for inundated land and land claimed for construction purposes, people who are resettled are eligible to receive a one-time resettlement payment from the Yunnan Huadian Nujiang Hydroelectricity Development Corporation. Again, neither the level of compensation nor the payment schedule has been announced officially.<sup>15</sup>

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<sup>15</sup> Despite the lack of official announcements, rumors about the levels of compensation were circulating throughout the villages during our site visits: compensation for inundation land was rumored to be RMB 17,000 for dry land and RMB 27,000 for paddy land, and the lump-sum resettlement payment was rumored to be between RMB 10,000 and RMB 40,000 per person.

All 144 households in three natural villages in Xiaoshaba were resettled to New Xiaoshaba Village in January 2007, and the resettlement experience of villagers in Xiaoshaba may serve as an indication of key challenges that further resettlement caused by hydropower projects on the Nu River will face. During site visits, it was found that many policies enacted for resettlement were in direct conflict with the national policies described in Section V. Of particular concern to displaced villagers were the size and cost of resettlement housing, the lack of provisions to enable residents to continue farming after resettlement, the lack of long-term training and economic development programs, and the lack of input regarding the resettlement process from the villagers themselves.

### *Resettlement Housing*

The construction of New Xiaoshaba Village was part of the national drive to build “New Socialist Villages” in the rural countryside. As with such villages built elsewhere in China, the new village consists of modern two-story houses carefully aligned along straight roads. There are two types of housing – those with small yards for growing fruits and vegetables for personal use (referred to as “agricultural housing”) and those without yards (“business housing”). Regardless of housing type, the first floor is designed to be a storefront and the second floor is designed to be used for residential purposes.

The residents relocated to the new village were required to purchase their new houses for RMB 116,700. Part of the price is defrayed by converting the value of their old houses, their residential land, and in some cases, the value of their trees. However, an average household still owed the village approximately RMB 20,000 after compensation for these assets. Regardless, residents generally considered the resettlement housing to be too small.

The selling price of the houses in the new village was much higher than the construction cost, indicating that the local government was reaping profits from resettlement. Specifically, no house in New Xiaoshaba exceeded 200 m<sup>2</sup>, implying a construction cost of at least RMB 584/m<sup>2</sup> for the resettlement houses. However, Yunnan Bureau of Statistics (2007) reports that the average building cost of new houses elsewhere in rural Nujiang Prefecture was only RMB 123 yuan/m<sup>2</sup>. Moreover, according to interviewees, the average real estate price in other villages in Liuku and Luzhang townships is 400-450 yuan/m<sup>2</sup>. All interviewees in New Xiaoshaba Village thus considered the purchase price of resettlement housing to be exorbitant.

The practice of resettlement in Xiaoshaba Village violates the national policy on resettlement because the villagers were not given freedom in building their own homes, a right provided by Chapter Three, Article 35 (Appendix 1). Furthermore, the practice of defraying the cost of housing based on the value of lost property violates Chapter Three, Article 33, which requires that resettled villagers receive their compensation payment directly and in full. The practice of automatically channeling compensation money to housing costs prevents farmers from moving to other areas, from building their own houses, and from leasing land elsewhere.

### *Leaving Agriculture*

Although residents of Xiaoshaba still had access to land in the old village during the 2008 site visit, they are certain to lose that land after inundation. Moreover, the local government made no provisions for allocating new farmland to displaced farmers, a violation of Chapter 2, Article 13 of the national regulations. Given that both “business homes” and “agricultural homes” are designed to accommodate storefronts on their first floors, it is clear that the local government expects villagers to shift from agricultural production to non-agricultural activities for their

livelihoods. However, it is hard to imagine these households being able to establish sustainable businesses given the small market and the large number of competing storefronts. Moreover, interviewees in Xiaoshaba expressed concerns over their lack of experience in conducting business and their desire to continue agricultural production.

#### *Lack of Long-Term Economic Development*

All of the interviewees in Xiaoshaba expressed concern about their future livelihoods, in large part because none had been informed about post-resettlement assistance programs. The lack of long-term support programs such as job training, business management classes, and community development programs is in clear violation of Chapter Five of the national regulations, which stipulate the provision of such programs in order to allow evacuees to quickly return to economic independence. Post-resettlement assistance programs are especially crucial for residents who have traditionally engaged in agricultural production and who are unfamiliar with off-farm jobs. Moreover, given the ethnic diversity of the Nu River region, community development and organization programs may prove crucial to ensuring that the resettled people and people in host communities can live harmoniously. Furthermore, several area residents expressed concern that with poor training in business and with few outlets for productive uses, large inflows of cash may foster social problems such as drug abuse.

#### *Lack of Input from Villagers*

Apart from being offered the opportunity to choose between “agricultural homes” and “business homes,” interviewees in Xiaoshaba unanimously expressed that they did not have a participatory stake in planning for resettlement. Indeed, all interviewees expressed confusion regarding the

details of resettlement. Although public meetings were held on the issue of resettlement prior to 2006, the residents that were interviewed believed that their opinions were not taken into account. Indeed, according to interviews conducted by journalists near Liuku in early 2006, local residents characterized the meetings as being “intimidating” and complained that their opinions were disregarded by planning authorities (Green Home 2006).

The lack of input from the villagers is a violation of Article 2, Chapter 9 of the national regulations. This violation is especially troublesome because the fieldwork revealed that the vast majority of residents affected by the Liuku Dam project considered hydropower development of the Nu River to be in the national interest, at least in principle. However, the relative opacity of the resettlement process has dampened the enthusiasm of local residents for supporting the project.

The villagers of Xiaoshaba lodged a formal complaint with the Lushui County government on 17 December 2007 (Liuku Zhen Xiaoshaba New Village All Villager Suggestion Letter 2007). In addition to the violations of national policy noted above, the complaint made specific demands, including the following:

- (i) That compensation for land be paid in full, instead of being paid in the form of rent for construction land;
- (ii) That full compensation standards for land must be no less than RMB 100,000 for every mu of residential land, private-use land, and paddy land; RMB 80,000 for every mu of dry land; RMB 500 for each mature fruit tree; RMB 300 for each fruit seedling; RMB 80 for each coffee tree; RMB 50 for each tea bush; and RMB 250 per month as poverty subsidy;
- (iii) That the government should immediately issue home ownership certificates to the resettled residents;
- (iv) That the government should re-measure and compensate farmers for slope land under cultivation;
- (v) That the local government should allocate public land for grazing cattle;
- (vi) That unused land in the new village must be managed by the villagers or distributed to individual households; and
- (vii) That the government exchange residential land in the old village for additional land in the new village on a one-for-one basis

## **VII. Implications for Other Inundated Communities**

Although Xiaoshaba was the first village to be resettled as part of the Nu River Project, the range of irregularities that took place during the resettlement process raises flags for future resettlement efforts in the area. First, residents expressed an emotional attachment to their land and their traditional means of production. Therefore, the local government might consider providing future evacuees with the option of either choosing compensation in the form of land or money. For residents choosing monetary compensation, the local government could offer guidance as to help affected persons to better manage their finances. Moreover, vocational training programs could be established to help evacuees find employment in non-agricultural sectors and to help them operate their own businesses.

In addition, constructing resettlement villages requires careful planning, including input from local residents in the form of public hearings. We do not believe that evacuees should face restrictions regarding in their choices of resettlement housing, i.e., housing should not be built on the presumption that all evacuees will operate shops. Moreover, resettled residents could have the option of building the houses themselves as a means of keeping construction costs low and transparent. Should the villagers decide to build houses on behalf of the evacuees, we advocate a transparent bidding process to prevent rent-seeking.

More generally, we advocate for more transparency regarding the dissemination of information related to resettlement and dam construction. Plans for compensation should be especially transparent as this is of particular interest to evacuees. The government would also be well served by disclosing compensation schemes in a timely manner to reduce uncertainty and to allow farmers to make future plans. More generally, these experiences suggest the need for

additional supervision of the Nu River Project on the part of the central government to ensure that local resettlement policies are in accordance with national laws.

### **VIII. Conclusion**

Sustaining China's economic development requires continued increases in energy production.

Currently, 78% of the country's electricity supply comes from coal burning, the negative consequences of which include high CO<sub>2</sub> emissions, acid rain, and clogged railroads.

Hydropower presents an appealing alternative to coal burning as a relatively clean source of power, in part because China is rich in water resources and because it has already mastered advanced technology in building large dams. Indeed, China could support approximately 45% of its current energy consumption if the dams that have already been approved for construction – not including those on the Nu – were built and operating at full capacity (Brown et al. 2008). However, both the central government and local authorities should be mindful of the considerable environmental costs of damming major rivers and the significant social and economic costs related to the ensuing displacement of local residents.

This paper is primarily concerned with the latter. The Nu River Project will undoubtedly impact the economy of southwestern China by providing this economically backward region with the infrastructure necessary to attract heavy industry and the prospect of rapid economic development. However, fieldwork in Liuku indicates that some aspects of the local resettlement plan appear to violate the national regulations pertaining to resettlement issued in 2006. Specifically, the high price of resettlement homes, the lack of continued opportunities in agricultural production, the lack of long-term economic development programs, and the lack of input from the villagers themselves are four major areas in which the resettlement plan appears

to violate national policy. Since the resettlement process for the Liuku Dam will undoubtedly be watched by others who may be impacted by dam development along the Nu River, these infringements negatively affect the prospect of public support for the entire Nu River Project.

This paper does not take a stance on the issue of whether the Nu River Project should proceed. However, if it does proceed, we advocate for improving the resettlement policy for households affected by the Liuku Dam to bring it in line with the national regulations. Doing so would engage local residents in decision-making regarding the resettlement process, would better provide for their livelihoods after resettlement, and would help to achieve buy-in from those who are most directly affected by hydropower development.

The central government appears to share these sentiments. In particular, in April 2009, Premier Wen again ordered a halt to the entire Nu River Project – including the Liuku Dam – to allow time for additional environmental and economic impact assessments (Shi 2009). The repeated emphasis on assessment demonstrates the central government’s dedication to sustainable development. By increasing transparency and by carefully following national policy, the Nu River Project may become a pillar for long-term economic prosperity in the context of building harmonious society in the Nu River region.

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**Appendix 1. “Regulations on Land Acquisition Compensation and Resettlement of Migrants for Construction of Large and Medium Scale Water Conservancy and Hydropower Project” (Excerpted)**

Chapter and Article	Content
Chapter One, Article 3	The country adopts a resettlement policy that is aimed at furthering economic development. The resettlement policy is a combination of compensation and subsidy payments before resettlement and financial support after the resettlement, which must enable the resettled people to enjoy living standards at par with, or exceeding, their original living standards.
Chapter Two, Article 9	During the planning stage for the resettlement plan, the opinions and attitudes of the resettled people and people living in the designated resettlement area should be taken into full consideration. And, when necessary, public hearings should be held.
Chapter Two, Article 13	Rural residents who are primarily engaged in agricultural production should be resettled primarily to locations that facilitate continued agricultural production... After resettlement, farmers should have equal amounts of land and other factors of production as people already living in the designated resettlement area.
Chapter Two, Article 22	For farmland used for the construction of large to medium scale water conservancy and hydropower projects, the compensation payment and the resettlement subsidy should be 16 times the average production value of the land during the past three years. If land compensation payments and resettlement subsidies cannot maintain the living standards of the resettled people at their original levels, the payment standards should be increased... Trees and seedlings on the land taken up should also be compensated according to the standards of the province, autonomous region, and municipality that in which construction is taking place. Buildings on the land should be compensated according to the principle that the compensation should enable the re-construction of the building with the same scale, same standard, and same function. For poor evacuees whose compensation payment is insufficient to construct basic shelter, an adequate subsidy should be offered...
Chapter Two, Article 25	Farmland used by the construction process should be compensated with an equal area farmland elsewhere... However, cultivation land with a slope of over 25 degrees does not need to be re-developed elsewhere.
Chapter Three, Article 33	Resettlement payment and compensation payment for houses, structures attached to the houses, trees, seedlings, and other agricultural and agricultural related equipment should be given directly to the evacuees in full by the county-level government in the resettlement area.

Chapter ...Houses for resettled rural residents should be built by the evacuees  
Three, Article themselves. The relevant local people's government or village committee  
35 should collectively plan the use of the residential land, but neither should  
mandate construction standards for the houses of the evacuees.

*Source: Central Government of PRC (2006a) and Central Government of PRC (2006b).*



**Table 1. Socio-Economic Background of the Nu River Area (2006)**

	<b>China<sup>1</sup></b>	<b>Tibet Autonomous Region<sup>1</sup></b>	Naqu Prefecture <sup>2</sup>	Changdu Prefecture <sup>2</sup>	Linzhi Prefecture <sup>2</sup>	<b>Yunnan Province<sup>1</sup></b>	Nujiang Prefecture <sup>3</sup>	Baoshan City <sup>3</sup>
Total Population (10,000 persons)	<b>131,448</b>	<b>268.6</b>	40.5	58.8	16.2	<b>4,483</b>	52.6	244.8
Population Density (persons/km <sup>2</sup> )	<b>137.0</b>	<b>2.2</b>	0.9	5.0	1.2	<b>113.8</b>	35.8	124.7
Per-Capita GDP (RMB/year)	<b>16,084</b>	<b>10,430</b>	8,061	5,553	15,125	<b>8,970</b>	8,249	5,541
Expenditure/Revenue Ratio	<b>1.04</b>	<b>13.75</b>	7.48	8.35	4.49	<b>2.35</b>	4.18	3.38
Per Capita Net Income of Farmers (RMB/year)	<b>3587</b>	<b>2435</b>	2490	2156	3149	<b>2251</b>	1,097	2,052
Percentage of Rural Households	<b>56.1%</b>	<b>71.8%</b>	90.5	91.5	74.1	<b>83.4%</b>	85.9%	90.2%

Sources: <sup>1</sup>China Bureau of Statistics (2007); <sup>2</sup>Tibet Bureau of Statistics (2007); <sup>3</sup>Yunnan Bureau of Statistics (2007)

**Table 2. Detailed Description of the Proposed Nu River Project**

Dam Name	County / District	Prefecture / City	Elevation <sup>1</sup>	Height <sup>1</sup> (m)	Reservoir Size <sup>1</sup> (million m <sup>3</sup> )	Installed Capacity <sup>1,A</sup> (MW)	Annual Electricity Production <sup>2</sup> (billion kw.h)	Total Investment <sup>2</sup> (billion RMB)	Total Population Displacement <sup>3</sup>	Agricultural Population Displacement <sup>3</sup>	Investment / Power (RMB/kw.h)	Population Displacement / Power (people/billion kw.h)
Songta	Zhayu County	Linzhi Prefecture	1950	307	6312	4,200	17.87	19.67	3,633	3,593	1.101	203.3
Bingzhongluo	Gongshan County	Nujiang Prefecture	1690	55	13.7	1,600	8.34	5.24	0	0	0.628	0
Maji	Fugong County	Nujiang Prefecture	1570	300	4696	4,200	18.97	18.44	19,830	13,059	0.972	1045.3
Lumadeng	Fugong County	Nujiang Prefecture	1325	165	663.6	2,000	10.09	9.14	5,092	5,092	0.906	504.7
Fugong	Fugong County	Nujiang Prefecture	1200	60	184	400	1.98	2.29	682	682	1.158	344.4
Bijiang	Fugong County	Nujiang Prefecture	1155	118	280	1,500	11.8	9.81	5,186	3,717	0.831	439.5
Yabiluo	Lushui County	Nujiang Prefecture	1060	133	344	1,800	13.3	6.00	11,012	7,646	0.662	828.0
Lushui	Lushui County	Nujiang Prefecture	955	175	1288	2,400	17.5	8.78	5,190	3,616	0.689	296.6
Liuku	Lushui County	Nujiang Prefecture	818	35.5	8.1	180	3.55	0.94	411 <sup>B</sup>	90	1.240	115.8
Shitouzhai	Longyang District	Baoshan City	780	59	70	440	5.9	2.53	587	587	1.103	99.5
Saige	Longyang District	Baoshan City	730	79	270	1,000	7.9	3.65	1,882	1,882	0.680	238.2
Yansangcun	Longling County	Baoshan City	660	84	391	1,000	8.4	4.35	2,470	2,470	0.837	294.0
Guangpo	Longling County	Baoshan City	600	58	124	600	5.8	2.87	34	34	0.912	5.9

Sources: <sup>1</sup>Magee and McDonald (2009); <sup>2</sup>He and Feng (2004b); <sup>3</sup>Luo, Bao, and Li (2005)

Notes: <sup>A</sup> Multi-year average; <sup>B</sup> Lou (2005) argues that these figures are understated, and our fieldwork suggests that this may be the case

**Table 3. Agricultural Production in Xin Village (per family)**

Major crops	Corn	Rice
Annual Production (jin/mu)	400-800	1200-1500
Sales price (yuan/jin)	1	1.6-1.7
Per capita farmland (mu)	Paddy Land: 0.85 (around 20% of paddy land is used for growing vegetables) Dry Land: 1	
Livestock	Pigs, Chicken, Goat, Cows	
Seed expense (RMB/mu)	Paddy Land 5 Dry Land: 4	
Fertilizer expense (RMB/year)	4000-5000	
Pesticide expense (RMB/mu)	30	
Hired labor expense (RMB/day)	30	
Per capita net agricultural income (RMB/year)	1000-2000	

*Source: Authors' fieldwork work in Nujiang Prefecture*

*Notes: With such low land allocations, households reported hiring outside labor only occasionally*

**Table 4. Initial and Adjusted Compensation for Construction Area Land**

Types of Land	Initial Compensation Price (RMB/year/mu)	Adjusted Compensation Price (RMB/year/mu)
Paddy	1660	2070
Dry	980	1220
Vegetable	1990	2490

*Source: Authors' fieldwork work in Nujiang Prefecture*