

available at [www.sciencedirect.com](http://www.sciencedirect.com)[www.elsevier.com/locate/ecolecon](http://www.elsevier.com/locate/ecolecon)

## China's sloping land conversion program: Institutional innovation or business as usual?

Michael T. Bennett\*

Visiting Scholar, College of Environmental Sciences, Peking University, Rm 322, Old Earth Science Bldg., Peking University, Beijing 100871, PR China

### ARTICLE INFO

#### Article history:

Received 9 September 2005

Accepted 22 September 2007

Available online 13 November 2007

#### Keywords:

Payments for Environmental Services  
Afforestation  
China

### ABSTRACT

China's Sloping Land Conversion Program (SLCP) is the largest land retirement/reforestation program in the developing world, having the goal of converting 14.67 million hectares of cropland to forests by 2010 (4.4 million of which is on land with slopes greater than 25°) and an additional "soft" goal of afforesting a roughly equal area of wasteland by 2010. Pending successful completion it could represent a 10–20% increase in China's national forest area and a 10% decrease in current cultivated area. In contrast to China's other forest-sector policies, SLCP uses a public payment scheme that directly engages millions of rural households as core agents of project implementation, and has the stated principals of volunteerism. Thus, insofar as current or future *de facto* program implementation involves decentralized, voluntary grassroots participation, SLCP represents an important departure from "business as usual" in how China manages its forest resources. This work draws upon current available research of the program and uses a 2003 household and village-level survey conducted by the Center for Chinese Agricultural Policy, CAS, to examine program design, implementation and outcomes to date. Results indicate that significant problems in design and implementation exist, with these including shortfalls in subsidies delivered, lack of respect of the principals of volunteerism, and insufficient technical support and budgeting for local implementation costs. More fundamentally, some program goals appear to be based on common misperceptions regarding the linkages between forests and watershed services. Overall, SLCP contains both innovative elements (volunteerism and the direct engagement of farmers) as well as components that hark back to policies and mindsets of decades past (the program's top-down, simplified contract structure, lack of sufficient consultation with local communities and rural households, and campaign-style mobilization). The paper concludes by providing four main suggestions to improve the program: 1) Increase local community input in design and implementation, and ensure that households have full autonomy in participation choice; 2) improve technical support and budgeting for local administrative costs and capacity building; 3) clarify the environmental services targeted and verify the measures needed to acquire these services; and 4) integrate SLCP into an overall package of complementary policies aimed at the rural sector.

© 2007 Elsevier B.V. All rights reserved.

\* Fax: +86 10 6276 7657.

E-mail address: [michaeltbennett@earthlink.net](mailto:michaeltbennett@earthlink.net).

## 1. Introduction

Though China's policymakers have long discussed cropland conversion programs, a severe Yellow River drought in 1997 and devastating floods in 1998 in the Yangtze River Basin and Northeast China spurred them to action.<sup>1</sup> In response to these disasters, the central government initiated the Sloping Land Conversion Program in 1999, with particular emphasis on west China (Xu et al., 2006). Also known as *Grain for Green*, it is the largest land retirement program in the developing world, with the target of converting around 14.67 million hectares of cropland to forests (4.4 million of which is on land with slopes greater than 25°) and an additional "soft" goal of afforesting a roughly equal area of wasteland by 2010 (SFA, 2003). Pending successful completion, it could thus represent a 10–20% increase in China's national forest area and roughly a 10% decrease in cultivated area (Hyde et al., 2003; ZGTJNJ, 2001). The program is currently implemented in more than 2000 counties across 25 provinces in China – a wide area containing huge ecological and economic heterogeneity – and involves the participation of tens of millions of rural households. It has a total budget of RMB 337 billion (over US\$40 billion), over RMB 50 billion of which has been spent so far, and over 7.2 million hectares of cropland have been retired by the end of 2003 (Uchida et al., 2007; Xu and Cao, 2001; Tao et al., 2004).

The Sloping Land Conversion Program (SLCP) is distinct from China's other water and soil conservation and forestry programs since it is one of the first and certainly the most ambitious "payment for environmental services" (PES) program in China. Most other large national forestry programs, such as the "Three-Norths" Shelterbelt Program (initiated in the late 1970s) and the Natural Forest Protection Program (initiated in 1998), are directly implemented by either state-owned forest enterprises or local forest authorities. In contrast, SLCP uses a public payment scheme that directly engages millions of rural households as core agents of project implementation, with the stated principals of volunteerism (SFA, 2003). Thus, insofar as current or future *de facto* program implementation involves decentralized, voluntary grassroots participation, SLCP represents an important departure from "business as usual" in how China manages its forest resources. This case study of SLCP draws from current available research of the program and uses a 2003 household and village-level survey conducted by the Center for Chinese Agricultural Policy, Chinese Academy of Sciences, to examine program design, implementation and outcomes.<sup>2</sup> It is important to note that in the backdrop of this discussion is significant local variation in implementation of the program spanning a wide diversity of economic, institutional and ecological settings across China. As such, I highlight the key forms of implementation and design as found in existing studies, while attempt-

ing to outline some of the range variation and its importance, where relevant.

## 2. Services and actors

The SLCP was initiated by the central government in 1999 with the stated environmental goals of reducing soil erosion and desertification and increasing China's forest cover and area by retiring steeply sloping and marginal lands from agricultural production. Soil erosion and desertification are the two of the most serious problems affecting China's land resources. World Bank (2001) reports that out of 331 million hectares of land prone to desertification (roughly a third of China's total area) about 262 million are actually affected, with this actual-to-potential ratio believed to be the highest in the world. Available data indicates that soil erosion affects roughly 360 million hectares of land in China, some 38% its total area, more than three times the world average (SFA, 2003; Huang, 2000). Using data from China's 2nd soil census, Yang (1994) finds that around 8% of the country's cultivated land is affected by "intensive" water erosion, and another 26% is affected by "light to medium" erosion. Southwest China (containing the upper watershed of the Yangtze River) and the Loess Plateau (containing the upper watershed of the Yellow River) alone are estimated to contain 25% and 22%, respectively, of China's eroded cropland, and fully 39% and 19%, respectively, of China's cultivated area affected by "intensive" erosion. Mackinnon and Xie (2001) estimate that benefits of erosion control in China (calculated in terms of the reduced costs of cleaning irrigation canals and reservoirs and the higher yields due to better water management) could be as high as RMB 3.9 billion per year. Ning and Chang (2002) estimate the net present value of reducing soil erosion to be RMB 50 billion.<sup>3</sup>

Overall, the SLCP targets a wide array of environmental services. Upper Yangtze and Yellow River Basin watershed services are the main focus of the program; the 2003 plan particularly emphasizes retirement of sloping cropland in these watersheds, reporting that China has some 6.07 million hectares of cultivated land with slopes greater than 25°, and that some 2 billion tons of silt are released into the Yangtze and Yellow Rivers annually, with two-thirds of this coming from sloping cropland (SFA, 2003). Total area slated for retirement is about equal between these two watersheds. At the same time, however, the 2003 plan's wording indicates that forest ecosystem services and timber value, forest rehabilitation and landscape restoration are also important targets. Timber value, in particular, is an important goal, since 75% of planned enrollment area is to be planted with timber-producing forests (which are termed in China's state forestry system as, ironically, "ecological forests"), as compared with 25% for orchard crops or trees with medicinal value.<sup>4</sup> Farmers are allowed to harvest all timber-producing forests planted under the program.

Regarding targeted watershed services, current research suggests that the SLCP's goals are unrealistic. Evidence does

<sup>1</sup> The Yellow-River experienced a historic 267-day dry-out in 1997 (Xu et al., 2001). The floods during the summer of 1998 occurred in the Yangtze River Basin and the Songhua and Nen rivers in Northeast China, claimed 3,000–4,000 lives and caused more than US\$12 billion in damages and lost production, including the loss of some 5million hectares of crops (Zhu et al., 2004; Lu et al., 2002; CIFOR, 2004).

<sup>2</sup> The survey includes data on 360 households and 36 villages.

<sup>3</sup> As quoted in Xu et al. (2005).

<sup>4</sup> The 2003 plan gives no numbers for planned grassland area.

indicate that cultivation of sloping land has significantly increased the rate of soil erosion and land degradation in the upper Yangtze River watershed. Long et al. (2006), in analysis of land use and soil erosion in Zhongjiang County, Sichuan Province (described as a typical agricultural county in the upper watershed of the Yangtze River), finds that 57% of agricultural land affected by soil erosion has slopes greater than 10°, and 42% of agricultural land on slopes greater than 25° has high erosion rates (8000–15,000 t/km<sup>2</sup>/year). However, the linkages between cultivation of sloping and fragile land and the frequency and severity of floods are not as clear-cut as commonly presumed, nor that afforesting such areas will be the most effective means of reducing erosion (FAO-CIFOR, 2005). Added to this, other research indicates that the 2003 plan significantly overestimates China's actual area of highly sloping cropland. Using remote sensing, Zhang et al. (2003) estimate that 1.59% of China's total cultivated dry land is on slopes greater than 25°. Based on China's most recent cropland census (1996) and various years of sown area data, this indicates that roughly 2 million hectares of dry land cultivated area is on slopes greater than 25°, less than half of the goal stated in the 2003 plan (ZGTJNJ, 2001).

Using the terminology of Wunder (2005), the program is a public PES scheme: it is primarily paid for by the central government, with program funds managed by the Ministry of Finance. As such, inefficiencies on the buyer side likely exist, since tax-payers do not all identically receive program-targeted environmental services. At the same time, if completed successfully the SLCP's future benefits could extend well beyond China's borders; it could result in an increase in current forest area by upwards of 10–20%, have a large impact on domestic timber supply and thus – given China's large and growing footprint in international timber markets – on pressures on the world's forests (Hyde et al., 2003; Sun et al., 2004; Zhu et al., 2004).

In recognition of the need for the program to be incentive-compatible for participants, SLCP also has the stated goals of poverty alleviation and assisting farm households to shift to more sustainable structures of production (SFA, 2003). The program also incorporates the goal – long held by the central government – of afforesting and restoring barren and degraded wasteland and mountainous areas.<sup>5</sup> During the pilot phase, this goal was an explicit requirement of participation, so that farmers retiring cropland were also required to afforest a certain amount of wasteland, often more than the amount of retired cropland, though this appears to have varied significantly by locale (Xu and Cao, 2001; Zuo, 2001). Given protests by participants of the significant labor requirements of this stipulation, the central government has since downgraded this to an optional, though encouraged, goal.

Added to this, Xu et al. (in press) argues that an additional hidden aim of the program has been to subsidize the ailing State Grain Bureau. This is one of the more troubling aspects of SLCP, since it appears to have adversely influenced design and implementation. Specifically, the high grain subsidy that is

part of program payments (discussed below) and the purchase of program grain from national stockpiles at RMB 0.4/kg above market prices appear to be program stipulations deliberately introduced to aid the State Grain Bureau, having resulted in a 24.55 million ton draw-down of stocks and an implicit RMB 9.8 billion subsidy by the end of 2003.<sup>6</sup> This, furthermore, could in part have facilitated fast expansion of the program after the pilot phase.

Though significant regional variation exists, environmental service sellers have generally been selected based on whether or not their land falls into program targeted area. As detailed in Zuo (2001), targeting of areas to retire has generally been conducted via a top-down approach, starting with retirement quotas that are distributed from the central government to the provinces, followed by subsequent distribution down through counties, townships and finally to participating villages. As can be seen in Table 1 below, significant variation exists in the 2003 survey sample villages in terms of the degree to which various levels of government are involved in selection of areas to retire and of what to plant on retired land. The selection process is strongly influenced by China's structure of local government, since only households in participating villages are able to enter the program, and as with many policies in rural China the onus of actual implementation falls to village and township governments, with these serving as the key mediators between the central government and rural households.

Program compliance is defined in terms of the quality, type and survival rates of the trees/grasses planted on the enrolled land, with survival rates being adjusted for regional conditions. During the pilot phase, the stipulated survival rate for the southwestern region was 85% and for the north was 70%. Based on discussions with SFA officials, this has since been revised to a nationwide standard of 75% during full-scale implementation, though *de facto* standards appear subject to significant local interpretation.<sup>7</sup> An additional stipulation during the pilot phase has been that, in conjunction with retirement of cropland, a set proportion of wasteland must also be afforested, though with no survival rate conditions. According the SLCP plan, total retirement of cropland to afforested wasteland is 1:1.2 overall for 2001–2005, with this varying from 1:1 for the Yangtze River Basin region to 1:1.4 for the Yellow River Basin region. For 2006–2010, this increases to 1:1.4 overall, varying from 1:1.2 for the Yangtze River Basin region to 1:1.6 for the Yellow River Basin region (SFA, 2003).<sup>8</sup>

<sup>6</sup> The backdrop to this is the central government's failed grain policy during the 1990s, which involved large-scaled grain procurements at above-market prices and a subsequent failed attempt at recentralizing grain markets. This resulted, by 1999, in a State Grain Bureau burdened by severe financial stress and stocks of aging and unsold grain estimated to be equal to China's annual production (Lu, 1998, 1999).

<sup>7</sup> Informal discussions with SFA officials, in fact, have revealed that these current survival rate standards, and other criteria used by the SFA's SLCP Office to categorize program forested area, conflict with those of the SFA's Department of Silviculture and Department of Forest Resources, the two entities generally responsible for managing China's afforestation initiatives.

<sup>8</sup> Zuo (2001) finds that in Inner Mongolia the stipulated proportion of cropland to wasteland afforestation was 1:3 in 2000, and 1:2 in 2001.

<sup>5</sup> The government has pursued this with multiple underlying objectives, including increasing national timber volume, protection of key watersheds, fighting desertification and ecosystem and landscape restoration.

**Table 1 – SCLP implementation in 2003 survey villages**

Question to village leader	Total (n=36)	Shaanxi (n=12)	Gansu (n=12)	Sichuan (n=12)
<i>Who decides how much land area should be retired?</i>				
Province	0%	0%	0%	0%
County	25%	25%	25%	25%
Township	50%	8.3%	58.3%	83.3%
Village	13.9%	16.7%	25%	0%
Village small groups	0%	0%	0%	0%
Households	22.2%	50%	8.3%	8.3%
Other	0%	0%	0%	0%
<i>Who decides which plots to retire?</i>				
Province	0%	0%	0%	0%
County	16.7%	16.7%	0%	33.3%
Township	52.8%	16.7%	58.3%	83.3%
Village	36.1%	33.3%	58.3%	16.7%
Village small groups	2.8%	0%	8.3%	0%
Households	16.7%	41.7%	8.3%	0%
Other	0%	0%	0%	0%
<i>Who decides what to plant on retired land?</i>				
Province	0%	0%	0%	0%
County	66.7%	41.7%	58.3%	100%
Township	19.4%	16.7%	41.7%	0%
Village	5.6%	8.3%	8.3%	0%
Village small groups	0%	0%	0%	0%
Households	11.1%	33.3%	0%	0%
Other	2.8%	0%	8.3%	0%
<i>Who conducts inspections and verifications?</i>				
County	100%	100%	100%	100%
Township	100%	100%	100%	100%
Village	2.8%	8.3%	0%	0%
Other	97.2%	91.7%	100%	100%
<i>Share of village that...</i>				
...distribute SLCP quotas to households.	61.1%	25%	58.3%	100%
...distribute SLCP quotas to village small groups	60%	27.3%	50%	100%
...are allocated SLCP quotas by township government	75%	41.7%	83.3%	100%

Source: 2003 Survey Data.

Compliance is monitored via a series of inspections conducted by various levels of government. These generally involve frequent inspections by village officials to ensure correct implementation, followed by formal evaluation by township and county governments to determine whether land passes inspection. As shown in Table 1 above, inspection and verification involved both county and township government in all villages in the 2003 survey. Random inspections by county or higher-level government and inspections by SFA officials are also conducted in some cases (Zuo, 2001; Xu and Cao, 2001).

Zuo (2001) notes that during the pilot phase officials tended to focus on retiring contiguous swaths of land to convert to forests, and generally took into account ecological conservation, watershed services and the types of vegetation appropriate for local conditions when delineating areas for program enrollment. However, case studies during the pilot phase also found

that most village and township governments have preferred the easier-to-implement method of simply targeting all steeply sloping cropland in the township rather than conducting targeting based on the conditions of entire catchments, and that in some cases plots closer to roads have been targeted to “showcase” implementation to higher-level authorities (Zuo, 2001; Xu and Cao, 2001). Xu et al. (in press) finds that targeting in the 2003 survey sample has generally been determined by plot slope and land quality. However, also evident is that a significant portion of high-quality low-sloping land has also been enrolled under the program in some regions, while high-sloping low-quality land remains in cultivation.

Since the program plan makes significant allowances for diversity in local implementation, the degree to which compliance and outcomes are linked appears to be strongly contextual. Overall, the program is conditional in terms of land retirement, but less so in terms of the management of the trees and grass planted on the enrolled land. As Table 2 below shows, survival rates of planted trees in many of the townships in the sample fell below those stipulated for subsidy delivery. Furthermore, survey results indicate that low survival rates have generally not resulted in significant withholding of subsidies.<sup>9</sup> As Zuo (2001) and others have observed during the pilot phase, the main reason for this would appear to be that the dual goals of environmental amelioration and poverty reduction place local leaders in a dilemma; withholding subsidies based on low survival rates can significantly dampen enthusiasm for the program and potentially harm participant welfare, while delivery without adhering to some indicators of compliance encourages poor implementation. Equally troubling is that the evaluation regime predominantly focuses on the direct indicators of implementation – area retired, number of trees planted, survival rates, whether or not funds have been disbursed – and has not looked at the broader picture of the degree to which the program is achieving its environmental goals (Zuo, 2001).

### 3. Implementation

Under SLCP, the State Forestry Administration plans to convert around 14.67 million hectares of cropland, 4.4 million of which is estimated to be on land with slopes of 25° or above (SFA, 2003).<sup>10</sup> The plan stipulates that retirement of cropland is to take place until 2010, with the subsidy period extending to 2017. The pilot phase was conducted from 1999–2001, followed by full-scale implementation. The pilot phase began with initial implementation in Shaanxi and Gansu provinces, located at the

<sup>9</sup> The second lowest average shortfall (24% of 2002 subsidy undelivered) was found in Chaotian Area, Sichuan Province, the county with the second lowest average survival rates of program planted trees in the sample. On the other hand, Yanchuan County in Shaanxi Province has the highest average survival rates in the sample, and yet also has the highest average shortfall in subsidies delivered (77% of subsidy undelivered).

<sup>10</sup> The program also has an additional a “soft” target of afforesting a roughly equivalent amount of denuded mountainous area and wasteland. However, in reality this simply represents a continuation of a longstanding policy.

**Table 2 – Average survival rate of tress planted under SCLP (%), 2003 survey**

Province	County	Township	SLCP standard	Inspections		
				1st	2nd	3rd
Shaanxi	Yanchuan	Yanshuiguan	70%	94.2%	93.6%	98%
		Majiahe		72.9%	95.8%	96.4%
		Yuji		79%	83.2%	95%
	Liquan	Yanxia	70%	56.3%	86.8%	81.1%
		Jianling		78.8%	47.9%	39.4%
		Chigan		100%	46.7%	52.1%
Gansu	Jingning	Zhigan	70%	70%	69%	66%
		Gangou		80%	76.6%	71%
		Lingzhi		–	75.7%	77.7%
	Linxia	Zhangzigou	70%	56.3%	46.7%	65%
		Tiezhai		90%	61.1%	75.8%
		Hexi		87.5%	69.5%	64%
Sichuan	Chaotian	Datan	85%	82%	61.5%	67.3%
		Zhongzi		70%	48.7%	77%
		Shahe		92.5%	74.1%	40.4%
	Li	Shangmeng	70%	100%	79.6%	76.1%
		Puxi		74.9%	80.7%	84.8%
		Guergo		70%	74.1%	77%

Source: 2003 survey data.

middle and upper reaches of the Yellow River Basin, and Sichuan Province, located at the upper reaches of the Yangtze River Basin. By the end of the pilot, SLCP was being implemented in about 27,000 villages across 400 counties in 20 provinces, a total of 1.2 million hectares of cropland had been converted and 0.47 million hectares of barren land afforested (Xu et al., 2004; Uchida et al., 2005). According to internal government reports, upon full implementation in 2002 SLCP was extended to a total of 1897 counties across 25 provinces, and by the end of 2003 the program encompassed over 2000 counties, had converted 7.2 million hectares of cropland and had afforested 4.92 million hectares of barren land (Xu et al., 2004). By the end of 2005, a total of about 9 million hectares of cropland had been enrolled.

During the pilot phase, an average of 408,000 ha of cropland was converted per year. Upon full implantation, however, this jumped to 2.9 million hectares per year during 2002–2003, a more than sixfold increase. The number of enrolled counties also jumped significantly, by 374% between the end of 2001 and the end of 2002. Fifteen million farmers entered the program in just the first five years, and leaders have estimated that upon completion it will affect 40–60 million rural households (Uchida et al., 2007; Xu et al., 2004). Zhang et al. (2006) finds in a survey of investment projects during 1998–2003 in 2459 sample villages across 6 provinces in China that SLCP is the third most common project being implemented at the village level, behind road and bridge, and irrigation investments.

Overall, SLCP is envisioned by policy makers as being complementary to its other forest sector policies, which are generally more command-and-control in nature. China’s central government has long promoted forest and watershed protection/restoration projects. Under the current policy regime, approved by China’s State Council in 2000, SLCP is one of the State Forestry Administration’s six major forestry programs (which are a consolidation of a previous ten programs). The other programs are the Natural Forest Protection Program (aimed at the state forestry sector), the

Key Shelterbelt Development Program in north China and the middle and lower reaches of the Yangtze River (aimed at combating desertification and protecting watersheds and coastal regions), the Beijing and Tianjin Sandstorm Source Control Program, the Wildlife Conservation and Nature Reserve Development Program, and the Fast-Growing High-Yield Plantation Development Program (Xu et al., 2006; SFA, 2005; Zhu et al., 2004).

The most comparable program to SLCP has been the “small watershed integrated management” engaged in by the Ministry of Water Resources (MWR) for the past two decades. Similar to SLCP, this has involved the participation of rural households in a framework of integrated watershed management including afforestation/reforestation activities, small dam construction and terracing of land to reduce water erosion. In the early 1980s, the MWR began to directly contract out fragile lands in some small watersheds to households for management, though with limited results (Liu, 2005). More recently, these initiatives have been embodied in the Water and Soil Conservation Act of the P.R.C. (1991), one of the first pieces of legislation passed to introduce market mechanisms into watershed management. It allows some small watersheds to be auctioned or leased to farmers or other private investors for development, with the lessee being obligated to protect against soil erosion and degradation. SLCP, thus, represents an important shift of some of the responsibilities for watershed management and restoration from the Ministry of Water Resources to the State Forestry Administration.

Subsidies for SLCP up through 2003 have been both in cash and in kind. The program stipulates that farmers who convert degraded and highly sloping cropland back to either “ecological forests” (the term used by the State Forestry Administration, ironically, to denote timber-producing forests), “economic forests” (orchards, or forests with medicinal value) or grassland will be compensated with 1) an annual in-kind subsidy of grain, 2) a cash subsidy, and 3) free seedlings, provided to the farmer at the beginning of the planting period. No formal pre-program

**Table 3 – Participant 1999 net income from enrolled land versus SLCP compensation standards**

		Net losing households	Net gaining households	All participants
Shaanxi (n=103)	Number of households	7	96	103
	1999 average net income from enrolled land (RMB/Ha)	4833	181	507
	Total converted land area (Ha)	5.13	68.11	73.24
	Average difference b/w SLCP standard & 1999 net income (RMB/Ha) <sup>a</sup>	-3033	1619	1293
Gansu (n=85)	Number of households	42	43	85
	1999 average net income from enrolled land (RMB/Ha)	3485	940	2026
	Total converted land area (Ha)	8.52	11.44	19.97
	Average difference b/w SLCP standard & 1999 net income (RMB/Ha) <sup>a</sup>	-1685	860	-226
Sichuan (n=76)	Number of households	23	53	76
	1999 average net income from enrolled land (RMB/Ha)	5371	1031	2457
	Total converted land area (Ha)	7.47	15.26	22.73
	Average difference b/w SLCP standard & 1999 net income (RMB/Ha) <sup>a</sup>	-2821	1519	93

Source: 2003 survey data.

<sup>a</sup> Subsidy grain was converted to cash based on the national market price of RMB 1/kg.

estimates of participant opportunity cost are mentioned in the 2003 plan, though they appear to enter into the regional differentiation of the in-kind subsidy, which is likely based on estimates of regional grain yields. The annual grain subsidy is set at 2250 kg/ha in the Yangtze River Basin, and 1500 kg/ha in the Yellow River Basin. The cash subsidy is RMB 300/ha of eligible land (US\$36/ha) per year. Both grain and cash subsidies are for 8 years if ecological forests are planted and for 5 years or 2 years if economic forests or grasses are planted, respectively (Xu et al., 2004). As of 2004, however, the subsidy structure has shifted to provision of seedlings and payments made wholly in cash.<sup>11</sup> Seedling provision for afforestation of cropland and barren wasteland is RMB 750 per hectare (~US\$91). The SLCP plan also states that funds are to be earmarked to provide technical assistance for implementation, with these being determined case by case. Finally, all income derived from the forests and grasslands planted as part of SLCP is to be exempt from taxation (SFA, 2003).

Program payments are on average quite generous, even by international standards, and over the long term rural households in the localities where SLCP is being implemented will be some of the direct beneficiaries (in addition to the downstream recipients of watershed services) both of the future environmental services provided by the program, including through hard-to-estimate future revenues from harvested timber.<sup>12</sup> However, significant questions exist regarding whether the program has benefited participants in the short term. Uchida et al. (2005) presents evidence that compensation standards do not adequately account for regional and inter-household production variability, resulting in shortfalls in compensation to participant households in a number of cases. Results from the 2003 survey data support

this. Table 3 below compares annual net income of enrolled plots in 1999 (i.e. before they were enrolled) with the amount of subsidies that should be received for these plots in 2002 according to the program standards. As can be seen, the SLCP compensation standards are significantly below 1999 (pre-SLCP) net income of enrolled plots for many participants. In Gansu, this is the case for almost 50% of the participants in the sample, for a total shortfall of RMB 14,366, on average 8% of 1999 household net income. Calculation based on all participants in the Gansu sample, in fact, finds a total net loss of RMB 4,521. In Sichuan, compensation standards fell below 1999 net income from enrolled plots for 30% of participants in the sample, for a total shortfall of RMB 21,075, with shortfalls for these households averaging 11% of 1999 net income. In Shaanxi, standards were below pre-program net income for almost 7% of participants, for a total shortfall of RMB 15,547, comprising an average shortfall of 33% of 1999 net income for these households. Furthermore, many of the sample households reported that 1999 harvests were poor, suggesting that these estimates are a lower bound on the number of households whose average annual net income on plots before enrollment exceeded compensation standards. Uchida et al. (2005) also finds that pre-program net revenue from retired land was higher than the SLCP standard for around 24% and 77% of their sample households in Ningxia and Guizhou provinces, respectively.

More troubling is evidence of significant shortfalls in subsidies actually delivered. Zuo (2001) finds several instances during the pilot phase where full compensation did not reach participating farmers. Xu and Cao (2001) find that in a group of 1026 households, fully 49.5% had received only partial compensation, 8.5% had received only grain and 17.6% had received no compensation at the time of the survey. Fieldwork for the 2003 survey and another survey in Hunan Province also found serious diversion of funds slated for farmer compensation. As detailed in Table 4 below, significant shortfalls in compensation received were also observed in 2003. Furthermore, these shortfalls do not appear to be the results of program lag time or sanctions due to poor implementation; the maximum average shortfall (77% of subsidy undelivered) was in Yanchuan County, Shaanxi Province, where implementation generally started earliest and average survival rates were highest in the sample. In comparison, the

<sup>11</sup> This is due in no small part to the significant draw-down of State Grain Bureau stocks for program subsidies. Generally, the in-kind portion of the subsidy scheme has been monetized using current grain prices of around RMB 1.4/kg.

<sup>12</sup> In monetary terms, annual compensation per hectare in the Yellow River and Yangtze River basins are around 1.9 times and 2.7 times, respectively, average rental payments of the US Conservation Reserve Program, which Heimlich (2003) estimates for 2000 to be US\$45.62/acre/year.

**Table 4 – Average shortfalls in grain and cash compensation in surveyed Areas, 2002**

	County	Grain (kg/ha) <sup>+</sup>		Cash (RMB/ha)		Total shortfall (RMB/ha) <sup>++</sup>
	Township	SLCP Standard	Actual Delivery	SLCP Standard	Actual Delivery	
SHAANXI (n=103)	Yanchuan	1500		300		
	Yanshuiguan		506		25	1269
	Majiahe		466		59	1276
	Yuju		94		8	1698
	Liquan					
	Yanxia		1074		112	614
	Jianling		1500		48	252
	Chigen		1471		78	251
GANSU (n=85)	Jingning	1500		300		
	Zhiping		574		104	1122
	Gangou		957		137	707
	Lingzhi		1170		201	429
	Linxia					
	Zhangzigou		499		86	1215
	Tiezhai		0		5	1795
	Hexi		588		36	1176
SICHUAN (n=76)	Chaotian	2250		300		
	Datan		1849		87	614
	Zhongzi		2050		0	500
	Shahe		2177		39	334
	Li					
	Shangmeng		2160		107	284
	Puxi		2250		231	69
	Guergou		618		50	1882
Average:		–	856	–	70	1021

Source: 2003 Survey Data. <sup>+</sup> This is a sum of corn, wheat, white and paddy rice, and wheat flour subsidies. Both white rice and wheat flour were converted to unhusked weight equivalents at a factor of 1:1.4. <sup>++</sup> This values grain at the national price of RMB 1/kg.

second lowest average shortfall (24% of subsidy undelivered) was in Chaotian Area, Sichuan Province, which had the second lowest average survival rates and where SLCP implementation generally started in the middle of the sample.<sup>13</sup> Similarly, in a national survey evaluating SLCP conducted by the SFA at the end of 2003, 21% of the surveyed participant households complained that slow delivery of subsidies was the most important difficulty they faced in implementing the program (SFA, 2004).<sup>14</sup>

Despite these observed shortfalls in subsidies, it is possible that the net present value of future income from trees and grasses planted under the program could more than offset farmers for foregone cropping income from the enrolled plots. This would depend on the household's level of expertise in managing agroforestry systems, and the types of trees (timber or orchard) and grasses selected, both in terms of suitability for local ecological conditions and market prospects. Chen et al. (2005, 2006), for example, use a sample of 400 households from Shaanxi and Qinghai provinces to estimate and compare the net present value of returns to the program over a 20-year

period. They calculate that – given that most of the sample planted crops that can generate income within a year or two, such as orchard trees or grasses with well-developed markets (e.g. alfalfa) – the net present value returns to program-planted trees and grasses are in general larger than forgone cropping income from enrolled land, even after subtracting program subsidies. However, Chen et al. (2006) also point out that farmers still face significant technical uncertainties in obtaining expected outputs in light of the frequent water shortages and natural disasters in the semi-arid/arid region where their study was conducted.<sup>15</sup>

Shortfalls in delivered subsidies are in part symptomatic of a key design problem: poor administrative budgeting. In general, program coordination, inspection and subsidy delivery for millions of plots is burdensome and costly, and yet the SLCP plan dictates that local governments bear their own implementation costs. The central government has allocated some administrative fees to provincial governments for SLCP implementation since 2002, but these have been insufficient and are often in large part diverted by higher levels before reaching the townships. Preliminary evidence from a 2005 follow-up to the 2003 survey finds that administrative costs

<sup>13</sup> The correlation coefficient between share of 2002 owed household subsidy undelivered and the year the village began implementing SLCP is statistically insignificant in the sample.

<sup>14</sup> SFA (2004) reports that the sample covers 21 provinces, autonomous regions and municipalities, 100 counties, 106 villages and 1020 households. Survey responses for the questions about difficulties of implementing SLCP are from 661 households.

<sup>15</sup> This might in part explain why farmers in the sample had not already, before SLCP, converted their land to the uses estimated to be more profitable, an insight especially relevant for the longer-time-horizon timber-producing forests planted under the program.

**Table 5 – Farmer autonomy in SLCP participation (n=348)**

Group	Measure of autonomy	% that said "yes"			
		All	Shaanxi (n=103)	Gansu (n=85)	Sichuan (n=76)
Participants (n=264)	Where the villagers ask their opinion about the project and how it could be best design prior to the time that the project was implemented?	42.8%	41.7%	41.2%	46.1%
	When you village began SLCP, did your household have autonomy to choose whether or not to participate?	61.7%	72.8%	43.5%	67.1%
	Did you have autonomy in choosing the type of trees to plant?	36.0%	47.6%	34.1%	22.4%
	Did you have autonomy in choosing which areas to retire?	34.5%	53.4%	15.3%	30.3%
	Did you have autonomy in choosing which plots to retire?	29.9%	40.8%	12.9%	34.2%
		All	Shaanxi (n=11)	Gansu (n=11)	Sichuan (n=36)
Non-participants (n=81)	Could you participate in SLCP if you wanted to?	25.9%	45.5%	29.4%	16.7%

Source: Xu et al., in press.

have indeed been significant. Village governments reported that in 2002 they spent on average 112 worker-days implementing SLCP, or an average of 6 worker-days per hectare of enrolled land in the village.<sup>16</sup> Start-up costs appear to be even higher; villages spent on average 160 worker-days during their first year of implementation, or 8.7 worker-days per hectare of retired land.<sup>17</sup>

Despite this, central authorities have placed significant political emphasis on implementation of SLCP. Shortfalls in many cases have thus likely been to recoup administrative costs, either directly via payments to laborers to plant trees on retired land and for extra seedlings, or indirectly via retention of subsidies to pay back-taxes owed by households. In other cases, they are the result of administrative burden and backlog in inspection and certification (Zuo, 2001; Xu and Cao, 2001). In one township in a key project county in Shaanxi Province, for example, half of the participating plots were not inspected and compensated on time. In another, many participating plots had yet to be inspected even three years after they had entered SLCP, and though the county government recruited 30 additional staff to deal with these problems, manpower has still been far short of that required to inspect some 67 thousand hectares of converted land (Xu et al., 2004).

Ironically, this situation has also created incentives for local governments to expand retirement area as a means to further recoup administrative costs or to rent-seek. Though the central government settled on the simplified, two-tier compensation scheme in part to prevent local officials from exploiting their informational advantage by exaggerating estimates of the forgone incomes of converted land so as to inflate their subsidies, local governments have simply tried to expand their land conversion quotas instead, either through

direct negotiation, or by first overreaching their quotas and then bargaining for more subsidies.<sup>18</sup> Xu et al. (in press), for example, finds some evidence that villages with connections to local forest bureaus have been able to enroll more land. Such behavior has existed since the beginning of the program, when the three pilot provinces of Sichuan, Shaanxi and Gansu overshot their quotas by more than 100% within 3–4 months. This continued through 2000, when 312 counties initiated land conversions on their own initiative, despite the fact that the central government's plan was to implement the pilot program in only 174 counties. To date, the State Forestry Administration continues to receive numerous requests from local governments asking for higher land conversion quotas. Though many of these requests are certainly due to the benefits for local communities and governments of the attractive compensation rates and future timber revenues resulting from the program, evidence from case-studies suggests that a significant share is also due to the combination of political pressure and adverse incentives created by problematic program design and implementation.

Apart from this, perhaps one of the most problematic aspects of implementation has been its *de facto* top-down approach. As detailed in Table 5 below, only 43% of participants in the 2003 survey indicated that villagers had been consulted by higher level authorities regarding program design and implementation before their village started SLCP. Furthermore, only around 53% of surveyed households felt that they could choose whether or not to participate (61.7% of the participants and only 25.9% of non-participants).<sup>19</sup> This ranges from 65.8% of households in Shaanxi, to 45.5% in Sichuan, to only 31% in Gansu Province. Participants felt they had even less choice in terms of how to adjust their structure

<sup>16</sup> Village leaders and secretaries, the two top officials in village government, spent upwards of 2.6 weeks each on average, or roughly 1.2 days per hectare of village retired land.

<sup>17</sup> Village leaders and secretaries spent on average more than 3 weeks each during the first year of implementation, or 1.7 days per hectare of village retired land. These estimates are based on the 15 villages in the sample that started either on 1999 or 2002, the two years for which data was collected.

<sup>18</sup> This type of behavior is a continuing and significant issue in China's local public finance and governance system. It is due, in part, to significant shortfalls in local government finances, especially in less developed regions, due to lack of tax compliance and the decentralization of rural public finances (Wong, 2000).

<sup>19</sup> These numbers do not change significantly when controlling for eligibility in terms of having sloping land. Fully 88% of the sample has land with slope >15°, and 76.5% has land with slope >25°.

of production. Only 36% said they could choose what kinds of trees to plant on their enrolled land. And only 34.5% and 29.9% of participant households felt that they could choose which areas and which plots, respectively, to retire. In Gansu Province, these numbers were only 15% and 13%, respectively. Xu et al. (in press) finds evidence that these outcomes reflect systematic differences in local implementation resulting in a number of villages in significant lack of autonomy on the part of households.

These results not only run counter to the program's stated principals of volunteerism, but also suggest that the program is not obtaining the efficiency gains promised by PES schemes over traditional command-and-control approaches via use of a market-based, voluntary mechanism of participation (Pagiola et al., 2002). Ideally, program implementation would involve both voluntary participation and an auction mechanism to optimally match payer benefits with participation costs (see Ferraro, 2008). In the case of SLCP, since no bidding mechanism exists, at minimum participation should be voluntary to minimize the possibility that some participants are being under-compensated.

#### 4. Additionality and baseline establishment

The explicit measures of environmental services purchased by SLCP as set down in the 2003 plan are the targeted total land area for retirement (14.67 million hectares), the portion of this that is to be on slopes greater than 25° (4.4 million hectares), the division of this area across regions and in terms of tree types to be planted, and the required survival rates of the trees planted on retired land (see Table 2). The regional division is set at 1:1.04 between the Yangtze River Basin/Southern area and Yellow River Basin/Northern area, and in all regions 75% of retired area is to be planted with timber-providing tree species, and 25% with orchard crops or trees with medicinal value (SFA, 2003).<sup>20</sup> No explicit baseline with which to evaluate these gains is presented in the plan, and it is unclear what would happen in absence of SLCP. Zhang et al. (2003), for example, estimates that from the late 1980s to 2000 a net conversion of 1.2 million ha of forestland to cropland occurred in China. Conversely, fast economic growth, increasing off-farm employment opportunities, technical innovation in agriculture and changes in relative prices could all be moving China quickly to a point where a net transition from cropland to forestland will naturally begin to take place.

Results from the 2003 survey suggest that SLCP has so far provided *de facto* additionality, since without it farmers would not have retired sloping cropland from production. Both Uchida et al. (2007) and Xu et al. (in press), furthermore,

provide some evidence that SLCP has induced participants in the sample to shift out of cropping and into husbandry. Viewed from a broader perspective, the sheer scale of SLCP has likely also stimulated a level of local and interregional dialogue and capacity building regarding natural resource management that would not have otherwise taken place.

#### 5. Permanence, accounting and leakage

No rigorous quantitative evaluation of the program's environmental impact exists at present; it is probably too early to be able to determine whether program-targeted environmental services are indeed being successfully provided, much less whether they will be over the long-term. It is unknown, for example, what share of afforested wasteland is viable and what share of retired cropland will be returned to cultivation after subsidies stop. The low survival rates for program-planted trees found in the 2003 survey (Table 2), however, suggest that achieving program goals has been difficult. Weyerhaeuser et al. (2005) also finds problems with low survival rates and insufficient technical support in a case study of SLCP in Yunnan Province. In the SFA's 2003 household survey evaluating SLCP, 61% and 27% of households reported that arid conditions and lack of technical support, respectively, were the largest barriers to successful implementation (SFA, 2004).<sup>21</sup>

Also important for the program's long-term prospects is the degree to which it benefits participants. To date, evidence regarding this is mixed, though it is possibly too early to be able to clearly identify program effects on participant income. Both Uchida et al. (2007) and Xu et al. (in press) – using standard program evaluation methodologies to examine SLCP impact on participant income using the 2003 survey – find program impact on household per capita income to be insignificant and generally negligible, though also find evidence that the program has induced participants to shift production towards husbandry.<sup>22</sup>

Table 6 below presents the responses of program participants in the 2003 survey to the question of what they will most likely do after the subsidy period ends. Taken at face value, this suggests that at least a fifth of retired cropland (and more than a third in Sichuan Province) will be returned to cultivation upon subsidy period end. However, the 2003 survey and other research suggest that this could be a lower bound. The 2003 survey, for example, finds that enrolled land before retirement provided 10%–50% of household income for 31% of participant households, and more than half of household income for 5% of participant households.<sup>23</sup> The survey also finds that on average 41% of household agricultural land was enrolled in the program for participants, and fully 57% for households in Shaanxi Province. The 2003 SFA survey

<sup>20</sup> According to the 2003 plan, the Yangtze River Basin and southern region consists of the provinces/municipalities/autonomous regions of Anhui, Jiangxi, Hubei, Hunan, Guangxi, Hainan, Chongqing, Sichuan, Guizhou, Yunnan and Tibet. The Yellow River Basin and northern region consists of Hebei, Shanxi, Inner Mongolia, Liaoning, Jilin, Heilongjiang, Ningxia and Xinjiang. Henan, Shaanxi, Gansu and Qinghai are shared between the two regional definitions. Tree-types are only delineated by whether they are timber-producing trees or orchard crops.

<sup>21</sup> See footnote 13.

<sup>22</sup> Uchida et al. (2007) finds some evidence of a positive impact on both livestock inventory and housing assets.

<sup>23</sup> Since these estimates are based on net crop income for 1999, described by a number of farmers in the sample as a "bad year", it is possible that they underestimate the true share.

**Table 6 – Participants' viewpoints on their post-SLCP activities**

Question: "If program subsidies stop after 5–8 years, what do you most likely intended to do?"	% Participants /% of retired area			
	All (n=264, 115.94 ha)	Shaanxi (n=103, 73.24 ha)	Gansu (n=85, 19.97 ha)	Sichuan (n=76, 22.73 ha)
<b>Promising</b>	<b>57.6%/54.2%</b>	<b>51.5%/52.0%</b>	<b>76.5%/76.9%</b>	<b>44.7%/41.3%</b>
Allow timber trees/orchard trees to reach maturity for harvesting	20.8%/23.7%	24.3%/26.3%	21.2%/22.1%	15.8%/16.8%
Can maintain livelihood with revenue from current activities (non-farm business/aqua culture/livestock/orchards)	36.7%/30.5%	27.2%/25.8%	55.3%/54.8%	29.0%/24.4%
<b>Ambiguous</b>	<b>20.1%/25.7%</b>	<b>27.2%/29.7%</b>	<b>14.1%/12.2%</b>	<b>17.1%/24.4%</b>
Continue farming	0.8%/0.2%	0.0%/0.0%	2.4%/1.1%	0.0%/0.0%
Find work in the city	12.5%/17.0%	17.5%/18.5%	10.6%/10.7%	7.9%/18.0%
Start a new non-agricultural activity	5.3%/6.9%	6.8%/8.9%	1.2%/0.3%	7.9%/6.1%
Other (no clarification given)	1.5%/1.5%	2.9%/2.3%	0.0%/0.0%	1.3%/0.3%
<b>Problematic</b>	<b>22.4%/20.1%</b>	<b>21.4%/18.2%</b>	<b>9.4%/11.0%</b>	<b>38.2%/34.3%</b>
Don't know	14.8%/13.8%	9.7%/10.4%	8.2%/10.9%	29.0%/27.5%
Assume/hope subsidies, of some type, will continue	1.5%/0.8%	0.0%/0.0%	0.0%/0.0%	5.3%/4.1%
If not making adequate income, will return plots to cultivation	1.5%/0.5%	3.9%/0.9%	0.0%/0.0%	0.0%/0.0%
Return currently retired plots to cultivation	4.6%/5.0%	7.8%/7.0%	1.2%/0.1%	4.0%/2.8%

Source: 2003 survey data.

evaluating SLCP finds that 37% households reported that retired land provided half or more of household income before retirement, and 44% of households reported that it provided 10%–50% (SFA, 2004). A survey of 400 households in Qinghai and Shaanxi provinces finds that over 70% of household cropland in the sample was enrolled in the program by 2003 (Chen et al., 2005, 2006). This suggests that in absence of significant gains in the development of sources of non-cropping income – particularly in arid and semi-arid north central China where households face significant production risk due to water shortages and frequent natural disasters – participants who originally did not wish to participate, or who are not being adequately compensated as part of participation, will simply return land to cultivation upon subsidy period end.

The only aspect of SLCP design that encourages permanence is the tax exempt status given to farmers on income earned from trees and grassland planted under the program. However, the short lengths of program subsidy periods likely more than offset any positive effects of this tax break. Furthermore, there is nothing in the program design to prevent or reduce leakage. As preliminary evidence of this, discussions with local leaders during fieldwork for a follow-up survey in 2005 found some examples of leakage, wherein villages allocated reserve land to participant households to offset their retired land area. However, beyond this no research to date has examined the degree to which leakage is taking place.

## 6. Differentiation

In general, SLCP has been designed with little differentiation. Apart from the two regional regimes and three subsidy lengths detailed above, program stipulations include little else that allows for differentiation across targeted areas and participants such as, for example, auction mechanisms or a more varied menu of contract choices. Though participant opportunity cost and the provision of environmental services is somewhat implicit in the program's emphasis on sloping and degraded cropland, subsidies do not change based on indica-

tors of environmental services provided such as plot slope. Implementation to date, furthermore, brings into question the program's stated regional focus on the important Yellow and Yangtze River basins, since by the end of 2003 SLCP was being implemented in over 2000 counties across 25 provinces.

The degree to which targeting has raised administrative costs appears to depend crucially on local implementation. Xu et al. (in press) finds, however, that plot slope and land quality have been important factors in the targeting of plots, and that larger plots are preferentially chosen for retirement. This, combined with emphasis by some local governments on retiring contiguous swaths of land, suggests that targeting has been conducted with an eye to minimizing transaction costs. Beyond that, introduction of more market-based mechanisms to better align environmental service provider costs with buyer benefits could help to reduce overall program costs and ensure that participants are not being adversely affected by the program.

## 7. Participation of disadvantaged groups

In the context of China, where the huge inequalities in rural land distribution seen elsewhere are nonexistent, targeting of small landholders has not been an issue in program design. Uchida et al. (2007) and Xu et al. (in press) also find little evidence in the 2003 survey that poorer households within the areas where SLCP is being implemented are being predominantly selected. That said, program emphasis on remote regions with high proportions of sloping and degraded land implicitly targets the poorer rural households in China. For example, four of the six counties in the 2003 survey are nationally designated poor counties. It is possibly too early to say what the long-term impact of the program will be on participants and rural households in the locales where SLCP is being implemented.

Overall, the stated dual goals of poverty alleviation could be adversely affecting the program's environmental efficiency, since it could be allowing local leaders to selectively deemphasize the program's environmental goals when these prove difficult to

obtain. In fact, the low survival rate of planted trees and fast rate of expansion with insufficient monitoring and evaluation suggest that if problems in design and implementation are not sufficiently addressed, the program will simply result in a one-off transfer to participants, with few substantive environmental outcomes.

## 8. Next steps

The sheer scale of the Sloping Land Conversion Program, by itself, makes it a particularly noteworthy PES scheme. However, it also means that caution should be exercised when applying the conclusions reached in this paper to the wide range of economic, institutional and ecological settings in China encompassed by SLCP. These results are, nonetheless, revealing. The State Forestry Administration is apparently committed to ultimately retiring the planned 14.67 million hectares. As of mid-August, 2007, a new policy has been instituted that extends the program an additional 8 years, and the government has indicated that it will improve the quality of implementation and design (State Council of the P.R.C., 2007).<sup>24</sup> As such, the main insights from this paper can be summarized into four key suggestions to policymakers:

- i) *Local communities should be given greater say in program design and implementation, and households granted full autonomy in participation choice.* The importance of rural households as SLCP's key long-term implementers makes participant willingness and choice key conditions to program success. Though insufficient use was made of the pilot phase to identify problems in program design and implementation before scaling up, greater consultation with local communities could help to improve SLCP's outcomes. Communities are best able to identify their own needs and constraints, and by doing so would help to improve program design and sustainability;
- ii) *Greater emphasis should be placed on technical support and budgeting to defray local costs of implementation and capacity-building.* Though no studies have yet documented their size, transaction costs for the program appear to be significant – especially those associated with monitoring and enforcement – and have been borne in large part by local governments and households. SLCP officials have, in fact, had to continually adjust the program in response to complaints made by local leaders and forestry officials of the heavy burden of implementation and lack of administrative resources and institutional capacity. Similarly, surveys and case studies of SLCP have also consistently identified insufficient technical support as a key constraint to achieving program goals. This is hardly surprising; it is a lot to expect that poor rural households are able to effectively transform themselves into agro-foresters without sufficient training and extension sup-

port. As such, policymakers needs to fundamentally reevaluate SLCP's budget priorities;

- iii) *The environmental services being targeted need to be clarified, and the linkages between program measures and provision of these services verified.* SLCP appears to be in part motivated by some common misunderstandings regarding the linkages between forests and watershed services (FAO-CIFOR, 2005). This is most evident in its drive to retire and afforest sloping cultivated area and barren wasteland in the arid north-central Loess Plateau region, encompassing the upper Yellow River basin. Trees use water, and thus the region's strained water resources make both the achievability and desirability of a large-scale afforestation drive questionable. Furthermore, if rejuvenation of China's forest resources is the ultimate goal, a package of reforms aimed at the state forestry sector could prove more effective and sustainable. Related to this, though the 5-year subsidy period might give participants enough time to establish sustainable, income-generating orchards, 8 years is too short for households to be able to develop viable, income-generating timber plantations;
- iv) *As a government-implemented PES scheme, SLCP should be more closely integrated into a portfolio of policies aimed at the rural sector.* Implicit in the 2003 SLCP plan is the assumption that retiring marginal cropland is a prerequisite for agricultural restructuring and poverty alleviation. In reality, greater access to rural credit, agricultural extension and off-farm employment opportunities, clarification and better enforcement of land rights, and the removal of the remaining legal barriers to rural-urban and interior-coastal migration embodied in China's hukou residency permit system could perhaps do as much as or more than SLCP to relieve pressure on threatened ecosystems due to agricultural extensification onto marginal lands. Careful examination of the underlying drivers of this in the upper Yellow and Yangtze River watersheds could help policymakers determine whether and what additional agricultural or off-farm sector policies would be complementary to SLCP.

Overall, the government's growing largesse towards environmental initiatives is encouraging. However, perhaps more revealing for the future of such initiatives in China is the answer to the question posed in the title of this piece: Is SLCP an institutional innovation or simply more "business as usual"? I believe the answer to this is, "both." Direct engagement of households as core agents of program implementation under the principal of volunteerism represents an exciting new direction taken by the government in managing China's strained natural resources. At the same time, the program's top-down, simplified contract structure, lack of sufficient consultation with local communities and rural households to identify their needs and constraints, and campaign-style political mobilization aimed at reversing, in one decisive thrust, a range of adverse environmental outcomes stemming from a complex combination of factors, hark back to policies and mindsets of decades past.

If the more innovative elements of SLCP can be strengthened, and the momentum it has created used to further stimulate local dialogue and capacity building regarding natural resource

<sup>24</sup> An example of this, heard during informal discussions with State Forestry Administration officials, is a plan to establish processing facilities so that timber from SLCP-planted forests will be a viable source of income for participating households.

management, SLCP will represent an important milestone in the government's evolving set of policies regarding the environment. Beyond this, local innovation, greater private sector involvement and use of more market-based mechanisms such as auctions for land retirement should be facilitated and fostered. Such additions to the program could help to capture the benefits promised by PES schemes over more traditional, top-down approaches.

## Acknowledgements

I wish to thank Professor Jintao Xu of the College of Environmental Sciences, Peking University, for his invaluable comments and suggestions on this paper, and for his design and implementation of the 2003 and 2005 surveys on which this work is in part based. I also wish to thank Scott Rozelle, Emi Uchida, Yazhen Gong and Jikun Huang for their help in designing and implementing the survey. All findings, opinions and mistakes contained within this manuscript are the sole responsibility of the author.

## REFERENCES

- Center for International Forestry Research (Cifor), 2004. China's timber imports raise concerns. CIFOR News Online 35 [http://www.cifor.cgiar.org/docs/\\_ref/publications/newsonline/35/china\\_timber.htm](http://www.cifor.cgiar.org/docs/_ref/publications/newsonline/35/china_timber.htm).
- Chen, Xie, Zhao, Jincheng, Liang, Dan, Bennett, Jeff, Zhang, Lei, Dai, Guangcui, Wang, Xuehong, 2005. Livelihood impacts of the conversion of cropland to forest and grassland program. Australian Centre for International Agricultural Research (AGIAR) Project ADP/202/021 Research Report No. 3.
- Chen, Xie, Zhao, Jincheng, Liang, Dan, Bennett, Jeff, Zhang, Lei, Dai, Guangcui, Wang, Xuehong, 2006. Livelihood impacts of the conversion of cropland to forest and grassland program. *Journal of Environmental Planning and Management* 49 (4), 555–570.
- Ferraro, Paul J., 2008. "Asymmetric Information and Contract Design for Payments for Environmental Services". *Ecological Economics* 65, 810–821. <http://www.sciencedirect.com/science>.
- Food and Agricultural Organization of the United Nations and the Center for International Forestry Research (FAO-CIFOR), 2005. *Forests and Floods: Drowning in Fiction or Thriving on Facts?* RAP Publication. 2005/03.
- Heimlich, Ralph, 2003. Land retirement. Chapter 6.2, *Agricultural Resources and Environmental Indicators*, 2003. ERS, USDA, Washington, D.C.
- Huang, Jikun, 2000. Land degradation in China: erosion and salinity. A Report Submitted to the World Bank. Center for Chinese Agricultural Policy, Beijing.
- Hyde, William, Belcher, Brian, Xu, Jintao (Eds.), 2003. *China's Forests: Global Lessons from Market Reforms*. Washington D.C., Resources for the Future.
- Liu, Zhen, 2005. The retrospect and prospects of China's soil and water conservation and integrated small watershed management. *China Water Resources* 19, 17–20.
- Long, H.L., Heilig, G.K., Wang, J., Li, X.B., Luo, M., Wu, X.Q., Zhang, M., 2006. "Land use and soil erosion in the upper reaches of the Yangtze River: Some Socio-Economic Considerations on China's Grain-for-Green Programme." *Land Degradation & Development* 17, 589–603.
- Lu, Feng, 1998. Grain versus food: a hidden issue in China's food policy debate. *World Development* 26 (9), 1641–1652.
- Lu, Feng, 1999. "Three Grain Surpluses: Evolution of China's Grain Price and Marketing Policies, 1978–1999", paper presented to the Symposium on China's Agricultural Trade and Policy: Issues, Analysis and Global Consequences, San Francisco, June 25–26, 1999. Available online at <http://sumner.ucdavis.edu/facultydocs/Sumner/iatrc/fenglu.pdf>.
- Lu, Wenming, Landell-Mills, Natasha, Liu, Jinlong, Xu, Jintao, Liu, Can, 2002. Getting the Private Sector to Work for the Public Good: Instruments for Sustainable Private Sector Forestry in China. International Institute for Environment and Development, London.
- Mackinnon, J., Xie, Y., 2001. *Restoring China's Degraded Environment-The Role of Natural Vegetation*. China Forestry Press, Beijing, China. (In Chinese).
- Ning, Datong, Chang, Y., 2002. An assessment of the economic loss resulting from the degradation of agricultural land in China. Consulting Report, ADB TA-3548 PRC.
- Pagiola, Stefano, Landell-Mills, Natasha, Bishop, Joshua, 2002. Making market-based mechanism work for forests and people. In: Pagiola, Stefano, Bishop, Joshua, Landell-Mills, N. (Eds.), *Selling Forest Environmental Services: Market-Based Mechanisms for Conservation and Development*. Earthscan, London, UK.
- SFA, 2003. *Sloping Land Conversion Program Plan. (2001–2010)* (In Chinese).
- SFA, 2004. *A Report for Monitoring and Assessment of the Socio-Economic Impacts of China's Key Forestry Programs*. China Forestry Press, Beijing. (In Chinese).
- SFA (China's State Forestry Administration), 2005. The six big forestry projects: the great pioneering work of rebuilding China's beautiful landscapes (In Chinese). <http://www.forestry.gov.cn/SHTGC/index.asp>.
- State Council of the P.R.C., 2007. State Council notice on the improvement of the conversion of farmland to forestland policy. National Release (2007) no. 25.
- Sun, Xiufang, Katsigris, Eugenia, White, Andy, 2004. Meeting china's demand for forest products: an overview of import trends, ports of entry, and supplying countries, with emphasis on the Asia-Pacific Region. *China and Forest Trade in the Asia-Pacific Region: Implications for Forests and Livelihoods*. Forest Trends.
- Tao, Ran, Xu, Zhigang, Xu, Jintao, 2004. Grain for green project, grain policy and sustainable development (In Chinese). *Social Sciences in China* 150, 25–38.
- Uchida, Emi, Xu, Jintao, Rozelle, Scott, 2005. Grain for green: cost-effectiveness and sustainability of China's conservation set-aside program. *Land Economics* 81 (2), 247–264.
- Uchida, Emi, Xu, Jintao, Xu, Zhigang, Rozelle, Scott, 2007. "Are the Poor Benefiting from China's Land Conservation Program?" *Environment and Development Economics* 12 (04), 593–620.
- Weyerhaeuser, Horst, Wilkes, Andreas, Kahrl, Fredrick, 2005. "Local impacts and responses to regional forest conservation and rehabilitation programs in China's Northwest Yunnan province." *Agricultural Systems* 85 (234–253).
- Wong, C., 2000. "Central-local relations revisited: the 1994 Tax Sharing Reform and Public Expenditure Management in China." *China Perspectives* 31, 52–63.
- World Bank, 2001. *China: Air, Land and Water, Environmental Priorities for a New Millennium*. World Bank, Washington, DC.
- Wunder, Sven, 2005. Payments for environmental services: some nuts and bolts. CIFOR Occasional Paper No. 42.
- Xu, Jintao, Cao, Yiyi, 2001. The socioeconomic impacts and sustainability of the SLCP. In: Xu, Jintao, Katsigris, Eugenia, White, Thomas A. (Eds.), *Implementing the Natural Forest Protection Program and the Sloping Land Conversion Program: Lessons and Policy Recommendations*. CCICED-Task Force on Forests and Grasslands. China Forestry Publishing House, Beijing.
- Xu, Jintao, Katsigris, Eugenia, White, Thomas A. (Eds.), 2001. *Implementing the Natural Forest Protection Program and the*

- Sloping Land Conversion Program: Lessons and Policy Implications. CCICED-WCFGTF (China Council for International Cooperation on Environment and Development, Western China Forests and Grassland Task Force). China Forestry Publishing House, Beijing.
- Xu, Jintao, Tao, Ran, Xu, Zhigang, Bennett, Michael T, in press. "China's Sloping Land Conversion Program: Does Expansion Equal Success?" Mimeo.
- Xu, Jintao, Yin, Runsheng, Li, Zhou, Liu, Can, 2006. China's ecological rehabilitation: unprecedented efforts, dramatic impacts and requisite policies. *Ecological Economics* 57 (4), 595–607.
- Xu, Zhigang, Xu, Jintao, Deng, Xiangzheng, Huang, Jikun, Uchida, Emi, Rozelle, Scott, 2005. "Grain for green versus grain: conflict between food security and conservation set-aside in China." *World Development* 34 (1), 130–148.
- Xu, Zhigang, Bennett, Michael, Tao, Ran, Xu, Jintao, 2004. China's sloping land conversion program four years on: current situation, pending issues. *The International Forestry Review*. Special Issue: Forestry in China – Policy, Consumption and Production in Forestry's Newest Superpower, vol. 6(3-4), pp. 317–326.
- Yang, Ruizhen, 1994. Cultivated land soil and water loss and control measures in China (In Chinese). *Bulletin of Soil and Water Conservation* 14 (2), 32–36.
- ZGTJNJ [China Statistical Yearbook]. China Statistical Press, Beijing.
- Zhu, Chunquan, Taylor, Rodney, Feng, Guoqiang, 2004. China's wood market, trade and the environment. *World Wildlife Fund*. Science Press, USA.
- Zhang, Guoping, Liu, Jiuyun, Zhang, Zengxiang, 2003. Temporal-spatial changes of cropland in China over the past 10 years based on remote sensing (In Chinese). *Acta Geographica Sinica* 58 (3), 323–332.
- Zhang, Linxiu, Luo, Renfu, Liu, Chengfang, Rozelle, Scott, 2006. "Investigating in Rural China: Tracking China's Commitment to Modernization." *Chinese Economy* 39 (4), 57–84.
- Zuo, T., 2001. Part II. The sloping land conversion program (SLCP). Chapter 3. Implementation of the SLCP. In: Xu, J., Katsigris, E., White, T.A. (Eds.), *Implementing the Natural Forest Protection Program and the Sloping Land Conversion Program: Lessons and Policy Implications*. CCICED-WCFGTF. China Forestry Publishing House, Beijing.