

China's Conversion of Cropland to Forest Program as a national PES scheme: Institutional structure, voluntarism and conditionality of PES

K. ZHANG^a, Y. ARTATI^b, L. PUTZEL^{b,c}, C. XIE^a, N.J. HOGARTH^d, J.N. WANG^a and J. WANG^a

^aChina National Forestry Economics and Development Research Center (FEDRC), No.18 Hepingli Dongjie, Dongcheng Dist., Beijing, 100029, China

^bCenter for International Forestry Research (CIFOR), Jalan CIFOR, Bogor, 16000, Indonesia

^cIUCN China, 5-1-72 Tayuan Diplomatic Compound No. 1. Xin Dong Lu, Beijing, China 100600

^dViikki Tropical Resources Institute (VITRI), Department of Forest Sciences, University of Helsinki, Latokartanonkaari 7, FI-00014, Finland

Email: 2310165085@qq.com, y.artati@cgiar.org, l.putzel@cgiar.org, xiechen@forestry.gov.cn, nicholas.hogarth@helsinki.fi, wangjianan@forestry.gov.cn, wangjiang2014@qq.com

SUMMARY

China's 'Conversion of Cropland to Forest Program' (CCFP) is one of the world's largest national 'Payment for Ecosystem Services' (PES) programs, with over 32 million rural households enrolled and 28 million ha converted to forest since 1999. Given the scale of the program and emerging interest in forest landscape restoration, the structure and function of implementation models is of interest. This study is based on key informant interviews tracing the structure and interactions among institutions for implementation of the CCFP from central government to provincial and sub-provincial scales in Yunnan Province. Data are used to analyze implementation arrangements for program planning, implementation and monitoring, and to identify features ensuring conditionality of PES payments. To assess the degree of voluntarism in enrolment, the study employs data from 87 household-level interviews in four southwestern provinces. Findings indicate that the CCFP system is designed to fulfil expectations of PES programs in terms of conditionality and voluntary participation on the side of ecosystem service sellers.

Keywords: governance, public PES, state environmental subsidies, rural welfare

La conversion de terres cultivées en programme forestier (CCFP) comme paiement national pour les projets de services de l'écosystème (PES) en Chine: structure et rôles institutionnels, assurer les caractères volontaires et conditionnels des versements de subvention

K. ZHANG, Y. ARTATI, L. PUTZEL, C. XIE, N.J. HOGARTH, J.N. WANG et J. WANG

La conversion chinoise des terres cultivées en programme forestier (CCFP) est l'un des programmes nationaux les plus larges au monde de paiement de services de l'écosystème (PES). Plus de mille études ont déjà analysé ses effets, son efficacité et sa durabilité. Ce papier isole une étude-cas de la Chine du sud-ouest, informée par divers niveaux de gestion au sein de la province du Yunnan, pour examiner le rôle que jouent les institutions dans la création d'un système visant à obtenir une participation volontaire des foyers fermiers et à assurer une conditionnalité des paiements, basée sur une obtention des buts de restauration. Le gouvernement central surveille le design de la politique, les inspections de conformité et les paiements; alors que le gouvernement local est un facteur-clé de la mise en pratique et du développement des mécanismes de coopération pour la mise en application. L'étude souligne: la restauration des zones pentues dégradées au moyen de services d'écosystème à grande échelle nécessite une adaptation locale des cadres institutionnels; la prédiction des conditions de marché est impérative pour évaluer la faisabilité d'un plus grand nombre de PES basés sur le marché; et, quand les buts de réduction de la pauvreté sont combinés à des programmes de restauration écologique, les mesures de PES payées par le public sont essentielles.

El programa de 'Conversión de Tierras de Cultivo a Bosques' (CTCB) como un sistema nacional de 'Pago por Servicios de Ecosistema' (PSE) en China: estructura institucional y funciones, garantía del carácter voluntario y la condicionalidad de los pagos de subsidios

K. ZHANG, Y. ARTATI, L. PUTZEL, C. XIE, N.J. HOGARTH, J.N. WANG y J. WANG

El programa de 'Conversión de Tierras de Cultivo a Bosques' de China (CTCB) es uno de los programas nacionales más grandes del mundo de 'pagos por servicios ecosistémicos' (PSE), que cuenta con más de mil estudios del análisis de sus efectos, eficiencia y sostenibilidad. Este documento utiliza un estudio de caso del sudoeste de China con informantes de diferentes niveles de gobernanza en la provincia de Yunnan para

examinar el papel de las instituciones en la creación de un sistema de participación voluntaria de los hogares agrícolas y garantizar la condicionalidad de los pagos en función de los objetivos de restauración. El gobierno central supervisa el diseño de políticas, las inspecciones de cumplimiento y los pagos, mientras que el gobierno local es clave para la implementación y el desarrollo de mecanismos de cooperación para la aplicación. El estudio destaca que: i) la restauración de áreas degradadas de laderas mediante servicios ecosistémicos a gran escala requiere la adaptación local de marcos institucionales; ii) la predicción de las condiciones del mercado es crucial para evaluar la viabilidad de sistemas de PSE en consonancia con el mercado; y iii) que cuando los objetivos de reducción de la pobreza se combinan en programas de restauración ecológica, las medidas de PSE financiadas por el público son esenciales.

INTRODUCTION

Launched in 1999, China's 'Conversion of Cropland to Forest Program' (CCFP – alternatively known as the 'Sloping Land Conversion Program' or 'Grain-for-Green') has now been the subject of thousands of studies (Gutiérrez Rodríguez *et al.* 2015). The CCFP was one of the primary programs designed to restore large areas of forest landscapes following the severe floods in 1998 that were attributed to upstream deforestation. Since then, 32 million farming families have received annual subsidies to plant and manage trees on their own land, totaling 28 million hectares (ha) of sloping land that was formerly classified as cropland or degraded lands with limited agricultural potential but great value for erosion and downstream flood prevention (SFA 2015). While the impacts of the program have varied enormously across China's vast territory and diverse population, program monitoring and scientific research have shown overall positive effects on many fronts, including improved environmental conditions, increased rural household income, more efficient agricultural productivity and industrial development in rural areas (Xu *et al.* 2006, Xie *et al.* 2014, Liu *et al.* 2014 and Gutiérrez Rodríguez *et al.* 2016).

Although the CCFP was originally established for environmental restoration purposes, the program's goals later expanded to explicitly target poverty alleviation, and it has since become one of China's largest rural development programs featuring both direct compensation to households and village-level development assistance (Bennett *et al.* 2014). The program is inter-connected with many other national and sub-national programs, some of which also employ subsidies targeting conservation, bioenergy production, and agricultural intensification. Forest tenure reform is a key foundation within the program, with participants granted forest tenure certificates over lands considered barren and unproductive, lands converted from agriculture and reclassified as forest, or lands reassigned from state or collective forest holdings (Yin *et al.* 2013, Bennett *et al.* 2011 and Gutiérrez Rodríguez *et al.* 2016). Compensation is based on the forested area managed by households, thus participant subsidies are higher with larger holdings.

The CCFP's system of payments to farmer households has been described as the "largest PES in the developing world" and the "largest national-level PES in the world" (Yeh 2013,

Gauvin *et al.* 2010 and Uchida *et al.* 2005). Over 13.5% of China's current inventoried forest area is land that was recently converted under the CCFP, and the program has enrolled 20% of the rural population (SFA 2005, 2013, STATS 2014).

Classifying the CCFP as a PES program may, however, be controversial. Wunder (2005) articulated an influential definition of PES as being a voluntary transaction between at least one buyer and at least one seller of a well-defined environmental service (ES) or a land-use likely to generate that ES, conditioned by actual delivery of the ES.¹ Some suggest that the CCFP is more of a command-and-control environmental program or a hybrid featuring some PES-like features. It has been cited as being an example of a PES variant, along with the national afforestation program in Vietnam, for maintaining certain features of a command-and-control policy (Kolinjivadi and Sunderland 2012) while at the same time incorporating a more market-based approach to environmental governance (Delang and Wang 2013).

This paper purposes not to resolve the debate about whether China's CCFP conforms to the ideal PES model, nor to assess associated social or environmental outcomes addressed elsewhere, but to shed light on the structure and management of the program. That institutional set up relates to some of the characteristics of PES programs, in particular the conditionality of delivery of promised environmental results, and the degree of voluntary enrolment among participating households. Incentives and the institutions that determine them are critical to the effectiveness of ecological restoration programs (Agrawal *et al.* 2008, Tucker 2010). Understanding the institutional structure of China's CCFP could help to better understand the underpinnings of a successful large-scale national PES program. Bennett *et al.* (2014) detected that village institutions were a key influence on local-level program outcomes. Zhang and Putzel (2016) highlighted some of the most obvious higher-level institutional innovations of the CCFP that incentivize, monitor, and enforce the program, including links to other national priorities such as land tenure reform and financial inclusion policies, in addition to the development of a cross-sectoral network of government agencies to implement. In comparison, this paper provides a more granular description of the CCFP's institutional structure using primary data acquired from field visits and household surveys.

¹ Recently, after considering many variants from environmental economics, ecological economics and applied examples, Wunder simplified and broadened his definition to "(1) voluntary transactions (2) between service users (3) and service providers (4) that are conditional on agreed rules of natural resource management (5) for generating offsite services" (Wunder 2015).

TABLE 1 CCFP compensation in Round I and II

Round	Round I (1999–2015)						Round II (2014–2020)				
	Northern China			Southern China							
	Phase I (1999–2007)	2004–2007	Phase II (2008–2015)	Phase I (2000–2007)	2004–2007	Phase II (2008–2015)					
Type of plantation	Tree	Tree	Tree	Tree	Tree	Tree	Tree		Grass		
One-off cash payment for seedlings (USD/ha)	115		115	115		115	692		346		
Grain subsidy (Tonnes/ha)	1.5	0	0	2.25	0	0	0		0		
Cash payment (USD/ha)		323	162		485	243	1,154	692	923	1,039	923
Annual cash stipend (USD/ha)	46	46	46	46	46	46	Included		Included		
Payment instalment	Annually			Annually			1 st , 3 rd and 5 th year		1 st year 3 rd year		
Duration (years)	8 (ecological forest) 5 (economic forest)			8 (ecological forest) 5 (economic forest)			5		3		

Source: State Council 2000, SFA 2001, Salzman 2005, Norgaard *et al.* 2007, Holloway 2007, Eugenio 2007, Yin and Zhao 2012, Zhao 2014, and Zhang *et al.* 2016

OVERVIEW OF THE CCFP

China's total forest area in 2013 was 208 million ha, or 21.63% of the national territory (SFA 2013), following the greatest national increase in forest cover worldwide between 1990–2010, at nearly 1.4% annually (FAO 2010). This increase was largely attributed to 'Six Key National Forestry Programs' being implemented since the late 1990s, of which the largest, in terms of geographical area and investment, are the Natural Forest Protection Program (NFPP) and the CCFP. Between 1998–2014, total investment in the six programs has been estimated at USD 100 billion² (SFA 2015).

Implemented in the middle and upper catchments of China's two main rivers, the Yangtze and Yellow rivers, the CCFP targets lands on slopes above 25°. Such lands were deemed to have limited agricultural productivity, while the program's re/afforestation activities were expected to reduce floods, soil erosion and desertification. The main instrument is a subsidy program compensating farming families for lost income associated with the conversion of their agricultural land to forest land, combined with investments to restructure and intensify food production and develop sustainable economic alternatives (SFA 2003, FEDRC and DDPAM 2003, and Yin and Zhao 2012).

By 2014, the CCFP had afforested 28.20 million ha, including 9.06 million ha of cropland and 16.57 million ha of land classified as being 'barren' or 'waste'. In that time, total investment in the program was USD 50.25 billion (around RMB 326.68 billion), 88% of which was funded by central government and the remainder by local government (SFA

2015). The program is currently being implemented in 1 897 counties across 25 provinces, with 32 million rural households and 124 million people participating (FEDRC and DDPAM 2003, Zhao 2014).

The first 'round' of the CCFP (CCFP Round I) was implemented between 1999–2014, with a second five-year round (CCFP Round II) starting in 2014. Round I featured two phases, Phase I (1999–2007, including an initial three-year pilot phase) and Phase II (2008–2014).

In its early years, the CCFP featured one-off payments for seedlings, an annual subsidy in grain reflecting the difference in productivity of croplands between southern and northern China, and an annual cash stipend (State Council 2000). After 2004, the program began to substitute the grain subsidy with cash payments relating to different crop productivity between Southern and Northern China (Administration office of State Council 2004, Zhang *et al.* 2008, Yin and Yin 2010). The duration of subsidy payments was designed to be longer depending on the type of forest and species planted. Subsidies for 'ecological' forest (mainly planted to provide ES) were for eight years, compared to five years for 'economic' forest (mainly planted to produce fruits, oil nuts, industrial products, etc.) (SFA 2001). Table 1 details the CCFP compensation in Rounds I and II.

In Phase II of Round I, cash payments were extended for another eight or five years (depending on forest type), but while the annual cash stipend was maintained, the payment amount was reduced by half. The other half was re-assigned to local government (through State Council Special Notice 2007) for development projects such as irrigation systems and

² The exchange rate used in the paper is 1 USD to 6.5 RMB, without adjustment for exchange rate fluctuations.

intensifying agricultural production through high-yield crops; diversifying rural energy sources with biogas, wind power and solar power to replace firewood consumption; supporting animal breeding and husbandry; and promoting non-wood forest products (Salzman 2005, Eugenio 2007, Holloway 2007, Norgaard *et al.* 2007, and Yin and Zhao 2012). In some areas that were assessed to be ecologically sensitive and unsuitable for economic activity, the program implemented migration programs (termed 'ecological migration'), relocating people to new areas and providing compensation, cropland, and/or retraining for new employment (Liang and Wu 2011, Gao 2009).

CCFP Round II, launched in 2014, targets the conversion of over 2.8 million ha of sloping and deserted croplands to either forest or grassland, by 2020. The new subsidies include different lump sums for compensation and seedlings depending on the type of plantation: tree or grass. The timescale of payment allocations also differs between tree and grass plantations (1st, 3rd and 5th year, and 1st and 3rd year, respectively) (Zhao 2014), with tree and grass subsidy payments lasting for five years and three years respectively. Round II sees some alterations to the way land is targeted for enrolment, with government stating their intention to create a more 'bottom-up' enrolment system, without, however, providing a clear explanation of the meaning behind 'bottom-up' (Zhang *et al.* 2016).

CCFP households receive their cash subsidies via direct transfer to their bank accounts following annual inspection of their plots by county forestry officers. CCFP plots pass or fail inspection based on minimum tree survival rates of 80% (75% in some areas), including replacement planting to offset mortality (State Council 2000). Inspection results are publicly posted in the village, approved by official seal and delivered to the county finance bureau for payment processing. Disbursements to households are tallied and also posted in the village (State Council 2003).

CASE STUDY: FROM CENTRAL GOVERNMENT TO YUNNAN PROVINCE – THE CCFP'S INSTITUTIONAL STRUCTURE AND PES CONDITIONALITY

This case study is based on two primary data sources. First, to describe the institutional structure and roles of all organizations working for CCFP policy, we designed a semi-structured questionnaire for key informant interviews with officials at central, provincial, county, and village government levels. Seventeen key informants were interviewed in 2015 from the main agencies involved in CCFP implementation (Table 2). From the provincial to local scale, the data is limited to responses from within Yunnan Province, and at the local level within Shangri-La municipality. Central government-level informants included two CCFP office directors

involved in policy-making, planning and inspection. Provincial-level interviewees included the provincial CCFP administration office director, and informants from the provincial finance department, the regional development department of the province's National Development and Reform Commission (NDRC), the land resources department planning division, and the agriculture department grassland management division. County-level interviewees included officials from the CCFP administration office within Shangri-La County's forestry bureau, the land resources bureau, county-level NDRC, finance bureau, and agriculture bureau, and a CCFP official from Diqing Prefecture's forestry bureau. Township and village-level informants included two top officials from the township forestry station and a deputy leader of Xiaozhongdian Village.

The second data source consists of results of household interviews in four provinces. Eighty-seven randomly selected participant households in 18 villages in eight counties of Guangxi, Guizhou, Sichuan and Yunnan provinces were interviewed between 2014–2015 as part of a project³ to review and improve the official government monitoring system used to measure the socioeconomic outcomes of the CCFP. The data used in this paper was collected in response to questions assessing the degree of voluntarism in household decisions to enrol as participants in the CCFP (Table 3).

The resulting interviews and survey data are used to shed light on two primary questions: 1. how does the institutional structure for planning, implementation and monitoring relate to the conditionality of subsidy payments? and 2. to what degree has participation in the CCFP been voluntary?

Shangri-La City, in Diqing Prefecture, Yunnan, where local institutional interviews were conducted, is a CCFP target area located on the southeast edge of the Qinghai-Tibet Plateau. With an average altitude of 3 459m, Shangri-La is classified as a "county-level city" and as such is the largest county in Yunnan Province's northwestern region, spanning 11 613km². Featuring high ethnic diversity, Shangri-La is located on the southeast edge of the Qinghai-Tibet Plateau, at the intersection of Yunnan, Sichuan and Tibet, and of three important rivers, the Jinsha (upper Yangtze), the Lancang (upper Mekong), and the Nu (upper Salween) Rivers. Over 93% of Shangri-La's land is mountainous, with forest covering 74.9% (Shangri-La Government 2013).

Institutional organization and program implementation

This section describes how the CCFP's multi-level and cross-sectoral planning, implementation and monitoring systems are organized and function to ensure participant households comply to agreed land use practices; this relates to the conditionality criterion in PES subsidy transfers. The program's multiple goals – including environmental remediation and forest production, social protection and socioeconomic

³ Research project entitled 'Enhancing research and knowledge sharing on forest landscape restoration in sloping landscapes in Asia and Africa' led by FEDRC and CIFOR.

TABLE 2 Key informant information: Central government and Yunnan Province

Adminis- tration level	No. of infor-mants	Code	Key informant	Date of interview
Central government	2	(9)	Director, Integrated Planning division, CCFP office, State Forestry Administration (SFA)	26 March 2015/ 19 October 2016
		(10)	Director, Inspection division, CCFP Office, SFA	26 March 2015
Province	5	(1)	Director, CCFP Office, Yunnan province Forestry department	11 June 2015
		(2)	Director of Division, Yunnan province Financial department	10 June 2015
		(3)	Officer, Western Development division, Yunnan province NDRC	10 June 2015
		(4)	Officer, Planning division, Yunnan province Land Resource department	11 June 2015
		(5)	Deputy Director, Grassland Management centre, Yunnan province Agriculture department	9 June 2015
County	7	(6)	Deputy Director, Shangri-La Land Resource department	18 June 2015
		(7)	Director, CCFP Office, Shangri-La Forestry Bureau	17 June 2015
		(12)	Director, Rural Environmental station, Shangri-La Agriculture and Technology department	18 June 2015
		(13)	Director, Agricultural Economics division, Shangri-La NDRC	18 June 2015
		(14)	Director, Rural Economics division, Shangri-La Finance department	18 June 2015
		(15)	Deputy Director, Shangri-La Husbandry department	18 June 2015
		(16)	Director, CCFP Office, Diqing (Tibetan autonomous prefecture) Forestry department	17 June 2015
Township and village	3	(17)	Director, Forestry station, Xiaozhongdian township, Shangri-La	16 June 2015
		(8)	Deputy village leader, Jieyi natural village, Tongman administration village, Shangri-La	15 June 2015
		(11)	Deputy Director, Forestry station, Nixi township, Shangri-La	15 June 2015
TOTAL	17			

TABLE 3 Names of selected study sites

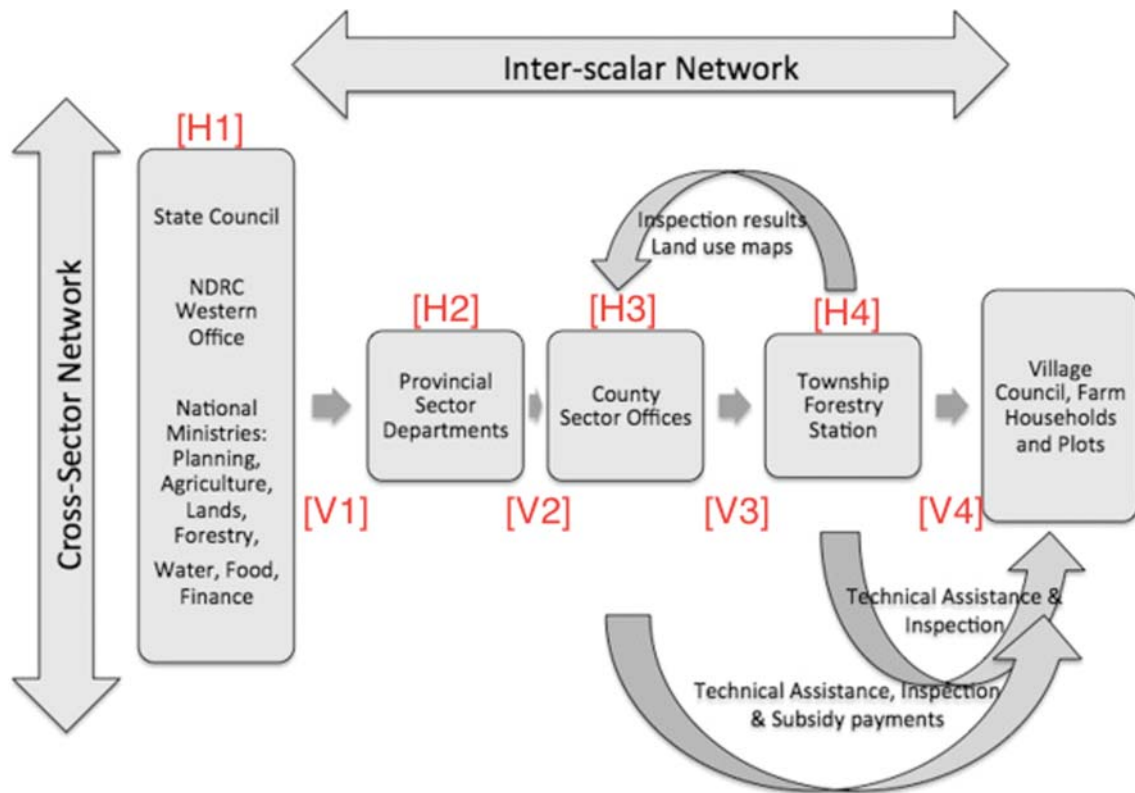
Province	County	Number of villages
Guangxi	Donglan	2
	Longlin	2
Guizhou	Libo	3
	Qingzhen	2
Sichuan	Jiu Zhaigo	3
	Tian Quan	2
Yunnan	Yiliang	2
	Shangri-La	2

development, and trade-offs between agriculture and forestry – require vertical coordination across administrative scales and horizontal integration across government sectors. The 2003 regulation of the CCFP (State Council 2003) defines a clear-cut rights and duties system for institutional roles; from policy, planning, and implementation (afforestation), to the continuous management and multi-level inspections upon which cash transfers and grain subsidies are contingent (Figure 1).

The overall program is coordinated by the Leading Group for Western Region Development of the State Council administered by the Western Department of the NDRC, responsible for conveying draft policy to the State Council for approval. The NDRC oversees program implementation, undertaken by a cross-sectoral consortium of government actors, including the State Forestry Administration (SFA), NDRC, Ministry of Finance (MOF), Ministry of Agriculture (MOA), Ministry of Water Resources (MOWR), Ministry of Land Resources (MLR) and the State Administration of Grain (State Council 2000, 2003, Kolinjivadi and Sunderland 2012). Cross-sectoral coordination at all levels of government creates the framework for the targeting of lands for conversion, and decisions on what should be planted. This is combined with a multi-scalar inspection system linked to the payment of subsidies to participating households, based on their maintenance of converted plots and the survivorship of trees in those plots. These outcomes are included as criterion in the performance evaluation of county and provincial-level government leaders.

Although the specific ecosystem services are not monitored as part of the incentive program, the system is a relatively robust framework to ensure conditionality, measured in terms of tree cover per area. Due to rural households in China often having several disconnected plots of varying sizes (the

FIGURE 1 Simplified image depicting the networks that coordinate the CCFP programme across sectors at four administrative scales



Central Government [H1], Province [H2], County [H3], and township/village [H4] and between administrative scales (Central Government to Province or County [V1], Province to County [V2], County to Township or Village [V3], and Township to Village [V4]). Adapted from Zhang and Putzel 2016

smallest can be less than 0.02 ha) (Yin *et al.* 2013), it would be exceedingly burdensome to enrol, and monitor performance of, individual plots or household's combined holdings based on delivery of ecological services, even if it was done so at the most local level. Targeting is therefore based on criteria of land type and slope, known to be associated with water and soil services, and conditionality is assessed based on household compliance to tree-planting and survivorship criteria (Bennett *et al.* 2014).

Coordination and verification across sectors and from central government to local scale (Shangri-La, Yunnan)

Based on key informant interviews, horizontal integration among sectors at four administrative levels is described – central government [H1], province [H2], county [H3], and township/village [H4], and vertical coordination among scales – central government to province or county [V1], province to county [V2], county to township or village [V3], and township to village [V4] (Figure 1).

At the central government level [H1], when the CCFP was launched, policies and regulations were established by the

State Council, while the NDRC coordinated horizontally among ministries. With respect to special ecological forestry programs, the integrated planning division of the SFA's central government CCFP office always drafted policy, consulting with relevant departments of the NDRC, MOF, MOA, MOWR and MOLR (9)⁴. The CCFP office is responsible for establishing annual plans and tasks for implementation, which are then approved by the NDRC (9).

Between the central government and province [V1], the NDRC delivers the annual implementation plan to the Western region's provincial office. At the provincial level within Yunnan, the NDRC coordinates [H2] four other main implementation departments: forestry, agriculture, finance, and land resources (3).

Meanwhile, the central CCFP inspection office uses a system of inspection that involves visual verification of tree cover for all 32 million participating households [V1]; conducted at least once annually by county-level forestry officers in each county. Inspection results are aggregated and transferred from county to province, and from province to the central CCFP inspection office, who instructs MOF to arrange subsidy disbursements to the provincial level [V1]

⁴ The numbers in brackets are related to the data sources shown in Table 3.

(10). In case of implementation issues within sub-provincial government jurisdictions, the central CCFP office conducts its own ad-hoc investigations (9), which can lead to provincial-level random field inspections organized by the provincial CCFP office (1 and 7).

The provincial forestry department oversees county-level CCFP implementation [V2], designs and develops technical guidance to support implementation, and conducts inspections to verify implementation at lower levels (1). The provincial finance department manages CCFP funds received from MOF, transferring them to lower levels of government; they may also request additional funding for CCFP implementation from MOF (2).

County-level government is the main sub-national implementing institution, responsible for fulfilling area-based restoration targets and assessing tree survival rates, used within the county government's evaluation of annual performance (including the mayor's performance). As at the national level, the county-level NDRC department provides cross-departmental coordination [H3] to plan for land-use change, agricultural productivity, and rural social welfare (including employment, rural infrastructure and monitoring of CCFP outcomes) (13). However, whenever disagreements between departments occur, the vice mayor of the county, who is in charge of agriculture and forestry, intervenes to ensure agreement (13). The land resources department cooperates with the forestry department in the process of plot verification. The latter provide feasible plots for conversion, based on field investigation and household applications, before submitting them to the land resource department (7); who then verify the validity of plots (i.e. that new CCFP plots proposed by the forestry department are steeper than 25° and not classified as 'basic cropland' according to the land use plan and map data; a procedure that is receiving more attention in Round II) (6). According to a bureau of animal husbandry official, it is their office in Shangri-La that conducts research and site analysis to select suitable grass species for restoration, and develops associated technical guidance for those conversions to grass (15).

NDRC communicates project plans from the provincial level and reports back on annual implementation based on meetings with forestry, agriculture and other bureaus and their field monitoring data. NDRC formulates the annual budget report, authorizes release of budgeted funds, and supervises implementation (13). The county finance bureau disburses CCFP funds to the township bank branch, providing a list of recipient names to the township finance office [V3] in accordance to rules and policies arranged by the MOF and provincial financial department (7). The transfer to townships is made based on a satisfactory annual inspection report, with data verified by the county forestry bureau (7 and 14). The county finance bureau also transfers subsidy payments to farmers' bank accounts [V4] (14). At the village level, both the township forest stations and village leaders disseminate

information about the CCFP national policy to households, including information about advantages and drawbacks of participation (8 and 11). Technical support is provided for participants by the township forestry station (11 and 17). A notable comment by one village leader was that the village government does not determine the location of CCFP plots: this is decided by farmers in a village meeting (8).

While the mechanisms for this coordination within and between levels of government are relatively well established, there is significant variability in practice at the local level. An important example is that between the county and village, the township government is generally responsible for mapping, requiring interaction with village leaders to determine the trade-offs between agriculture and forestry and resolve the problem of maps that contain overlapping designations in land use among sectors. In Round II this problem is expected to be addressed, as responsibility for land designation is supposed to be solely managed by the land resources department (3). The provincial land resource department will categorize land eligible for CCFP enrolment on a land use map based on the 2009 national land inventory and modified with updated land data (4).

Conditionality of subsidy payments

Since the CCFP's implementation, the forest coverage rate over the entire CCFP area increased by an average of 3.0% between 1998–2013 (Zhao 2014). Another study estimates that between 1998–2012, forest coverage in the 100 officially monitored counties increased by 7.3%, while the area of cropland affected by floods and droughts decreased by 38.4% (Xie *et al.* 2014). When it comes to national-level data on ecological outcomes, there is a scarcity of reliable data. A systematic review assessing the scientific reliability of hundreds of studies sheds more light on the program's ecological outcomes, but results are highly variable (Gutierrez Rodriguez *et al.* 2016).

Nonetheless, the results of the field visits and surveys suggests that the system of oversight and enforcement has thus far been quite effective in ensuring that participants meet the conditional requirements for receiving subsidies, which requires 80% tree survival rate and effectively ensuring the ecological outcomes of the CCFP. The program enforces continuous and consistent management of CCFP land, and compliance is monitored through annual inspections, with multiple layers of verification and accountability (as previously described). In the household surveys conducted in four southwestern provinces in this study, 96.55% of respondents claimed to understand their commitment to continuous management of their CCFP land, and 97.70% claimed that their CCFP land has been managed and protected since their participation⁵. About 78% of the interviewees affirmed that their CCFP plots had been inspected every year before their cash subsidy distribution, and 93.10% of households affirmed

⁵ A separate survey conducted in 2012 found somewhat lower numbers at the national level: 73.13% and 80.52% respectively (Liu *et al.* 2014). The same survey showed that 88% of surveyed households consider the CCFP to be of benefit to their livelihood (Liu *et al.* 2014).

that their CCFP subsidy had been transferred directly to their bank account once per year.

An especially important feature of the CCFP monitoring system, which speaks directly to the question of conditionality, is that of the penalties associated with non-compliance. Subsidy payments are contingent on annual inspections of household CCFP plots, with the previously-mentioned minimum threshold of tree cover required for compensation. Throughout the survey of households and key informant interviews at the village, township and county levels, participants were asked what happens in the event that household plots do not pass inspection. Common answers to this question were: 1) that this situation rarely occurs, and 2) if it does occur, subsidies are suspended, but households are given the opportunity to comply by replacing trees that had died to bring the area of cover up to standard. Once they comply, they are given the full subsidy, including the payment that was skipped in the previous year. This indicates that the CCFP has a lenient system in which compliance is encouraged over time. The combination of regular inspection, remuneration contingent on compliance, but tolerance in terms of allowing households to improve performance without losing their benefits, is a 'light touch' approach to enforcement and conditionality that seems to work well in the case of the CCFP. The degree to which this holds true would depend on further studies of households that did not pass inspection.

Voluntarism of service providers

According to Blomquist *et al.* (2010), a degree of flexibility and autonomy must be put in place for locals to try and seek feasible solutions and incorporate self-correcting procedures and social learning opportunities into the process, when an ecological restoration program targets both human and ecological systems together. In China's CCFP, even though there are unified standards, durations, and specific restoration measures that are planned at the central government level and implemented in a top-down structure, implementation is still locally variable and in many ways flexible in different places and regions, especially at the county level, which is the main implementation unit of the policy.

CCFP Round I

To date, there has been little consensus on the degree of voluntarism of farmers when it comes to enrolling land in the CCFP and planting trees. A recent systematic review (Gutierrez Rodriguez *et al.* 2016) notes that the enrolment of farmers has been secondary to the identification of land plots by the CCFP program, and found hugely divergent figures between specific counties (albeit counties far apart in surveys separated by a decade) ranging from only 8.1% (Xu *et al.* 2004) to 90.9% (Song *et al.* 2014) voluntary participation in the program. On a broader scale, the review authors found some credibility in an estimate of voluntarism across three provinces in the mid-80% range (Song *et al.* 2014).

A 2012 survey of 1 757 households across 17 provinces showed that 80% of CCFP households expressed their willingness to participate in the CCFP in the future (Liu *et al.* 2014). Xu *et al.* (2004) found that when households have autonomy in which plots to allocate for conversion to trees, they tend to choose plots farther away from the homestead. And, Bennett *et al.* (2014) found that when CCFP participants are allowed to select plots for conversion, farmers choose less fertile and more remote plots, which results in lower survival rates. The same study found that plots belonging to farmers who were able to choose which trees to plant, showed a higher degree of survivorship.

From the household surveys conducted for this study, about 84% of respondents stated that they had exercised full rights to decide whether or not to enrol in the CCFP, with 3.45% and 4.60% stating that they were 'mostly' or 'relatively free' to decide on their participation, respectively. Only about 1% said they had little choice and the remaining 7% of households said they did not have any choice on whether to participate. These results indicate that, although not uniform, the majority of interviewed participants agree that they have a relatively high degree of voluntarism in terms of whether or not to participate in the CCFP. The majority of households also had the ability to decide what tree species to plant in their plots, although the advice of the forestry bureau was often followed.

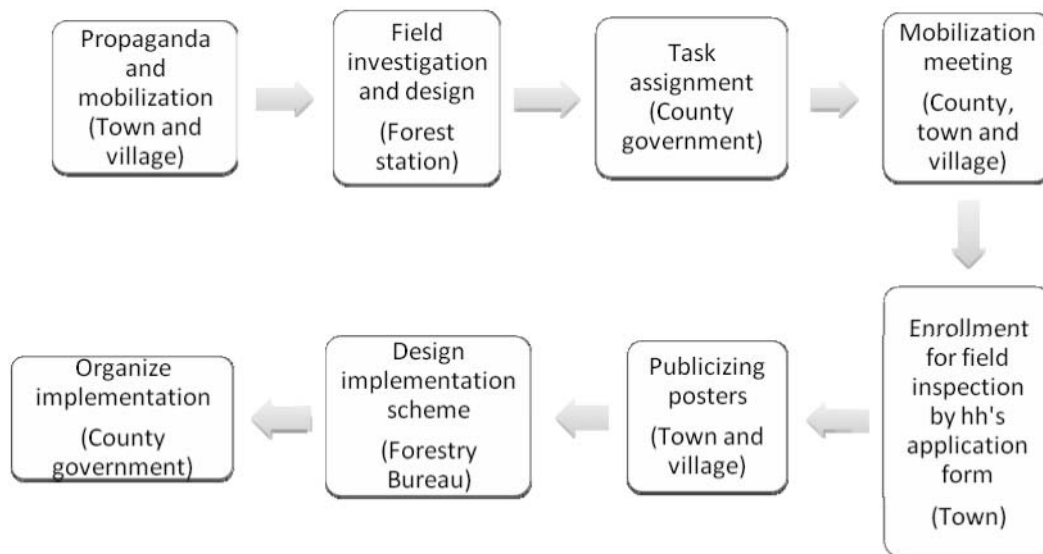
CCFP Round II

The guidelines for Round II call for a more 'bottom-up' process of application by households to participate in the CCFP (Figure 2). Key informants were asked to explain their perspective on what this would entail, in terms of the flow of information to village households and the enrolment process.

According to a county land resources officer, Round II of the CCFP 'fully considers' households' willingness to participate, as well as local conditions and economy (6). The new approach in Round II of the program is designed to be more transparent than the former, with massive amounts of information on policies publicized and opened to households through various tools (Xie *et al.* 2015).

Ensuring that adequate information is shared with participants in Round II is particularly important, because the subsidy levels were lowered and delivered less frequently (1); and there is also now an application process required of households first, so information needs to be broadcast to farmers through various channels. For this reason, the Yunnan provincial government issued two announcements about CCFP Round II, aiming to give more opportunity to farmers to participate (5). According to a county official in Yunnan, high participation in Round I was largely due to an attractive subsidy, such that farmers went of their own accord to the township to request a higher allocation of CCFP land (7). For Round II, there is a need for more outreach to educate farmers about the policy, including the change in subsidies, according to a provincial official in Yunnan (1). To this end, the forestry department needs to develop a plan and share it with farmers, to encourage more applications.

FIGURE 2 Preparation process for CCFP Round II



Source: Xie *et al.* 2015

There is a great deal of debate around what the call for a more ‘bottom-up’ approach means in practice. A national CCFP inspection officer suggested that Round II participation is based on voluntary participation but does not require a ‘bottom-up’ application process from households, in part because the area suitable for conversion is relatively small, and households do not know about detailed viable land standards and land use plans (10), (Zhang *et al.* 2016). According to one provincial CCFP officer, although the ‘bottom-up’ application seems to be a good idea, it would be complicated to achieve in practice because farmers may have limited ability to assess the eligibility of their lands, and conflicts could occur with local forestry officers if their applications would be rejected (1).

In Round II, the eligibility requirements are more stringent. In Round I, even land that was ‘basic cropland’ (assessed as productive and key to food security) was sometimes converted under the CCFP (7). In Round II, eligible lands must be over 25° in slope, should be important for watershed protection or subject to desertification, and should only be low-yield cropland and not classified as ‘basic cropland’, which is now protected (4). A county land resources officer explained the process as a pre-selection of eligibility, followed by a voluntary process of adoption. First, the bureaus of forestry and land resources verify which land is eligible to enrol, and consider potential problems farmers may face. After confirming land eligibility, the bureau of land resources then informs the higher-level (prefecture and province level) land resources department. After registration of the new CCFP-eligible land, the forestry bureau informs farmers. In group meetings organized to ensure farmers have prior information and are aware of their right to decide on whether to participate or not, the government explains and promotes the CCFP policy and the associated subsidies that are available to farmers, as well as the conditions and process of

verifying land eligibility and specific information on identified eligible areas (6). These conditions are such that, as before, the process will only be partially ‘bottom-up’, featuring a pre-selection of eligibility followed by a voluntary enrolment process (7).

Beyond the enrolment process, there is supposed to be more effort in Round II to collect information from village/household level to inform how the program was designed and implemented. According to one local-level informant, there are two differences in Round II decision making. First, monitoring indicators have been established from extensive consultations with farmers by township-level forestry and grassland officials, whereas in Round I, indicators were centrally established without consultation. Second, decision-making in the new round was decentralized (15), i.e. cross sectoral and multi-scalar.

Finally, in terms of what is planted, Round II features a greater degree of autonomy than Round I. In Round I, the main purpose was to expand ‘ecological forest’ cover, so it was decreed that only 20% of CCFP lands could be planted as ‘economic forest’. In Round II, farmers are given the freedom to decide what to plant, and from the outset are allowed to intercrop in either type of forest (1) and (9), which was not allowed in the early years of Round I.

DISCUSSION

According to this study, the CCFP features several elements that relate to the effectiveness and efficiency of a PES program. Namely, it provides environmental services such as flood and erosion control (e.g. Gutierrez-Rodriguez *et al.* 2016), is structured to ensure some degree of conditionality of payments and is perceived by a large majority of participants to be a voluntary program.

Due to the high degree of organization in planning, monitoring and linking compliance to the delivery of subsidies, the criterion of conditionality appears to be met. Farmers, villages, and townships are rewarded based on their compliance to an activity known to be the source of ecosystem services, namely trees planted to reduce erosion and prevent floods in the landscape. Reward based on compliance via practical acts is taken as a proxy for reward based on the delivery of actual ecosystem services, and more precisely, delivery of a specific quantity of those services. Compliance to fulfil inspection of a certain percentage of tree survival rate is used a measurable indicator, rather than a complex measurement of actual services delivered, which is possibly influenced by natural fluctuation and third-party effects (Salzman 2009). This degree of conditionality is typical of national-level PES schemes elsewhere, for example in Costa Rica, Mexico, and the United States (Pagiola *et al.* 2005, Postel and Thomson 2005). At a higher level (i.e. watershed-scale or larger), the fulfilment of conditions in return for the money spent is demonstrated through actual reduction in floods and erosion; the program has decreased soil erosion by 38.8% in the 10 years since project implementation in 1999 (Li *et al.* 2010). In terms of the exchange subsidy for ecosystem services between the national government and the hill farmer population, China's CCFP can be considered as fulfilling – at least on a collective level – the conditions of being a national PES program.

Transactions are predominantly of a voluntary nature, at least on the provider side, although with some limitations. Many surveys and studies suggest relatively high percentages (>80%) of voluntary participation among households enrolled in the CCFP. Preliminary indications are that Round II of the CCFP will feature mechanisms for information and enrolment that should ensure even higher levels of voluntarism. However, providers have had no ability to negotiate the price of compensation for the services they provide, individually or as communities, and the uniformity of remuneration standards, though differentiated between north and south, is evidence in itself that there is no specific calculation of opportunity costs, which would vary from farm to farm, village to village and at all scales to the regional level. Voluntarism of participant households is also supported by the number of farmers attracted by CCFP subsidies in Round I; attraction which must be based on farmers' basic calculations that the CCFP subsidies at least met the opportunity costs of cropping on sloping land.

While the results of this study are informative, there are notable limitations which could be addressed through additional research. Firstly, the study focused on the south-western part of China which has high numbers of ethnic minority communities, who historically have high dependency on land and traditional knowledge in land management. The degree of their participation in CCFP might differ from farmers in other regions. Secondly, the study did not specifically assess factors causing compliance and performance failures by participants. Levels of participation among identity groups has been found to be variable (Bennett *et al.* 2014). In addition, exogenous factors, such as environmental and

geographic conditions, might lead to lower tree survival rates. Thirdly, although CCFP is a national program, the institutional description presented is based on data from interviews at the central government level and only one province and district. Specific local arrangements are likely to vary somewhat in other districts and provinces, given their autonomy, unique financial circumstances and human resource capability. Despite that, the central CCFP officials interviewed both believed that the institutional framework's relative uniformity from province to province has been key to the fulfilment of CCFP's ecological restoration targets. Fourthly, the heterogeneity of households is not taken into account in presenting overall figures of voluntarism. Future analysis could benefit from comparisons of factors affecting participation against variable demographic, economic, and geographic conditions.

CONCLUDING THOUGHTS

This study aims to shed light on how the CCFP program is structured and managed, and how this relates to some of the key characteristics of PES, in particular the conditionality of delivering promised environmental results, and the degree of voluntarism among participating households. Using data from 17 key informant interviews at different government scales and from household surveys covering 18 villages across eight counties in four provinces in Southwest China, the study identifies the following conclusions:

The CCFP program has designed a strong framework of inspections and monitoring to ensure the conditionality of subsidy payments to farmers based on compliance to a relatively easily measurable indicator, namely a certain rate of tree survival. It shows that the program has a relatively high degree of participatory voluntarism. Reward (cash and in-kind payments) and voluntarism are both important factors for attracting farmers/landowners to restore land in the PES program, as they help participants understand the benefits and consequences when they fulfil and/or fail to comply with agreed rules. They equally address fairness, regardless of whether or not the compliance indicator is designed by service users. Nevertheless, future studies are needed to understand the influence of rewards in motivating actors to voluntarily participate in a land restoration or PES program.

Central government is the main actor in policy design and inspection of compliance indicators to pay participant rewards, with the majority of payments coming from national fiscal coffers, which helps local governments to improve local forest landscape regardless of their financial capacity. For the national population to benefit from large-scale ecosystem services across diverse geographies, as the CCFP program intends, significant and sustained funding is required. In the absence of large market demand and an existing market that can self-organize, the central government of China has invested over USD 45 billion to address the problem of flooding and soil erosion (to name the two targeted ES) that affect many millions of citizens.

In term of implementation, the program involves various departments within provincial, county, township and village

government. Effective cross-sectoral cooperation mechanisms depends on the institutional setting; key to this are clear-cut lines of responsibility for different sectors, and transparency of decision-making supported by double-checking systems, such as the household lists coming from the forestry department, the compensation fund being managed by finance departments, and corruption being avoided through direct fund transfers to participating households' bank accounts (Zhang and Putzel 2016). Most effective of all appears to be the annual performance review of local-level governance, which strongly contributes to the local enforcement of CCFP policies. There are many practical local institutional experiences which need to be explored and shared as the institutional structure gradually evolves in response to the existing problems and low efficiencies discovered by the monitoring system; particularly with the inclusion of more 'bottom-up' planning in Round II of the program, which impacts on compliance indicators.

The study highlights that to achieve its intended aims, China's CCFP requires locally adapted institutional frameworks to address the need for planning, negotiation, monitoring and enforcement mechanisms, which is often challenging and costly.

In order to assess the potential for a more market-based system to work, it would be necessary to predict the conditions under which an ecosystem services market of similar economic proportions – with transactions as significant as the amount invested in the CCFP (over USD 45 billion) – would develop, and over what timescale. Equally, the landscapes over which the program is implemented are highly heterogeneous, so linking particular quantities of flood prevention to particular sites is unrealistic in terms of biophysical monitoring. The scale of participation of China's rural population in the CCFP (124 million people) is such that a compensation system that differentiates delivery of ecosystem services (flood prevention and erosion control) between households would be both impractical and, most likely, highly inequitable. It would be unfair if rural smallholders were given different subsidy amounts to compensate the same amount of effort in planting and maintaining trees.

In a developing country with goals of reducing rural poverty, the use of such significant amounts of public funds to achieve an environmental goal, and in this case a goal with benefits that flow downstream to service users far from the providers, almost surely necessitates linking fund use with the direct social welfare of participants (in this case, particularly the service providers, rural people farming marginal agricultural lands).

Less clear however, is the central government's ability to sustain the CCFP over the long-term, due to economic priorities and financial fluctuations. If maintenance of tree cover is contingent on continued payments, at what point do people begin to cut the trees if payments stop? This may become a moot point as China's rural population is dwindling and aging, and lands are left fallow. Conversely, as China's demand for timber continues to grow, undeniably, there are also companies ready to take advantage of any future timber harvest from CCFP lands, and farmers who would be more than willing to cash in.

ACKNOWLEDGEMENTS

This research was conducted in collaboration between the China National Forestry Economics and Development Research Center (FEDRC) and the Center for International Forestry Research (CIFOR), and funded by the UK Department for International Development (DFID) through the KNOWFOR program. We thank all survey participants and informants from Guangxi, Guizhou, Sichuan and Yunnan provinces.

REFERENCES

- ADMINISTRATION OFFICE OF STATE COUNCIL. 2004. *Notice of further improving the methods on grain subsidy of Conversion Cropland to Forest Program*. Available online at: <http://tghl.forestry.gov.cn>
- ADMINISTRATION OFFICE OF STATE COUNCIL. 2005. *Notice of implementing 'five combined targets' to further consolidating the achievements of Conversion Cropland to Forest program*. Available online at: <http://tghl.forestry.gov.cn>
- AGRAWAL, A., CHHATRE, A. and HARDIN, R. 2008. Changing governance of the world's forests. *Science* **320**(5882): 1460–1462.
- BENNETT, M.T., XIE, C., HOGARTH, N.J., PENG, D. and PUTZEL, L. 2014. China's Conversion of Cropland to Forest Program for household delivery of ecosystem services: how important is a local implementation regime to survival rate outcomes? *Forests* **5**(9): 2345–2376.
- BENNETT, M.T., MEHTA, A. and XU, J. 2011. Incomplete property rights, exposure to markets and the provision of environmental services in China. *China Economic Review* **22**(4): 485–498. Available at: <http://dx.doi.org/10.1016/j.chieco.2010.12.002>.
- BLOMQUIST, W., DINAR, A. and KEMPER, K.E. 2010. A framework for institutional analysis of decentralization reforms in natural resource management. *Society and Natural Resources* **23**: 620–635.
- DELANG, C.O. and WANG, W. 2013. Chinese forest policy reforms after 1998: The case of the Natural Forest Protection Program and the Slope Land Conversion Program. *International Forestry Review* **15**(3): 290–304.
- EUGENIO FIGUEROA, B. 2007. Restoring natural capital: A mainstream economic perspective. In ARONSON, J., MILTON, S.J. and BLIGNAUT, J.N. (Eds) *Restoring natural capital society for ecological restoration international science, business, and practice*. Island Press, Washington.
- FAO (Food and Agriculture Organization of the United Nations). 2010. *Global forest resource assessment: Main report*. FAO, Rome.
- FEDRC (China National Forestry Economics and Development Research Center), Department of Development Planning and Assets Management of State Forestry Administration). 2003. *A report for monitoring and assessment of the socio-economic impacts of China's key forestry programs*. China Forestry Publishing House, Beijing.

- GAO, H.Q. 2009. *Sustainable development system for converting farmland into forest (grassland) project in north-eastern Shannxi region*. Dissertation, Northwest Agriculture and Forest University, Yangling, Shaanxi, China.
- GAUVIN, C., UCHIDA, E., ROZELLE, S., XU, J.T. and ZHAN, J.Y. 2010. Cost-effectiveness of payments for ecosystem services with dual goals of environment and poverty alleviation. *Environmental Management* **45**: 488–501. DOI: 10.1007/s00267-009-9321-9
- GUITIERRÉZ RODRIGUEZ, L., HOGARTH, N.J. ZHOU, W., PUTZEL, L., XIE, C., and ZHANG, K. 2015. Socio-economic and environmental effects of China's conversion of cropland to forest program after 15 years: A systematic review protocol. *Environmental Evidence* **4**(6): 2.
- GUITIERRÉZ RODRÍGUEZ, L.G., HOGARTH, N.J., ZHOU, W., XIE, C., ZHANG, K., and PUTZEL, L. 2016. China's conversion of cropland to forest program: a systematic review of the environmental and socioeconomic effects. *Environmental Evidence* **5**(1): 21.
- HOLLOWAY, L. 2007. Targeting sustainable options for restoring natural capital in Madagascar. In: ARONSON, J., MILTON, S.J. and BLIGNAUT, J.N. (Eds.) *Restoring natural capital society for ecological restoration international science, business, and practice*. Island press, Washington.
- KOLINJIVADI, V.K and SUNDERLAND, T. 2012. A review of two payment schemes for watershed services from China and Vietnam: The interface of government control and PES theory. *Ecology and Society* **17**(4).
- LI, C.B., QI, J.G., and FENG, Z.D. 2010. Quantifying the effect of ecological restoration on soil erosion in China's loess plateau region: An application of the MMF approach. *Environmental Management* **45**(3): 476–87.
- LIU, H., CHANG, G. and JIANG, Z. 2014. Effects of CCFP on households: Results from household questionnaires. In China National Forestry Economics and Development Research Center (FEDRC), Department of Development Planning and Assets Management of State Forestry Administration. (Eds.) *A report for monitoring and assessment of the socio-economic impacts of China's key forestry programs 2013*. China Forestry Publishing House, Beijing.
- PAGIOLA, S., ARCENAS, A. and PLATAIS, G. 2005. Can payments for environmental services help reduce poverty? An exploration of the issues and the evidence to date from Latin America. *World development* **33**(2): 237–253.
- POSTEL, S.L. and Thompson, B.H. 2005. Watershed protection: Capturing the benefits of nature's water supply services. *Natural Resources Forum* **29**: 98–108. doi:10.1111/j.1477-8947.2005.00119.x
- SALZMAN, J. 2009. A policy maker's guide to designing payments for ecosystem services. Available online at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1498629.
- SHANGRI-LA GOVERNMENT. 2013. Shangri-La county profile. Available online at: http://www.xgll.gov.cn/html/2013/xqjj_0723/81.html
- STATE COUNCIL. 2000. *Several opinions on further implementing Conversion of Cropland to Forest Program*. Available online at: <http://tghl.forestry.gov.cn>
- STATE COUNCIL. 2003. *Regulation of Conversion Cropland to Forest Program*. Available online at: http://www.gov.cn/gongbao/content/2003/content_62531.htm
- STATE COUNCIL. 2007. *Decree of improving Conversion Cropland to Forest Program*. Available online at: <http://ghzj.forestry.gov.cn/portal/ghzj/s/2119/content-336029.html>
- SFA (State Forestry Administration). 2001. *Notice 550 on the standards of ecological and economic forest in CCFP* (in Chinese). <http://www.forestry.gov.cn/portal/main/s/434/content-32107.html>
- SFA. 2003–2015. *China forestry development reports (annual report)*. China Forestry Publishing House, Beijing.
- SFA. 2013. *The 8th NFI 2009–2013*. Available online at: <http://data.forestry.gov.cn/lysjk/indexJump.do?url=view/moudle/dataQuery/dataQuery>
- STATS. 2014. *Rural population* Available online at: <http://data.stats.gov.cn/search.htm?s=2014年农村人口>
- TUCKER, C.M. 2010. Learning on governance in forest ecosystems: Lessons from recent research. *International Journal of the Commons* **4**(2): 687–706.
- UCHIDA, E., XU, J.T. and ROZELLE, S. 2005. Grain for green: Cost-effectiveness and sustainability of China's conservation set-aside program. *Land Economics* **81**(2): 247–64.
- WUNDER, S. 2005. *Payments for environmental services: Some nuts and bolts*. Occasional paper 42: 24p. CIFOR, Bogor, Indonesia. Available online at: http://www.cifor.cgiar.org/publications/pdf_files/OccPapers/OP-42.pdf.
- WUNDER, S. 2015. Revisiting the concept of payments for environmental services. *Ecological Economics* **117**: 234–243.
- XIE, C., ZHANG, K., PENG, W., WANG, J.N., LIU, J.J., JIANG, X.L., and LI B.Y. 2014. Monitoring report on social and economic impacts of CCFP. In China National Forestry Economics and Development Research Center (FEDRC), and Department of Development Planning and Assets Management of State Forestry Administration (Eds.) *A report for monitoring and assessment of the socio-economic impacts of China's key forestry programs 2014*. China Forestry Publishing House, Beijing.
- XIE, C., WANG, J.N., PENG, W., ZHANG, K., WANG J., LIU, J.J., YU, B.C., and JIANG, X.L. 2015. Report on the new round of CCFP policy. In China National Forestry Economics and Development Research Center (FEDRC), and Department of Development Planning and Assets Management of State Forestry Administration (Eds.) *A report for monitoring and assessment of the socio-economic impacts of China's key forestry programs 2015*. China Forestry Publishing House, Beijing.
- XU, J.T., YIN, R.S., LIU, C. and LI, Z. 2006. China's ecological rehabilitation: Unprecedented efforts in uncharted territory. *Ecological Economics* **57**: 595–607.

- XU, Z.G., BENNETT, M.T., TAO, R. and XU, J. 2004. China's sloping land conversion program four years on: Current situation, and pending issues. *International Forestry Review* **6**(3/4): 317–26.
- YEH, E.T. 2013. The politics of conservation in contemporary rural China. *Journal of Peasant Studies* **40**(6): 1165–1188. DOI.10.1080/03066150.2013.859575
- YIN, R. and YIN, G. 2010. China's primary programs of terrestrial ecosystem restoration: Initiation, implementation, and challenges. *Environmental Management* **45**(3): 429–441.
- YIN, R. and ZHAO, M. 2012. Ecological restoration programs and payments for ecosystem services as integrated biophysical and socioeconomic processes: China's experience as an example. *Ecological Economics* **73**: 56–65.
- YIN, R., LIU, T., YAO, S. and ZHAO, M. 2013. Designing and implementing payments for ecosystem services programs: Lessons learned from China's cropland restoration experience. *Forest Policy and Economics* **35**: 66–72.
- ZHANG, K., SONG, C., ZHANG, Y. and ZHANG, Q. 2017. Natural disasters and economic development drive forest dynamics and transition in China. *Forest Policy and Economics* **76**: 56–64.
- ZHANG, K., XIE, C., PENG, W. and WANG, J. 2016. Issues on the implementation of New Round Conversion Cropland to Forest Program and its policy recommendations. *Forestry Economics* **3**: 52–58.
- ZHANG, L., BENNETT, J., WANG, X.H. and XIE C. 2008. Literature review of Conversion Cropland to Forest Program. In ZHANG, L., BENNETT, J. et al. (Eds.). *Cost-benefit analysis on the program for conversion of cropland to forest land in China*. Economic Science Press, Beijing.
- ZHANG, K. and PUTZEL, L. 2016. Institutional innovation and forest landscape restoration in China: Multi-scale cross-sector networking, household fiscal modernization and tenure reform. *World Development Perspective* **3**: 18–21.
- ZHAO, S.C. 2014. *Carefully implementing new round Conversion of Cropland to Forest Program*. Available online at: <http://finance.people.com.cn/n/2014/1030/c1004-25934813.html>