Incentivizing household forest management in China's forest reform
Limitations to rights-based approaches in Southwest China

Krul, Kees; Ho, Peter; Yang, Xiuyun

DOI
10.1016/j.forpol.2019.102075

Publication date
2020

Document Version
Accepted author manuscript

Published in
Forest Policy and Economics

Citation (APA)
Krul, K., Ho, P., & Yang, X. (2020). Incentivizing household forest management in China's forest reform: Limitations to rights-based approaches in Southwest China. *Forest Policy and Economics*, *111*, Article 102075. https://doi.org/10.1016/j.forpol.2019.102075

Incentivizing household forest management in China's forest reform: Limitations to rights-based approaches in Southwest China

Kees Krul [a b], Peter Ho [c d *], Xiuyun Yang [e]

[a] *Faculty of Technology, Policy and Management, Delft University*
[b] *Visiting research fellow, Asia Research Institute, National University of Singapore*
[c] *Department of International Development, London School of Economics*
[d] *School of Social Sciences, Tsinghua University*
[e] *School of public affairs, Xiamen University*

Abstract

On the basis that property rights provide effective incentives to their users, rights-based approaches have become well-received for purposes of improved resource management, production, and conservation. Recent reform in China's collective-owned forest sector has also been guided by a rights-based approach in generating new incentives and economic benefits for households. Forest property rights have been reconfigured into formal, private, and transferable form, and households are financially compensated for rights' attenuation. In this paper, we draw on a household survey (N=331) and a series of interviews (N=29) to empirically examine how three types of forest rights are exercised and perceived by rural households in the Wuling Mountain Area, a relatively poor and mountainous area in Southwest China. Our findings show that although the new rights arrangements are largely perceived as credible by households, the rights are rarely exercised, without tangible contributions to the intended benefits. In explaining this, we find that current economic values of household forests are low. This may suggest that rights-based approaches are unlikely to realize their intended effects if the natural resources themselves are of too little value, an oversight in conventional discussions on resource rights.

Keywords: *Forest Reform; Property rights; Rights-based approaches; Natural Resource Management; China*

1. Introduction

Over recent decades, discussions on natural resource management (NRM) have increasingly focused on the implementation of property rights (e.g., Gibson et al., 2002; Johnson and Forsyth, 2002; Kumar et al., 2015). There is a consensus that rights are instrumental to how actors manage resources (Bromley, 1992; Ostrom, 1990), where rights are often perceived as catalysts in bringing about effective incentives in meeting (state) objectives of improved resource management, production, and conservation. The strong emphasis on property rights in resource policies – hereafter referred to as the 'rights-based' approach (similar to Johnson & Forsyth, 2002; Kumar et al., 2015) – has become particularly evident in the forest sector. Here, a strong tendency is evident in recognizing, establishing, and formalizing forest rights, and devolving these to local communities or households (Hyde, 2015; Kumar et al., 2015; Oyono, 2009; Safitri, 2009). Moreover, objectives of forest conservation are increasingly led by payment for ecosystem services (PES) programs that compensate users for the attenuation of forest rights (Sierra and Russman, 2006; Trædal et al., 2016; Zhang et al., 2018).

New insights have, however, pointed to persisting discrepancies between the intended effects of changes in property rights and their actual outcomes (e.g., Galik and Jagger, 2015; Pils, 2016). They have shown that a focus on property rights alone might be insufficient in

acting as a 'panacea' to realize policy objectives, and contrarily, it has been suggested that changes in the increasingly complex character of resource management may often bring about unintentional or adverse outcomes (Ho, 2018). In response, recent works have focused on enhancing the conceptualization of resource rights, for instance, by emphasizing the ability to exercise resource rights (Ribot and Peluso, 2003), or by accounting for the indirect benefits that have become increasingly associated with resources (Sikor et al., 2017). Other works, including those using the 'credibility thesis' (Ho, 2014), have postulated that changes in property rights will only be credible if they are sufficiently aligned with the needs and preferences of local users (Pils, 2016; Zeuthen, 2018). Empirical studies that integrate such considerations are needed to increase our understanding of the mechanisms and conditions under which rights-based approaches might be successful.

China's most recent instance of forest reform – the Collective Forest Tenure Reform (CFTR), implemented nationwide in 2008 – has adopted a set of far-reaching measures that reconfigure property rights in its tenure arrangement. With an explicit focus on three rights – management, alienation, and income rights – the reform aims to create new incentives and benefits for over 500 million farmers (NFGA 2019). Such efforts concur with China's broader efforts in addressing rural-urban inequalities, mitigating migration patterns, and creating new economic opportunities for smallholder farmers (Yin et al., 2013; Zhan, 2019). This study examines whether China's rights-based reform has been successful in meeting its intentions, assessing how forest rights have become exercised and perceived by households. Empirical insights are derived from a household survey (N=331) and a series of interviews (N=29) in the Wuling Mountain Area, a relatively poor and underdeveloped area in Southwest China.

The next section will provide a brief theoretical background to rights-based approaches, where some limitations are identified and how they have been addressed in recent literature. Section 3 zooms in on China's forest reform upon which three main rights are identified that guides the analysis. Section 4 introduces the empirical site and elaborates on sampling and data collection. Section 5 presents the findings along with the three rights, which are discussed in Section 6 before we conclude.

2. Towards a theory of property rights

2.1 Theoretical foundations: a rationale for rights

Following advances in institutional economics,[1] property rights are often understood as the "parameters" or rules that determine the allocation, management, and use of resources (Alchian, 1977; Libecap, 1986, p. 229). On this basis, they derive their main significance from structuring (constraining) actors' behavior by distributing incentives (Alessi, 1983; Libecap, 1986): "[d]ifferent bundles of property rights, whether they are de facto or de jure, affect the incentives individuals face, the types of actions they take, and the outcomes they achieve" (Schlager and Ostrom, 1992, p. 256). Incentives are conducive to a greater "internalization of externalities" (Demsetz, 1974, p. 164), which enables actors to consider their relevant costs and benefits (externalities) with an optimal decision.

[1] Theoretical concepts of 'property', 'rights', and 'property rights' are explained here mainly from an institutionalist perspective. Note that different conceptualizations exist in other fields such as anthropology, sociology, or political science.

With this importance, institutional theorists have long sought to determine the most optimal and efficient configuration of property rights. From these endeavors, formal, private, and transferable rights have become widely accepted as warranting the most efficient resource outcomes (Besley, 1995; Coase, 1998; Soto, 2000): formal rights improve tenure security and increase investment incentives (Feder and Nishio, 1999; Platteau, 1996); private rights mean that resource users directly experience the costs and benefits of their decisions (Demsetz, 1974); and transferable rights will ensure that the resource is continuously valued and efficiently allocated (Williamson, 2000). While these configurations may optimally facilitate the role of resources as an asset for production and exchange (Libecap, 1989), natural resources require extra attention due to their ecological value. To address this, recent approaches (including PES programs) provide resource users with monetary compensation when they choose not to exercise certain rights (e.g., withdrawal right) (Trædal et al., 2016).

2.2 Empirical challenges and limitations

Rights-based approaches have grown influential, particularly in forest sectors. A growing number of studies, however, have questioned the underlying assumption that allocated rights naturally distribute effective incentives for improved resource management (Galik and Jagger, 2015; Gibson et al., 2002; Thanh and Sikor, 2006). It has been empirically demonstrated that the expected incentives may be compromised by a wide range of intervening and endogenous factors. For instance, rights may be subjected to varying interpretations that enable actors to alter them (Mahoney and Thelen, 2009; Skjølsvold, 2010), or resource users may remain unfamiliar and inadequately informed of their rights (Larson et al., 2008). Moreover, rights may not be compatible with the local context: prevailing institutions such as customary laws may constrain rights (Paudel et al., 2009), or rights may be conflicting with traditional resource practices (Agrawal and Chhatre, 2007; Tang and Gavin, 2015). The absence of supportive mechanisms, such as legal institutions and extension services, may further compromise the functioning of rights. As a consequence, discrepancies may occur between *de jure* and *de facto* rights (Ostrom, 2005).

2.3 Exercising and perceptions of rights

The increased recognition of limitations to conventional rights-based approaches, together with changing dynamics in resource governance, have been reflected in the conceptualization of resource rights as well (Galik and Jagger, 2015; Nor-Hisham and Ho, 2016; Penner, 1995). For instance, Ribot and Peluso (2003, p. 154), putting forward a theory of access, state that: “[b]y focusing on ability, rather than rights as in property theory, this formulation brings attention to a wider range of social relationships that can constrain or enable people to benefit from resources without focusing on property relations alone.” This consideration helps to explain why some are able (and others not) to benefit from resources, despite similarities in rights. In a similar vein, Galik and Jagger (2015) emphasize the duties and liabilities of rights. A recent study by Sikor et al. (2017, p. 338) reconceptualizes resource rights in response to changes in resource governance, and particularly the “multiplicity of social actors” including local communities and the increased “significance of indirect benefits” such as PES programs. These works have marked an important shift that has shifted conventional notions of rights into

broader conceptualizations – integrating the abilities, duties, and liabilities of rights – that evaluates how resource users exercise their rights.

Another important consideration, and especially in the face of 'blueprint' approaches, is how rights align with the needs and preferences of users. This has also been the focus of the 'credibility thesis' (Ho, 2014), implemented in a growing number of studies that examine how property rights function in their endogenous context (e.g., Mengistu and van Dijk, 2018; Mollinga, 2016; Pils, 2016; Yang, 2018; Zeuthen, 2018). According to the credibility thesis, a rights arrangement is credible when it rallies sufficient social support with a common agreement, i.e., when actors' expectations of external behavior are met (Aoki, 2007; Ho, 2014).

While it may be useful to conceptualize resource rights along with a set of 'bundles' for analytical purposes (Galik and Jagger, 2015; Sikor et al., 2017), it has become clear that the actual outcomes of rights-based approaches are mixed and contextually-determined. To address this seemingly epistemological challenge, a closer look at how resource rights (and their changes) relate to their users is imperative. Building on the advances described above, we posit that the performance of rights-based approaches is contingent not only on how (and whether) rights are *exercised* (Galik and Jagger, 2015; Ribot and Peluso, 2003) but also how they are *perceived* by their respective users (Ho, 2014). Characteristics of the resource itself may also affect the exercising and perceptions of rights (Ostrom, 2005).

In sum, when considering and conceptualizing the variety of resource rights, it is critical to examine the precise role of rights, what they represent for actors, and which contextual conditions explain variation in their performance. We will further substantiate this argument with our empirical case, detailed in the next section.

3. China's new round of forest reform – incentivizing household forest management

China's collective-owned forest sector, which currently constitutes about sixty percent of the nation's forests (State Forestry Administration, 2010a), has been subjected to major institutional transformation over the last four decades. Forest reform in China has long emphasized afforestation and forest conservation, and is associated with significant gains in forest cover (Zeng et al., 2015). However, China's recent instance of forest reform – the Collective Forest Tenure Reform (CFTR) – marks a new phase where aims to create new incentives and economic benefits for households are made more explicit:

> The Collective Forest Tenure Reform promotes initiatives for farm household's employment and income […]. Implementing the reform will help households to obtain important means of production and stimulate farmers enthusiasm for forest production and management, especially for those living in mountain areas. (Article 2, CPC Central Committee and State Council, 2008)

The reform aims to affect the livelihoods of about 560 million farmers (NFGA, 2019). After a round of titling during the first five years of the reform, the second and ongoing phase of the reform aims to improve households' exercising of rights (Yin et al., 2013; Zhang et al., 2017). Three distinct rights are addressed by the reform: i) the 'release' of management rights (*jingying quan*); ii) the implementation of alienation rights (*chuzhi quan*); and iii) the protection of income rights (*shouyi quan*) (Article 10-12, CPC Central Committee and State Council, 2008). Although these rights share characteristics with definitions raised in conceptual papers, their

precise meaning and use in the Chinese setting remains highly contextual.[2] As these three rights will form the analytical framework of this study, the following expounds on each with stipulates pronounced in the policy text.

3.1 Releasing management rights: reducing state control

Background: When the People's Republic of China was established in 1949, private property including land was outlawed and replaced by state or collective property (Ho, 2001). All rural land was appropriated and successively allocated to newly established 'collectives,' which were granted ownership and took responsibility for its management (Salant and Yu, 2016). This arrangement was sustained until the late 1970s when, following similar initiatives in the agricultural sector, the 'Three Fixes' policy in 1981 called for the separation of use-rights (*shiyong quan)* from ownership (*suoyou quan*) (Liu and Dachang, 2001). Communes were dismantled and replaced by a forest household responsibility system (FHRS) in which households were granted use-rights and took responsibility for forest management.

Disappointing outcomes in the ensuing years, however, meant that FHRS's implementation was partially halted or reversed. Then in 2003, privatization of forest rights' was reintroduced in Fujian province (Holden et al., 2013). Positive initial results in Fujian and other provinces, catalysed the national implementation of the Collective Forest Tenure Reform (CFTR) in 2008. It endorsed further individual forest management as well as the extension of lease terms to seventy years.

While in many places forest use-rights were allocated to households, management rights contrarily have been subject to state restrictions (see also Section 3.3). Most importantly, the National Forest Protection Program (NFPP) created a 'blanket' ban on any logging of natural forests along the Yangtze River and Yellow River, which also affected forests that were commercially managed by farmers. The non-discriminatory imposition of the ban severely constrained management rights, which led to an immediate decrease of households' livelihoods relying on timber harvest (see Liu et al., 2008).

Specific guidelines and intentions: While the privatization of forest use-rights is encouraged, the reform also addresses the current impositions on management rights (and their negative outcomes for household incentives). To do so, the CFTR has sought to 'release' management rights through a classified management approach. It distinguishes two types of forests: commercial (*shangpin lin*) and ecological (*gongyi lin*). For commercial forests, state control over small-scale production is reduced, and farmers (as well as companies) are granted more autonomy and can decide which trees to plant, log, and sell. While cutting restrictions of ecological forests remain in place, non-timber forest products (NTFP, such as fruit trees, mushroom harvest, medicinal herbs, livestock raising) and tourism are promoted as main channels to realize economic benefits.

[2] Schlager and Ostrom (1992, p. 251) define management rights as "the right to regulate internal use patterns of a resource" and alienation rights as "the right to sell or lease a resource". Income rights resembles the definition of use rights by Sikor et al. (2017, p. 340): "the right to enjoy direct and indirect benefits from a resource". However, because the use and interpretation of rights in China's forest reform have unique features, we obtained specific guidelines and interpretations from State Council, 2016; CPC Central Committee and State Council, 2003, 2008.

3.2 Implementing alienation rights: embedding China's market-oriented approach

Background: China has witnessed a swift transition from a planned economy towards a market-orientated economy. During the 1990s, the agenda of forest reform targeted creation of a market for forest rights. While land transfers and auctions to private and even foreign actors had already occurred,[3] the transfer of forest use-rights was arranged in the amended Forest Law of 1998 (Holden et al., 2013). With the transfer of contracted rights allowed in the Rural Land Contract Law of 2002, land use-rights – including forests – eventually were codified as usufruct rights in the Property Law of 2007. At present, the alienation of forest use-rights within and outside the village is allowed, and in most cases, permission from the collective is not required (see Yin et al., 2013).

Specific guidelines and intentions: The alienation[4] of forest rights is permitted on the conditions that i) the term does not exceed the tenure period, and ii) the use of forestland remains unchanged (prohibiting land conversion). The alienation of rights is pursued to promote forest transfer with the interrelated objectives of realizing economies of scale and developing (large-scale) cooperative forms of forest management. Alienation has also been associated with a carbon trading system. To facilitate forest transfer, specific measures have aimed at: setting up and improving a property transaction system (*chanquan jiaoyi pingtai*); enhancing forest appraisal services; calling on financial institutions to improve forest credit products; and facilitate forest rights to be used as collateral.

3.3 Protecting income rights: from sanctions to subsidies

Background: In 1985, the central state decided to liberalize timber markets by abolishing the unified procurement price system (Liu et al., 2017b). As forest use-rights were granted to households only a few years before, this decision unexpectedly triggered unsustainable timber harvests on a large-scale, which was particularly severe in Southwest China (Robbins and Harrell, 2014). The state swiftly responded by stalling and reversing the course of privatization, returning timber markets under strict state control, and imposing new regulations (Liu and Dachang, 2001; Yin and Newman, 1997). High stumpage taxes and fees not only impeded forest income rights but also created heavy burdens for households (Liu et al., 2017b; Yin et al., 2013).

While household incentives consequently declined (Xie et al., 2014), dramatic floods along the Yangtze river in 1998 motivated further and stricter measures (Dai et al., 2011). Six key forestry programs were launched, of which the most significant are i) the Natural Forest Protection Program (NFPP) to ban further logging and promote afforestation, and ii) the Conversion of Cropland to Forest Program (CCFP) to restore vegetation on grasslands and steep slopes by providing farmers with cash subsidies (Dai et al., 2011; Gutiérrez Rodríguez et al., 2016; Liu et al., 2008).[5] Although harvest restrictions and cutting permits remain, taxes and fees were gradually reduced or eliminated over concerns of rural poverty (Yin et al., 2013).

[3] Oral communication with Wen Tiejun, October 8, 2017.
[4] Further specified into: subcontracting (*zhuanbao*); lease (*chuzu*); transfer (*zhuanrang*), shareholding (*rugu*), mortgage (*diya*), and capital contribution *(chuzi*).
[5] For a complete overview see (Dai et al., 2011, p. 1091 table 3).

Specific guidelines and intentions: It is important to observe the underlying shift from solely imposing sanctions and penalties, towards compensating farmers for rights' attenuation. Measures of the CFTR have explicitly aimed to protect income rights in two ways. The first revolves around compensation in case of expropriation, calling for fair and adequate resettlement fees. The second is about easing the 'contradiction' (commercial production versus ecological preservation) by providing households subsidies if their forests are designated for ecological purposes. While subsidies have been introduced under the key forestry programs, the CFTR calls for an increase of the compensation standards.

4. Methodology

It has become clear that China's most recent instance of forest reform has been guided by a strong focus on property rights. Apart from calls to formalize rights, management rights are allocated to households (with management restrictions gradually reduced), alienation rights are implemented to encourage the transfer of forest rights, and subsidies are installed to protect income rights. We examine whether these formal changes in rights matches the intended outcomes of the reform, i.e., enhanced incentives and economic benefits for households. Recalling from Section 2.3, we will zoom in on at how rights are perceived and exercised by resource users, and their relation to the resource.

4.1 Research site

For empirical applicability, the Wuling Mountain Area (WMA) is selected as the site of research. It is located in Southwest China and stretches over 71 counties in four bordering province-level administrations: Chongqing, Hubei, Hunan, and Guizhou. The area currently serves as a pilot site for a State Council regional development and poverty alleviation project (State Council, 2011). The WMA region is home to about 36 million people, of which approximately three quarters live in rural areas, although a rapid increase in urbanization has been witnessed. Its population is characterized by a high prevalence of indigenous peoples, such as Tujia, Miao, and Dong. In 2010, the per capita average net income level was 3499 yuan, just 59.1% of China's national average (State Council, 2011). There are persisting and widening income disparities between rural and urban households, and about one out in ten households lives in poverty.

The area is rich in natural resources, and WMA's forest cover stands at 53 percent of its total surface – including some of China's last remaining natural forests. National forest protection programs, including NFPP and CCFP, are both enforced in the WMA (see Liu et al., 2008, p. 9478). The CFTR was implemented around 2008, although most of WMA's forests were already distributed to households during the Three Fixes policy. Over ninety percent of the area's forests belong to the collective-owned forest sector (SFA, 2009, 2010b, 2012). With a large collective-owned forest sector, and a relatively poor population living in mountainous terrains, the objectives of the reform to generate welfare benefits thus appear highly relevant for households in the WMA.

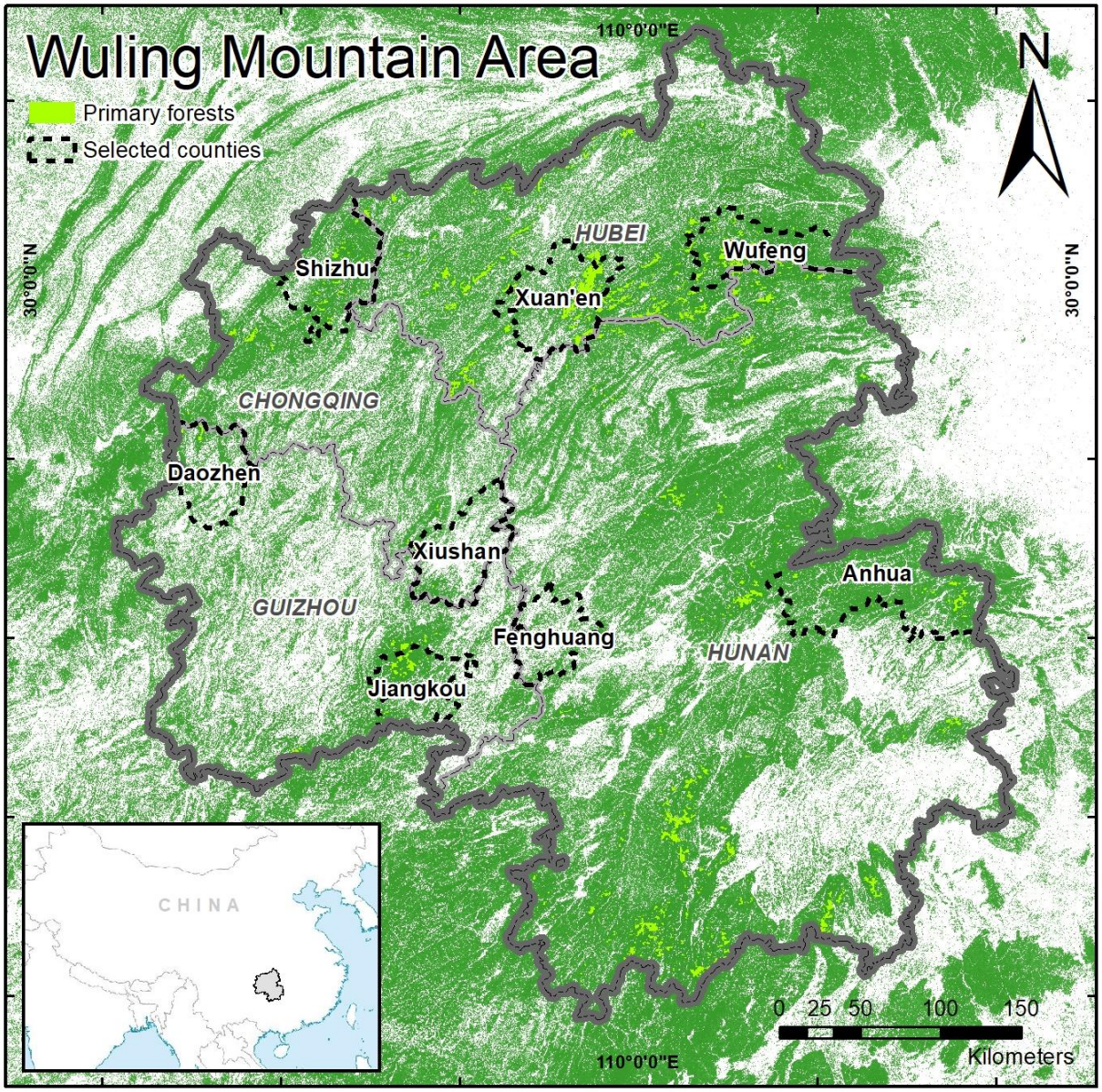

Figure 1 Wuling Mountain Area (source: the authors)

4.2 Sampling and data collection

Cluster sampling was applied where we selected two counties in every province, totaling eight counties. Because geographical differences in forest compositions may influence household incentives and benefits, a diverse set of counties with varying forest compositions was constructed (Figure 1), containing those with comparatively high or low tree cover (Shizhu, Wufeng, Xiushan), high tree gain or loss (Anhua, Fenghuang), and presence of intact forests (Jiangkou, Xuan'en, Daozhen).[6]

[6] Sampling was performed through a spatial model built with Python using Google Earth Engine (GEE), based on the dataset of global tree cover (version 1.3, released 2017) by Hansen et al. (2013). The model also includes data of China's intact forests (*yuanshi senlin*). The output produced a county level overview of i) tree canopy cover in 2000, ii) tree cover loss between 2000-2015, iii) tree cover gain between 2000-2012, and iv) intact forest cover.

For the collection of data, both quantitative and qualitative insights were obtained – known as the mixed-methods (Creswell, 2003). First, quantitative insights were derived from a household survey (N=331) carried out in 2017. The survey was first pre-tested in-person with 47 households in two centrally-located counties in the WMA (Xiushan and Fenghuang). After careful review, a full-scale survey was designed and carried out in Fall 2017. The surveys were collected in-person on tablets using the EpiCollect5 application (version 1.1.4) and were logged with GPS coordinates. In every selected county, approximately ten villages were visited and in each village, about five surveys were collected (totaling 40 to 50 surveys per county). We chose this number not only because data saturation tended to occur at this point, but also because it was often not possible to find more than five respondents in one village, so exceeding this number would create bias towards larger villages. Due to the absence of an accessible sampling frame (e.g., a household register), and the difficulties creating one, we opted for a household-to-household convenience sampling method.

While this meant that our sample of 331 households is statistically non-representative, we attempted to enhance representation by selecting different and random villages within each county and with varying distances to urban centers. Table 1 shows the basic characteristics of our sample, which correlates with some main features of China's rural population (see T. Liu & Sun, 2015). Most notably, the average age of respondents concurs with China's increasingly aging rural population and the relatively high out-migration in rural families is also reflected. The sample also features a large portion of farmers, which may indicate that rural livelihoods are still highly land-dependent.

Following Creswell and Plano Clark (2011), the household survey was complemented with qualitative insights to improve robustness and validity. Semi-structured interviews (N=29) were conducted in-person to gain additional in-depth knowledge about the intentions of the reform and its implementation. Given that the county-level forestry bureaus are mainly responsible for the reform, at least one representative was interviewed in every selected county. We further validated and triangulated officials' claims through a small number of (purposely-selected) semi-structured interviews with local leaders or cadres (9) and tenure experts (6).

Table 1 Basic sample features

N = 331	In % valid
Gender	
Male	61.3
Female	38.7
Occupation	
Farmer	91.0
Other (off-farm)	9.0
Education	
Illiterate	19.3
Elementary	51.7
Junior high	21.5
High school	6.5
University	0.9
Average age (in years)	62.4
Household composition (in persons)	

Average household size	5.8
Members out-migrated	1.7

5. Results

The empirical results are presented with the analytical framework. The first section draws on the household survey and discusses how every right has been perceived and exercised by households. Based on insights from observations and interviews, the second section identifies other factors also at stake in China's forest tenure arrangement.

5.1 Disentangling forest reform: household perceptions and exercising of rights

Management rights: The first measure of the reform was to 'release' forest management rights – i.e., granting households with more rights and decision-making. Whereas in other provinces this has been paired with a new round of privatization, the majority of households in this study (87.9%) were already allocated forest use-rights in the early 1980s and have individually managed their forests since then. For 82.1% under individual management, this arrangement was supported, considerably higher than those under collective management (56.5%) and cooperative management (27.3%, i.e., a small group of households, *xiaozu*) (Table 2). At the same time, the recent extension of the tenure term to 70 years was also widely supported (Table 3).

Table 2 Household management satisfaction

			Management satisfaction		
			Yes	*Indifferent*	*No*
Management type	*Individual*	Count	234	26	25
		%	82.1%	9.1%	8.8%
	Collective	Count	13	3	7
		%	56.5%	13.0%	30.4%
	Cooperative	Count	3	1	7
		%	27.3%	9.1%	63.6%
Total		Count	250	30	39
		%	78.4%	9.4%	12.2%

Table 3 Household tenure term satisfaction

			Term satisfaction	
			No	*Yes*
Indicated duration of tenure term	*30 years*	Count	11	13
		%	45.8%	54.2%
	70 years	Count	6	41
		%	12.8%	87.2%
Total		Count	17	54
		%	23.9%	76.1%

Despite support for individual management and extension of the tenure term, the actual exercising of management rights has remained low. Results from the survey show that 64.3% spend little time on forest management, and most notably, 50.9% never planted trees on their land. Similarly, only 8.1% has applied for a cutting permit, which is currently free but still required when harvesting more than a stipulated number of trees.

The low exercising of management rights was also reflected in the uses of household forests (Figure 2). In 81.8% of cases, forests were solely used for self-use, which can be translated into using a small number of trees for subsistence purposes to satisfy cooking and heating needs. However, as fuelwood is increasingly replaced by electricity, the use of forest resources has declined for nearly all households (92.2%). The average decline of 73.3% over

the last 15 years shows that dependency on forest resources has drastically diminished, together with their importance for self-use.

In relation, commercial uses of forests were much less common. Only a fraction of households (3.5%) engaged in NTFP, such as tea trees and mushrooms, while even fewer (2.5%) used their land for commercial purposes such as tourism. Given these low figures, it is not surprising that only 8.2% of households obtained direct economic benefits from their forests. For those with a benefit, it has been mostly derived from the sale of timber (45.8%), NTFP (41.7%), and the transfer of forest rights (12.5%). However, only 12.5% considered these as an important source of revenue. This means that from all surveyed households who individually managed forests, just 1.0% obtained *substantial* economic benefits from their forests.

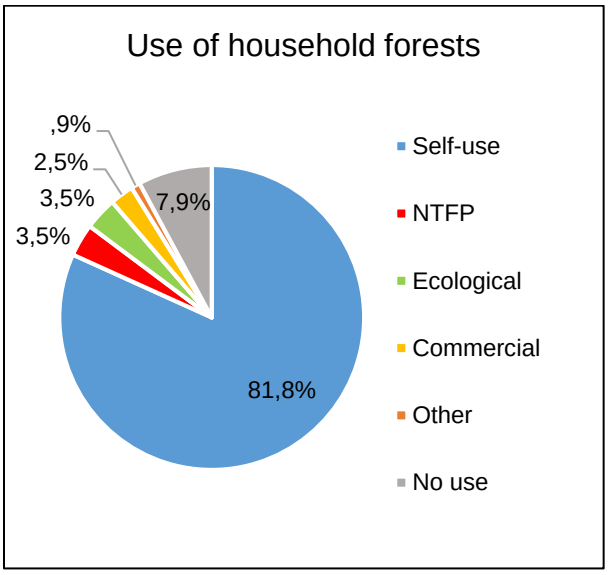

Figure 2 Use of household forests

Alienation rights: With the low exercising of management rights, best reflected by infrequent commercial uses, the transfer of forest rights may provide households with an additional, alternative economic opportunity. This is especially relevant considering current migration patterns, which have caused many households to migrate away from their forests. Despite this relevance, the survey results show that only 5.8% have engaged in forest transfer. Here, 4.1% engaged in renting out their forests, commonly to a private company for a fixed period. Just 1.7% cited selling their forest use rights, which were permanently sold to factories for a lump sum.[7] None of the respondents stated using their rights as collateral in order to obtain credit.

To explain why the exercising of alienation rights have remained low household attitudes towards forest transfer were examined. Figure 3a shows a modest readiness for forest transfer, with more households willing to rent-out (38.1%) compared to those willing to sell their forest rights (29.1%), which is not surprising given that selling forest rights has permanent implications. At the same time, a sizable group was undecided about forest transfer, particularly for renting-out (35.6% of respondents answered 'maybe'). This may indicate that some

[7] Depending on the size of land sold, households reported they were given tens of thousands of yuan. Figures vary between 20,000 and 90,000 yuan per mu (equivalent to 2,800-12,500 USD per 1/15 hectare), but given the low number of observed cases, these figures serve only as an indication.

households are not fully accustomed to the idea of forest transfer yet. Finally, a considerable group was unwilling to transfer forests (explained in Figure 3b): a large group wanted to retain their forests, while others pointed to market deficiencies which are mainly caused by a lack of demand for forests. The survey results further show that some households were not fully aware of the opportunities for forest transfer, as 23.3% indicated that renting-out is not allowed (and 58.4% for sale). This was paired with a relative high ambiguity over tenure rights, as 59.6% of households under individual management believed to possess ownership, with only 13.8% pointing to the collective as the rightful owner.

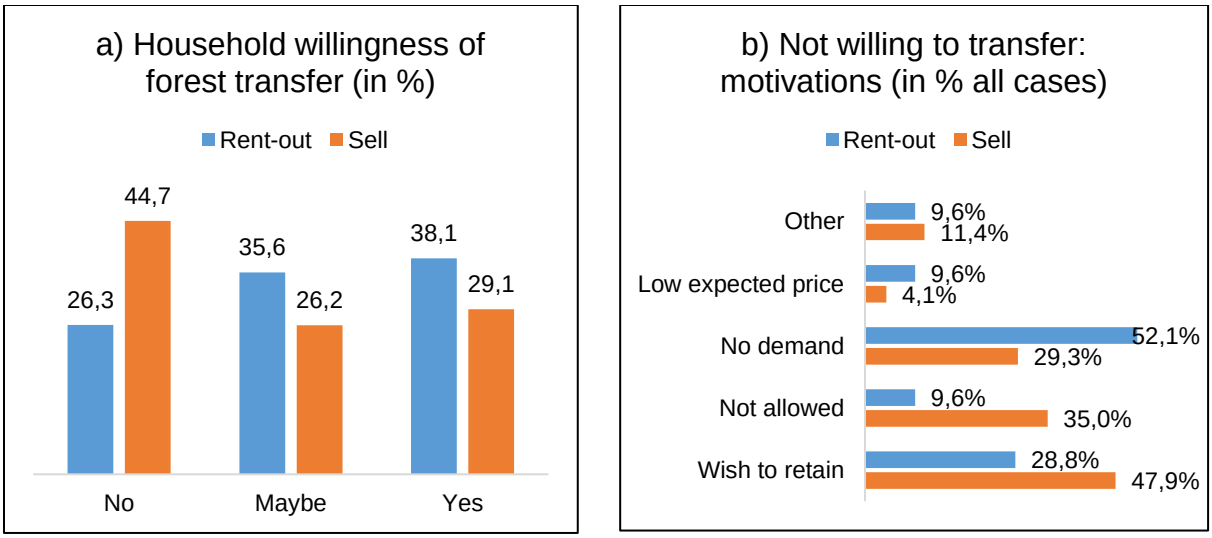

Figure 3a and 3b Household willingness of forest transfer

Income rights: Both management rights and alienation rights are guided by income rights,[8] assuming that the right to economically benefit from the resource will affect one's incentive to manage or obtain it. With cutting bans enforced in the research area, it is important first to assess how these are internalized by households. The majority of households (65.8%) acknowledged the need to apply for a permit when exceeding a certain number of trees to cut (although with varying estimates). At the same time, 97.1% recognizes the effect of such restrictions, with some claiming that deforestation would occur without these. These findings correspond with few reports of illegal harvesting (reported by 7.6%).[9]

With cutting restrictions largely respected, the subsidies offered by the NFPP and CCFP have aimed to compensate forest users for the attenuation of their income rights. The programs are relatively common in the research site, with 37.0% indicated receiving a subsidy. Farmers received an annual fee of about 8 to 10 yuan for every mu included in the program.[10] However, as most households only hold small pockets of forest, the amount of subsidies is perceived as

[8] Although formal guidelines have also focused on fair compensation in case of expropriation, no such cases were encountered and therefore this section focusses on the distribution of subsidies. It is relevant to note, however, that 89.6% is confident to receive a fair compensation in case of expropriation.

[9] Although the survey did not ask about the role of potential sanctions, it is generally understood that penalties for illegal harvest are strict in China. One respondent, a village leader in Hunan, was sentenced for three years due to (illegal) harvesting of approximately 65 hectares of forestland.

[10] Equivalent to approximately 1-1.5 USD per 1/15 hectare. The survey did not differentiate between both programs.

low by 76.1% of households. Households in our sample have an average of 3.2 forest parcels with each an average size of 5.5 mu (about a third of a hectare). This means that even in a hypothetical case where all forests are included, the total annual compensation would only average to about 150 yuan annually (about 22 USD).

5.2 Explaining discrepancies

The previous section may indicate that the current configuration of property rights in China's forest sector has become credible, best reflected by high support for individual management but also by the adherence of cutting restrictions. This is also reflected in the overall attitudes of forest rights (Figure 4), where 90.2% expressed satisfaction with their current rights, and 68.8% indicated no need for further (policy) changes. At the same time, household forests are still seen as important for most (84.3%). Despite such credibility, however, we have also seen that the actual exercising of forest rights has remained low – best characterized by low levels of forest management and infrequent transfers of forest rights.

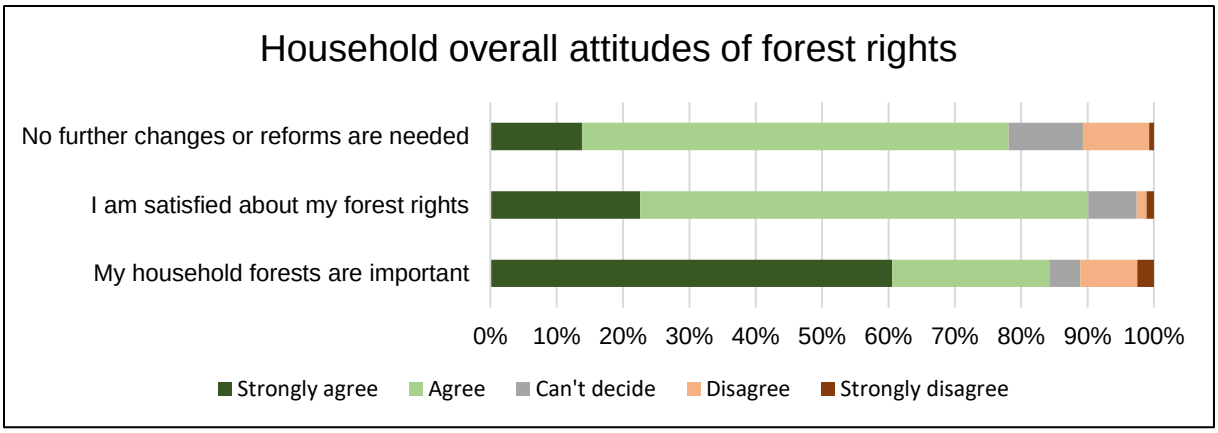

Figure 4 Household overall attitudes of forest rights

These results point to an anomaly in China's forest tenure arrangement: even though nearly all surveyed households have been unable to derive a substantial economic benefit from their forests, the rights arrangement still appears highly credible. The in-depth insights derived from interviews provide further elucidation to explain this.

The low exercising of management rights (paired with little economic benefits) may be explained not only because of declining dependencies of forest resources but also by rapid demographic changes across rural China. With the youth moving to more lucrative off-farm jobs in urban areas, there is a high proportion of seniors residing in the villages.This was also illustrated in the survey sample, where the average age was 62 and approximately one in four household members out-migrated. The aging composition of China's forest users has been viewed as a critical hindrance for forest reform as the laborious tasks of forest management are no longer fulfilled by forest users:

> Now that all young adults have left, only the elderly are still at home. It is impossible to call them to develop your industry. *D.011, Forest reform officer, October 16, 2017*

Given that the aging population puts a direct constraint on individual forest management, China's continued trajectory of allocating forest use-rights to households are viewed with

skepticism by local authorities in the WMA. Most agreed that a collective form of management can be better equipped to improve forest management:

> The younger generations do not know the boundaries and number of plots. What is the meaning of the contracting system? If you do not even know it yourself, how will it be managed? My view is that ultimately collective management is better. *D.004, Village leader, September, 16, 2017*

> Actually, I personally think that initially forests should not have been assigned to households. Forests are not the same as agriculture land. Cultivated land is to solve the problem of 'food and clothing'. Forests are not the same, the first priority is to provide wood and the second priority is to protect the ecology. This is totally not the same. *D.006B, Forest reform officer, September 21, 2017*

Some households and village leaders have also echoed officials' complaints about individual management. They have argued that it has hindered the construction of roads to tap on the economic benefits of valuable trees, which are usually located in mountainous terrains that are difficult to access, particularly for the aging population. Moreover, the fragmented land structure may motivate interested parties to obtain forests that are collective-managed instead of individual-managed due to lower transaction costs, reducing market demand for household forests. Fragmentation has also put an immediate barrier to land appraisal that is often a prerequisite for transfer. The following statement illustrates this issue for collateralizing forest rights:

> If you only have five mu, and you want to get a loan, how can you do that? You need to evaluate your forest assets. For evaluation, you need a qualified person to assess, which you need to hire. We only have one accredited person in this province. You only have five mu of forest, but he asks 50.000 yuan, what can you do? This is a problem. *D.011, Forest reform officer, October 16, 2017*

The difficulties of land appraisal have constrained the functioning of forest markets, which in the research site already suffered from market deficiencies that were identified by households (Section 5.1). Others have suggested that the market deficiencies are not exclusive for transfer, but also apply for timber markets:

> Right now, the prices of trees are low, so no people are cutting the trees. You can cut trees down, and bring them to the road, but people will not pay for it. *D.003A, Forest reform officer, September 13, 2017*

On the other hand, market deficiencies are not solely caused by forest fragmentation and remoteness. Another factor is that restrictions over forestland have remained, and although households are being compensated when their forests are designated for ecological conservation, the results have shown that they have been unable to create significant benefits for households as most retain small parcels of forests. At the same time, some have suggested that the prevailing restrictions over forest rights remained as an impediment to income rights and incentives of management and alienation:

> There are no such cases [of forest transfer], because if you want to rent the forest, you want to cut the trees, but since you can not cut the trees no one is willing to do that. *B.010, Village leader, February 9, 2017.*

6. Limitations to China's rights-based approach

While individual management introduced in China's agricultural sector remains largely successful (Coase and Wang, 2012), its introduction in the forest sector has proven to be difficult with persisting issues (Liu et al., 2017a; Xiong et al., 2018; Xu, 2010). The introduction of individual management since the 1980s has resulted in a large number of small forest parcels. In the subsequent decades, however, economic growth has motivated many young villagers to move to urban areas, increasing the proportion of elderly in villages, which ultimately inhibits the ability (Ribot and Peluso, 2003) to exercise management rights. Although the state's response has been to encourage forest transfer for more efficient management, we observed this is constrained by low market demand and high transaction costs, while strict regulations over forests have also remained.

It has become evident that the rights-based approach featured in China's forest reform has been largely unable to meet its objectives for households. Instead of creating new incentives and economic benefits, households' forest use and dependencies have diminished considerably over the last decades and the reform has been unable to reverse this trend. At the same time, however, the rights arrangement has become largely credible and rallied social support amongst households. This anomaly may point to the limitations of the rights-based approach. These are not only presently manifested but also in the ensuing phases and directions of (rights-based) forest reform.

The most plausible direction is the intensification of previous efforts on allocating and improving forests rights. This would imply reducing further restrictions on management rights, enhance the institutional conditions for the alienation of rights, and increasing subsidies for income rights. However, it is unlikely that these efforts will be sufficient in addressing the underlying issues of land fragmentation and an aging population. Moreover, China's forest sector already hosts some of the largest PES programs in the world (Liu et al., 2008), and even if subsidies for ecological programs are raised, per capita levels will remain low as most households are smallholders.

A more radical direction would be to introduce fundamental changes in China's forest tenure arrangement. As households only hold the use-rights of land, some groups have called for the full privatization of land rights (Zhan, 2020). However, while it will be doubtful that the central government breaks from its socialist principle of collective land ownership (Lin, 2009), it is also not likely that this will incentivize households as most already believe they have full ownership. Another more drastic measure would be to reallocate use-rights to the collective level, as proposed by some authorities. While this could enhance economies of scale and reduce transaction costs, our results concur with other studies that showed individual household forests remain highly appreciated (Siikamäki et al., 2015). Such measures are, therefore, likely to be faced with strong resistance from farmers.

It appears that the main problems residing in China's forest tenure arrangement cannot be easily ascribed to property rights, nor do property rights alone offer a direct institutional 'fix'. Whereas the institutionalization of natural resources have implied that the focus has been diverted to the rights of the resource instead of the resource itself (Coase, 1960), our results show that the key issue lies not in China's rights arrangement – but instead, with the resource itself and particularly its limited economic value and potential. The economic values of household forests are currently low because of deficiencies that pertain to the users (the absence

of an active group able to turn forests into more profitable uses), the market (a lack of demand for both forestland and forest resources), and the government (imposing strict restrictions with inadequate compensation). Taken together, the low economic values have meant that the reform has been largely unable to realize its objectives because WMA's forests provide insufficient basis to generate new incentives or economic benefits for households.

This may still explain why the reform appears more successful in other areas, for instance in areas where infrastructure and geographical conditions may be more suitable for (large-scale) economic production, or where demographic change does not constrain individual forest management. While our findings concur with other studies that found transactions around forests remains low (Shen et al., 2009; Siikamäki et al., 2015; Zhang et al., 2017), a number of studies have indicated that the reform led to positive incentives in household management, improved tenure security, increased afforestation and non-timber forest production (NTFP), and more investments (He and Sikor, 2017; Qin and Xu, 2013; Ren et al., 2018; Xie et al., 2016; Yi, 2016). It remains clear, however, that for the WMA – an area representative of household forests in remote and mountainous terrains – the ambitions of the reform has yet come to fruition.

7. Conclusion

Over the last few decades, rights-based approaches aimed to facilitate new types of economic transactions around natural resources. They are often formulated on the basis that formal changes in rights will provide effective incentives for resource management, production, and more recently, conservation. At the same time, it has become increasingly clear that the reconfiguration of property rights are not always successful. Recent works seek to address this by revising the conceptualization of rights (Galik and Jagger, 2015; Ribot and Peluso, 2003; Sikor et al., 2017), while other studies have looked at how rights are aligned with the needs and perceptions of actors (Ho, 2016; Sun and Ho, 2018; Zeuthen, 2018).

While such works have improved our understanding of how rights function vis-à-vis their users, China's case shows that successful reform is not just about property rights alone. Ten years after the intensive (and credible) efforts under the Collective Forest Tenure Reform, the reform has been largely unable to create new incentives and economic benefits for households in the WMA. Our case has shown that rights-based approaches are unlikely to realize their intended effects if natural resources hold too little economic value or potential. This is an important consideration commonly blindsided in conventional studies on property rights reforms, where success stories between reforms, forest conservation, and economic growth are mistakenly taken for causal relations.

Undoubtedly, this provokes a chicken-or-egg dilemma as advocates of rights-based approaches (and particularly those promoting formal, private, and transferable rights) would argue that it is first necessary to 'get the institutions right' (Rodrik, 2004) before the economic potential of resources can be capitalized on. Although our results are not conclusive about the long-term effects of reforms, what is clear, is that such processes will take a longer period to manifest. Moreover, throughout these processes, values may also be subjected to changes in resource use and production. This calls for an analytical shift that further incorporates not only how rights are exercised or perceived by resource users, but also how they stand in relation to the resource.

Acknowledgments: This research has been supported by the European Research Council, RECOLAND GA 282690, Fujian Social Science Foundation Project (No. FJ2019C035), and Fundamental Research Funds for the Central Universities (20720191002). The authors would like to thank Tan Jing Min, David Sims, Zhan Shaohua, Aad Correljé, and Leon Hermans for their comments on earlier drafts of the paper, as well as the members of the TECSEA reading group at the National University of Singapore for their helpful remarks. We also express our gratitude to the two anonymous reviewers for their comments.

References

Agrawal, A., Chhatre, A., 2007. State involvement and forest co-governance: Evidence from the Indian Himalayas. Stud. Comp. Int. Dev. 42, 67–86. https://doi.org/10.1007/s12116-007-9004-6

Alchian, A.A., 1977. Economic forces at work. Liberty press, Indianapolis.

Alessi, L. De, 1983. Property Rights, Transaction Costs, and X-Efficiency: An Essay in Economic Theory. Am. Econ. Rev. 73, 64–81.

Aoki, M., 2007. Endogenizing institutions and institutional changes. J. Institutional Econ. 3, 1–31. https://doi.org/10.4337/9781783476213.00026

Besley, T., 1995. Property Rights and Investment Incentives: Theory and Evidence from Ghana. J. Polit. Econ. 103, 903–937. https://doi.org/10.1086/262008

Bromley, D.W., 1992. Making the Commons Work: Theory, Practice and Policy. ICS Press, San Fransisco.

Coase, R., 1998. The New Institutional Economics. Am. Econ. Rev. 88, 72–74.

Coase, R., 1960. The problem of social cost. J. Law Econ. 3, 1–44.

Coase, R., Wang, N., 2012. How China Became Capitalist. Palgrave Macmillan, New York.

CPC Central Committee and State Council, 2008. Quanmian tuijin jiti lin quan zhidu gaige de yijian [Views on fully promoting the collective forest right system reform].

CPC Central Committee and State Council, 2003. Guanyu jiakuai linye fazhan de jueding [Decisions on accelerating forestry development].

Creswell, J., 2003. Research design: qualitative, quantiative and mixed methods approaches, Fourth. ed. Sage, Thousand Oaks.

Creswell, J.W., Plano Clark, V.L., 2011. Choosing a mixed methods design. Des. Conduct. Mix. methods Res. 2, 53–106.

Dai, L., Wang, Y., Su, D., Zhou, L., Yu, D., Lewis, B.J., Qi, L., 2011. Major forest types and the evolution of sustainable forestry in China. Environ. Manage. 48, 1066–1078. https://doi.org/10.1007/s00267-011-9706-4

Demsetz, H., 1974. Toward a Theory of Property Rights, in: Gopalakrishnan, C. (Ed.), Classic Papers in Natural Resource Economics (2000). Palgrave Macmillan, London, pp. 347–359.

Feder, G., Nishio, A., 1999. The benefits of land registration and titling. Land use policy 15, 25–43.

Galik, C.S., Jagger, P., 2015. Bundles , Duties , and Rights : A Revised Framework for Analysis of Natural Resource Property Rights Regimes. Land Econ. 91, 1–18. https://doi.org/10.1353/lde.2015.0000

Gibson, C.C., Lehoucq, F.E., Williams, J.T., 2002. Does privatization protect natural resources? Property rights and forests in Guatemala. Soc. Sci. Q. 83, 206–225. https://doi.org/10.1111/1540-6237.00079

Gutiérrez Rodríguez, L., Hogarth, N.J., Zhou, W., Xie, C., Zhang, K., Putzel, L., 2016.

China's conversion of cropland to forest program: a systematic review of the environmental and socioeconomic effects. Environ. Evid. 5, 1–22. https://doi.org/10.1186/s13750-016-0071-x

Hansen, M.C., Potapov, P. V, Moore, R., Hancher, M.C., Turubanova, S. a, Tyukavina, A., Thau, D., Stehman, S. V, Goetz, S.J., Loveland, T.R., Kommareddy, A., Egorov, A., Chini, L., Justice, C.O., Townshend, J.R.G., 2013. High-Resolution Global Maps of 21st-Century Forest Cover Change. Science (80-.). 850, 2011–2014. https://doi.org/10.1126/science.1244693

He, J., Sikor, T., 2017. Looking beyond tenure in China's Collective Forest Tenure Reform: Insights from Yunnan Province, Southwest. Int. For. Rev. 19, 29–41.

Ho, P., 2018. Institutional function versus form: The evolutionary credibility of land, housing and natural resources. Land use policy 75, 642–650. https://doi.org/10.1016/j.landusepol.2018.02.001

Ho, P., 2016. Empty institutions, non-credibility and pastoralism: China's grazing ban, mining and ethnicity. J. Peasant Stud. 43, 1145–1176. https://doi.org/10.1080/03066150.2016.1239617

Ho, P., 2014. The "credibility thesis" and its application to property rights: (In)Secure land tenure, conflict and social welfare in China. Land use policy 40, 13–27. https://doi.org/10.1016/j.landusepol.2013.09.019

Ho, P., 2001. Who Owns China's Land? Policies, Property Rights and Deliberate Institutional Ambiguity. China Q. 166, 394–421.

Holden, S.T., Yi, Y., Jiang, X., Xu, J., 2013. Tenure Security and Investment Effects of Forest Tenure Reform in China, in: Holden, S.T., Otsuka, K., Deininger, K. (Eds.), Land Tenure Reform in Asia and Africa: Assessing Impacts on Poverty and Natural Resource Management. Palgrave Macmillan, Hampshire, pp. 256–282.

Hyde, W.F., 2015. Whereabouts devolution and collective forest management? For. Policy Econ. 72, 85–91. https://doi.org/10.1016/j.forpol.2016.06.018

Johnson, C., Forsyth, T., 2002. In the eyes of the state: Negotiating a "Rights-based approach" to forest conservation in Thailand. World Dev. 30, 1591–1605. https://doi.org/10.1016/S0305-750X(02)00057-8

Kumar, K., Singh, N.M., Kerr, J.M., 2015. Decentralisation and democratic forest reforms in India: Moving to a rights-based approach. For. Policy Econ. 51, 1–8. https://doi.org/10.1016/j.forpol.2014.09.018

Larson, A.M., Cronkleton, P., Barry, D., Pacheco, P., 2008. Tenure rights and beyond: community access to forest resources in Latin America. Occasional Paper no. 50. CIFOR, Bogor. https://doi.org/10.17528/cifor/002631

Libecap, G.D., 1989. Distributional Issues in Contracting for Property Rights. J. Institutional Theor. Econ. 145, 6–24.

Libecap, G.D., 1986. Property Rights in Economic History: Implications for Research. Explor. Econ. Hist. 23, 227–252.

Lin, G.C.S., 2009. Developing China: Land, Politics and Social Conditions. Routledge, New York.

Liu, C., Wang, S., Liu, H., 2017a. An Examination of the Effects of Recent Tenure Reforms in China's Collective Forests on Peasants' Forest Activities and their income. Int. For. Rev. 19, 55–67. https://doi.org/10.1505/146554817820888672

Liu, C., Wang, S., Liu, H., Zhu, W., 2017b. Why did the 1980s' reform of collective forestland tenure in southern China fail? For. Policy Econ. 83, 131–141. https://doi.org/10.1016/j.forpol.2017.07.008

Liu, D., Dachang, L., 2001. Tenure and Management of Non-State Forests in China since 1950: A Historical Review. Environ. Hist. Durh. N. C. 6, 239–263. https://doi.org/10.2307/3985086

Liu, J., Li, S., Chen, X., Ouyang, Z., Tam, C., Chen, X., 2008. Ecological and socioeconomic effects of China's policies for ecosystem services. Proc. Natl. Acad. Sci. 105, 9477–9482. https://doi.org/10.1073/pnas.0706436105

Liu, T., Sun, L., 2015. Eine apokalyptische Vision der demographischen Alterung in China: Das Problem der Altenpflege in dem Land mit der größten Anzahl alter Menschen weltweit. Z. Gerontol. Geriatr. 48, 354–364. https://doi.org/10.1007/s00391-014-0816-5

Mahoney, J., Thelen, K., 2009. A theory on gradual institutional change, in: Mahoney, J., Thelen, K. (Eds.), Explaining Institutional Change: Ambiguity, Agency, and Power. Cambridge University Press, Cambridge, pp. 1–37.

Mengistu, F., van Dijk, M.P., 2018. Credibility of institutions in Addis Ababa (Ethiopia), effects of government policies on real estate developers. Land use policy 79, 913–921. https://doi.org/10.1016/j.landusepol.2016.12.031

Mollinga, P.P., 2016. Secure rights and non-credibility: the paradoxical dynamics of canal irrigation in India. J. Peasant Stud. 43, 1310–1331. https://doi.org/10.1080/03066150.2016.1215304

NFGA (National Forestry and Grassland Administration), 2019. Jiti linquan gai nongcun shengchanli de yici da jiefang [Collective forest reform a major liberation for rural productivity].

Nor-Hisham, B.M.S., Ho, P., 2016. A conditional trinity as "no-go" against non-credible development? Resettlement, customary rights and Malaysia's Kelau Dam. J. Peasant Stud. 43, 1177–1205. https://doi.org/10.1080/03066150.2016.1253559

Ostrom, E., 2005. Understanding institutional diversity. Princeton University Press, Princeton.

Ostrom, E., 1990. Governing the Commons: The evolution of institutions for collective action. Cambridge University Press, Cambridge.

Oyono, P.R., 2009. New niches of community rights to forests in Cameroon: Tenure reform, decentralization category or something else? Int. J. Soc. For. 2, 1–23.

Paudel, N.S., Banjade, M.R., Dahal, G.R., 2009. Community Forestry in Changing Context Emerging Market Opportunities and Tenure Rights. ForestAction and CIFOR, Kathmandu.

Penner, J.E., 1995. The "Bundle of Rights" picture of property. UCLA Law Rev. 43.

Pils, E., 2016. Assessing evictions and expropriations in China: Efficiency, credibility and rights. Land use policy 58, 437–444. https://doi.org/10.1016/j.landusepol.2016.07.015

Platteau, J.-P., 1996. The Evolutionary Theory of Land Rights as Applied to Sub-Saharan Africa: A Critical Assessment. Dev. Change 27, 29–86. https://doi.org/10.1111/j.1467-7660.1996.tb00578.x

Qin, P., Xu, J., 2013. Forest land rights, tenure types, and farmers' investment incentives in China: An empirical study of Fujian Province. China Agric. Econ. Rev. 5, 154–170.

Ren, Y., Kuuluvainen, J., Toppinen, A., Yao, S., Berghäll, S., Karppinen, H., Xue, C., Yang, L., 2018. The effect of China's new circular collective forest tenure reform on household non-timber forest product production in natural forest Protection Project regions. Sustain. 10. https://doi.org/10.3390/su10041091

Ribot, J.C., Peluso, N.L., 2003. A Theory of Access*. Rural Sociol. 68, 153–181.

Robbins, A.S.T., Harrell, S., 2014. Paradoxes and Challenges for China's Forests in the Reform Era. China Q. 218, 381–403. https://doi.org/Doi 10.1017/S0305741014000344

Rodrik, D., 2004. Institutions and Economic Performance - Getting Institutions Right. CESifo DICE Rep. 2, 10–15.

Safitri, M.A., 2009. The mystery of formalising informal land tenure in the forest frontier: The case of Langkawana, Lampung, Indonesia, in: Ubink, J., Hoekema, A.J., Assies, W.J. (Eds.), Legalising Land Rights: Local Practices, State Responses and Tenure Security in Africa, Asia and Latin America. Leiden University Press, Leiden.

Salant, S.W., Yu, X., 2016. Forest loss, monetary compensation, and delayed re-planting: The effects of unpredictable land tenure in China. J. Environ. Econ. Manage. 78, 49–66. https://doi.org/10.1016/j.jeem.2016.02.004

Schlager, E., Ostrom, E., 1992. Property-Rights Regimes and Natural Resources: A Conceptual Analysis. Land Econ. 68, 249. https://doi.org/10.2307/3146375

Shen, Y., Zhang, Y., Xu, X., Zhu, Z., Jiang, C., 2009. Towards decentralization and privatization of China's collective forestlands: A study of nine villages in 3 provinces. Int. For. Rev. 11, 456–463. https://doi.org/10.1505/ifor.11.4.456

Sierra, R., Russman, E., 2006. On the efficiency of environmental service payments: A forest conservation assessment in the Osa Peninsula, Costa Rica. Ecol. Econ. 59, 131–141. https://doi.org/10.1016/j.ecolecon.2005.10.010

Siikamäki, J., Ji, Y., Xu, J., 2015. Post-reform Forestland Markets in China. Land Econ. 91, 211–234. https://doi.org/10.3368/le.91.2.211

Sikor, T., He, J., Lestrelin, G., 2017. Property Rights Regimes and Natural Resources: A Conceptual Analysis Revisited. World Dev. 93, 337–349. https://doi.org/10.1016/j.worlddev.2016.12.032

Skjølsvold, T.M., 2010. One size fits all? Designer-institutions: Lessons from two flawed attempts in Malawi. Int. J. Commons 4, 758–771.

Soto, H. De, 2000. The Mystery of Capital: Why Capitalism Triumphs in the West and Fails Everywhere Else. Basic Books, New York.

State Council, 2016. Guowuyuan bangong ting guanyu wanshan jiti linquan zhidu de yijian guobanfa [Opinions of the General Office of the State Council on Improving the Collective Forest Right System].

State Council Leading Group for Poverty Alleviation and Development, 2011. Wuling shan pianqu quyu fazhan yu fupin goingjian guihua [Wuling Mountain Area Development and Poverty Alleviation plan 2011-2010].

State Forestry Administration, 2012. Di ba ci quanguo senlin ziyuan qingcha [The eighth national forest inventory, fourth report 2012]. Beijing.

State Forestry Administration, 2010a. China Forestry Statistical Yearbook. China Forestry Press, Beijing.

State Forestry Administration, 2010b. Di ba ci quanguo senlin ziyuan qingcha [The eighth national forest inventory: second report 2010]. Beijing.

State Forestry Administration, 2009. Di ba ci quanguo senlin ziyuan qingcha [The eighth national forest inventory first report 2009]. Beijing.

Sun, L., Ho, P., 2018. Formalizing informal homes, a bad idea: The credibility thesis applied to China's "extra-legal" housing. Land use policy 79, 891–901. https://doi.org/10.1016/j.landusepol.2016.10.024

Tang, R., Gavin, M.C., 2015. Degradation and re-emergence of the commons: The impacts of government policies on traditional resource management institutions in China. Environ. Sci. Policy 52, 89–98. https://doi.org/10.1016/j.envsci.2015.04.023

Thanh, T.N., Sikor, T., 2006. From legal acts to actual powers: Devolution and property rights in the Central Highlands of Vietnam. For. Policy Econ. 8, 397–408.

https://doi.org/10.1016/j.forpol.2005.08.009
Trædal, L.T., Vedeld, P.O., Pétursson, J.G., 2016. Analyzing the transformations of forest PES in Vietnam: Implications for REDD+. For. Policy Econ. 62, 109–117. https://doi.org/10.1016/j.forpol.2015.11.001
Williamson, O.E., 2000. The New Institutional Economics: Taking Stock, Looking Ahead. J. Econ. Lit. XXXVIII, 595–613.
Xie, L., Berck, P., Xu, J., 2016. The effect on forestation of the collective forest tenure reform in China. China Econ. Rev. 38, 116–129. https://doi.org/10.1016/j.chieco.2015.12.005
Xie, Y., Gong, P., Han, X., Wen, Y., 2014. The effect of collective forestland tenure reform in China: Does land parcelization reduce forest management intensity? J. For. Econ. 20, 126–140. https://doi.org/10.1016/j.jfe.2014.03.001
Xiong, L., Wang, F., Cheng, B., Yu, C., 2018. Identifying factors influencing the forestry production efficiency in Northwest China. Resour. Conserv. Recycl. 130, 12–19. https://doi.org/10.1016/j.resconrec.2017.11.009
Xu, J., 2010. Collective forest tenure reform in China: what has been achieved so far, in: World Bank Conference on Land Governance. World Bank, Washington DC.
Yang, X., 2018. Credibility and social conflicts: Mining institutions and rural community in China. PhD thesis, Delft University of Technology, Delft. https://doi.org/10.4233/uuid
Yi, Y., 2016. Devolution: Deforestation or Forestation? Panel Evidence from the Collective Forest Tenure Rights Reform in China, in: World Bank Conference on Land and Poverty. World Bank, Washington DC.
Yin, R., Newman, D.H., 1997. Impacts of rural reforms: the case of the Chinese forest sector. Environ. Dev. Econ. 2, 291–305. https://doi.org/10.1017/S1355770X97000041
Yin, R., Yao, S., Huo, X., 2013. China's forest tenure reform and institutional change in the new century: What has been implemented and what remains to be pursued? Land use policy 30, 825–833. https://doi.org/10.1016/j.landusepol.2012.06.010
Zeng, W., Tomppo, E., Healey, S.P., Gadow, K. V., 2015. The national forest inventory in China: history - results - international context. For. Ecosyst. 2, 23. https://doi.org/10.1186/s40663-015-0047-2
Zeuthen, J.W., 2018. Whose urban development? Changing credibilities, forms and functions of urbanization in Chengdu, China. Land use policy 79, 942–951. https://doi.org/10.1016/j.landusepol.2017.07.009
Zhan, S., 2020. The Land Question in China: Debating Land Rights in a Precarious Era. New Left Rev. XX.
Zhan, S., 2019. The Land Question in China: Agrarian Capitalism, Industrious Revolution, and East Asian Development. Routledge, Oxon.
Zhang, H., Kuuluvainen, J., Yang, H., Xie, Y., Liu, C., 2017. The effect of off-farm employment on forestland transfers in China: A simultaneous-equation Tobit model estimation. Sustain. 9, 1–14. https://doi.org/10.3390/su9091645
Zhang, K., Artati, Y., Putzel, L., Xie, C., Hogarth, N.J.N., Wang, J.N., Wang, J., 2018. China's Conversion of Cropland to Forest Program as a national PES scheme: Institutional structure, voluntarism and conditionality of PES. Int. For. Rev. 19, 24–36. https://doi.org/10.1505/146554817822330542