Forestland rights institutions and forest management of Vietnamese households

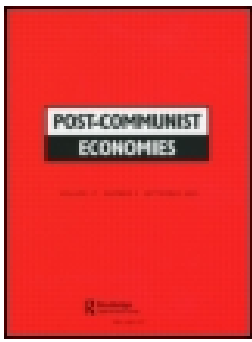**Dataset** · November 2016

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ABSTRACT

This article aims to unbundle the influence of prevailing forestland rights institutions on the forest management behaviours of Vietnamese households. Based on a sample of 398 observations, we investigate the impact of two dimensions of forestland rights institutions (i.e. the formality and the duration) of two types of forest (i.e. production and protection forests) on two types of forest management behaviours (i.e. clearing and improving forest). We find that different dimensions of forestland rights institutions have different impacts on the forest management behaviour of households.

Introduction

Forests and their resources are very important for the socio-economic development of many countries including Vietnam, at both the macro and micro levels. The export of wood and wooden products contributes significantly to the total value of Vietnamese exports, accounting for around 4.8% or 3.4 billion USD in 2011 (General Statistics Office, 2013). It is also estimated that there are about 25 million people (including 10 million indigenous people) who depend on income derived from working in the forests of Vietnam (Chao, 2012). The question of sustainable management is therefore crucial. However, the forested area of Vietnam has declined significantly, from 14.3 million hectares (ha) in 1943 to 11.1 million ha in 1976 to 8.25 million ha in 1995 (McElwee, 2004). In other words, nearly 50% of Vietnam's forest cover disappeared during the second half of the twentieth century, especially during the period 1970–1990. At the same time, the quality of the forests has also declined: more than 70% of Vietnam's natural forest is actually considered 'poor forest' (under 80 m³/ha) or replanted (McElwee, 2004). Although the forested area increased to about 13.86 million ha in 2013, it is argued that only 0.6% 'primary forest' remains (Food and Agriculture Organization, 2011). In addition, about 2500 ha of forest were illegally destroyed every year during the period 2010–2013 (General Statistics Office, 2013). Because of the quantity and quality constraints of indigenous forest, Vietnam also imports wood and this is criticised for causing deforestation abroad (Meyfroidt & Lambin, 2009).

Many factors can be considered as causes of deforestation and forest degradation in Vietnam. However, as in many other countries, it is often argued that the human factor and

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governmental policies are the major determinants of these phenomena (Cattaneo, 2001; Deacon, 1994; McElwee, 2004). The problem is mainly influenced by human behaviour rather than non-human factors such as natural disasters (Gibson, McKean, & Ostrom, 2000). Human behaviour largely depends on incentives, especially those induced by forest policy (Gibson et al., 2000). In the context of developing and transitional economies that lack fundamental market-supporting institutions (McMillan, 1995; World Bank, 2002, 2004), ill-defined property rights in general, and land rights in particular, as well as ineffective enforcement mechanisms are often suggested as central challenges confronting policy-makers in the area (McElwee, 2004; Omura, 2008). In the case of Vietnam, the impact of land rights institutions on forest management is even more crucial. Recently, the Vietnamese government revised its laws and regulations on land ownership (i.e. the Law on Land) that continue to define the entire population, represented by the State and its agencies, as the unique landowner. There have been many calls for reform of *de jure* institutions of land rights (Son & Tuan, 2011) but major questions remain. For example, does the current institutional framework for land rights significantly impact on natural resource management in general, and forest management in particular? Under what conditions will the decentralisation of ownership (i.e. reinforcing the role of private and common ownership) lead to sustainable forest management? In this context, it is important to first understand how the prevailing land rights institutions influence forest management in Vietnam before choosing the direction of institutional reforms.

This study aims to respond at least partially to these questions by investigating the impact of the prevailing forestland rights regulations on the forest management of Vietnamese households. More precisely, our research questions are: do forestland rights institutions (i.e. the formality and the duration of forestland use rights) matter to the forest management behaviours of Vietnamese households (i.e. clearing and improving forest); and if they matter, how do they matter? It is evident that there are many actors involved in the forest management process, such as governmental agencies (at both national and local levels), the private sector, and communities (Neef & Schwarzmeier, 2001). However, the major and numerically largest forest management actor in Vietnam is its inhabitants and their families whose livelihood depends on the forest; that is, the 'forest peoples'. For this reason, we focus on households as our target population. Our assumption is that 'forest peoples' could either be protectors or deforesters depending largely on the forest policies, especially forestland rights policies, which induce and direct their behaviour.

This article is organised as follows. In the next section, based on institutional theory, we review the potential impact of property rights and land rights institutions, in particular on resource management. We then contextualise the forestland rights institutions and forest management in Vietnam. The third section describes the data and variables used in this study, followed by a presentation of the results of our research. A final section concludes.

Literature review

Property rights institutions and resources management

In this part, we first clarify the major mechanisms through which property rights and land rights institutions (i.e. formal or official rules and regulations of land and forestland) can influence resources management in general. We next distinguish two dimensions of land rights institutions: the rights, and the structure of ownership (Gibson et al., 2000). We then

briefly review the empirical evidence provided by prior studies on the extent to which land rights institutions influence resources management.

Institutions are defined as:

> the rules of the game in a society or, more formally, are the humanly devised constraints that shape the human interaction. [As a result], they structure incentives in human exchange, whether political, social, or economic … They can be either … formal constraints – such as rules that human beings devise – or … informal constraints – such as conventions and codes of behaviours. (North, 1990, pp. 3–4)

Institutions can be classified into two levels. The first of these is the institutional environment, defined as 'the set of fundamental political, social and legal ground rules that establishes the basis for production, exchange and distribution. Rules governing elections, property rights, and the right of contracts are examples of ground rules that make up the economic environment' Davis & North, 1971, p. 6. The second level is the institutional arrangement or institutions of governance, defined as 'an arrangement between economic units that govern the ways in which these units can cooperate and/or compete' (Davis & North, 1971, pp. 6–7). Our study focuses on the formal property rights institutions as a fundamental element of the institutional environment.

Property rights and land rights institutions can influence resource management in general, and forest management in particular, through two major mechanisms. First, people invest in more long-term resource management measures that are often associated with higher risk and uncertainty (e.g. expropriation, eviction) only if they perceive that they will able to attract a future return on their investment (Besley, 1995; Omura, 2008). Thus, clear and secure property rights offer greater incentive to invest in longer-term resource management measures rather than focusing on short-term exploitation. Second, clear and secure property rights also create resources (i.e. land) that can be traded as goods or collateral (Feder & Onchan, 1987; Johnson, McMillan, & Woodruff, 2002). Relying on this, the current owner could access other resources (e.g. credit) that, in turn, can be used to invest in sustainable resource management measures. Alternatively, owners can easily exchange or transfer by renting or selling their assets. In other words, clear and secure property rights reduce transaction costs of resource management.

Property rights and land rights in particular include several constituent rights such as use, rent, mortgage, sell, give, exchange, modify, and bequeath (Besley, 1995; Omura, 2008). In principle, actors will have more incentive to invest and to invest more in long-term resource management measures if they have full rights of ownership. However, the formal recognition of property rights is the only necessary condition. If these *de jure* rights are not effectively and efficiently protected by formal enforcement mechanisms, they cannot have a positive effect on *de facto* resource management, because actors fear expropriation risks from both public and private sources. It is argued that property and land rights in developing and transition economies are still ill-defined, limited, and weakly enforced (McMillan, 2007; World Bank, 2002). In this context, deforestation and forest degradation are among several consequences of natural resources management (Gibson et al., 2000).

There are three types of property regimes within which goods, rights, and owners interact differently: state, private, and common property regimes. It is important to note that private property means not only individual but also group associations, such as family households, corporations (Bromley, 1989). In private property regimes, owners could have full rights over their forest asset, while in common property regimes they are often prohibited from selling

their rights to non-members of the community (Agrawal & Ostrom, 1999). By contrast, under state property regimes, groups and individuals cannot fully determine rights that are regulated and controlled by state agencies (Neef & Schwarzmeier, 2001). In fact, in both developed and developing countries the structure of ownership is often mixed, with the three aforementioned property regimes co-existing.[1] Prior studies have suggested that identifying the appropriate property regime for each type of good (i.e. public, private, and common goods) is the first crucial condition for successfully managing resources in order to avoid an 'open access regime' which can have negative consequences such as deforestation and forest degradation (Ostrom, 1990, 2000; Ostrom, Gardner, & Walker, 1994).

The relationship between property rights (i.e. land rights) institutions and resource management, including forest management, has been investigated by several prior studies, at both the macro and micro levels.[2] However, due to our research objective, we only present the findings of selected studies at the micro level (i.e. households and farms) relating to developing and transitional economies with similar natural and socio-economic conditions to Vietnam. In their study on Thailand, Feder and Onchan (1987) found that ownership security (i.e. titled land) improves the farm's access to institutional credit (measured as the ratio of capital formation), and induces the farm to enhance their land (i.e. bundling and clearing tree stumps). In addition, they also suggested that the main impact of land titling on the farm's investment is mediated by its impact on the farm's access to institutional credit. However, Besley (1995) only found limited empirical evidence for the impact of property rights (i.e. transfer rights including sell, rent, mortgage, pledge, bequeath, and gift) on investment behaviours (e.g. drainage, tree crops, continuous manuring, land excavation, irrigation) of famers in Ghana. Recently, in the context of an indigenous upland community in the northern Philippines, Omura (2008) found that both the formality (i.e. titling) of land rights and the uncertainty of constituent rights (i.e. use, rent, mortgage, sell, give, exchange, modify, and bequeath) do not significantly influence the adoption of sustainability-improving techniques (e.g. application of organic fertiliser, nitrogen-fixing crop planting, etc.). Nevertheless, the alienable rights (i.e. sale or transferability rights) strongly and positively influence the farm's investment in sustainability-improving measures (i.e. investing in infrastructures) that require a higher cost in terms of both input and time.

In summary, existing theoretical and empirical studies provide some support for the relationship between property rights and resources management at the micro level. However, the strength and direction of this relationship have not been firmly proven even within the context of developing countries. It seems that a farm's resource management behaviour should be explained by incorporating property rights and other factors such as the characteristics of households and famers, as well as their resources (i.e. land). In the next section we clarify the context of forestland rights and forest management in Vietnam before investigating the relationship between these issues at the household level.

Forestland rights institutions and forest management in Vietnam

In Vietnam, based on the major use purposes, the Law on Forest Protection and Development (Vietnam's National Assembly, 2004) distinguishes three types of forest:

- *Protection forests*, used mainly to protect water sources and land, to prevent erosion and desertification, to restrict natural calamities and regulate climate, and thus to contribute to environmental protection. These include: headwater protection forests;

wind-shielding and sand-shielding protection forests; protection forests for tide shielding and sea encroachment prevention; and protection forests for environmental protection.

- *Special-use forests*, used mainly for: conservation of nature, specimens of the national forest ecosystems, and forest biological gene sources; scientific research; protection of historical and cultural relics, including landscapes; and recreation and tourism in combination with protection, which contribute to environmental protection. These include: national parks; nature conservation zones, including nature reserves and species–habitat conservation zones; landscape protection areas, including forests of historical or cultural relics as well as scenic landscapes; and scientific research and experiment forests.
- *Production forests*, used mainly for production and trading of timber and non-timber forest products in combination with protection, contributing to environmental protection. These include: natural production forests; planted production forests; and seeding forests, including the selected and recognised planted forests and natural forests (Law on Forest Protection and Development, 2004, article 4).

As already mentioned, the current land rights regulations in Vietnam (i.e., Constitution, Vietnam's National Assembly, 2013a, articles 53 and 54; Law on Land, Vietnam's National Assembly, 2013b, article 1) define the property regime, and land in particular, as being under the state-ownership regime. Within this institutional framework, the State allocates and leases forestland to its agencies (e.g. state forest enterprises, the Special-Use Forest Management Board, and the Protection of Forests Management Board), private entities (i.e. individuals, households, etc.), and communities with some constraints on quota and duration. The current forestland rights institutions do not allow the allocation of protection and special-use forests directly to private entities and communities, only through state agencies (Law on Land, 2013b, articles 135, 136, and 137). For production forests, individuals and households can be allocated a maximum of 30 ha (Law on Land, 2013b, article 129, clause 3) for a maximum period of 50 years (Law on Land, 2013b, article 126). The private entities, as users and not owners, have the right to exchange, assign, lease, sub-lease, bequeath, and donate land use rights; the right to mortgage, guarantee, and contribute capital using land-use rights; and the right to be paid compensation when the State recovers land (Law on Land, 2013b, articles 166 and 167). In principle, these use rights are only valid (i.e. feasible) within the duration of allocated (i.e. titled) forest area which is proven to have no conflict (Law on Land, 2013b, Section 5).

In 2013, the total area of forest in Vietnam was about 13.86 million ha, of which 10.42 million ha were natural forests and 3.44 million ha were planted forests (General Statistics Office, 2013). By function, the area of production forests was about 6.20 million ha (47.7%) while protection forests and special use forests were about 4.74 million ha (36.5%) and 2.06 million ha (15.8%) respectively (Ministry of Agriculture & Rural Development, 2009). By ownership, state-owned forests and forestlands amounted to more than 10.9 million ha or 76% of the total forests and forestland area, while private entities (i.e. individuals, households) and communities only owned about 4.8 million ha or 24% (Forest Science Institute of Vietnam, 2009). Since 1994, the Vietnamese government has allocated more forestland to private entities and communities (Tan, Ngai, & Thanh, 2007). Forestland under the ownership of private entities (i.e. households and individuals) and communities increased from 9.9% and 0% respectively in 1995 to 26.8% and 1.5% in 2004 (Ngai, Tan, Sunderlin, & Yasmi, 2009). Nevertheless, by the end of 2007, due to misunderstandings and a lack of resources and

incentives, the programme of Forestland Allocation only allocated 62% of the total forestland (Tien et al., 2011). Therefore, state agencies are theoretically the major *de jure* actor in forest management (in terms of area) for all types of forest. However, several studies have demonstrated that, due to a lack of capabilities and incentives, state agencies themselves do not manage a large proportion of the forestlands under their responsibility but re-allocate (i.e. lease or rent), formally and informally, to private entities, such as workers and their families (McElwee, 2004). Thus, it is rational to argue that the total forested area (including titled, leased, and rented land) that is directly managed by private entities (i.e. individuals and households) is much larger than the official statistics, and private entities are in fact a major *de facto* actor of forest management.

In summary, Vietnam's current institutional framework on forestland rights has two major issues that could affect households' forest management behaviours. Firstly, if households have informally rented or leased forestland from state agencies, this land will not be formally certificated (i.e. titled). As prior studies have suggested, this could influence households' incentives to invest in long-term forest management measures because they fear eviction and contractual conflicts. Secondly, for allocated (i.e. titled) forestlands, the fact that households are considered users but not owners and only have a limited duration to perform their use rights (i.e. 50 years maximum) could impact their forest management behaviours, especially towards the end of this period. We will empirically investigate these issues in the following sections.

Methods

Data

In this study, we use a secondary data-set provided by a 2012 project between Vietnamese and Nordic institutions. The project included a survey on different dimensions of the livelihood of households in three Vietnamese provinces: Bac Kan (northern mountain region), Kon Tum (highland central region), and Kien Giang (southern region). These provinces represent the three regions that have the largest proportion of forested areas in Vietnam. The questionnaire provides abundant information on household characteristics, households' production, assets, living conditions, and forest management practices. In all, 448 households were interviewed (Bac Kan, 150; Kon Tum, 148; Kien Giang, 150). Of these, 398 kept forestland (i.e. production and protection forests), and therefore our analysis was only performed on this sample.

Variables

The variables and their measurements are summarised in Table 1.

Dependent variables
We employ two groups of dependent variables concerning households' forest management behaviours: clearing and improving forest.

In our secondary data, households were asked about the forested area (measured by hectare) that they fully cleared during three periods: before 1990, between 1991 and 2000, and between 2001 and 2011. Based on this information, we generated the first dependent

Table 1. Variables and measurements.

Variable	Measurement
Dependent variables	
Clearing forest	
CLEAR	Whether households undertook clearing behaviour or not until 2011 – as a binary variable: 1 = Yes (n = 248) 0 = No (n = 150)
Enhancing forest	
ENHAN_1	Whether households adopted this forest management technique – trimming – as a binary variable: 1 = Yes (n = 286) 0 = No (n = 112)
ENHAN_2	Whether households adopted this forest management technique – planting – as a binary variable: 1 = Yes (n = 156) 0 = No (n = 242)
ENHAN_3	Whether households adopted this forest management technique – protection – as a binary variable: 1 = Yes (n = 159) 0 = No (n = 239)
Independent variables	
Formality	
FORMA_1	Whether households received certification for production forestland as a binary variable: 1 = Yes (n = 242) 0 = No (n = 53)
FORMA_2	Whether households received certification for protection forestland as a binary variable: 1 = Yes (n = 168) 0 = No (n = 29)
Duration	
DURAT_1_1	*De jure* duration of households' production forestland as a continuous variable (n = 227)
DURAT_1_2	*De jure* duration of households' protection forestland as a continuous variable (n = 58)
DURAT_2_1	*De facto* duration that households managed their production forestland as a continuous variable (n = 258)
DURAT_2_2	*De facto* duration that households managed their protection forestland as a continuous variable (n = 138)
Control variables	
CONTR_1	Households' distance – the mean value of the distances (km) from households to their forests as a continuous variable
CONTR_2	Households' size – the total number of labourers – as an ordinal variable: 0 = less than or equal to two people (n = 222) 1 = from three to four people (n = 129) 2 = five people and more (n = 47)
CONTR_3	Households' income from forest in 2011 as a continuous variable (million VND)
CONTR_4	General quality of total forest area under households' responsibility, as a continuous variable

variable regarding whether or not households undertook clearing behaviour before 2012 (CLEAR). For improving behaviours, households were asked whether they have adopted techniques such as trimming (ENHAN_1), planting (ENHAN_2), and protecting (ENHAN_3). These dependent variables are all measured as binary variables with '1' = 'Yes', '0' = 'No' and logistic regression techniques were therefore used for estimation.

Independent variables
We use two groups of independent variables relating to forestland rights institutions: the formality (i.e. titling) of forestlands and the duration of allocation.

Regarding the former, in our secondary data, households were asked about the forestland area for each type of forest for which they received certification (i.e. production and protection forests). Based on that data, we generated two binary variables related to whether or not households received certification for their production forestlands (FORMA_1) and their protection forestlands (FORMA_2).

For the duration of allocation, we discern two variables: *de jure* duration and *de facto* duration. In our secondary data, households were asked about the *de jure* duration of each type of forestland (i.e. production and protection) allocated to them, measured as a continuous variable (total number of years). Based on this, we generated the *de jure* duration of households' production forestlands (DURAT_1_1) and protection forestlands (DURAT_1_2), both measured as continuous variables.

Households were also asked about the specific year they received certification for each type of forestland. Based on this information, we calculated the *de facto* duration that households managed their production (DURAT_2_1) and protection forestlands (DURAT_2_2) by first taking the year of certification away from the year of survey (2012) and then deducting this new value from the *de jure* duration, all measured as continuous variables. These alternative measurements of duration were discretely introduced into models.

Control variables

We introduced characteristics of households and their forestland into our models as control variables.

The households' distance to their forest could be an important influence on their forest management behaviours. If this distance is too great, it can increase forest management costs (e.g. transportation costs) but decrease the risk of forest exploitation. We measure this as a continuous variable (CONTR_1) and by the mean value of the distances (km) from households to their nearest and farthest forests.

The households' size or labour force (CONTR_2) can significantly influence their forest management behaviours through its impact on management costs in activities such as clearing, trimming, planting, and protecting forests. In our secondary data, this variable is measured by the total number of labourers and as an ordinal variable with '0' = 'less than or equal to two people', '1' = 'from three to four people', '2' = 'five people and more'.

The households' income from the forest (CONTR_3) is an important influence on their behaviours for two major reasons. First, this can directly influence investment in activities such as clearing, trimming, planting, and protecting forests. Second, it can influence households' motivation to undertake these investments. This is measured as a continuous variable (million VND) and by the sum of the income that households earned from their forest in the year before the survey (2011).

The quality of forests can significantly influence households' forest management behaviours, mainly because it may affect their motivation to mobilise resources for developing, protecting, and exploiting forests' resources. In our secondary data, this variable is measured as an ordinal variable with '1' = 'bare forestland', '2' = 'poor forest', '3' = 'medium forest', and '4' = 'rich forest' for each type of forest under households' responsibility. We generated a new variable for the general quality of total forest area by simply adding the scores for all types of forests: the higher the households' total, the better the quality of their forests (CONTR_4).

Results

Descriptive analyses

The results of descriptive statistics are presented in Tables 2 and 3. The households in our sample have on average 5.02 ha of production forests and 5.18 ha of protection forests. The percentage of certified (i.e. titled) forested area is about 75.4% for production-forested area and 83.2% for protection-forested area. Interestingly, the *de facto* duration of all types of forest is much higher than the *de jure* duration: the average *de facto* duration of production and protection forestland is about 20.6 and 11.6 years respectively, while the average *de jure* duration is about 18.5 and 7.7 years. This means that, in our sample, households manage forests for longer than their allocated time span and have to, in principle, renew their ownership.

The households' average labour size is about 2.8 persons and the distance to their forests is about 2.1 km. Surprisingly, among the 398 households, only 88 earned income from their forest in 2011 with an amount totalling about 9.6 million VND/year (about 450 USD). This means that the 'forest people' in our sample mainly rely on non-forest income (e.g. agriculture, aquaculture, wages, etc.) rather than on forests (e.g. timber and non-timber products).

A total of 248 households (62.3%) have cleared their forest in the past. The average area of cleared forest increased from 0.56 ha in the period 1991–2000 to 0.70 ha in the period 2001–2011. A total of 286 households (71.86%) indicated they have adopted trimming

Table 2. Descriptive statistics (independent variables).

	N	Mean	Mode	Standard deviation	Minimum	Maximum
Production forest (ha)	295	5.02	2.00	5.86	0.10	32.00
Certified area of production forestland (%)	295	75.74	100.00	39.65	0.00	100.00
Protection forest (ha)	197	5.18	1.00	6.90	0.05	30.00
Certified area of protection forestland (%)	197	83.16	100.00	36.42	0.00	100.00
De jure duration of production forestland (years)[a]	295	18.49	0.00	31.50	0.00	120.00
De facto duration of production forestland (years)[a]	295	20.64	0.00	25.94	0.00	100.00
De jure duration of protection forestland (years)[a]	197	7.75	0.00	18.04	0.00	100.00
De facto duration of protection forestland (years)[a]	197	11.63	0.00	14.56	0.00	70.00
Household's labour (persons)	398	2.83	2.00	1.45	1.00	15.00
Distance between household and their forest (km)	398	2.13	0.50	3.32	0.00	21.00
Earned income from forest in 2011 (million VND)	398	9.65	0.00	38.86	0.00	350.00

[a]Calculated as the sum of duration of different forest plots that could be allocated in principle to a maximum 50 years; the total duration may therefore be greater than 50.

Table 3. Descriptive statistics (dependent variables).

	Clearing	Trimming	Planting	Protecting
No	150	112	242	239
Yes	248	286	156	159
Total	398	398	398	398

behaviours, 156 (39.20%) undertook planting, and 159 (39.95%) indicated that they had taken protection measures.

Regression models

Forestland rights institutions and clearing forest

The results of correlation analysis are presented in the second column of Table 4. These show that there is a significant relationship between: the formality (i.e. certification) of protection forestlands (FORMA_2) and clearing behaviour (CLEAR); the *de jure* duration of production forestlands (DURAT_1_1) and clearing behaviour (CLEAR); the *de facto* duration of production forests (DURAT_2_1) and clearing behaviour (CLEAR); and the *de facto* duration of protection forests (DURAT_2_2) and clearing behaviour (CLEAR). These relationships were then estimated using regression techniques.

The results of regression analysis are presented in Table 5. Model 1 shows that the formality of protection forestlands has a significant negative effect on the clearing behaviour of households. In other words, the more likely households are to receive formal certification for their protection forestlands, the less likely they are to clear them. Among the control variables, only the distance between households and their forests (CONTR_1) and the quality of forest (CONTR_4) had a significant effect. The distance to their forests (CONTR_1) significantly and negatively influences the clearing behaviour of each household. By contrast, the quality of the forest (CONTR_4) significantly and positively influences forest management behaviour. Stated differently, the larger the distance to their forests, the less likely households are to clear them; and the higher the quality of their forests (e.g. high volume of trees), the more likely households are to clear (i.e. exploit) them.

The impact of forestland rights' duration on clearing behaviour is shown in Models 2, 3, and 4. Models 2 and 3 demonstrate that the *de jure* duration and *de facto* duration of production forestlands significantly and positively influence the clearing behaviour of households. This means that the longer the duration of households' ownership of production forestland, the more likely they are to clear (i.e. exploit) their forests. This is understandable because households have the most rights over their production forests. Model 4 shows that the *de facto* duration of protection forestland significantly and negatively influences the

Table 4. Correlation analyses.

	CLEAR	ENHAN_1	ENHAN_2	ENHAN_3
Formality				
FORMA_1	0.10 (0.10)	−0.03 (0.58)	0.12 (0.03)	0.14 (0.02)
FORMA_2	−0.16 (0.02)	0.05 (0.45)	0.11 (0.13)	0.14 (0.05)
Duration				
DURAT_1_1	0.27 (0.00)	−0.06 (0.20)	0.03 (0.49)	0.08 (0.11)
DURAT_1_2	−0.01 (0.81)	−0.05 (0.31)	−0.06 (0.27)	0.07 (0.17)
DURAT_2_1	0.25 (0.00)	−0.03 (0.54)	0.04 (0.42)	0.04 (0.45)
DURAT_2_2	−0.16 (0.00)	0.04 (0.44)	−0.05 (0.33)	0.05 (0.28)
Control				
CONTR_1	−0.14 (0.00)	−0.11 (0.03)	−0.05 (0.33)	−0.11 (0.03)
CONTR_2	−0.02 (0.75)	−0.01 (0.87)	0.00 (0.97)	−0.03 (0.52)
CONTR_3	−0.09 (0.08)	0.03 (0.50)	0.05 (0.33)	−0.01 (0.80)
CONTR_4	0.21 (0.00)	0.02 (0.72)	0.00 (1.00)	0.09 (0.07)

Note: Spearman correlation.
p values in parentheses.

Table 5. Forestland rights and clearing behaviour.

	Model 1	Model 2	Model 3	Model 4
Independent variables				
FORMA_1				
FORMA_2	0.30 (1.16)*			
DURAT_1_1		1.02 (0.01)**		
DURAT_1_2				
DURAT_2_1			1.03 (0.01)**	
DURAT_2_2				0.97 (0.01)**
Control variables				
CONTR_1	0.90 (0.05)*	0.93 (0.03)*	0.93 (0.03)*	0.89 (0.03)**
CONTR_2	1.08 (0.26)	1.05 (0.17)	1.01 (0.16)	1.00 (0.16)
CONTR_3	0.99 (0.01)	1.00 (0.00)	0.99 (0.00)	0.99 (0.00)
CONTR_4	1.30 (0.13)**	1.21 (0.98)*	1.22 (0.09)*	1.45 (0.11)***
Observation	186	379	379	379
LR χ^2 (5)	19.05	43.51	45.38	38.29
Prob > χ^2	0.00	0.00	0.00	0.00
Pseudo R^2	0.08	0.09	0.09	0.08
Log likelihood	−115.88	−230.40	−229.46	−233.01

Notes: Logit regression; odds value (log odds).
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

clearing behaviour of households. In other words, the longer the duration of households' ownership of protection forestland, the less likely they are to clear this type of forest. This finding is very important because it demonstrates that households, or more generally 'forest peoples', can, with an appropriate time span of rights over this type of land, become forest protectors. Among the control variables, the distance between households and their forests (CONTR_1) and the quality of the forests (CONTR_4) significantly influence the clearing behaviour of households. The direction of their impact is unchanged as compared with Model 1.

Forestland rights institutions and improving forest

The results of the correlation analysis are presented in the last three columns of Table 4. They show that there is a significant relationship between: the formality (i.e. certification) of production forestlands (FORMA_1) and planting behaviours (ENHAN_2); the formality of production forestlands (FORMA_1) and protecting behaviours (ENHAN_3); and the formality of protection forestlands (FORMA_2) and protecting behaviours (ENHAN_3). Surprisingly, there is no significant relationship between any type of duration of forestland rights and improving behaviours. Thus, we did not perform regression analyses for this relationship.

The results of the regression analyses are presented in Table 6. Models 5, 6, and 7 demonstrate that the formalities of production and protection forests positively influence improving behaviours of households: the more likely households are to receive formal certification for their forest, the more likely they are to perform improving behaviours (i.e. trimming, planting, and protecting). However, these impacts are not statistically significant. Among the control variables, only the households' size (CONTR_2) significantly and negatively influences their planting behaviour. Interestingly, the larger the households, the less likely they are to undertake planting activities. This is understandable because, as mentioned earlier, the 'forest people' in our sample mainly rely on non-forest income. In other words, the forest perhaps cannot provide enough income for larger households, causing their members to seek non-forest earnings.

Table 6. Forestland rights and enhancing behaviours.

	Model 5 (ENHAN_1)	Model 6 (ENHAN_2)	Model 7 (ENHAN_3)
Independent variables			
FORMA_1	1.93 (0.68)	1.90 (0.69)	
FORMA_2			2.45 (0.06)
DURAT_1_1			
DURAT_1_2			
DURAT_2_1			
DURAT_2_2			
Control variables			
CONTR_1	0.99 (0.04)	0.98 (0.04)	0.92 (0.05)
CONTR_2	0.97 (0.17)	0.70 (0.13)*	1.11 (0.25)
CONTR_3	1.00 (0.00)	0.99 (0.00)	1.00 (0.00)
CONTR_4	0.93 (0.07)	1.02 (0.08)	1.02 (0.09)
Observation	279	279	186
LR χ^2 (5)	5.25	9.23	6.54
Prob > χ^2	0.39	0.10	0.25
Pseudo R^2	0.01	0.02	0.02
Log likelihood	−184.90	−182.05	−122.89

Note: Logit regression; odds value (log odds).
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Testing by era

To verify the robustness of the relationship between forestland rights institutions and forest management behaviours, we performed a further test to clarify the impact of forestland rights (i.e. duration) on households' clearing behaviours during different periods. Tan et al. (2008) argue that Vietnam's forestland rights institutions have experienced three important changes: before 1990, the State was the major manager of forestlands; during the 1990s, the State increasingly recognised the forestland rights of private entities (i.e. individuals and households); and during the 2000s, the State recognised the legal status of communities in forestland tenure. Our secondary data provide information on households' clearing behaviour by time periods. Thus, we generated three dependent variables of clearing: before 1990 (CLEAR_90), during 1991–2000 (CLEAR_91_00), and during 2001–2011 (CLEAR_01_11) as continuous variables (i.e. measured by hectare of cleared forest).

    The results of the correlation analyses are presented in Table 7. They show that there is a significant relationship between: the *de jure* duration of production forestlands (DURAT_1_1) and clearing behaviour in the period 1991–2000 (CLEAR_91_00); the *de jure* duration of production forestlands (DURAT_1_1) and clearing behaviour in the period 2001–2011 (CLEAR_01_11); and the *de facto* duration of production forestlands (DURAT_2_1) and clearing behaviour in the period 1991–2000 (CLEAR_91_00). These relationships were then estimated by regression techniques.

    The results of the regression analyses are presented in Table 8, yielding two major findings. First, clearing behaviour in the period before 1990 was not significantly influenced by forestland right institutions. That is understandable because during this period the State was still the major actor and there was little role for private entities. Second, clearing behaviour in the period 1991–2000 was significantly influenced by the *de facto* duration of production forestland rights (Model 9), while this behaviour during the period 2001–2011 was significantly influenced by the *de jure* duration of production forestland rights (Model 10). This is straightforward because time is needed to exploit production forests, and in the early part of the forest's life cycle (normally 10 years or less) it is the *de jure* duration rather than the *de facto* duration of forestland rights that matters to households' forest management behaviours.

Table 7. Forestland rights institutions and clearing behaviour by period: correlation analyses.

	CLEAR_90	CLEAR_91_00	CLEAR_01_11	DURAT_1_1	DURAT_1_2	DURAT_2_1	DURAT_2_2
CLEAR_90	1						
CLEAR_91_00	−0.02 (0.63)	1					
CLEAR_01_11	0 (0.98)	−0.24 (0.00)	1				
DURAT_1_1	0.03 (0.5)	0.18 (0.00)	0.12 (0.02)	1			
DURAT_1_2	−0.02 (0.62)	0.08 (0.1)	−0.01 (0.9)	0.29 (0.00)	1		
DURAT_2_1	0.06 (0.23)	0.17 (0.00)	0.07 (0.16)	0.94 (0.00)	0.25 (0.00)	1	
DURAT_2_2	−0.03 (0.59)	0.02 (0.76)	−0.03 (0.49)	0.14 (0.00)	0.82 (0.00)	0.08 (0.09)	1

Note: Pearson correlation.
p values in parentheses.

Table 8. Forestland rights institutions and clearing behaviour by period: regression analyses.

	Model 8 (CLEAR_91_00)	Model 9 (CLEAR_91_00)	Model 10 (CLEAR_01_11)
Independent variables			
FORMA_1			
FORMA_2			
DURAT_1_1	0.00 (0.00)		0.01 (0.00)*
DURAT_1_2			
DURAT_2_1		0.01 (0.00)*	
DURAT_2_2			
Control variables			
CONTR_1	−0.04 (0.02)*	−0.04 (0.02)*	0.00 (0.02)
CONTR_2	−0.04 (0.08)	−0.04 (0.08)	0.12 (0.09)
CONTR_3	−0.02 (0.00)	−0.00 (0.00)	−0.00 (0.00)
CONTR_4	0.10 (0.04)**	0.10 (0.04)***	−0.03 (0.04)
Constant	0.27 (0.14)*	0.25 (0.14)	0.67 (0.17)***
Observation	379	379	379
F	6.00	6.20	1.31
Prob > *F*	0.00	0.00	0.26
R^2	0.07	0.08	0.01
Root MSE	1.04	1.04	1.28

Note: Linear regression, coefficient (standard error).
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Conclusions

The objective of this article is to unbundle mechanisms by which, and the extent to which, prevailing forestland rights institutions influence the forest management behaviours of Vietnamese households. More precisely, we investigated the impact of the formality and duration of production and protection forestland rights on the clearing and improving behaviours of Vietnamese households. The first major finding is that greater formality (i.e. titling) and duration of protection forestland rights will decrease deforestation. Secondly, the formality and duration of households' rights over both production and protection forests do not have a significant effect on improving behaviours. It seems that improving forests depends more on household conditions (i.e. size) than on institutional conditions.

Some factors can limit the value of our findings. First, the measurement of our variables is still relatively simple. For example, we only have information about clearing and improving behaviours for the total forested area rather than each type of forest (i.e. production and protection forests). This is, however, a limitation of our secondary data. We did not success-fully demonstrate the impact of forestland rights institutions on improving the behaviour of households. That is because our secondary data only provided a limited number of improv-ing behaviours. In addition, the cross-sectional nature of our secondary data does not allow us to draw definitive conclusions about the causal relationship between forestland rights and the forest management behaviours of Vietnamese households.

Nevertheless, this study provides important implications for policy-makers and future research. For policy-makers, the study demonstrates that the current institutional framework of forestland rights that does not directly allocate protection forestlands to households and needs to be revised. State agencies are still the *de jure* manager of protection forests in Vietnam. However, as several prior studies have demonstrated (e.g., McElwee, 2004), the state agencies cannot successfully fulfil their task because of a lack of capabilities and incen-tives. Meanwhile, implementation of the Forestland Allocation programme is too slow (Tien, Vien, & Lam, 2011). The allocation of protection forestlands to private entities needs to be

fostered in terms of scope (i.e. rights) and scale (i.e. areas). Although the statistical results do not provide strong support, the fact that households in receipt of formal certification for their forest are more likely to improve it (Models 5, 6, and 7) means that the risk of degradation could be reduced by formalising forestland rights. This would allow households to use their forestlands as collateral and access resources (e.g. loans and other forms of capital) for investing in them.

Future research will benefit from investigating the impact of current forestland rights institutions on the forest management behaviours of other actors such as state agencies and communities. Doing so would provide a more complete picture of forestland rights and forest management in Vietnam. In addition, it would also be interesting to explore why institutions have no effect on some households' forest management behaviour, and what (i.e. non-institutional factors) does affect household behaviour. More comprehensive studies – especially longitudinal – on the relationship between changes to forestland rights institutions and the forest management of different actors are also critically needed. Finally, a replication study across different countries would be valuable in validating our findings and implications.

Notes

1. For example, the structure of forest ownership in Sweden is a mixture of privately (family) owned forest at 50% of total forest area, state-owned and other public forms of ownership at 25%, and industrial private ownership at 25%. Retrieved 7 March 2013 from http://www.nordicforestry.org/facts/Sweden.asp
2. At the macro level, see the work of Deacon (1994) or Cattaneo (2001), among others.

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