

CHAPTER 8

TRADITIONAL INSTITUTIONS AND SUSTAINABLE LIVELIHOOD

Evidences from upland agricultural communities in the Philippines

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Abstract. This paper investigates the effects of traditional informal institutions on the sustainable management of upland agricultural fields in indigenous communities of the northern Philippines. The estimated results from the case study suggest significant positive effects of a traditional reciprocal exchange-labour system and customary property rights restrictions on field maintenance activities, although the existence of traditional authority is not found to be significant. The results imply a continuing positive role for embedded customs in these communities, despite some evidences of decaying traditional institutions.

Keywords. traditional/informal institutions; sustainable resource management; The Philippines

INTRODUCTION

Numerous studies in both academic and practical development spheres employ the now familiar buzzwords of ‘traditional’, ‘indigenous’ and ‘communal’ resource management systems. Although not necessarily signifying the same thing, the terms are often commonly applied in developing-country contexts where traditional indigenous knowledge or techniques are used in the management of natural resources, often falling under the common-property regime. The research objective of this paper is to examine empirically whether the so-called ‘traditional/indigenous’ informal institutions, which are sometimes considered to hinder people’s incentives, function to encourage a sustainable livelihood for the local people.

Our particular focus is on the land tenure and management systems. Informal, traditional tenure systems vary depending on the context, yet they are distinguished from formal individualized systems as they are generally sanctioned customarily rather than through formal titling. These informal property rights often lack a certain degree of exclusiveness, in terms of ownership, rights to alienate the land, etc. There

have been empirical works looking at traditional land tenure systems, inquiring whether formal, as opposed to informal, institutions provide proper incentives for the farmers to manage the land. The findings are mixed. While some find that formal titles are effective (Feder and Onchan 1987; Feder and Feeny 1993; Deininger and Chamorro 2002), some find mixed results (Place and Hazell 1993; Besley 1995) and others do not find formal land tenure to be relevant or effective (Migot-Adholla et al. 1993; Gavian and Fafchamps 1996). These findings have led some of these authors either to recommend for or warn against land privatization/registration schemes.

Our study aims to contribute to the understanding of the linkages between traditional land tenure systems and land management incentives. Whilst most previous studies did not specifically look into the effectiveness of traditional tenure per se but examined possible effects of formal titling and/or privatization schemes, we attempt to investigate the effectiveness of traditional institutions. Also, while the foci of previous works are on the linkages between land tenure and land improvements for productivity enhancement and/or increased credit access, we focus on land improvements in terms of sustainability enhancement. Especially given the fragile upland environment of our case study area, such sustainability-enhancing land improvements are essential for the long-term sustenance of people's livelihood. We analyse the indigenous agricultural communities of Cordillera in the northern Philippines, where traditional institutions are considered to have effectively guided people's livelihoods, yet seem to be in a changing process. This empirical work, utilizing original data, is expected to contribute to the understanding of the probable path of sustainable livelihood for rural populations, which often have a disadvantaged status and depend on a fragile natural-resource base.

CASE-STUDY BACKGROUND

Cordillera, composed of six upland provinces, is located in the centre of Northern Luzon Island of the Philippines, surrounded by lowland provinces. The region mainly consists of indigenous cultural communities whose practices have been less disturbed by immigration, compared with the rest of the Philippines (the majority of population movement has been intra-Cordilleran)¹. These indigenous communities range from traditional indigenous ones to those that are more recently established, with varying perceptions of customary laws, economic orientations and natural-resource management practices. These predominantly agricultural communities can typically be placed somewhere along the continuum of subsistence-based rice production and commercially oriented vegetable production communities. Fifty-nine percent of the rural households in the region live below the poverty threshold, and most of the communities have only a poorly developed transportation and marketing infrastructure (Source: Philippines National Statistics Office 2000).

Table 1. Annual-income basic statistics

	Average annual income (1,000 Philippine Pesos)	Standard deviation	Median
All communities (N=789)	44.27	125.12	16
Rice communities (Nr=396)	13.96	16.79	9.3
Vegetable communities (Nv=393)	78.82	171.23	30

Note a: The reported annual incomes from the survey are net, subtracting costs incurred for agricultural production, based on current prices of year 2000.

Source: field survey data (2000, 2001) by the author.

Note b: Average annual income for Philippines: PP 145,000; average annual income for Cordillera, including the capital city of Baguio: PP 139,613; Poverty threshold for Cordillera (rural): PP 14,616 (all figures of 2000; based on current prices).

Source: Philippines National Statistics Office (2000).

This case study is carried out in eight communities across the provinces of Benguet, Mountain Province and Ifugao. Half of these communities are mainly rice-producing and the other half are mainly vegetable-producing communities. Although no formal statistics are available distinguishing the poverty rate between these two types of communities, rice communities in general are poorer (see Table 1). However, vegetable production is prone to higher degree of fluctuation in its profits due to price changes and crop failures.

Environmental fragility

More than 80% of the land in the region has a slope of above 18 degrees. The fact that the region consists of highly sloped land means that it typically requires certain management techniques and conservation measures in order to practice agriculture in a sustainable manner. Historically, there has been a reduction in the extent and density of forest cover and a conversion of increasingly steeper lands to agriculture, due to increasing population and in-migration, logging concessions and expansion of agricultural activities². Such activities have increased the extent and rates of soil loss and erosion, consequently reducing water availability in local irrigation systems. Of the total regional area of 1,829,400 ha, 28% is classified as 'slight erosion' class, 40% as 'moderate erosion', 23% as 'severe erosion' and the remaining 9% as either 'no apparent erosion' or 'unclassified' (FAO 1990). By far, topsoil erosion is the dominant form of land degradation in the region, accounting for 87% (*ibid.*). Since the region forms the upper watershed for most of Northern Luzon's rivers, the forest and related resource management of the area is also vital for the water supply of the lowlands. The environmental externality effects of their agricultural activities are also critical as chemical pollution can reach the water systems³.

According to the provincial slope maps, most of the research sites have slopes of between 30 and 70%, where above 50% is considered to be very steep. Highly sloped lands are especially prone to erosion and require proper terracing, construction of retaining stone walls or other soil erosion prevention measures such as wattling. Also, functioning irrigation and drainage management is necessary in order to avoid overflowing and protect fields from heavy downpours, which can destroy terraces.

Traditional institutions

All eight surveyed communities adopt the formal administrative structure of *barangay*, municipality and province⁴. However, apart from formal organizations such as a *barangay* committee, there are traditional institutions in many communities promoting community welfare. Decisions based upon past precedents and experience are typically made amongst a council of elders. Such institutions appear to be still effective in some communities, especially in rice-growing communities in Mountain Province and Ifugao (field observations 2000, 2001)⁵. They govern different aspects of economic and social lives, including the way in which natural resources are managed and agricultural activities are carried out. For instance, the observance of planting cycles is still seen in some communities. On the other hand, the tradition of various public feasts, which has redistributive characteristics, is still widely seen in more commercialized vegetable-growing communities (Lewis 1989, field observation 2000, 2001).

In some communities, such as Bayyo of Mountain Province, traditional customs still play important roles in regulating various parts of life. Also in Ifugao, some communities are reported to retain their traditional communal forest management systems: forests are managed and inherited according to customary laws in order to maintain a forest environment that protects their lower farmlands from soil erosion and regulates water provision (Department of Environment and Natural Resources 1987, p. 8-9). Yet, general observations from our case study seem to reveal a less active communal management of natural resources compared to the descriptions in some anthropological case studies. Less use of traditional reciprocal labour exchange during peak times is seen, especially in vegetable-growing communities where the arrangements no longer suit all-year-round commercial production. In these communities, wage hired-labour arrangements seem to be more common. Although to a lesser extent, a similar trend is seen in rice-growing communities. Water shortage troubles and complaints about inequitable distributions are reported in the surveyed communities, even though water has traditionally been managed through communal/corporate cooperative organizations. Likewise, although conflicts over land have traditionally been settled by communal authorities, disputes in recent years, especially at an individual level, have been increasingly brought to municipal/state courts⁵.

Customary laws on land tenure

The Philippine law defines land with a slope greater than 18 degrees as *de jure* public forestlands. This applies to more than 80% of the region's lands, although they are mostly *de facto* private agricultural lands. While some of the residents possess formal titles, others occupy the land through communal sanctions by customary law, through the virtue of tax declaration, or through the mere fact of physical occupancy. Yet, there has been a strong concept of ancestral property amongst the indigenous people. The 'time immemorial' presumption underlines that land which 'has been held under a claim of private ownership' since time immemorial is presumed 'never to have been public land'. This presumption has proved to be valid at least six times by the Philippine Supreme Court (Lynch 1986, p. 381)⁶. Thus, even at the state level, there exist conflicting statutes on land matters.

In contrast to the concept of private property, indigenous customary laws on land – although their details differ in each community – typically allow lands to be held individually, communally or by corporate groups. For all types of ownership, the land tenure rules encompass the acquisition, access, management, maintenance and transfer of land, including inheritance procedures. Natural resources generally fall into one of three classified property regimes – individual, corporate and communal – where the most valuable (generally the most heavily invested) object falls into the individual property regime⁸. The most valuable lands, i.e., agricultural and residential lands, generally fall into individual property. Agricultural fields in our case study, except for a few cases, are individual property.

Individual property may be governed by customary rules concerning its inheritance and transfers. Land resources are inherited usually upon marriage. Individual rights enable the right holder to use, rent and alienate the property according to the customary laws, which often impose some restrictions on exercising these rights, depending on the kind of property. For instance, one may alienate her/his land only in an emergency, in order to meet mortuary requirements, fine payment, hospital bills, children's education fees and the like. This also often requires the consent of parents, and to be offered first to close relatives (Prill-Brett 1993). The indigenous mortgaging of Ibaloy communities is characterized by an oral contract, with no set duration, no interest, first offered to relatives and no practice of foreclosure, and the arrangement can be passed on to succeeding generations. This is based on the principle that the property remains redeemable by the original owner or her/his descendants in the future. However, the introduction and adoption of another mortgaging arrangement in the 20th century – with a written contract with set duration and conditions – indicate that such traditional arrangements were not always effective (Prill-Brett 1992).

Thus seen, customary rights are often restrictive compared to those property rights with fuller alienability based on western systems. The fact that there are rules/restrictions/communal sanctions on the exercise of various rights can be considered rational consequences of coping strategy with respect to the fragile upland environment. In other words, such an institution may have arisen in order to sustain the productivity of land and minimize the risk of crop production failures. For instance, fields in some Bontoc communities are reported to follow a certain

agricultural cycle each year, based on the ecological information. Their planting and harvesting schedules are coordinated in order to enable proper labour rotation. There are also compulsory rest days to prevent the spread of pests⁹. These activities entail restricted use rights and require good coordination. The need for coordination also arises in terms of investments put into a field, since the proximity of fields can produce substantial externality effects. The existence of communal restrictions indicates that the communal authority holds overall management rights so as to promote communal welfare and maintain communal solidarity.

ANALYTICAL FRAMEWORK AND EMPIRICAL MODEL

We analyse whether traditional informal institutions encourage the sustainable livelihood of people. In terms of 'traditional institution', we look at the following factors: the existence of effective traditional authority; the practice of reciprocal exchange-labour systems; the access to informal credit; the strength of property rights; and the existence of restrictions over the exercise of rights¹⁰. The first factor concerns each individual's perception regarding the effectiveness of traditional authority. The second factor concerns whether the traditional system of exchange labour is still effective or not. The third factor concerns whether a farmer has ordinary access to informal credit arrangements when (s)he is in need. The fourth factor concerns the total number of constituent rights held, regardless of the rights being held in full or restricted. The fifth factor concerns whether there are any restrictions imposed on exercising the rights. As explained earlier, an absence of and/or restrictions on alienable rights are seen especially in those communities where traditional values are still dominant in everyday life. Thus these fourth and fifth factors may reveal the prevalence of traditional institutions. Note that we only consider 'owned fields' and not 'rented' or 'borrowed fields' in order to make consideration of the third factor valid; naturally, more constituent rights are held for owned fields. All the data, except for property rights restrictions, are taken per household. This is to allow for the heterogeneity of perceptions amongst community members, especially in communities in transition. For instance, even perceptions regarding the existence of (effective) traditional authority could differ among members of the same community. Property rights data are taken per field unit.

With regard to sustainable livelihood, we look at people's incentives in exercising sustainability enhancing agricultural practices. In particular, we look at whether farmers actually pursue sustainability-enhancing land management. Activities include the construction and maintenance of terraces, stonewalls, irrigation and hedgerows as well as sustainability-enhancing technique adoption (e.g., application of organic fertilizers and reduced cultivation). These activities are considered to be crucial in conducting environmentally sound agriculture in the upland environment, as they essentially retain soil quality, regulate water inflows/outflows and prevent soil erosion and destruction of terraces. They seem to be done according to traditional practices, imbedded knowledge and norms, although not necessarily stipulated in the customary laws. The customary institutions, if still effective, are expected to have a positive impact, especially on

maintenance activities and technique adoption, in the form of ongoing, medium-/short-term land management and improvements. On the other hand, they may not influence construction activities; they require much heavier inputs and thus, such activities are likely to be done infrequently, according to individual needs rather than communal concerns. This may also be reflected in the high zero observation of construction type improvements.

Thus, a farmer's sustainability-enhancing activities (y_{ij}) are set as the dependent variable for field i of a farmer household j . Independent variables for the base model are: existence of traditional authority (A_j); access to an exchange-labour system (L_j); access to informal credit (IC_j); the strength of property rights over the field (R_{ij}); and the average number of restrictions over property rights per constituent right held (RE_{ij}), i.e., the total number of restrictions divided by the number of constituent rights held. In addition to this basic model, we estimate an extended model incorporating other household characteristics that are considered to be relevant for traditional values as well as sustainability-enhancing activity decisions. These variables are: proportion of agricultural products sold in a market (*propsold*); net annual income (*income*); whether the respondent (either or both in case of a couple) has graduated from a college or a vocational-training school (*college*); and age (average age in case of a couple) (*age*). *Propsold* measures how much a household is commercialized in terms of its agricultural activities. Together with *college*, they may indicate 'less traditional values' held by the farmers. *Income* is considered to encourage sustainability-enhancing activities. *Age* is included as older people are considered to hold 'more traditional values'.

The unit of measurement is field for the dependent variable and independent variables (R_{ij}) and (RE_{ij}). All other variables are measured in household units and are applicable across all fields cultivated by the same household. The relationship is thus depicted as:

$$y_{ij} = f(A_j, L_j, IC_j, R_{ij}, RE_{ij}, others_j) \quad (1)$$

For the dependent variable (y_{ij}), we separately consider (a) 'construction activities' as long-term land management investments; (b) 'maintenance activities' as medium-term land management investments; and (c) 'technique adoption' as short-term land management investments. As mentioned earlier, we expect that construction activities are less likely to be affected by the institutional factors of our concern. The dependent variable (y_{ij}), a farmer's sustainability-enhancing activities, is an ordinal index constructed to reflect a farmer's actual land management deeds that are considered to be sustainability enhancing. For long-term heavy investment, however, we essentially estimate it via binary mode given its high observation of zero deeds; '1' if one or more investment deed is taken and '0' if none is taken.

Table 2. *Sustainability-enhancing activity indices*

Activity / Investment category	Mean (standard deviation)			Value range	Investment deeds
	N	Nv	Nr		
Construction: long-term, intensive	0.30 (0.46)	0.48 (0.50)	0.19 (0.39)	0-1	Horizontal terrace; non-horizontal terrace; stonewall; irrigation canal/hose/pipe; stone-piling
Maintenance: medium-term, less intensive	2.77 (0.73)	2.44 (1.01)	2.97 (0.35)	0-5	Terrace maintenance; stonewall maintenance; irrigation maintenance; tree hedgerow; tree crop planting; grass hedgerow
Sustainability-enhancing technique adoption	2.30 (1.49)	2.86 (1.34)	1.95 (1.47)	0-7	Organic fertilizer; contour cultivation; nitrogen-fixing crop planting; cover cropping; crop rotation; multiple cropping; reduced cultivation; lime application

Notes: For owned fields only (N=523). Nv (vegetable-growing communities): 202; Nr (rice-growing communities): 321.

Source: Survey data (2000, 2001) by the author.

The existence of traditional authority (A_j) is a dichotomous variable taking a value of (0,1). Access to an exchange-labour system (L_j) employs three categorical dummy variables: (1) reciprocal exchange labour only; (2) exchange labour and casual daily labour; and (3) no access to an exchange-labour system, as the base category. The first one is considered to be the most traditional form. Access to informal credit also has three categories: (1) informal credit without interest; (2) informal credit with interest; and (3) no access to informal credit, as the base category. The strength of property rights (R_{ij}) is a summation of the number of constituent rights (use; rent/tenant; mortgage; sell; give; exchange; bequeath; modify) held by a farmer, regardless of them being full or restricted rights. With eight constituent rights, a strength-of-rights index accordingly takes a value ($0 \leq R_{ij} \leq 8$). Some have only use right, even being the owners of the fields, while others have several or all of these rights. We do not weigh each constituent right with its degree of importance, since weights must be arbitrary in their nature, having no clear criteria. The simple summation measure is considered to reflect the overall strength of rights, since those less frequent rights, e.g., rights to sell, give, etc., are, by definition, included only in stronger rights. The total number of restrictions over property rights (RE_{ij}) is an average number of all restrictions posed on these constituent rights. For household-level variables measured by a couple unit or single unit if unmarried, we take the higher value for education among the couple and the average value for the age. Table 3 provides summary statistics of independent variables.

Table 3. Summary statistics of independent variables

Variable	Type	Mean (standard deviation)	Note
Traditional authority (A_i)	Binary	0.64 (0.48)	
Access to exchange-labour system (exchange labour only) (L_j)	Binary	0.32 (0.47)	
Access to exchange-labour system (exchange and wage labour) (L_j)	Binary	0.33 (0.47)	
Informal credit market access (no interest)	Binary	0.16 (0.36)	
Informal credit market access (interest)	Binary	0.20 (0.40)	
Property rights strength (R_{ij})	Numerical	4.40 (2.59)	Total number of constituent rights held
Number of restrictions per right (RE_{ij})	Numerical	0.35 (0.52)	Restrictions on property rights (per constituent right)
Proportion of crops sold	Numerical	0.36 (0.42)	
Net annual income	Numerical	45.36 (133.32)	
Age	Numerical	45.20 (12.81)	Years (average value for a couple)
College graduate	Binary	0.11 (0.31)	

Note: N=523 (owned fields only).

Source: Survey data (2000, 2001) by the author.

ESTIMATION MODELS

For the empirical model (1), we simply represent household-level variables as a vector of household characteristics ($\mathbf{h}_j$) and field-level variables as a vector of field characteristics ($\mathbf{z}_{ij}$):

$$\begin{aligned}
 y_{ij} &= f(A_j, L_j, IC_j, R_{ij}, RE_{ij}, others_j) \\
 &= f(\mathbf{h}_j, \mathbf{z}_{ij}) = \beta_0 + \beta_1 \mathbf{h}_j + \beta_2 \mathbf{z}_{ij} + \varepsilon_{ij}
 \end{aligned} \tag{2}$$

where y_{ij} : investment activity index for a field j of a household i ;

$\mathbf{h}_i = (A_j, L_j, IC_j, \text{other household-level variables})$:
a vector of household characteristics;

$\mathbf{z}_{ij} = (R_{ij}, RE_{ij})$: a vector of field characteristics.

We apply an ordered logit model (Ologit) for main estimations (maintenance activities and technique adoption), as it is found to suit the data best, especially since the dependent variable is of ordinal nature (number of investment deeds taken). Household cluster effects are applied to adjust for standard errors, given the fact that certain households have several fields. Since the Ologit estimated parameter values also reflect the identifying assumptions regarding the variance of errors, we also compute the ‘factor change in odds ratios’ in order to interpret the probability of an event that is independent of the assumptions (see Long (1997) for details).

For construction activities that are recoded into a binary index, we apply the household random-effects logit model (RElogit): in particular, a random-intercept model, which is one of the simplest forms of the random-effects model. The random effects are found to be significant and its specification passes the Hausman test. The estimation equation takes into account the variables and the error terms measured at different levels, those corresponding to a field (i) and a household (j). Here, equation (2) is respecified as:

$$y_{ij} = f(\mathbf{h}_j, \mathbf{z}_{ij}) = \beta_0 + \beta_1 \mathbf{z}_{ij} + \varepsilon_{ij} \quad (3)$$

Having $\beta_0 = (\omega_{00} + \omega_{01} \mathbf{h}_j + u_{0j})$

$$y_{ij} = (\omega_{00} + \omega_{01} \mathbf{h}_j + u_{0j}) + \beta_1 \mathbf{z}_{ij} + \varepsilon_{ij} = (\omega_{00} + \omega_{10} \mathbf{z}_{ij} + \omega_{01} \mathbf{h}_j) + \varepsilon_{ij} + u_{0j} \quad (4)$$

where a row vector $\beta_1 = \omega_{10}$ represents fixed coefficients. In the last part of equation (4), the coefficients are all systematized to ω from β , where ω_{00} is the average intercept, ω_{10} and ω_{01} are coefficient (row) vectors at level one (field level) and at level two (household level), corresponding to each element of the $\mathbf{z}$ and the $\mathbf{h}$ (column) vectors, respectively. The last part of equation (4) within the parenthesis is the fixed part of the model, while $\varepsilon_{ij} + u_{0j}$ is the random part. Any random factor that is not captured by the fixed system of the equation should be reflected in the error terms.

ESTIMATION RESULTS

Estimations are carried out for the base and extended models for each activity category, construction, maintenance and technique adoption activities. The base model contains limited variables that are considered to be particularly relevant to the analysis. The extended model contains other household characteristics that are considered to affect the investment incentives. As mentioned above, if traditional institutions are still effective in coordinating people’s activities, we expect that they should encourage sustainable resource management, especially in the form of maintenance activities and technique adoption. Traditional institutions are reflected in the existence of traditional authority, the practice of reciprocal labour exchange, the access to informal credit, the overall strength of property rights and the existence of restrictions on the exercise of certain rights over one’s land.

Table 4.1. Estimation results

	Construction		Maintenance		Technique adoption	
	Logit with random effects		Ordered Logit with cluster effects			
	Base model	Extended model	Base model	Extended model	Base model	Extended model
Scalar measures						
Wald χ^2 (K)	48.65 (7)	60.13 (22)	56.60 (7)	74.58 (11)	74.29 (7)	88.35 (11)
Deviance (DoF)			879.92 (511)	857.95 (505)	1671.17 (509)	1654.04 (503)
McKelvey and Zavoina's R ²			0.23	0.26	0.24	0.26
AIC			1.728	1.71	3.249	3.244
BIC			-2318.73	-2301.21	-1514.96	-1492.61
Estimates						
	(absolute z-value); significant at 0.01 ***, 0.05 **, 0.1 *					
<i>Traditional authority</i>	0.17 (0.47)	0.06 (0.17)	-0.08 (-0.29)	-0.08 (-0.29)	0.42* (1.66)	0.41 (1.56)
Exchange labour only	-0.09 (-0.18)	0.03 (0.06)	1.55*** (3.92)	1.40*** (3.26)	-0.05 (-0.16)	-0.03 (-0.07)
Exchange and wage labour	-0.34 (-0.75)	-0.18 (-0.39)	1.23*** (3.18)	1.05*** (2.82)	0.44 (1.52)	0.38 (1.32)
Informal credit (no interest)	-0.65 (-1.38)	-0.79* (-1.65)	-0.09 (-0.28)	0.13 (0.40)	-0.04 (-0.15)	0.03 (0.10)
Informal credit (interest)	-0.18 (-0.46)	-0.32 (-0.78)	-0.76*** (-2.58)	-0.55* (-1.74)	0.00 (0.01)	0.08 (0.25)
Property rights strength	0.31 *** (3.77)	0.27 *** (3.09)	-0.08 (-1.13)	-0.04 (-0.48)	0.351 *** (5.31)	0.33 *** (4.14)
Restrictions per right	0.12 (0.28)	0.20 (0.48)	0.456* (1.79)	0.39 (1.46)	1.11 *** (3.75)	1.19 *** (3.93)
Proportion sold		0.74 (1.40)		-0.76 (-1.56)		0.03 (0.07)
Annual income		-0.00 (-0.53)		0.00 *** (5.25)		0.00 *** (1.96)
Age		0.00 (0.11)		0.01 (1.27)		-0.00 (-0.19)
College		-0.49 (-0.91)		-0.46 (-1.26)		0.29 (0.94)
Constant	-2.49 (-3.75)	-2.55 (-2.84)				

Notes: Base model (N=523; Households=269); Extended model (N=507; Households=259)

Source: Survey data (2000, 2001) by the author.

Overall, the scalar measures suggest a reasonably good fit for the models. With regard to the estimated significance and the degree of coefficients, general similarities between the base- and extended-model estimations are seen. Some of the traditional institutional factors are found to have significant positive impacts especially on maintenance and technique adoption activities, but not on construction activities. Apart from these factors, *annual income* is found to be significant with positive effects in some of the estimations.

For ‘construction activities’, in both the base- and extended-model estimations, *property rights strength* is found to be statistically significant at the 1% level, having positive effects. This indicates that a strong level of restrictions that leads to the absence of rights does not encourage construction activities. None of the traditional institutional factors is found to be significant, apart from access to *informal credit without interest* exerting negative effects, although it is found to be significant only at the 10% level. This is a reasonable finding since these activities typically require heavy inputs and long-term perspectives in realizing benefits. Thus the decisions over such long-term investment activities are expected to be affected by individual/field-level factors, rather than customary rules and institutions.

Table 4.2. Selected estimation results in standardized coefficients and factor change in odds

	Maintenance		Technique adoption	
	Base model	Extended model	Base model	Extended model
	Estimates			
	(absolute z-value); significant at 0.01***, 0.05**, 0.1*			
	(a)	(a)	(a)	(a)
	(b)	(b)	(b)	(b)
<i>Traditional authority</i>	0.92	0.92	1.52*	1.50
	0.96	0.96	1.22*	1.22
Exchange labour only	4.73***	4.06***	0.95	0.98
	2.07***	1.93***	0.98	0.99
Exchange and wage labour	3.44***	2.87***	1.55	1.46
	1.79***	1.65***	1.23	1.20
Informal credit (no interest)	0.92	1.13	0.96	1.03
	0.97	1.05	0.99	1.01
Informal credit (interest)	0.47***	0.58*	1.00	1.09
	0.74***	0.81*	1.00	1.03
Property rights strength	0.93	0.96	1.42***	1.39***
	0.82	0.91	2.48***	2.35***
Restrictions per right	1.58	1.48	3.02***	3.30***
	1.27	1.22	1.78***	1.86***

Notes: N=791; Household=412

(a) Factor change in odds [$\exp(\beta)$] for a unit change; (b) Factor change in odds [$\exp(\beta)$] for a standard deviation change

With regard to 'maintenance activities,' some of the traditional institutional factors are found to be significant, consistent with our *a priori* expectations. Amongst the customary institutional factors that are considered, access to exchange-labour systems, both *exchange labour only* and *exchange and wage labour* are found to be particularly significant at the 1% level with positive effects. This suggests that those with an access to reciprocal exchange-labour arrangements are more likely to make maintenance activities. The results particularly indicate a strong impact of *exchange labour only*; having a unit higher access to the exchange-labour system increases the odds of observing extra maintenance activities by a factor of 4.1-4.7. On the other hand, *informal credit with interest* is found to be significant with negative effects at the 1% level in the base-model estimation, although the significance is dropped to the 10% level in the extended-model estimations. While *restrictions on property rights* is found to be significant at the 10% level with positive effects in the base model, the same significance is not found in the extended model; this suggests that the finding is not robust. In the extended model, *net annual income* is found to exert positive effects at the 1% level of significance.

Regarding 'sustainability-enhancing technique adoption', *restrictions on property rights* is found to be statistically significant at the 1% level with positive effects in both the base and extended models. The magnitudes of effects are the highest among those estimated coefficients. On the other hand, *property rights strength* is also found to be significant with positive effects in both estimations. As in the case of 'construction activities', having stronger rights seems to induce these activities, i.e., too much restriction is not desirable. *Traditional authority* is found to be significant with positive effects, although only at the 10% level, in the base-model estimation. Like in the case of 'maintenance activities', *net annual income* is found to have positive effects with the significance level of 5%. Other household characteristics, such as *age*, are not found to be significant. These findings suggest that traditional institutions, especially in terms of moderate restrictions put on property rights, encourage sustainability-enhancing technique adoptions/activities that are integrated in daily cultivation practices and are often productivity enhancing.

CONCLUSIONS

We have investigated whether traditional/indigenous informal institutions function to encourage sustainable management of resource bases, as a part of coping strategies. Such traditional institutions, although sometimes considered to hinder people's incentives, may enhance the sustainable livelihood of people living in a fragile environment. Unlike previous studies, which focused on the effects of formal institutions, we have directly focused on the effects of traditional institutions. In particular, we have examined how traditional authorities, reciprocal exchange labour systems, informal credit access and restrictions over exercise of property rights affect the sustainability-enhancing activities of the farmers. Despite the seemingly changing significance of traditional institutions, as suggested by less use of labour exchange, increasing resource conflicts regarding water and land that are not being

resolved by the traditional authorities, and increased reliance on formal judicial systems, we have found significant effects of traditional institutional factors, especially on maintenance activities. Although the existence of traditional authority per se was not found to be particularly significant, the exchange-labour system was found to have significant positive effects on the exercise of maintenance deeds. In addition, restrictions on property rights were found to have positive and significant effects on the adoption of sustainability-enhancing techniques, although too much restriction may exert opposite effects. The analysis suggests that embedded customs are likely to encourage the sustainable livelihood of these upland communities. This seems to support the previous findings that formal institutions are not necessarily a solution to better management of natural resources.

ACKNOWLEDGEMENTS

This study was enabled by the financial support from the Matsushita International Foundation, the Cambridge Political Economy Society Trust, the Showa Shell Sekiyu Foundation for Promotion of Environmental Research, Jesus College and the Department of Land Economy of the Cambridge University. The author is grateful for the respondents and the logistical support provided by the Cordillera Studies Center of the University of the Philippines College Baguio. The author wishes to thank for constructive comments provided by the anonymous reviewers.

NOTES

¹ The term indigenous cultural communities (ICCs), as it is used in the Philippines, refers to communities and social groups that have a cultural and social identity distinct from the dominant Filipino society. They are regarded as homogenous societies – though this is not necessarily true. They generally have strong communal bonds and distinct cultural traits, being historically differentiated from the majority of Filipinos (Asian Development Bank 1995, 59-60).

² Although no data are available for the region alone, the Philippine forest cover decreased at a rate of over 2% annually, during the period 1950-1990. The region nevertheless still contains a higher proportion of forest cover than other regions, estimated to be 672,320 ha (data source: DENR 2003), although it is only 45% of the 'classified' forestland of 1,487,073 ha.

³ Not only loss of forest cover but also mine development, where production was estimated at 10.8 million tons in 1987, can cause serious damage to land and water resources if it is not managed properly (Department of Environment and Natural Resources 1987, p. 28).

⁴ A community generally refers to a *barangay*, the smallest administrative unit in the Philippines, but it sometimes refers to several neighbouring *barangays* and/or smaller units, *sitios*.

⁵ Especially Bayyo of Bontoc, Mountain Province still upholds the customary law effectively. Such a case was also observed in Batad of Banaue, Ifugao, and to a more limited extent in Fidelisan of Sagada, Mt. Province, although both sets of data had to be discarded due to data collection problems. On the other hand, Maligcong of Bontoc, Mt. Province, whose data also had to be discarded, seemed to experience the demise of the traditional system, perhaps due to their community being increasing 'touristicized' (field observation 2000, 2001).

⁶ It is known as the Cariño Doctrine; this 'time immemorial' presumption results from the decision made in the U.S. Supreme Court in 1909 over the land disputes between the indigenous Cariño family and the colonial government.

⁷ It is known as the Cariño Doctrine; this 'time immemorial' presumption results from the decision made in the U.S. Supreme Court in 1909 over the land disputes between the indigenous Cariño family and the colonial government.

⁸ Here our review refers mostly to the major customary laws of Ibaloy and Bontoc communities, where extensive reports are available (for further detail, see Prill-Brett 1992). They can be considered to be more or less representative cases of indigenous customary laws. For a summary of property rights types and governing rules in the Cordillera communities, see, for instance, Prill-Bret (1989; 1993) and Rood (1989).

⁹ For fuller details, see Prill-Bret (1987).

¹⁰ Note that the included variables are not the whole representation of 'traditional institutions'. For instance, the practice of a 'redistributive feast' given by wealthy families, which is considered to represent a traditional value, as stressed by Lewis (1989), is not considered here.

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