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Source: *Conservation & Society* , 2021, Vol. 19, No. 1 (2021), pp. 44-56

Published by: Ashoka Trust for Research in Ecology and the Environment and Wolters Kluwer India Pvt. Ltd.

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Conservation and Society 19(1): 44-56, 2021

Article

Local Institutions and the Governance of Tree Resources: The Case of the Shea Tree (*Vitellaria paradoxa* C.F Gaertn.) in West Nile Region of Uganda

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Abstract

The role of institutions in conservation of biological resources is globally recognised. This study is aimed at assessing institutions governing conservation and management of the Shea tree in West-Nile region of Uganda where it is at risk of extirpation. Arua and Nebbi districts which are dominated by different ethnic groups were selected for the study. The study involved 200 respondents, six focus groups and 20 key informants. Chi-square tests were used to analyse the origin and level of compliance to institutions between the two districts. A multinomial logit model was used to analyse factors influencing levels of rule enforcement. Content analysis was used to analyse data from key informants and focus group discussions. The results showed the existence of seven different rules that were categorised as management, conservation and harvesting rules. The level of compliance to rules for the Shea tree was higher in Nebbi than Arua. Involvement in rule crafting, clarity of resource boundary, age, education level and ethnicity of respondents significantly influenced participation in rule enforcement. The study concluded that traditional institutions are relevant in the conservation of Shea trees. It is therefore, vital to incorporate them into statutory laws in the quest for sustainable management of Shea tree.

Keywords: Local and statutory institutions, Governance, Shea tree, West Nile region

INTRODUCTION

The crucial role played by institutions in the context of natural resource governance is increasingly globally recognised (Atalla 2015; Alinon and Kalinganire 2008; Hodgson 2006; Gibson et al. 2005; Ghate and Nagendra 2005; Ghate 2004). Institutions are humanly created mechanisms that shape social and individual expectations, interactions, and behaviour (Agrawal and Perrin 2008). They define who makes decisions, according to which procedures, what actions are permitted, what information must be provided, and what sanctions will be assigned to individuals (Singh 1994). Institutions therefore form 'the rules of the game' while the actors are the 'players of the game' (Skoog 2005).

Institutions constitute both formal and informal rules, regulations, norms and social meaning such as shared values and perceptions of the 'appropriate way of conducting issues' (Cleaver 2000). Formal institutions are usually established and constituted by binding laws, regulations and legal orders which prescribe what may or may not be done (Hodgson 2006). They are statutory in nature. Informal institutions, on the other hand, are constituted by conventions, norms, values and accepted ways of doing things, whether economic, political or social which are embedded in traditional social practices, norms, taboos, beliefs, folklores, tales and culture which can equally be binding

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(Hodgson 2006; Sokile et al. 2005). They may also be referred to as traditional institutions. The enforcement of statutory institutions is usually through state actors and often codified while traditional institutions are enforced outside the legally recognised channels (Pahl-Wostl 2009) and do not usually depend on the state for enforcement (Colding and Folke 2001).

Institutions are generally complex and persist over time, serving collective and valued purposes (Ostrom 1990). They are critical in promoting efficiencies in resource allocation by limiting and regulating harvesting levels and management practices (Akpalu et al. 2009). They can also usefully create consistency on human activities (Hodgson 2006) and thus, are an important transaction cost-minimising arrangement (North 1990) for sustainable natural resource management (Ghate and Nagendra 2005). Institutions guide social processes and reflect social patterns of engagement (Gupta et al. 2010) and the decisions and actions of particular resource users in regard to the sustainability of such resource (Akpalu et al. 2009).

The successful management of biological resources requires that rules of behaviour are followed (Keane et al. 2008). In many African countries, formal and informal institutions exist to regulate utilisation of important indigenous tree species (Gumaa 2011; Poudyal 2009; Oduol et al. 2008). For instance, Ramadhani (2002) noted that informal and formal institutions continue to play an important role in management and access of *Strychnos cocculoide*s and *Uapaca kirkiana* in Zimbabwe. Similarly, Kirkland et al. (2007) reported that there were traditional taboos that prohibited felling of live marula trees (*Sclerocarya birrea*) in South Africa.

The Shea tree (*Vitellaria paradoxa* C. F. Gaertn) is another iconic indigenous African fruit tree with a long history of informal and formal institutional governance (Boffa 1999; Teklehaimanot 2004). It is endemic to an almost unbroken belt of 6000 km long and 500 km wide that extends from the eastern part of Senegal to the high plateau of Uganda (Bouvet et al. 2004) Figure 1.

Two subspecies of *V. paradoxa* are documented: subspecies paradoxa (distributed mainly in West Africa, extending from Cameroon to Senegal) and subspecies nilotica (distributed mainly in eastern Africa), extending from Central African Republic to south-western Ethiopia in the east and Uganda in the south (Hall et al. 1996).

This Shea tree is highly valued because its pulp can be eaten when ripe while the nut can be processed into oil, which on settling forms butter. This is locally consumed in foods and traded in the cosmetics, confectionary and pharmaceutical industries (Lamien et al. 2007; Maranz et al. 2004; Lovett et al. 2000; Hall et al. 1996). The bark, roots and leaves of the Shea tree are used in traditional medicines to treat various ailments (Ahmed et al. 2009; Abbiw 1990). The tree is also valued for its wood and charcoal (Okullo et al. 2004; Boffa 2000; Lovett and Haq 2000) and has been recognised as a primary source of income among rural households especially for women and children who are traditionally responsible for the harvesting of products from the tree species (Elias and Carney 2007; Ferris et al. 2001). A study by Ferris et al. (2001) in the villages and rural markets in northern Uganda indicated that shea oil provides a major source of income to the households engaged in its trade. On average, a litre of the oil goes for 10,000 Ugandan shillings (2.9 USD). The potential economic worth of Shea tree in Uganda is rated up to 118 Million USD per annum.

Due to the increasing economic and socio-cultural value of the Shea tree, a number of rules governing management and utilization of the tree exist across the shea belt communities of Africa (Bonkoungou 2002; Lovett and Haq 2000; Boffa 1999). Some of the rules documented include: banning of cutting Shea trees except those with undesirable form, usually the smallest in size or those that are unproductive (Bonkoungou 2002; Lovett and Haq 2000; Boffa 1999); collecting only shea fruits that have fallen down (Lovett and Haq 2000); only picking dry branches for fire food (Elias and Carney 2007; Ferris et al. 2001); and restrictions on setting fires on Shea tree stands. In some jurisdictions, the tree is protected through national legislation. In Uganda, it is listed among the "reserved" tree species (GoU 2016). A reserved tree species in Uganda is considered to be a species of international or national importance that is endangered or rare or threatened and therefore subject to control as the Minister responsible for forestry may specify (GoU 2003). The National Forestry and Tree Planting Regulations, 2016 operationalises this statutory legislation by out-lawing any cutting down of *V. paradoxa* and anyone found guilty will have committed an offence and is liable to prosecution. Cutting down of reserved tree species such as *V. paradoxa* can only be done under special circumstances such as safety which has to be proved by the Minister responsible for Forestry.

All the aforementioned rules seek to promote management and sustainable utilisation of the tree. Some studies in West Africa and elsewhere in Northern Uganda, indicate that where institutions exist and are well enforced, the Shea trees are sustainably used and protected by the local communities (Atalla 2015; Alinon and Kalinganire 2008). However other recent studies (e.g. Byakagaba et al. 2011; Okullo 2004) show continued decline of the Shea tree population in the shea parklands of Uganda including West Nile region in spite of the continued interest in sustainable management and conservation of the tree species (Okiror et al. 2012; Gwali et al. 2011) and the tree being recognised as a "reserved" tree species in Uganda's national legal framework (GoU 2016). This is further confirmed by it being included on the IUCN Red List of Threatened Species (IUCN 1998). The Shea tree was added on the list in January 1998 as "vulnerable" because it has been overexploited for timber, firewood and charcoal production. This is coupled with loss of its natural range due to agricultural encroachment and increasing population pressure.

It is against this backdrop that the current study was undertaken with the aim of assessing the institutions governing use and management of the Shea tree in the West Nile region of Uganda where it is at risk of extirpation due to unsustainable utilisation. Specifically, we determined the origin of formal (statutory) and informal (traditional) rules and established how they are monitored and enforced among the *Alur* and *Lugbara*

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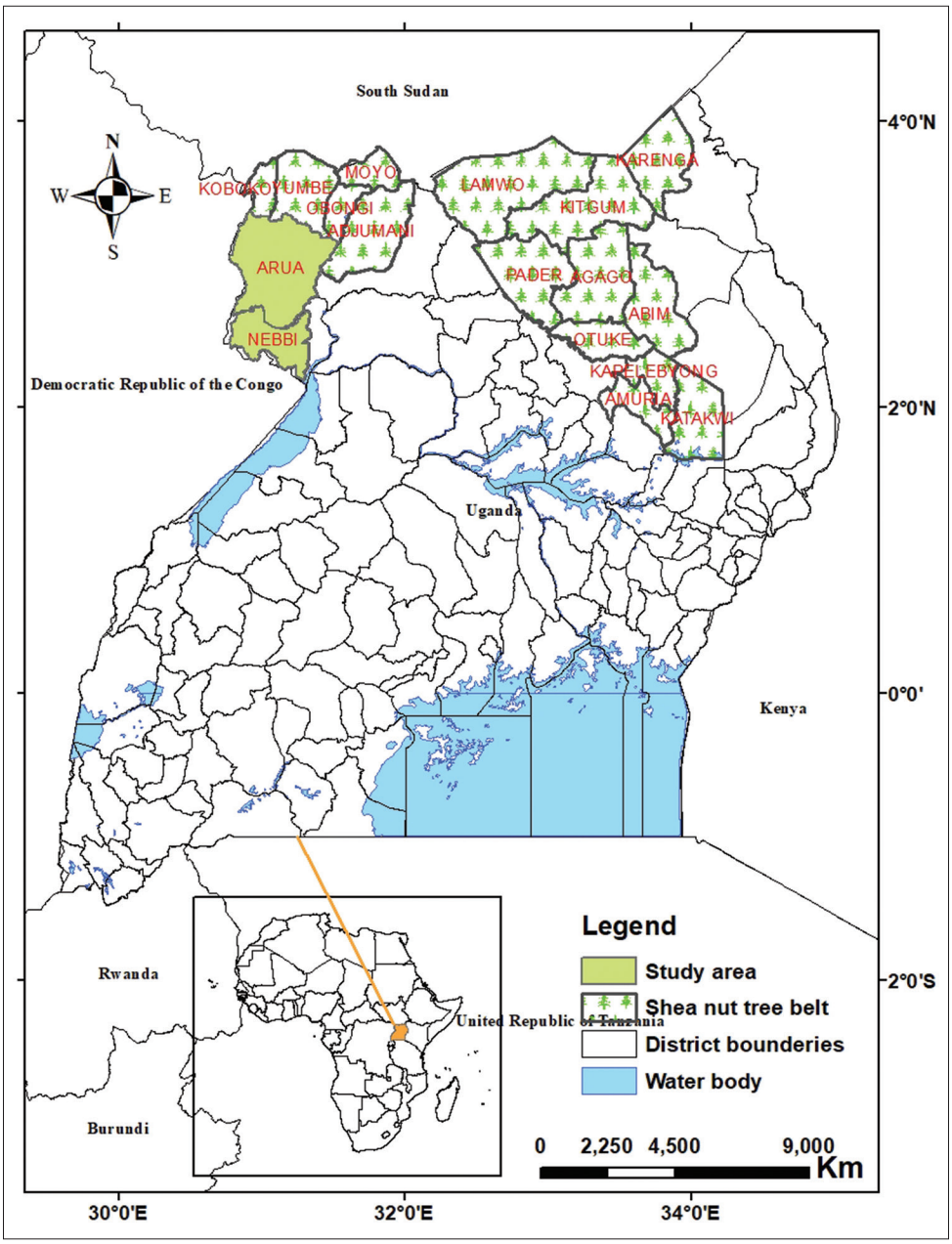

Figure 1
Map showing Shea belt in Uganda and the study districts

communities who are the most dominant ethnic groups in Nebbi and Arua districts of West Nile region respectively. We envisage that the findings can inform current and future policy and legal frameworks governing the use and management of socio-ecologically important tree species such as the Shea tree in the quest to reduce biodiversity loss and enhance conservation.

MATERIALS AND METHODS

Study area

The West Nile region of Uganda is located in the North Western part of the country and it lies at 2°10' and 3°49' latitudes and 30°44' and 32°05' longitudes. The vegetation cover in the region is composed of Sudanian undifferentiated woodlands and Guineo-Congolean mosaics (White 1983). The dominant vegetation community is Vitellaria/ Combretum/ Terminalia woodland (Mwebaze 2010; Byakagaba 2015). The Shea tree is the most highly valued indigenous fruit tree found in the Savannah woodlands of West Nile (Acema and Muhereza 2010). The tree is highly valued for the fruit and the butter obtained from the oil generated from its nuts. The management and conservation of the Shea tree in the study area is majorly defined by a customary land tenure system in which the trees are found and to some extent the statutory laws governing forests and trees in Uganda. The statutory laws include— the

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National Forestry and Tree Planting Act 2003 and the National Forestry and Tree Planting Regulations 2016 which categorise the Shea tree as "reserved." Customary land tenure is a system of land ownership governed by customary principles which are regulated and sanctioned by customary authorities such as clans (GoU 1998). Tree resources are usually communally owned following rules defined by the clan authorities. Other types of tree tenure include state (when the trees are found in protected areas) and private ownership (when trees are found on private land holdings). The Shea tree belt in the region has experienced a large increase in human population; as a result, most Shea trees in the region occur on cultivated land (Byakagaba et al. 2011).

The current study was conducted in Arua and Nebbi districts of West Nile region. The two districts were purposively selected because they are dominated by two different ethnic groups with varying socio-cultural characteristics thus were suitable for comparison of informal institutions governing conservation and management of the Shea tree. These ethnic groups are the Lugbara in Arua district and the Alur in Nebbi district (UBOS 2003). The two groups speak different languages and have different cultural practices and do not have a shared history thus making them suitable for the study purpose and design. The Alur of Nebbi district have an organised traditional system with a paramount chief known as "Rwoth" at the top of the hierarchy who governs through appointed chiefs. While among the Lugbara of Arua district, there is no traditional authority analogous to a paramount chief and no central authority, but there are elders whose authority only applies to their clan. The combined population of the two districts in the year 2014 was 1,178,871 people (UBOS 2014). This figure almost doubled the one recorded during the 2002 population and housing census. The average population growth rate in the studied districts is 4.6% which is higher than the national average of 3.3% (UBOS 2014).

Data collection methods

Focus Group Discussions (FGDs) were used to generate information at community level. In total, six (3 in Nebbi and 3 in Arua) focus group discussions of eight to ten participants were conducted. The focus group discussions were segregated according to gender to allow free discussions for 30 minutes and later merged to get a general view of both sexes for 45 minutes. The participants included; elders (60 years and above), middle aged persons (36 to 59 years) and youths (18 to 35 years). An equal number of males and females were included in the FGDs. The participants were selected by community members based on their experience and knowledge about institutions governing management of Shea trees. The discussions provided an in-depth understanding of institutions governing management and utilisation of Shea trees and triangulated the information obtained from the key informants.

Key informant interviews were held with 20 individuals. The categories of people interviewed included two District Forest Officers, two Local Council III chairpersons, eight Local Council I Chairpersons four elders, three chiefs and one paramount chief among the Alur people of Nebbi district. The numbers of these categories were split equally between the two districts except for Arua district where paramount chief and chiefs do not exist elders were considered. The choice of the categories was based on their roles in management of Shea trees. The District Forest officers and Local Council Chairpersons are involved in enforcing formal institutions governing the use, conservation and management of the Shea tree, while elders, chiefs and the paramount chief are involved in enforcing informal institutions. Therefore, their perspectives were considered important for the study objectives.

The focus group discussions and the key informant interviews were used to generate the rules and their categories and narratives on different aspects which were being studied. These were then integrated in the questionnaire used in the household survey.

Household interviews guided by a semi structured questionnaire were conducted in eight randomly selected villages from four parishes in the two districts. The villages were equally divided between the two districts. A 20% minimum sample size as recommended in social surveys (Hetherington 1975) was ensured. One hundred households were randomly selected in each district and this gave a total of 200 households in the two districts.

Data analysis

Data from focus group discussions and key informant interviews were analysed using the content analysis technique. Content analysis is a form of scientific inquiry that helps researchers to explain common trends in survey data (GAO 1989). In content analysis, it is assumed that words and phrases that are frequently mentioned are relatively more important to the subject matter than those less frequently mentioned (Stemler 2001). The purpose was to generate narratives from the content of the messages from different categories of focus groups and key informants on the themes under study. Narratives are story lines through which people advance their knowledge and views about phenomenon (Tumisiime and Svarstad 2011). This was followed by comparing narratives from different actors and socio-categories represented in the key informant interviews and focus group discussions. Both the content and meaning were considered when formulating the narratives. This was done in an iterative process to identify descriptive and interpretive statements. Quotes were identified, lifted out from original statement and compared among the different cases of interviewees.

Data from household questionnaires were coded in Microsoft Excel and analysed using the Statistical Package for Social Scientists (SPSS) version 16.0 (2007 release, _ IBM Corp., Chicago, IL USA). Descriptive statistics were used to determine the number of people who were aware of the rules and complied with them. Chi-square tests with Cramer's V to indicate strength of relation were used to analyse the association between the origin of rules and the level of compliance to the rules and

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ethnicity. Factors influencing level of rule enforcement were examined using a multinomial logit (MNL) model. This is because the response variables were categorical with more than two options which justify the use of MNL to analyse such data (Greene 2003). Besides the model does not assume normality, linearity, or homoscedasticity thus making it suitable for the type of data that were collected from the households.

Description of the MNL

By letting Y denote a random variable taking the values {1, 2 ...J} where J is a positive integer and by letting X denote a set of conditioning variables, here, Y represents the aspects of good rule enforcement and X denotes the various socio-demographic and other factors characterising the respondents.

Assuming that each respondent faces a set of discrete, mutually exclusive choices of rule enforcement aspects which depend on the socio-demographic characteristics and other factors X, the sum of the probabilities is unity. Following Greene (2003), the MNL model specifies the following explanatory variables X as:

$$Prob(Y = j) = \frac{e^{Xjb_j}}{\sum_{k=0}^{J} e^{Xb_k}},\ j = 0,1,....J \quad (1)$$

Where βj is a vector of coefficients on each of the independent variables X. The indeterminacy in the model (Equation 1) can be removed by assuming that β0 = 0, thus j parameter vectors will be needed to determine the j+1 probability. Therefore, the probabilities can be estimated as:

$$Prob(Y = j / X) = \frac{e^{Xb_j}}{1+\sum_{k=1}^{J} e^{Xb_k}},\ j = 0,1,...J;\ b_0 = 0 \quad (2)$$

For j = 1, the binomial model form is obtained. The model implies that we can compute J log-odds

$$\ln\left(\frac{P_{ij}}{P_{ik}}\right) = X_i^{'}(b_j - b_k) = X^{'}b_j \text{ if } k = 0 \quad (3)$$

For the Independence of Irrelevant Alternatives (IIA) assumption to hold, Pj/Pk should be independent of the remaining probabilities. The parameter estimates of the MNL model provide only the direction of the effect of independent variables on the dependent (response) variable, but estimates do not represent the actual magnitude of change and probabilities. According to Greene (2000), estimating the marginal effects which are functions of the probability itself and measure the expected change in probability of a particular choice being made with respect to a unit change in an independent variable from the mean solves this problem. Therefore, by differentiating equation (2) with respect to the explanatory variables, the marginal effects of the probabilities are:

$$dj = \frac{dP_j}{dx} = P_j\left(b_{j-}\sum_{k=0}^{J} P_k\, b_k\right) = P_j\left(b_j - \bar{b}\right)$$

The choice sets in the enforcement criteria included; 'no enforcement,' 'monitoring,' 'sanctioning' and 'monitoring and sanctioning' of rule offenders. These constituted the dependent variables. Descriptive statistics were obtained and the option with the highest frequency in the choice set was taken as the base category. The independent variables consisted of; ethnicity, age, sex, level of education, involvement in rule crafting and clarity of resource boundary. Choice of independent variables was informed by previous studies like (Agrawal 2001; National Research Council 2002; Gibson et al. 2005) that found these variables important in rule enforcement processes. All the independent variables are either metric or dichotomous in nature while the dependent variables are non-metric. The numerical problems in the model were checked by examining the Standard Errors (SE) of the coefficients (Z). Large SE of coefficients usually reflect existence of problems such as multicollinearity among the independent variable and zero-cell for dummy-coded independent variable. The description of explanatory variables are given in Table 1.

RESULTS

Almost all (99%) respondents interviewed were aware of some rules that regulate utilisation and conservation of the Shea tree in their community. A total of seven rules were documented during FGDs and Key informant interviews in the two Shea parkland communities and they were categorised into three i.e. conservation, management and harvesting rules. There was no clear difference between the rules as being traditional or statutory. This is because both the state agents and the traditional leaders enforced the same rules except for harvesting rules that were enforced by the traditional leaders. The slight difference in the rules therefore, only arose from the agencies responsible for crafting and enforcing the rules (Table 2).

Conservation rules were the most reported in the two districts (46%). On the other hand, management rules were least mentioned (20.5%). The Alur were more knowledgeable

Table 1
Description of explanatory variables (n=200)

Variable	Measurement	Expected sign
Ethnicity	Dummy (0=Lugbara, 1=Alur)	+/-
Gender	Dummy (0=Female, 1=Male)	+/-
Age of respondents	Dummy (1=Young, 2=Middle aged, 3=Old)	+/-
Educational level	Dummy (0=No education, 1=Primary, 2=Secondary, 3=Tertiary and 4=University)	+
Clarity of resource boundary	Dummy (0=No, 1=Yes)	+
Involvement in rule crafting	Dummy (0=No, 1=Yes)	+

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about the conservation, management and harvesting rules than the Lugbara as reflected by high response rates.

The traditional chiefs (33%) and the local government officials (13.1%) were the most reported source of rules on conservation, management and harvesting among the Alur community of Nebbi district. While the local government officials (23.9%) and the elders15.9%) were the most reported source of the rules among the Lugbara community of Arua district.

The least source of rules reported among the Alur and Lugbara communities were central government agencies or departments (0.6%) and an equal (2.2%) number from the two ethnic groups reported user groups as the source of the rules (Figure 2). There was a significant difference in the source of rules among the two ethnic groups (Cramer's V= 0.66, $P < 0.001$).

Through the key informants interviews and the focus group discussions, it was reported that the local rules crafted by elders and chiefs were developed through community or clan meetings and Kingdom council sittings respectively. On the other hand, formal rules like the by-laws and ordinances crafted by local government agents were developed through local council meetings at various levels i.e. sub county and district local government councils. One of the Lugbara elders in Ayaka village, Omoo parish Arivu Sub County, Arua district said during the a focus group discussion, '*to make rules on Shea tree, a clan meeting is called to discuss challenges related to the Shea tree. The members of community are requested to suggest solutions to the problems and some of the solutions are pronounced by the chairperson of the meeting as rules which all members have to abide by.'* For instance he reported that the rule 'no cutting down of a fruiting Shea tree' was as a result of rampant cutting of the tree in the community for charcoal. It was noted that the process of rule formation only varied from the initial stage of meetings where people involved differed and this determined the source of the rules.

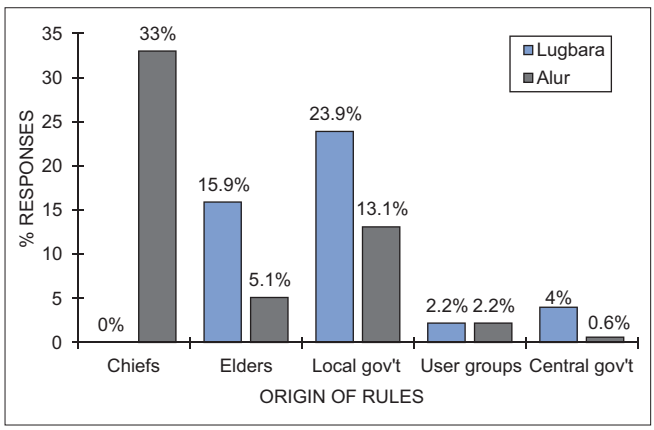

Figure 2
Response on source of rules among the Lugbara (Arua) and Alur (Nebbi) page

Rule Enforcement

Rule enforcement involved monitoring and sanctioning of rule offenders. Monitoring as a component of rule enforcement entailed patrolling to identify illegal activities on the Shea tree. It was done by the chiefs, local council members, elders and the youth vigilante group (Table 3).

Twenty-five percent of the respondents among the Lugbara (Arua district) reported that no one monitors the conservation, management and harvesting rules on the Shea tree. In comparison, about 70% of the respondents among the Alur (Nebbi district) were aware of the people responsible for monitoring the rules governing the Shea tree. The chiefs were the most important in actual monitoring the rules among the Alur (17%) followed by the local councils and elders (7.5%) each and youth vigilante groups (7%). Among the Lugbara, it was only village local councils (11.5%), elders (6.5%) and youth vigilantes (1.5%), who were actively involved in monitoring the rules. During the focus group discussions, it was reported that the frequency of monitoring was generally low. The lowest frequency was however reported among the Lugbara community of Arua district. For instance, one of the Lugbara youth in Alivu village, Pajuru parish, Arivu Sub County in Arua district, involved in monitoring said, *'I monitor Shea trees once after six months because I am not motivated al at all to do the work*.' On the other hand, one of the Alur chiefs in Pajukwi village, Kalowang parish Nebbi Sub County in Nebbi district who is involved in monitoring said, '*I monitor*

Table 2
Rules governing conservation, management and harvesting of the Shea trees (n=200)

Rules	Arua (Lugbara)		Nebbi (Alur)		Overall %	Average response/ category
	Freq	%	Freq	%		
Conservation						
No cutting down of a fruiting shea butter tree	99	45	99	45	99	46
No setting fire on a shea parkland	14	7	26	13	20	
Preserve shea seedlings and saplings while clearing land for agriculture	14	7	24	12	19	
Management						
Prune only shea trees on cultivated land and not those in natural stands	26	13	27	13.5	26.5	20.5
Dry branches on the tree can be cut for firewood	12	6	17	8.5	14.5	
Harvesting						
Do not climb to pick shea fruits up the tree	24	12	41	20.5	32.5	24.8
No shaking the branches of a shea butter tree to pick its fruits	8	4	26	13	17	

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once every month because once I get an offender, I always get paid from part of the fine.'

The forms of incentives for monitors included; allocating part of the fines used as a sanction on infractions which could be in form of cash or domestic animals (14.5%) and special recognition of monitors during social functions by the paramount chief, elders and local government officials (6%). Motivation of monitors was generally at the discretion of the King (Rwoth), elders and the local government officials of the two communities.

Penalties and sanctions for infractions

Violating conservation rules always carried severe punishment including cash and animal fines, curses, indefinite suspension from the community and corporal punishment. For violation of harvesting and management rules, the type of penalty or sanction given were the same in both communities and was dependent on the number of times the offender was considered to have broken the rules and the magnitude of the offence. About 83% of the respondents reported that first time offenders who broke management and harvesting rules were given a verbal warning and were cautioned not to repeat the offence. Other penalties such as those for repeat offenders included cash fine (73%), corporal punishment (10%), cattle fine (29%) and curses (52%) that only applied to Alur community. The rest are as shown in (Figure 3).

Level of compliance to rules governing Shea tree in Arua (Lugbara) and Nebbi (Alur) districts

The level of compliance with the rules varied among the two shea communities. Over 90% of the respondents among the Alur community reported that majority of the population comply with the conservation, management and harvesting rules.

In contrast, 76.67% among the Lugbara community in Arua reported that none or very few people comply with the rules (Table 4). The differences in level of compliance among the two ethnic groups were significantly different (Cramer's V = 0.790, p< 0.001).

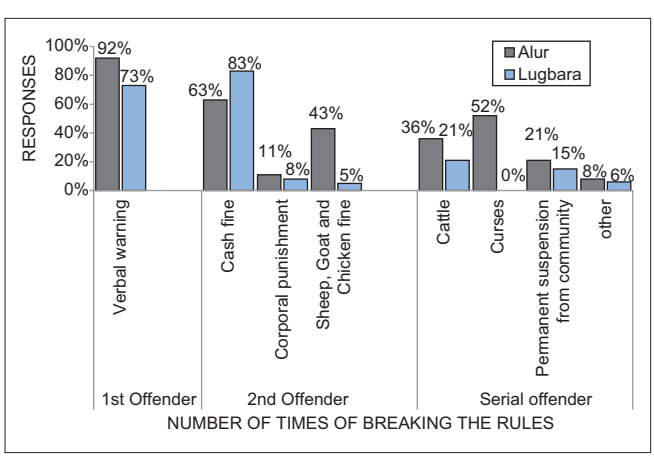

Figure 3
Penalties and sanctions for infractions page

Factors influencing level of rule enforcement among shea parkland communities of Arua and Nebbi districts

A multinomial logit model was run to establish factors that influenced monitoring, sanctioning and rule enforcement among the two district with distinct ethnic groups studied. The levels of enforcement were, 'monitoring,' 'sanctioning,' 'full enforcement' (i.e monitoring and sanctioning) and 'no enforcement.' The practice with the highest frequency in the choice set was taken as the base category. In all cases "no enforcement" had the highest frequency and was therefore the base category (Table 5).

Involvement in rule crafting, clarity of resource boundary, age and ethnicity of the respondents significantly influenced the various levels of rule enforcement process in Arua and Nebbi districts. Sex had no significant influence on any of the levels of rule enforcement process.

Interpretation

At $p < 0.05$

a) The probability of a respondent mentioning that they participate in full rule enforcement (monitoring, sanctioning and monitoring and sanctioning) increased with involvement of the respondent in crafting the rules regarding management of the Shea tree. Generally, the more the involvement in rule crafting process, the more likely a person would participate in full enforcement process.
b) The probability of respondents participating in monitoring rule breakers reduced with increase in age ($p = 0.013$) while their ability to sanction increased with increase in age ($p = 0.004$). This means young people were more likely to be involved in monitoring while older people were more involved in sanctioning
c) The probability to carry out sanctioning and full rule enforcement depended on the education level of respondents. The higher the education level of the

Table 3
Monitoring of rules in Arua (Lugbara) and Nebbi (Alur) districts (n=176)

Response	Arua (Lugbara) %	9 (Alur) %	Cramer's V
Chiefs	0.00	17.0	
No one	25.0	6.00	
Local Council members	11.5	7.50	0.562
Elders	6.50	7.50	
Youth vigilante group	1.50	7.00	
I don't know	6.50	5.00	

Table 4
Level of compliance with the rules (n=188)

Response	Alur %	Lugbara %	Cramer's V
Most users	35.71	15.55	
About half users	15.31	07.78	
All users	45.92	00.00	0.790
Few users	03.06	60.00	
No one	00.00	16.67	

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Table 5
Statistical test for factors influencing level of rule enforcement

Dependent / Independent	Monitoring		Sanctioning		Full enforcement	
	B	***P***	***B***	***P***	***B***	***P***
Ethnicity	0.714	0.107	-0.534	0.160	-0.716*	0.020
Sex	-0.108	0.880	0.093	0.894	0.537	0.351
Age	-1.304*	0.013	1.720*	0.004	0.107	0.779
Education level	0.651	0.343	1.182*	0.019	1.177*	0.011
Clarity of boundary	2.472*	0.004	1.509*	0.045	0.816	0.219
Involvement in rule crafting	2.153*	0.007	1.916*	0.016	2.011*	0.004

*Significant at 5%

respondents, the higher the probability of being involved in sanctioning and full rule enforcement.

d) The probability of respondents to monitor and sanction offenders increased with clarity of the resource boundary (p=0.004 and p=0.045 respectively) that is where access rights were clear. This means the clearer the resource boundary, the higher the probability of monitoring and sanctioning.

e) The probability of full rule enforcement was dependent on the ethnicity of the communities. The Alur who had a paramount chief and strong social fabric were more likely to participate in full enforcement than the Lugbara who did not have a paramount chief.

DISCUSSION

Rules governing the use and management of the Shea tree

The study showed that there were several rules governing use and management of the Shea tree among the communities of Arua (Lugbara) and Nebbi (Alur) districts. Most of the rules identified have been reported elsewhere by other authors (Okiror et al. 2012; Gwali et al. 2011; Bayala et al. 2006; Ferris et al. 2004; Traore et al. 2002). The rules were treated as statutory or traditional depending on their source but principally they were the same in the two communities. The Alur community was more knowledgeable about the rules than the Lugbara community. The popularity of the rules among the Alur community could be attributed to better enforcement and deterrent penalties on any infractions. These were significantly lacking among the Lugbara community. For instance, among the Alur ethnic group, some respondents claimed that any person found cutting the Shea tree would be cursed to death by the paramount chief. This was confirmed by all the chiefs interviewed and the paramount chief himself. Mowo et al. (2016) note that such strict enforcement and harsh penalties imposed on rule breakers, increases peoples' awareness on the rules. This is because the sanctions threaten a would-be injurer with a penalty and dose of societal condemnation.

None of the rules mentioned were directed to planting of Shea trees instead the focus is on conservation, management and harvesting of the Shea trees. The study however showed that the communities have regulatory measures that encourage stewardship of natural regeneration of this tree species notably preserving shea seedlings and saplings while clearing land for agriculture. This therefore suggests that the local regulatory environment is suitable for restoration of degraded Shea tree landscapes through natural regeneration. A supportive regulatory regime is important for natural regeneration in tropical landscapes (Chazdon and Guariguata 2016).

The most reported rule among the two shea parkland communities of Arua and Nebbi districts was prohibition of cutting of any fruiting Shea tree. Almost all the respondents expressed knowledge of this rule. This further shows the convergence between formal and informal rules governing the Shea tree. It was observed that even before the Shea tree was declared a reserved tree species in 2016, local customary law prohibited its cutting. This is why this rule was being enforced by both traditional and government authorities. The Shea tree has many socio-cultural uses such as being used in the making of funeral beds, pregnancies, births, weddings and war rituals (Gwali et al. 2011; Sturges 2008). Additionally, the tree provides not only an important support for sustainable rural development but also a way for livelihood support and maintaining livelihood security for rural people (Adedokun et al. 2016). Since the tree directly contributes to the livelihoods of rural people, cutting it was considered immoral and wrong by the community, thus, community members and leaders were determined to prevent it. This could explain why the conservation rule on cutting a fruiting Shea tree was very important and easily recognised among the two shea communities of Arua and Nebbi districts despite having different socio-economic and historical trajectories. A similar trend was observed by Jamala et al. (2013) in Nigeria among the communities living in the Shea belt. This therefore suggests that informal institutions where prohibition is applied are shaped by the value the community attaches to the tree resource. The findings are in agreement with Virtanen (2002) who contends that some species are protected for their utilitarian value, such as medicinal plants, fruit trees, and those species, which are believed to provide environmental services.

Most rules governing Shea trees in Nebbi district were made by cultural leaders who were under the leadership of the paramount chief. Like in other cultures, the tree is highly valued in the Kingdom for performing traditional rituals like cleansing (Carette et al. 2009; Ferris et al. 2004). Besides it provides goods and services for the people in the area. As such, the traditional authority has interest in its sustainable utilisation to secure the socio-cultural heritage of this area that

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is associated with the tree. A similar scenario was reported by Ramadhani (2002) from Zimbabwe who found that the origin of most rules governing management of indigenous fruit trees was the elders in the area.

The rule crafting process is important in natural resource management because it has a direct bearing on the enforcement process and the condition of the resource (Ostrom 2007). Well-crafted rules that clearly spell out the dos and the donts can easily be understood and enforced; conversely poorly crafted rules become amorphous and nebulous for people to comply with (Skoog 2005). The process of local rule crafting among the shea parkland communities interviewed involved; holding meetings to identify resource (Shea tree) exploitation problems, suggesting solutions to the problems and translating some solutions into rules. This process concurs with (Skoog 2005), who noted a similar process in crafting new rules. During FGDs and key informant interviews, the respondents also explained that rules were sometimes directives from elders, chiefs and local council leaders. This finding is consistent with Hodgson (2002). It was however, noted that local community members, especially among the Lugbara community of Arua who constitute the main resource users were not actively involved in the rule crafting process. Other studies (Akpalu et al. 2009; Ostrom 2007) suggest that if resource users are not directly involved in the formulation of resource management rules, they may consider such rules illegitimate. As a result, such rules suffer from higher rates of violation, relative to rules formulated and enforced by resource users themselves.

Rule enforcement

Enforcement is the process whereby all actors who are subject to a standard or legal requirement carry out their obligations effectively (Mvondo 2009). It is critical for sustainable management of natural resources because it ensures that community members do not appropriate resource units beyond sustainable levels (Banana et al. 2001). The level of rule enforcement varied among the two shea parkland communities interviewed. It comprised monitoring and sanctioning of rule breakers.

Monitoring as a rule enforcement component is done to ensure that community members adhere to the set rules (Gibson et al. 2005). Without monitoring, rule enforcement becomes difficult because sanctioning entirely depends on monitoring. This therefore, implies that for effective rule enforcement, regular monitoring is very crucial. Monitoring among the shea parkland communities includes aspects such as ensuring rule compliance, dealing with infraction, and guarding/patrolling the resource area from outsiders (Budzinski 2003). In the current study, it was mostly done by the Local council officials among the Lugbara community and the traditional chiefs among the Alur. Although there were monitors in both Alur and Lugbara communities, the level of monitoring was overall low. The weak monitoring of the rules was mostly as a result of organisational challenges in the community. One reason was the inadequate pay of the monitors that demotivated them. Besides, the monitors lived in the communities that they were supposed to regulate. Studies elsewhere (Heltberg 2001) have suggested that this can potentially compromise monitors because of the social ties that they have to protect in order to fit in the communities. It was evident that resource users were not involved in monitoring yet it is expected that they would find it critical since sustainability of the Shea tree is important in their livelihoods. This challenges the commonly held notion that existence of a right to harvest some portion of the resource is an important determinant for the participation of local communities in monitoring (Coleman et al. 2009). This is probably because the benefits from the use of the Shea tree is not significant to incentivise local communities to participate in monitoring which is currently done on voluntary terms.

Sanctions in rule enforcement are important because they induce people to follow the rules (Colding et al. 2003). This is achieved by making the undesired behaviour less attractive and risky for whosoever wants to engage in it (Mulder et al. 2008). Failure to sanction rule violators encourages further rule violations or promotes resentment among users against existing institutions. As such, this may undermine the legitimacy of the set rules. The Local Council officials and the chiefs did most of the sanctioning among the Lugbara and Alur communities, respectively.

The sanctions to impose on rule breakers depended on; the severity and nature of the offence, and the attitude that the rule-breaker displays towards the authority. Some of them included; verbal warnings, imposing animal or cash fines, corporal punishments and stripping offenders of use rights. In some extreme cases, curses were pronounced on those that were involved in any infractions especially among the Alur community while for Lugbara the offenders would be indefinitely suspended from the community or jailed. Such harsh penalty levied on the offenders is a testimony that the Shea tree is highly valued and venerated among the parkland communities (Atalla 2015).

Compliance to rules

Compliance to rules is important for effective functioning of an institution (Gibson et al. 2005). A comparison of level of compliance with the rules between Alur and Lugbara showed that the Alur community complied more with the rules than the Lugbara community (Table 4). The relatively high compliance among the Alur community could be attributed to their high level of organisation at a local level through their traditional Kingdom with the King (Rwoth) at the top with Chiefs that support him to enforce rules on the Shea tree at village level. The local people in the Kingdom especially in the villages still respected the authority of the King. As such, whatever rules came from the King were treated with due respect. The chiefs had full power to enforce rules that were passed by the King. Since the Shea tree was highly valued in the Kingdom, most of the rules governing its management originated from the King. Consequently, to ensure compliance to the rules, sanctions imposed on offenders were strictly and effectively

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enforced. Ghate and Nagendra (2005) noted that such strict enforcement of sanctions prevents the spread of free-riding behaviour, thereby instilling a sense of trust in the community, thus promoting compliance. It was however, noted that among the Alur people where allegiance to the King was low, especially around the town and villages bordering Arua district (which does not have a King) compliance with the rules was relatively poor. This suggests that traditional institutions are difficult to enforce in urban areas because of their cosmopolitan nature. Urban areas and their surroundings tend to attract immigrants who increase socio-cultural heterogeneity, which in turn reduces the propensity to collective action (Poteete and Ostrom 2004). This has also been reported in Ghana, where exposure to foreign culture and practices reduced compliance on traditional institutions such as taboos that are critical in ensuring sustainable resource use (Osei-Tutu 2017).

In Arua district which is the cradle of the Lugbara people, compliance to rules was very low. In such cases, Ostrom (2007) noted that individuals act independently without minding much about their actions and this can result in an unsustainable exploitation of natural resources. Besides, crafting of most rules governing management of the Shea tree in Arua district were spear headed by Local Council members who had delegated authority from central government. The resource users most likely, treated the rules as illegitimate since they were not involved in the crafting process. Studies by Mowo et al. (2016) showed that enforcement of bylaws relevant to natural resource management in eastern Africa was weak due to limited community participation in their formulation. In such circumstances McKean, (2000) notes that non-compliance to the rules is eminent. There is therefore need to harness from the legitimacy and veneration of the traditional institutions in promoting compliance to rules relevant for the conservation of important tree species such as the Shea tree.

Factors that influence levels of rule enforcement among shea parkland communities

Age of the respondents had a negative significant influence on monitoring at ($p<0.05$) and a positive significant influence on sanctioning. This is because since monitoring entails moving within the community and around the resource boundary, it requires some minimum physical strength. Therefore, as people get older, their physical energy and strength reduces due to various physiological changes that come with aging, hence their ability to move within the community and around the resource boundary also reduces. This could explain why ability to monitor decreased with increase in age. The finding is consistent with Velez and Lopez (2013) who noted that the tendency of people to monitor compliance to rules reduces with increase in age. Younger people are more involved in monitoring than older people because they are more agile than older one. On the other hand, older people do more sanctioning than younger people. The reason is that sanctioning requires individuals that command respect in society either through statutory instruments or traditional authority. The older people within a community are usually the elders with the locus of authority to sanction any rule infractions in most African communities (Mowo et al. 2011).

The ability of respondents to sanction and fully enforce the rules governing the Shea tree increased with increase in their education level. This is a cue that those involved in enforcement were mainly the educated; this trend was more observed in Nebbi than Arua. The educated peoples' ability to enforce rules could be attributed to the high respect accorded to them in the community and their better comprehension of the rules (Aidan et al. 2011).

The enforcement components of monitoring and sanctioning increased with increase in clarity of physical resource boundary (which was defined by village boundaries). Respondents were more likely to be involved in monitoring and sanctioning on trees within their village than those located elsewhere. Clarity of resource boundary influences the certainty that individuals in a group will have over the benefits and also the costs they expect to face when considering an institutional solution to a common's dilemma (National Research Council 2002). Dietz et al. (2003), further expounded that very well-defined boundaries reduce uncertainty and promote a collective solution while very poorly defined boundaries increase uncertainty and thus retard efforts to find or sustain a collective solution. Similar observations were made by Agrawal and Angelsen (2009) who posited that successful management of forest resources collectively requires clarity of physical boundaries. Among the Lugbara community village boundaries were less clear than in Alur community. This coupled with weaker traditional structures and limited involvement in rule crafting could explain why compliance was low among the community.

Ethnicity of the respondents had a significant influence on full rule enforcement which involved monitoring and sanctioning at ($p<0.05$). This is because communities with high levels of social organisation and cohesion such as the Alur find it easier to sustain regular monitoring of rule conformance needed for long-term sustainability of the resource (Gibson et al. 2005). Besides they enjoy the tradition of rulemaking and the members are used to following rules that emanate from their leaders (Ostrom 1990). But in ethnic groups like the Lugbara where no internal organisations exist to unite the members, rule enforcement is difficult. Members from such ethnicity often have no respect for the rules.

Although sex did not have any significant influence on rule enforcement, it was found during focus group discussions that women play some important role in rule enforcement as monitors.

The monitoring is not deliberately done but when women go to the shea parkland for other purposes like collecting dry shea branches for firewood or pick shea fruits, any illegal activity, they find they report to relevant authorities because of the value they attach to the tree. This positively contributes to rule enforcement because monitoring constitutes the most important aspect of rule enforcement on which sanctioning depends (McKean 2000). This finding is supported by Greig (2006) who reported that women in the process of collecting shea fruits in Benin usually report any rule infractions they

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encounter to leaders. In so doing they help improve compliance on rules governing the Shea tree.

CONCLUSION

Rules concerning conservation, management and use of the Shea trees in northern Uganda are documented in this study. The rules are mostly crafted by the chiefs among the Alur in Nebbi district and the Local council members at district and sub county levels among the Lugbara community in Arua district respectively. Monitoring of the rules is mostly done by the groups that crafted the rules. Rule enforcement is better in communities with a hierarchical traditional governance system with a paramount chief and chiefs than those without. The informal rules crafted by chiefs among the Alur in Nebbi district are better enforced than the formal rules crafted by Local council members at various levels among the Lugbara community in Arua district thus debunking the common narrative among mainstream conservationists that local people do not have the capacity to manage their natural resources. The findings confirm that informal institutions are relevant in the conservation of Shea trees because good rule enforcement results in better compliance which subsequently can lead to sustainable use of tree resources like the Shea tree. This can be through using locally agreed sanctions as shown in the current study. There is therefore need to consider inclusion of traditional rules in the broader conservation strategy of tree species. This is because communities where they are in force tend to be more compliant to conservation than where they do not exist as demonstrated in this study. Formal rules were less enforced suggesting that there were underlying reasons that lead to poor compliance.

Participation in rule crafting is a necessary condition for ensuring sustainable management and conservation of Shea tree resources. Therefore, local and central governments need to encourage it and provide incentives to local authorities (paramount chief, chiefs and elders) so that they increase the level of monitoring and to sanction opportunistic behaviour. This good collaboration between formal and informal institutions will ensure more sustainable resource management and could facilitate the inclusion of traditional rules in government regulatory frameworks on Shea tree and other natural resources in Uganda.

Participation in rule enforcement (monitoring, sanctioning and full enforcement) in Shea tree conservation, management and use was significantly influenced by; ethnicity, age, education level, involvement in rule crafting and clarity of resource boundary. This confirms that participation in enforcement of rules governing common pool resources like the Shea tree may be influenced by various socio-economic, biophysical, political and historical factors that ought to be explored.

ACKNOWLEDGEMENTS

We are grateful for the financial support by the Agricultural Technology Agribusiness and Advisory Services Project, funded by the International Development Agency and ForLand project. We appreciate the shea parkland communities of Arua and Nebbi districts for their cooperation during data collection. Valuable suggestions made by anonymous referees are greatly acknowledged.

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Received: 15-Nov-2019**; Revised:** 08-Jul-2020**; Accepted:** 09-Jul-2020**; Published:** 09-Dec-2020

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