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Forest resource endogenous cultural institutions in rural Cameroon: compliance determinants and policy implications

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Scholarly and policy interest on endogenous cultural institutions (ECIs) in sub-Saharan Africa (SSA) is gaining traction, albeit with a lack of robust empirical evidence on compliance determinants. This article contributes in this regard, by drawing from a sample of 200 forest dependent households in the Santchou Landscape of Cameroon, complemented by key informant interviews ($N=17$) and focus group discussions ($N=11$). Using the ordinary least square and the logit model, we (i) analyze forest use practices shaped by ECIs, (ii) assess forest based ECIs compliance determinants, and (iii) estimate the effect of compliance determinants on forest based ECIs. We find that while norms and customs shape the harvesting of wood based and vegetal based NTFPs, they are less likely to shape the exploitation of seed based NTFPs. Second, demographic and economic factors override socio-political determinants of ECIs. Third, elites are less likely to affect forest based ECI compliance. Policy should leverage culturally sensitive ECIs in regulating forest resource use.

Keywords: norms; determinants; compliance; institutional change; NTFPs; Cameroon

1. Introduction

The role of institutions in shaping the access, use and management of natural resources in sub-Saharan Africa (SSA) spans precolonial, colonial and post-colonial phases – each of these phases having their strengths and shortcomings linked to the outcomes they produce (Kimengsi and Balgah 2017; Kimengsi and Balgah 2021). Institutions that shaped natural resource use could be classified as informal (uncodified rules which transcend generations) and formal ones (codified rules which are sanctioned by the state through law enforcement) (Osei-Tutu, Pregernig, and Pokorny 2015; Yeboah-Assiamah, Muller, and Domfeh 2019). Furthermore, they are equally classified as endogenous (largely derived from within communities – with stark differences per community) and exogenous, largely formal and emanating from the state (Osei-Tutu, Pregernig, and Pokorny 2015; Osei-Tutu 2017; Yeboah-Assiamah, Muller, and Domfeh 2017; Kimengsi, Abam, and Forje 2021a). It is established that in exogenous institutions, largely formal rules have dominated the natural resource landscape – with the virtual neglect of endogenous, largely informal rules (Buchenrieder and Balgah 2013; Kimengsi and Balgah 2017). The balance sheet is telling: while exogenous

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institutions dominate the landscape, they have seemingly succeeded in creating several protected areas which are largely inefficiently monitored. In addition, existing endogenous institutions tend to countervail exogenous ones, creating a natural resource management conundrum in SSA (Kimengsi and Balgah 2021). The failure to institute a jelled institutional arrangement to promote efficiency in natural resource management (Kimengsi *et al.* 2022) has contributed to the breakdown or weakening of well working endogenous cultural institutions. For instance, the Kgotla system of the Batswana people and the royal hunting preserves of the amaZulu and amaSwati people all bear eloquent testimony to the role played by endogenous institutions in shaping natural resource management (Ghai 1992; Fabricius 2004). As most of these institutions have been subjected to a breakdown emanating from demographic pressure, market forces and the fallouts of globalization (Chabwela and Haller 2010; Ensminger 1997; Haller, Acciaioli, and Rist 2016), there is renewed interest today in inventorizing the last vestiges of endogenous cultural institutions. In other words, studies that seek to understand what is left of endogenous institutions are increasingly gaining ground today, especially as exogenous, formal and state-driven institutions have seemingly been unable to deliver efficient natural resource management outcomes.

Endogenous cultural institutions (ECIs) are informal rules that are developed within communities and transferred from one generation to the other, through norms, values, beliefs and taboos (Colding, Folke, and Thomas 2003). On the other hand, exogenous institutions relate to the formal rules emanating from the state which are codified through law, policies and regulations. They are exogenous to communities. It should, however, be noted that endogeneity is not completely analogous to informality – as formal rules of a country are endogenous vis-a-vis formal regulations which emanate from international and regional processes (exogenous).

ECIs vary depending on the milieu in question, across SSA (Kimengsi *et al.* 2022). They are, however, broadly grouped under customs, norms, beliefs, values, traditions, and taboos. For instance, beliefs about sacred forests are common across SSA. Furthermore, the rain-making traditional practice – Mbona in parts of Southern Africa, is an example of tradition (Nyirenda 2020). In this article, ECIs are construed to include traditional (informal rules) such as norms, beliefs, customs, taboos and values. Besides household socioeconomic characteristics which determine institutional compliance, other parameters such as political (dominance of state rules, political leanings, elite phenomenon, alliances between traditional and state actors, and leadership influence among others), social (education, communication/social media, modernization, health issues, changing consumption patterns among others), demographic (youthful population, population growth, migration influence, changing youth preferences, changing age structure, gender campaigns) and economic factors (search for income, monetization of fines, price increases, and growing market access) have either singly or in combination affected institutional compliance (Coulibaly-Lingani *et al.* 2009; Tesfaye *et al.* 2012; Kimengsi *et al.* 2019a).

With the significant cultural diversity in SSA, emphasis in this case is largely on endogenous cultural institutions. Cameroon is a classic example – with over 250 ethnic groups (Yenshu 2011). With such ethnic diversity, Cameroon registers an ethnic fractionalization¹ score of 0.89, far above the SSA average of 0.71 (Fearon 2003). Besides the cultural diversity, Cameroon has over 30 protected areas which have come under the influence of both exogenous and endogenous institutions. This is particularly true for rapidly transforming landscapes which are characterized by significant cultural

diversity. So far, studies have explored institutional bricolage dynamics around the Santchou Landscape (Kimengsi and Balgah 2021), including the analysis of the spatio-temporal variations in ECIs (Kimengsi, Abam, and Forje 2021a). These studies all point to the need for evidence establishing the determinants of compliance to ECIs in the Santchou Landscape – a rapidly transforming landscape which equally serves as a cultural melting pot. As Cameroon is currently in the process of revising her forest policy, it is only germane that context-specific evidence on the efficacy of ECIs is provided to avail decision makers with the information which could guide the leveraging of existing ECIs in the policy revision process. Against this background, this article seeks to (i) explore forest use practices shaped by ECIs, (ii) assess the determinants of compliance with forest-based ECIs, and (iii) estimate the effect of compliance determinants on forest-based endogenous cultural institutions and their policy implications. The focus of the article on ECIs is justified on the following counts: (a) previous studies and policy emphasis have prioritized exogenous institutions while neglecting endogenous ones (Zenger, Lazzarini, and Poppo 2001; Kimengsi and Balgah 2017); (b) ECIs are rapidly transforming (Ensminger 1992, Cleaver 2002, 2012; Haller, Acciaioli, and Rist 2016, Haller, Belsky, and Rist 2018; Wartmann, Haller, and Backhaus 2016), requiring studies to establish what is left of them; (c) robust analysis on the effectiveness of the last vestiges of ECIs are lacking in diverse cultural settings of SSA – including Cameroon. Specifically, this article seeks to provide answers to the following questions: *What are the forest use practices shaped by ECIs in the Santchou landscape of Cameroon? What determines compliance with forest-based ECIs? How can the effects of forest-based ECI compliance determinants be estimated in the Santchou Landscape of Cameroon?* The novelty of this article centers on the fact that previous studies have analyzed the compliance of exogenous (formal) institutions while paying little attention to what shapes the compliance of endogenous cultural institutions. Its novelty is further reflected in its ability to employ robust mixed-methods approaches in analyzing the dynamics around endogenous cultural institutions. The results provide fresh insights to further advance theoretical perspectives in natural resource management institutions with emphasis on their compliance. From a practical perspective, it provides a useful lens to advance the forest policy revision process of Cameroon, drawing from a social learning perspective.

2. Materials and methods

2.1. Study site

Of Cameroon's over 30 protected areas, the Santchou Landscape is unique in that it harbors the rare species of the dwarf elephant (*Loxodontapumilio*). It is not possible to explain the ECIs of this landscape without alluding to their belief in totems – the elephants. In fact, the name Satchou actually denotes *San Nzou* (meaning father of elephants). The Santchou landscape forms part of the Menoua Division. It is located between latitude 5°18'0" North and 9°54'0" East (Figure 1). The reserve is an outcrop of French colonial rule in 1947. During this period and as part of the French policy of direct rule, natural reforestation, reforestation and the protection of biodiversity was prioritized. To enforce this, a more centralized direct rule provision was instituted – starkly opposing the existing ECIs. Still within the ambit of the centralized largely exogenous rule, the area was renamed a wildlife reserve in 1986 (Kimengsi and Balgah 2021). The Santchou Landscape which is located in the French speaking region

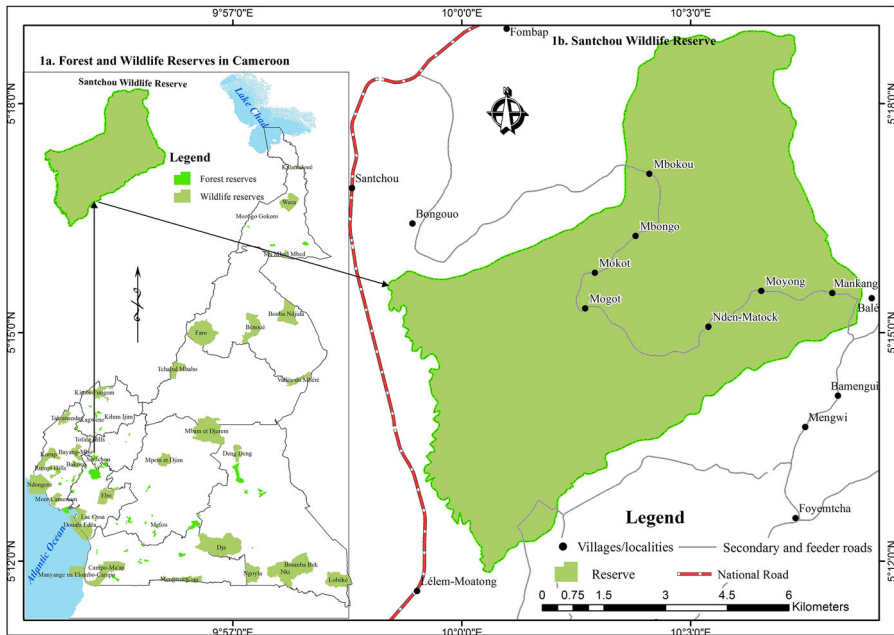


Figure 1. Map of the Santchou Landscape.

of Cameroon is the original home of the Mbo of the sawa tribes (Mbeng and Buba 2017). The landscape is found in the Santchou Sub-Division which has a population of 46,249 inhabitants, covering over 60 villages (PDC 2009 and BUCREP 2005).

Today, the original settlers have witnessed a surge in the number of in-migrants from other parts of the country – making the area a cultural melting pot. This new dynamic further validates the need to analyze the state of ECI compliance and their determining factors. Officially, the Santchou Landscape is managed by Cameroon’s Ministry of Forestry and Wildlife (MINFOF). This formal entity and the rules thereof, continually interact with the ECIs (beliefs and customs), explaining potential variations in the level of compliance to forest-related ECIs. Apart from timber, some of the non-timber forest products (NTFPs) extracted here include *Piper guineensis* (bush pepper), *Piper nigrum* (Penja pepper) *Cola nitida* (cola nut), *Irvingia gabonensis* (bush mango) *Rocinodendron heudelottii* (njansang), *Garcinia mannii* (chewing stick), *Garcinia cola* (bitter cola), *fuel wood* and *Megaphrynium macrostachyum* (ngongo leaf).

2.2. Data collection

This article is a product of ongoing multidisciplinary research on “Past customs, current law: Analyzing the Effects of Endogenous and Exogenous Institutions on Sustainable Forest Management in Cameroon” under the CAMFORST Project. The project seeks to analyze conditions under which endogenous cultural and exogenous institutions shape forest management and conservation in Cameroon (for details, please see: <https://tu-dresden.de/forst/camforst>). Earlier studies assessed the spatio-temporal distribution of the last vestiges of ECIs (Kimengsi, Abam, and Forje 2021a), and the manifestations of institutional bricolage in this Landscape (see Kimengsi and Balgah 2021). These studies reported on the need to effectively establish the determinants of

Table 1. Target villages and their HHs sizes in Santchou.

Targeted villages	Total no. of HHs	Sampled HHs
Mokot	102	50
Mboukou	55	50
Mankang	105	50
Bale	150	50
Total	412	200

ECI compliance using mixed-methods approaches. Data was obtained in the following phases. Phase one ran from July to August 2020 in which preliminary field visits were made to the study site, to appraise the in-reserve and out-reserve villages. This led to the selection of four villages to include Mbokou Mokot, and Mankang (in-reserve) and Bale (out-reserve). Preliminary data on the key forest resources, and the nature of forest-linked ECIs were obtained, using key informant interviews ($N=5$) and focus group discussions ($N=2$). Phase two of data collection ran from March to April 2021. Prior to this, a structured questionnaire (60 main items) was developed. The questionnaire captured questions linked to the socio-demographic characteristics of respondents. Subsequent sections of this instrument captured questions focusing on forest resources and use practices, the characterization of ECIs as structures (e.g. traditional council) and processes (e.g. taboos). In addition, this segment of the questionnaire captured questions on the source of the different forms of institutions.

The third segment was designed to capture questions on the evolution of forest-based ECIs, while the fourth section dwelt on the effectiveness and determinants of institutional compliance. A pretest was performed with the structured questionnaire involving 10 households in the village of Ngang and Mogot. The main outcome of the pretest was the fact that a number of questions which were not well framed in the structured questionnaire, were further rephrased to enhance comprehension by the respondents. After the pretest, the questions were then introduced into the Kobo Tool programme and tablets were used during the surveys. The survey involved a simple random sampling of households in the four villages. This method was preferred to enhance generalization, since the study involved a significant number of villages and population. To assure that every household was given a chance to be selected, we numbered each household – this was easy as the settlements were linear in nature. We then wrote down the household numbers on pieces of paper and repeatedly selected numbers through raffle draws. The numbers that were randomly selected guided the data collection team to locate the corresponding household and administer the questionnaire. To facilitate data collection, two research assistants with good knowledge of the French language were recruited and trained to support data collection. In all, a total of 200 households were sampled (Table 1). Data collection using this instrument lasted between 60 and 90 minutes.

In addition to this dataset, the initially developed key informant interview (KII) guide was revised to incorporate the questions that explain the changes in forest-linked institutions and institutional compliance. This raised the number of questions to 12. We equally developed a guide for focus group discussion (FGD) containing 8 items. Field notes were used to record the data from KIIs and FGDs. Qualitative data followed the data saturation principle (Saunders *et al.* 2018); in total, we conducted 11 FGDs and 17 KIIs. The interviews and FGDs lasted between 45 and 70 minutes.

While ECIs are construed as structures (e.g. secret societies and traditional councils) and processes (e.g. values, beliefs and customs), in this study, we focus on the process dimension of ECIs. In the Santchou Landscape, some of these include beliefs, customs and taboos. We therefore identify the relevant ECIs linked to forest use practices and analyze their compliance determinants. We equally acknowledge the determinants of institutional compliance are shaped by household socioeconomic characteristics including age, gender, education, migration, household income, and main occupation (Table 2), including societal parameters such as political (dominance of state rules, political leanings, elite phenomenon, alliances between traditional and state actors, and leadership influence among others), social (education, communication/social media, modernization, health issues, changing consumption patterns among others), demographic (youthful population, population growth, migration influence, changing youth preferences, changing age structure, gender campaigns) and economic factors (search for income, monetization of fines, price increases, and growing market access).

2.3. Empirical strategy

The empirical analysis focuses on estimating the effect of compliance determinants on forest-based endogenous cultural institutions in the Santchou Landscape. Descriptive statistics were used to explore forest-use practices shaped by ECIs, and to analyze factors influencing compliance with forest-based ECI processes. The ordinary least square (OLS) estimation technique and the logit model were used to estimate the extent to which compliance determinants affect forest-based ECIs in the Santchou Landscape. The econometric model for this relationship is specified as:

$$ECI = \beta_0 + \beta_1 CD + \beta_2 X + \varepsilon_i \quad (1)$$

where ECI is a composite score measuring changes in forest-based endogenous cultural institutions (for the OLS model) and a binary outcome for each traditional rule (for the logit model), CD represents the different groups of compliance determinants, X is a vector of household characteristics and β_i are vectors of parameter estimates. The ECI composite index (score) is constructed using the Min-Max rescaling transformation procedure and is based on traditional rules and processes such as norms, customs, beliefs, taboos and values. The Min-Max rescaling transformation is a method in which each variable is decomposed into an identical range between zero and one, with a score of 0 being the worst rank for a specific indicator and a score of 1 being the best. In this article, the score is zero if there are no observed changes in forest-based endogenous cultural institutions and one if there are any changes in these ECIs. All other values are then scaled between the minimum and maximum values. According to Yoon (2012) the scaling procedure ultimately subtracts the minimum value (X_{min}) and divides by the observed difference between the maximum value (X_{max}) and the minimum value (X_{min}), as illustrated below:

$$C_i = \frac{X_i - X_{min}}{X_{max} - X_{min}} \quad (2)$$

With this approach, differentially-scaled indicators can be standardized into indices. The traditional rules used in constructing a forest-based endogenous cultural institutional index are presented in Table 2. This approach has been used by several scholars

Table 2. Variables used in the analysis.

Variables	Description
Gender	1: if respondent is male and 0: otherwise
Age	Age of household head in years
Education	Education of respondent is categorized into no formal education; primary; secondary and tertiary education.
Household income	Household average monthly income (in CFA)
Main occupation	1: if respondent's main occupation is non farming and 0: otherwise
Migration status	1: if household is a migrant and 0: otherwise
Endogenous cultural institutions (ECIs)	1: if ECI is a norm and 0: otherwise
	1: if ECI is a custom and 0: otherwise
	1: if ECI is a belief and 0: otherwise
	1: if ECI is a taboo and 0: otherwise
	1: if ECI is a value and 0: otherwise
Forest use practices	Wood based NTFPs (fuel wood and chewing stick)
	Vegetal based NTFPs (medicinal plant, ngongo leaf and eru)
	Seed based NTFP (bush pepper, penja pepper, kola nuts, bitter cola and njangsang)
	Other NTFPs (honey extraction, bush meat, snails, mushroom and others)
Determinants of Compliance	
Political	1: if dominance of state rules and 0: otherwise
	1: if political leanings and 0: otherwise
	1: if elite phenomenon and 0: otherwise
	1: if traditional and state actors alliance and 0: otherwise
	1: if leadership influence and 0: otherwise
Social	1: if education and 0: otherwise
	1: if communication/social media and 0: otherwise
	1: if modernization and 0: otherwise
	1: if health issues and 0: otherwise
	1: if changing consumption patterns and 0: otherwise
Demographic	1: if youthful population and 0: otherwise
	1: if population growth and 0: otherwise
	1: if migration influence and 0: otherwise
	1: if changing youth preferences and 0: otherwise
	1: if changing age structure and 0: otherwise
	1: if gender campaigns and 0: otherwise
Economic	1: if search for income and 0: otherwise
	1: if monetization of fines and 0: otherwise
	1: if price increases and 0: otherwise
	1: if growing market access and 0: otherwise

Norms included the acceptance of spiritually enforced sanctions (e.g. for encroaching into sacred sites). Customs: It is a custom not to kill elephants (totems). Also certain sites were preserved in the forest with people respecting the encroachment prohibitions.

Values: The respect for traditional days in which work (including forest-based activities) is prohibited. Beliefs: The elephant is seen as a totem which should be preserved. Taboos: Pregnant women do not eat animals (pangolins, rat moles and snakes).

including St. Bernard (2007) and Cutter, Burton, and Emrich (2010) to aggregate variables and create composite scores. It has also been employed by the UNDP (2014) to compute human development indices (HDIs). However, to free the traditional rules from assuming their initial measurement units, the indices generated were standardized

Table 3. Household socio demographic characteristics.

Variable	Obs	Mean	Std. Dev.
Age of household head	199	50.95	9.84
Household head is male	199	0.92	0.28
Household monthly income	199	34,561	34,120
Education of household head			
Completed primary education	200	0.62	0.49
At least secondary education	200	0.28	0.45
Main occupation is non farming	198	0.11	0.31
Household size	198	7.27	2.80
Household head is a migrant	199	0.20	0.40

and the standardized indices are between 0 and 1. There are five traditional rules used in computing the forest-based ECI index and thus, the standardization was obtained by calculating average values for the different traditional rules as follows:

$$ECI = \frac{\sum_{i=1}^n IndexA_i}{n} \quad (3)$$

where $IndexA_i$ are the traditional rules that make up the ECI index and n is the number of traditional rules (5 in our case). The range for the composite index was from 0 to 1 with high values denoting the higher prevalence rate of forest-based ECIs. The effect of compliance determinants on forest-based endogenous cultural institutions is estimated using the OLS regression, since the dependent variable is continuous. For robustness, we further estimate the effect of compliance determinants on the independent measures of ECIs using a logit model.

3. Results

3.1. Descriptive statistics on household socioeconomic characteristics

The results from the household socio-economic analysis (Table 3) indicate that 92% of the respondents are from male-headed households, and 20% of the household heads are migrants. The mean age of the household head is 51 years and as expected, most household heads had completed only primary education (62%). Farming is the main occupation of 89% of household heads. The average household size is 7 members and the average household income is CFA34,561. We can therefore infer from this analysis that household heads around the Santchou Landscape are predominantly male, with nearly one-quarter of the households constituting the migrant population.

3.2. Forest use practices shaped by endogenous cultural institutions

On the role of ECIs in shaping forest-use practices around the Santchou landscape (Table 4), it is observed that norms and customs are the main endogenous cultural institutions shaping the harvesting of fuel wood, followed by values and beliefs. The results suggest that over 64%, 61%, 46%, 44% and 35% of the respondents respectively cited norms, customs, values, beliefs and taboos as important ECIs shaping fuel wood exploitation. Endogenous cultural institutions do not significantly affect the harvesting of chewing stick as an NTFP. For example, only 22% of the respondents

Table 4. Endogenous cultural institutions and forest use practices.

Variable	Norms		Customs		Beliefs		Taboos		Values	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Wood-Based NTFP										
Fuel wood	0.64	0.48	0.61	0.49	0.44	0.50	0.35	0.48	0.46	0.50
Chewing stick	0.02	0.14	0.00	0.00	0.03	0.16	0.01	0.10	0.22	0.41
Vegetal Based NTFP										
Medicinal plant	0.51	0.50	0.57	0.50	0.69	0.46	0.31	0.46	0.60	0.49
Ngongo leaf	0.40	0.49	0.57	0.50	0.22	0.42	0.07	0.25	0.62	0.49
Eru	0.00	0.00	0.01	0.07	0.00	0.00	0.00	0.00	0.40	0.49
Seed-Based NTFP										
Bush pepper	0.10	0.30	0.25	0.44	0.18	0.38	0.01	0.10	0.09	0.28
Penja pepper	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.33
Njangsang	0.11	0.31	0.19	0.39	0.01	0.10	0.02	0.12	0.14	0.35
Bitter cola	0.24	0.43	0.53	0.50	0.20	0.40	0.02	0.14	0.24	0.43
Kola nuts	0.43	0.50	0.76	0.43	0.45	0.50	0.04	0.20	0.42	0.49
Other NTFP										
Honey extraction	0.10	0.30	0.23	0.42	0.07	0.25	0.01	0.10	0.26	0.44
Bush meat	0.48	0.50	0.59	0.49	0.83	0.38	0.95	0.22	0.31	0.46
Snails	0.03	0.16	0.03	0.16	0.00	0.00	0.01	0.07	0.62	0.49
Bush mango	0.01	0.07	0.03	0.16	0.01	0.10	0.00	0.00	0.01	0.10
Mushrooms	0.09	0.29	0.18	0.38	0.04	0.20	0.01	0.07	0.13	0.34
Others	0.12	0.33	0.19	0.39	0.06	0.23	0.10	0.30	0.03	0.17

reported values as the main ECI shaping chewing stick harvesting, while none cited the role of customs. Concerning vegetal based NTFPs, the different ECIs are essential in shaping the harvesting of medicinal plants and ngongo leaf, but not eru. The results indicate that beliefs, values, customs and norms are key in shaping the harvesting of medicinal plants. Specifically, over 69%, 60%, 57%, 51% and 31% of the respondents respectively cited beliefs, values, customs, norms, and taboos as important ECIs shaping the exploitation of medicinal plants. Values is the main ECI influencing the exploitation of ngongo leaf and eru. Interestingly, ECIs have no significant role in shaping the exploitation of seed-based NTFPs. For example, it is only in bitter cola and kola nuts that at least more than half of the respondents (53% and 76% respectively) cited customs as a key ECI in shaping their exploitation. Regarding other NTFPs, ECIs are very important in shaping the harvesting of bush meat. The results suggest that over 95%, 83%, 59%, 48% and 31% of the respondents respectively cited taboos, beliefs, customs, norms and values as important ECIs shaping bush meat harvesting.

3.3. Determinants of compliance with endogenous cultural institutions

The determinants of compliance with ECIs are further classified into political, social factors, demographic and economic factors (Table 5). Dominance of state rules, alliance between traditional and state actors and political leaning are key political factors that determine the level of compliance with ECIs. According to 88%, 49% and 45% of the sample, the dominance of state rules, the alliance between traditional and state actors and political leaning are respectively key political factors influencing

Table 5. Determinants of compliance with endogenous cultural institutions.

Variables	Obs	Mean	Std. Dev.
Political factors influencing compliance			
Dominance of state rules	199	0.88	0.33
Political leaning	199	0.45	0.50
Elite phenomenon	199	0.20	0.40
Alliance between traditional and state actors	199	0.49	0.50
Leadership influence	199	0.15	0.35
Others	199	0.01	0.07
Social factors influencing compliance			
Education	199	0.70	0.46
Communication/social media	199	0.54	0.50
Modernization	199	0.84	0.37
Changing consumption pattern	199	0.24	0.43
Health issues	199	0.21	0.41
Demographic factors influencing compliance			
Youthful population	198	0.37	0.49
Population growth	198	0.80	0.40
Migration influence	198	0.39	0.49
Changing youth preference	198	0.65	0.48
Changing age structure	198	0.40	0.49
Gender campaigns	198	0.06	0.24
Economic factors influencing compliance			
Search for income	198	1.00	0.00
Monetization of fines	198	0.30	0.46
Price increases	198	0.16	0.36
Growing market access	198	0.48	0.50

compliance with ECIs. Modernization, education and communication/social media are key social factors influencing compliance with endogenous cultural institutions. Specifically, 84%, 70% and 54% of respondents respectively cited modernization, education and social media as key social factors influencing compliance with ECIs. Concerning demographic factors, population growth, changing youth preference, changing age structure and migration are major factors influencing the level of compliance with ECIs. The results suggest that 80%, 65%, 40% and 39% of the sample respectively cited population growth, changing youth preference, changing age structure and migration as main demographic factors influencing compliance with ECIs. Finally, all respondents cited the search for income, 48% cited growing market access, 30% cited monetization and 16% cited price increase as key economic factors influencing compliance with forest-based ECIs.

3.4. Effect of compliance determinants on Forest-based endogenous cultural institutions

In this article, norms, customs, beliefs, taboos and values constitute forest-linked endogenous cultural institutions (ECIs). Forest-based ECI index is constructed using the min–max rescaling transformation and estimated using the ordinary least square (OLS) technique. We also estimated the effect of compliance determinants on the individual forest-based endogenous cultural institutions using a logit model. Table 6 presents regression estimates predicting changes in ECIs as a function of political,

Table 6. The effect of compliance determinants on forest based endogenous cultural institutions.

	(1)	(2)	(3)	(4)
Dominance of state rules	0.166*** (0.045)			
Political leaning	0.020 (0.029)			
Elite phenomenon	0.105*** (0.037)			
Alliance between traditional and state actors	0.025 (0.029)			
Leadership influence	0.117*** (0.042)			
others	0.169 (0.195)			
Education		0.003 (0.025)		
Communication or social media		0.263*** (0.031)		
Modernization		0.022 (0.032)		
Changes in consumption pattern		0.008 (0.031)		
Health reasons		0.022 (0.032)		
Youthful population			0.144*** (0.024)	
Population growth			0.101*** (0.030)	
Migration influence			0.123*** (0.026)	
Changing youth preference			0.129*** (0.027)	
Changing age structure			0.109*** (0.025)	
Gender campaigns			0.077 (0.049)	
Monetization of fines				0.082*** (0.027)
Price increases				0.081** (0.032)
Growing market access				0.192*** (0.025)
Constant	0.245*** (0.049)	0.285** (0.126)	0.207* (0.121)	0.346*** (0.126)
Observations	196	195	194	194
R squared	0.143	0.479	0.492	0.432

Notes: Standard errors in parentheses. An index for changes in traditional rules is used as a measures of endogenous cultural institutions (see Table 2 for index constructed). For regression results in each column, individual and household characteristics such as age, sex and education of the respondent, household monthly income, migration status and main occupation of the respondent. *** $p < 0.01$, ** $p < 0.05$, * $p < 0$.

social, demographic and economic compliance determinants. Among the different compliance determinants, demographic and economic compliance determinants are highly significant in explaining changes in forest-based endogenous cultural institutions. On

Table 7. The effect of political and social compliance determinants on ECIs.

	(1)	(2)	(3)	(4)	(5)
Political compliance determinants					
Dominance of state rules	0.64*** (0.20)	0.02 (0.11)	0.02 (0.08)	0.21 (0.14)	0.22** (0.11)
Political leaning	0.02 (0.07)	0.01 (0.07)	0.02 (0.04)	0.02 (0.06)	0.11 (0.07)
Elite phenomenon	0.31*** (0.10)	0.18* (0.10)	0.03 (0.06)	0.34** (0.15)	0.20** (0.09)
Alliance between traditional and state actors	0.14** (0.06)	0.19*** (0.07)	0.07 (0.05)	0.04 (0.06)	0.06 (0.07)
Leadership influence	0.56*** (0.11)	0.07 (0.11)	0.05 (0.05)	0.08 (0.08)	0.06 (0.10)
Observations	195	195	195	195	195
Social compliance determinants					
Education	0.02 (0.05)	0.05 (0.08)	0.05 (0.04)	0.03 (0.05)	0.09 (0.07)
Communication or social media	0.40*** (0.04)	0.10 (0.09)	0.09 (0.05)	0.22*** (0.08)	0.20*** (0.07)
Modernization	0.08 (0.06)	0.02 (0.10)	0.00 (0.06)	0.06 (0.07)	0.11 (0.09)
Changes in consumption pattern	0.04 (0.05)	0.31*** (0.09)	0.03 (0.04)	0.15** (0.06)	0.11 (0.09)
Health reasons	0.06 (0.06)	0.21** (0.10)	0.03 (0.05)	0.10 (0.06)	0.18* (0.10)
Observations	196	196	196	196	196

Note: Robust standard errors in parentheses. The dependent variables are ECIs and include, norms in Column 1, customs in Column 2, beliefs in column 3, taboos in column 4 and values in column 5. For regression results in each column, we control for individual and household characteristics such as age, sex and education of the respondent, household monthly income, migration status and main occupation of the respondent. *** $p < 0.01$, ** $p < 0.05$, * $p < 0$.

the other hand, a few political and social factors significantly influence changes in ECIs.

Concerning political factors, the results indicate that *ceteris paribus*, dominance of state actors, significantly increases the ECI composite index by 0.17 units and leadership influence increases ECI index by 0.12 units. On the contrary, the elite phenomenon reduces the ECI composite index by 0.11 units. For social compliance determinants, only social media has a significant effect on ECIs. Social media increase changes in the ECI composite index by 0.26. The demographic factors suggest that youthful population, population growth, migration influence, changing youth preferences and changing age structure significantly increase the ECI composite index by 0.14, 0.10, 0.12, 0.13 and 0.11 units, respectively. The result from the economic factors reveal that the monetization of fines, increase in prices and the growth in access to the market significantly increase the ECI index by 0.08, 0.08 and 0.19, respectively. Thus, relative to political and social compliance factors, demographic and economic factors are key determinants of endogenous cultural institutions around the Santchou landscape.

In Table 7 and Table 8, the logit estimates of the effect of political, social, demographic and economic compliance determinants on the individual ECIs are presented.

Table 8. The effect of demographic and economic compliance determinants on ECIs.

	(1)	(2)	(3)	(4)	(5)
Demographic compliance determinants					
Youthful population	0.32*** (0.04)	0.02 (0.07)	0.02 (0.05)	0.19*** (0.04)	0.16** (0.07)
Population growth	0.31*** (0.08)	0.11 (0.08)		0.05 (0.07)	0.03 (0.08)
Migration influence	0.24*** (0.06)	0.17** (0.08)	0.15** (0.06)	0.00 (0.06)	0.08 (0.07)
Changing youth preference	0.19*** (0.07)	0.01 (0.08)	0.11* (0.06)	0.11* (0.06)	0.26*** (0.07)
Changing age structure	0.28*** (0.04)	0.25*** (0.06)	0.04 (0.05)	0.18*** (0.05)	0.31*** (0.06)
Gender campaigns	0.26* (0.15)	0.45** (0.22)		0.09 (0.12)	0.14 (0.14)
Observations	195	195	146	195	195
Economic compliance determinants					
Monetization of fines	0.17*** (0.06)	0.14* (0.08)	0.02 (0.04)	0.05 (0.05)	0.04 (0.07)
Price increases	0.20*** (0.08)	0.03 (0.10)	0.01 (0.05)	0.08 (0.06)	0.10 (0.10)
Growing market access	0.43*** (0.01)	0.08 (0.07)	0.08* (0.04)	0.22*** (0.06)	0.28*** (0.06)
Observations	195	195	195	195	195

Note: Robust standard errors in parentheses. The dependent variables are ECIs and include, norms in Column 1, customs in Column 2, beliefs in column 3, taboos in column 4 and values in column 5. For regression results in each column, we control for individual and household characteristics such as age, sex and education of the respondent, household monthly income, migration status and main occupation of the respondent. *** $p < 0.01$, ** $p < 0.05$, * $p < 0$.

Table 7 shows the estimated effect of political and social compliance determinants of ECIs while Table 8 presents the estimated effect of demographic and economic compliance determinants of ECIs. The results suggest that the dominance of state rules significantly increases the chance of changes in norms by 64 percentage points and values by 22 percentage points. Interestingly, elite phenomenon significantly reduces the likelihood of changes in norms, taboos and values by 31, 34 and 20 percentage points, respectively. Alliance between traditional and state actors significantly reduces the likelihood of changes in norms by 14 percentage points and increases the probability of changes in customs by 19 percentage points. Leadership influence increases the probability of changes in norms by 56 percentage points. Regarding social factors, communication/social media significantly increases the probability of changes in norms, taboos and values by 40, 22 and 20 percentage points, respectively. Changes in consumption patterns increase the probability of changes in taboos and reduces the likelihood of changes in customs by 15 and 31 percentage points, respectively. Health as a factor reduces the probability of changes in customs by 21 percentage points.

From Table 8, it could be observed that the youthful population increases the probability of changes in norms, taboos and values by 32, 19 and 16 percentage points, respectively, while population growth increases the probability of changes in norms by 31 percentage points. Migration significantly increases the likelihood of changes in norms, customs and beliefs by 24, 17 and 15 percentage points while changes in youth preferences increase the likelihood of changes in norms, beliefs, taboos and values by

19, 11, 11 and 26 percentage points, respectively. Interestingly, changes in age structure significantly reduce the probability of changes in customs by 25 percentage points but increase the likelihood of changes in norms, taboos and values by 28, 18 and 31 percentage points, respectively. Gender campaigns increase the probability of changes in norms and customs by 26 and 45 percentage points, respectively. Concerning economic compliance determinants, monetization of fines increases the probability of changes in norms and customs by 17 and 14 percentage points, respectively, while price increases raise the likelihood of changes in norms by 20 percentage points. Growing market access significantly increases the probability of changes in norms, beliefs, taboos and values by 43, 8, 22 and 28 percentage points, respectively. The results in Table 7 and 8 are consistent with the results in Table 6 which suggests that demographic and economic factors are key compliance determinants of the observed changes in endogenous cultural institutions.

4. Discussion

There is renewed interest today to inventorize what is left of endogenous cultural institutions – the ‘last vestiges’ of endogenous cultural institutions. This validates the need to unbundle the compliance determinants for ECIs in culturally-diverse SSA – Cameroon being a classic example. In this article, we provide evidence from one of Cameroon’s protected areas – the Santchou landscape, by (i) analyzing forest-use practices shaped by ECIs, (ii) assessing the determinants of compliance with forest-based ECIs, and (iii) estimating the effect of compliance determinants on forest-based endogenous cultural institutions.

4.1. Forest use practices shaped by endogenous cultural institutions

On the role of ECIs in shaping forest-use practices around the Santchou landscape, it is observed that norms and customs are the main ECIs shaping the harvesting of wood-based NTFPs (e.g. fuel wood). In the Santchou Landscape, it is a norm to accept spiritually enforced sanctions linked to the harvesting of wood from certain trees of spiritual importance. For instance, the *Ewuweh* as an entity is believed to reside in trees where spiritual judgements are passed. Such trees are prohibited from wood harvesting. Furthermore, certain parts of the forest were customarily kept as sacred and prohibited from encroachment. While use practices are shaped by these ECIs, field evidence further reports that most of these provisions are hardly evoked today in the administration of justice to defaulters.

However, the ECIs play a crucial role in shaping the harvesting of vegetal based NTFPs including medicinal plants and ngongo leaf. It is surprising for ngongo leaf, especially as field evidence reveals that the majority of those who harvest ngongo leaf are migrants who hardly pay attention to the cultural norms of the communities. For medicinal plants, this holds true, as the harvesting method is designed in a way that people follow due procedures and harvesting is regulated. This practice of regulated medicinal plants harvesting ties with Ostrom’s principle of “congruence between appropriation and provision rules and local conditions” as earlier proven in several cases across the globe (Ostrom 1990, 90). ECIs play a lesser role in shaping the exploitation of seed-based NTFPs; only bitter cola and kola nuts registered more than 50% in this case. For other NTFPs, ECIs are very important in shaping the harvesting

of bush meat, with most of the ECI parameters accounting for more than 50% of the sample. Specifically, the taboo that pregnant women do not eat certain animals (pangolins, rat moles and snakes) reported 95%, while the belief in totems (elephants) which should not be killed stands at 83%. The custom of not killing elephants, and to preserve certain parts of the forest – restricting encroachment accounted for close to 60%. In principle, the practice of totems is quite common in the community. As recounted by a male respondent:

The elephants exist in this landscape. They are our totems and we have decided to keep them in a safer location, away from the government and other poachers. If you want to see an elephant just tell us and on your way back, you will meet one. (Notable, Mankang village, March 2021)

Several studies have highlighted the role of taboos in regulating forest-use practices. For instance, around the Korup National Park, Bobo, Aghomo, and Ntumwel (2015) reported that accumulated knowledge on wildlife species use stands at over 50%. However, they noted a less than 10% magico-religious and multipurpose values for wildlife and the presence of taboos linked to forest use practices (especially wildlife hunting). The claims of respondents on the presence of elephants does not seem to tie in with field realities, as elephants are difficult to observe in the landscape. In this light, therefore, it is plausible to indicate that the debate remains inconclusive. In Ghana, Emieaboe, Ahorsu, and Gbogbo (2014) reported that in spite of the popularity of the myths and taboos, they seemingly play an insignificant role in shaping forest-use practices; this is largely due to the fact that they either misdirect attention from real forest conservation problems or they have an established antidote and remedy for violation. This weakens compliance. A contrary view is shared by Begossi, Hanazaki, and Peroni (2000) who reported that taboos play a significant role in shaping forest use practices in the Brazilian Amazon.

4.2. Determinants of compliance with endogenous cultural institutions

The extent to which people comply with respective institutions is a function of several forces. The analysis revealed that the most significant political factors include the dominance of state rules, and the alliance between traditional and state actors. The centralized system of forest management in Cameroon (despite the decentralization reforms of the 1990s) only go to confirm the dominance of state rules. For instance, with growing signals of an eventual relocation of the in-reserve villages, it is clear that state rules are strongly being enforced in the area – to the detriment of ECIs. As recounted by a state forestry official: “The state’s rule cannot be challenged. The state is a sacred monster which destroys any resistance and opposition. As all lands and resources belong to the state, its rules must prevail (April 2021)”.

Growing state dominance in terms of rules and the enforcement agents (forestry officials) has left traditional leaders in a very precarious situation – relying on the ‘wisdom’ of the state as traditional rulers put it. Furthermore, other traditional rulers have entangled themselves into alliances which robs them of their moral responsibility to administer justice within the ambit of the ECIs they were enthroned to preserve and protect. As a female focus group discussion participant retorted:

“The problem with the non respect of our traditional institutions should be blamed on our leaders and notables. They do not practice what they are called to do. Leaders sometimes are biased in sanctioning defaulters, while some of them also fail to respect rules which were laid down. Most of them are interested in what they stand to gain financially”. (Female FGD participant, Mankang Village)

Cases of such alliances of convenience have been earlier reported in this context (Kimengsi and Balgah 2021) and in other contexts. In some parts of Asia, the ‘capture’ of endogenous cultural institutions by political and administrative bureaucrats through a series of legal and extra-legal processes has earlier been established. This situation prevails with little or no room for accountability (Basnyat *et al.* 2018; Basnyat, Treue, and Pokharel 2019). Described as ‘bureaucratic recentralisation’, this process has allowed such bureaucrats the opportunity to reap personal benefits. In the Rio Juma Settlement of the Brazilian Amazon, Carrero *et al.* (2020) explained how politico-economic forces which manifest through increasing land speculation, and the expansion of agricultural frontiers, tend to weaken customary systems while advancing the colonization agenda with impunity. The functioning of local forest management institutions hinges, to some extent, on the nature of social capital and governance. In the analyses of 47 forests which cut across 7 countries, Gibson, Williams, and Ostrom (1999) showed that different social capital dimensions have measurable effects on the condition of forests. This validates the position that irrespective of the national policy, social capital matters in the functioning of forest institutions and in explaining the state of forest management. In the context of the Santchou landscape, this evidence is yet to be established; therefore, future studies that explore the role of social capital in explaining the functioning of ECIs are required.

Modernization, education and communication/social media are key social factors influencing compliance with endogenous cultural institutions, accounting for between 54 and 84%, while population growth and changing youth preference are key compliance determinants. Surprisingly, migration accounts for the least of the demographic factors. This is surprising, especially as growing signs of migrant settlement could be observed in the Santchou Landscape. Furthermore, key informant and focus group participants consistently attributed the intensification of the harvesting of NTFPs (especially ngongo leaf) to the migrant population. Finally, the growing interest to secure income is cited as a main determinant by all respondents. This further confirms the fact that rising timber and NTFP harvesting in the area is driven by the need to secure an income. A female respondent held that:

We used to harvest NTFPs (e.g. ngongo leaf) in the past just for household use. Even eru, we never used to eat it. Today, migrants have come and they are harvesting ngongo leaf at a very rapid rate for the market. Even eru, it was migrants who introduced it to us before we started eating it. (Female respondent Bale village April 2021)

This search for income explains rising institutional bricolage in Santchou (Kimengsi and Balgah 2021). In other contexts of SSA, studies have reported that growing non-compliance with fairly stable traditional institutions is linked to demographic pressure, resource scarcity and price increase, and on migration and modernization (Haller, Acciaioli, and Rist 2016; Ensminger 1992, 1997). However, in certain areas, ECIs which are deemed profitable for a few traditional authorities and notables are preserved (Haller 2001).

4.3. Effect of compliance determinants on Forest-based endogenous cultural institutions

On the effect of compliance determinants on forest-based ECIs, the analysis reveals that demographic and economic compliance determinants are highly significant in explaining changes in forest-based ECIs, while just a few political and social factors significantly influence changes in ECIs. This contrasts with evidence from the Brazilian Amazon where political and administrative factors were instrumental in the weakening of endogenous cultural institutions shaping forest use and management (Carrero *et al.* 2020). In parts of Latin America (e.g. Bolivia), land tenure arrangements have been found to influence the management of forests at community levels. For instance, Pacheco and Heder Benatti (2015) showed that despite the similarity in the goals of policy frameworks related to land tenure, implementation approaches were contrasting with agrarian expansion being highly evident in lowland Bolivia while the State of Pará prioritized conservation. However, in Mexico, Klooster (2003) showed how the introduction of new reforms led to increased possession and management of forests by local communities. This further showed signals of efficiency and sustainability in terms of the community-level management approaches applied. Despite studies on land use/land cover dynamics around the Santchou landscape (Meli and Meli 2015), there is still limited evidence on the role of land tenure in shaping the functioning of forest management institutions.

Demographic factors (youthful population, population growth, migration influence, changing youth preferences and changing age structures) significantly increase the ECI composite index by between 10 and 14%. For economic factors, the monetization of fines, increase in prices and the growth in access to the market increases the ECI index by between 8 and 19%. It is therefore concluded that demographic and economic factors are key determinants of endogenous cultural institutions around the Santchou Landscape. In East Africa, Jiren *et al.* (2021) explained how informally-shaped institutions are exposed to a series of shocks from formal institutions and actors. This is linked to the latter's pursuit to advance the socio-economic agenda of enhancing food security for natural resource dependent households. This view is shared by Rahman *et al.* (2014), taking the case of the Madhupur National Park in Asia. However, it was not shared by Buchenrieder and Balgah (2013) who rather reported that in Central Africa, informal institutions tend to countervail formal ones with sub-optimal outcomes. This evidence suggests that policy construction needs to be significantly informed by evidence derived from social learning around forested areas such as the Santchou Landscape. This will complement, rather than countervail, established policies.

One of the key demographic determinants is population growth and changing youth preferences. This explains why the youthful population increases the probability of changes in norms, taboos and values by 32, 19 and 16 percentage points, respectively. Today, most youths have an apathy for maintaining and upholding the traditions and customs of the old. This tendency has seen most youths leaving their villages as they strive to embrace modernization. This claim does not hold for all settings in SSA: For instance, in Zimbabwe, farming households (irrespective of age) still adhered to endogenous cultural institutions in their natural resource use practices (Mapfumo, Mtambanengwe, and Chikowo 2016). A similar scenario was reported for East Africa - Uganda and Tanzania (Namanda, Amour, and Gibson 2013). Furthermore, migrants tend to introduce their institutions (values and way life) in the areas of destination. Migration significantly increases the likelihood of changes in norms, customs and

beliefs by 24, 17 and 15 percentage points, respectively. This has a negative effect on the culturally embedded ECIs. However, in the Santchou Landscape, an institution which was transplanted from the South West Region (*Abashi*) has positively shaped use practices, as it is significantly enforced (Kimengsi, Abam, and Forje 2021a). While the study contrasts previous findings on migration and changing ECIs in the context of agro-based climate adaptation (Kimengsi and Silberberger 2022), studies in other contexts have identified migration as a key factor driving endogenous cultural institutional change (Ensminger 1992). In West Africa, migration was not factored as a key determinant in shaping institutions and forest-use practices (Coulibaly-Lingani *et al.* 2009). The extent to which migrants positively or negatively shape forest-linked ECIs needs to be prioritized in future investigations. Politically, state dominance as earlier raised stood as a key factor affecting compliance by 0.17 units and leadership influence increases ECI index by 0.12 units. The elite phenomenon is the least factor shaping ECI compliance. This is quite surprising, as previous studies have reported the significant role of elites in reshaping institutions in Asia, Latin America and Africa. This reduces the ECI composite index by 0.11 units. Growing social media influence explains why it has a significant effect on ECIs (0.26). On the whole, the results show significant variations in the effect of demographic and economic factors as key compliance determinants of forest-linked endogenous cultural institutions.

5. Conclusion

This article explored the determinant of forest-based ECIs taking the case of the Santchou Landscape in Cameroon. From the analysis, the following conclusions are derived: First, norms and customs are the main ECIs shaping the harvesting of wood-based NTFPs (e.g. fuel wood) and vegetal based NTFPs (e.g. medicinal plants and ngongo leaf). However, the extent to which such norms apply for ngongo leaf – a migrant-dependent NTFP still needs to be scientifically ascertained. Furthermore, while ECIs play a lesser role in shaping the exploitation of seed-based NTFPs, they play important roles in shaping the harvesting of bush meat; this relates especially to the custom of not killing elephants. Third, while demographic and economic indices of compliance are highly significant in explaining changes in forest-based endogenous cultural institutions, just a few political and social factors significantly influence changes in ECIs. Therefore, demographic and economic factors are key determinants of endogenous cultural institutions around the Santchou landscape. Finally, while state dominance defines compliance, elites play lesser roles in shaping ECI compliance. Studies that fully explore the role of different categories of elites in determining compliance are required. The results suggest the need to further leverage existing norms and customs as potentially useful endogenous cultural institutions that could continue to regulate forest resource-use practices around the Santchou Landscape. Furthermore, the need to factor demographic and economic factors into the review of Cameroon's forest policy to reflect cultural sensitivities needs to be effectively taken into account. On the whole, policy construction needs to significantly draw from social learning to assure that it will complement, rather than countervail established policies. As previous studies have focused on analyzing the compliance of exogenous (formal) institutions, this article represents a novelty, by employing a robust mixed-methods approach to analyze the dynamics around endogenous cultural institutions in forest settings. While this study provides novel evidence to inform Cameroon's forest policy revision, it

crucially provides fresh insights to advance theoretical perspectives on institutional compliance, with an emphasis on endogenous cultural institutions in the context of sub-Saharan Africa. As a limitation, the article did not analyze the role of social capital and land tenure in explaining forest management institutional compliance. Therefore, future studies should provide complementary evidence by exploring the role of social capital and land tenure in shaping the functioning of forest management institutions.

Note

1. Ethnic fractionalization measures diversity as a steadily increasing function of the number of cultural groups in a country. Fractionalization indices range from 0 (when all individuals are members of the same cultural group) to 1 (when each individual belongs to his or her own group) (Drazanova 2020).

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References

- Basnyat, B., T. Treue, and R.K. Pokharel. 2019. "Bureaucratic Recentralisation of Nepal's Community Forestry Sector." *International Forestry Review* 21 (4): 401–415. doi:10.1505/146554819827906861.
- Basnyat, B., T. Treue, R. K. Pokharel, L. N. Lamsal, and S. Rayamajhi. 2018. "Legal Sounding Bureaucratic Re Centralisation of Community Forestry in Nepal." *Forest Policy and Economics* 91 (C): 5–18. doi:10.1016/j.forpol.2017.08.010.
- Begossi, A., N. Hanazaki, and N. Peroni. 2000. "Knowledge and Use of Biodiversity in Brazilian Hot Spots." *Environment, Development and Sustainability* 2 (3/4): 177–193. doi:10.1023/A:1011409923520.

- Bobo, K.S., F.F.M. Aghomo, and B.C. Ntumwel. 2015. "Wildlife Use and the Role of Taboos in the Conservation of Wildlife around the Nkwende Hills Forest Reserve; South West Cameroon." *Journal of Ethnobiology and Ethnomedicine* 11 (2): 2. [10.1186/1746 4269 11 2](https://doi.org/10.1186/1746-4269-11-2).
- Buchenrieder, G. and R. A. Balgah. 2013. "Sustaining Livelihoods around Community Forests. What is the Potential Contribution of Wildlife Domestication?" *Journal of Modern African Studies* 51 (1): 57 84.
- Carrero, Gabriel Cardoso, Philip Martin Fearnside, Denis Ribeiro do Valle, and Cristiano de Souza Alves. 2020. "Deforestation Trajectories on a Development Frontier in the Brazilian Amazon: 35 Years of Settlement Colonization, Policy and Economic Shifts, and Land Accumulation." *Environmental Management* 66 (6): 966 984. doi:[10.1007/s00267 020 01354 w](https://doi.org/10.1007/s00267-020-01354-w).
- Chabwela, H.N., and T. Haller. 2010. "Governance Issues, Potentials and Failures of Participative Collective Action in the Kafue Flats, Zambia." *International Journal of the Commons* 4 (2): 621. doi:[10.18352/ijc.189](https://doi.org/10.18352/ijc.189).
- Cleaver, F. 2012. *Development through Bricolage: Rethinking Institutions for Natural Resource Management*. New York: Routledge.
- Cleaver, F. 2002. "Reinventing Institutions: Bricolage and Social Embeddedness of Natural Resource Management." *The European Journal of Development Research* 14 (2): 11 30. doi:[10.1080/714000425](https://doi.org/10.1080/714000425).
- Colding, J., C. Folke, and E. Thomas. 2003. "Social Institutions in Ecosystem Management and Biodiversity Conservation." *Tropical Ecology* 44 (1): 25 41.
- Coulibaly Lingani, P., M. Tigabu, P. Savadogo, P. C. Oden, and J. M. Ouadba. 2009. "Determinants of Access to Forest Products in Southern Burkina Faso." *Forest Policy and Economics* 11 (7): 516 524. doi:[10.1016/j.forpol.2009.06.002](https://doi.org/10.1016/j.forpol.2009.06.002).
- Cutter, S. L., C. Burton, and C. Emrich. 2010. "Disaster Resilience Indicators for Benchmarking Baseline Conditions." *Journal of Homeland Security and Emergency Management* 7 (1): 51. doi:[10.2202/1547 7355.1732](https://doi.org/10.2202/1547-7355.1732).
- Drazanova, L. 2020. "Introducing the Historical Index of Ethnic Fractionalization (HIEF) Dataset: Accounting for Longitudinal Changes in Ethnic Diversity." *Journal of Open Humanities Data* 6 (1): 6. doi:[10.5334/johd.16](https://doi.org/10.5334/johd.16).
- Emieaboe, P. A., K. E. Ahorsu, and F. Gbogbo. 2014. "Myths, Taboos and Biodiversity Conservation: The Case of Hunters in a Rural Community in Ghana." *Ecology, Environment and Conservation* 20 (3): 879 886.
- Ensminger, J. 1997. "Changing Property Rights: Reconciling Formal and Informal Rights to Land in Africa." In *The Frontiers of the New Institutional Economics*, edited by J. N. Drobak, and J. V. C. Nye, 165 196. San Diego: Academic Press.
- Ensminger, J. 1992. *Making a Market. The Institutional Transformation of an African Society*. Cambridge: Cambridge University Press.
- Fabricius, C. 2004. "Historical Background to Community Based Natural Resource Management." In *Rights, Resources and Rural Development Community Based Natural Resource Management in Southern Africa*, edited by C. Fabricius, and E. Koch. Oxfordshire and New York: Earthscan.
- Fearon, J. D. 2003. "Ethnic Structure and Cultural Diversity by Country." *Journal of Economic Growth* 8 (2): 195 222. doi:[10.1023/A:1024419522867](https://doi.org/10.1023/A:1024419522867).
- Ghai, D. 1992. "Conservation, Livelihood and Democracy: Social Dynamics of Environmental Changes in Africa." Discussion Paper 33. United Nations Research Institute for Social Development. Accessed 10 November 2017. [http://www.unrisd.org/unrisd/website/document.nsf/\(httpPublications\)/](http://www.unrisd.org/unrisd/website/document.nsf/(httpPublications)/).
- Gibson, C., G. Williams, and E. Ostrom. 1999. "Social Capital and the Governance of Forest Resources." Workshop in Political Theory and Policy Analysis W99I 5, Indiana University, Bloomington, IN.
- Jiren, Tolera Senbeto, Maraja Riechers, Arvid Bergsten, and Joern Fischer. 2021. "A Leverage Points Perspective on Institutions for Food Security in a Smallholder Dominated Landscape in Southwestern Ethiopia." *Sustainability Science* 16 (3): 767 779. doi:[10.1007/s11625 021 00936 9](https://doi.org/10.1007/s11625-021-00936-9).
- Haller, T. ed. 2010. *Disputing the Floodplains: Institutional Change and the Politics of Resource Management in African Floodplains (Brill, African Social Studies Series, 2010, with a Foreword by Elinor Ostrom)*. Leiden: Brill.

- Haller, T. 2001. "Rules Which Pay Are Going to Stay: Indigenous Institutions, Sustainable Resource Use and Land Tenure among the Ouldeme and Platha, Mandara Mountains, Northern Cameroon." *Bulletin de l'APAD* 2001 (22): 148. <http://journals.openedition.org/apad/148>. doi:10.4000/apad.148.
- Haller, T., J. M. Belsky, and S. Rist. 2018. "The Constitutionality Approach: Conditions, Opportunities, and Challenges for Bottom up Institution Building." *Human Ecology* 46 (1): 1-2. doi:10.1007/s10745-018-9966-1.
- Kimengsi, J. N., R. Owusu, I. N. S. Djenontin, J. Pretzsch, L. Giessen, G. Buchenrieder, M. Pouliot, and A. N. Acosta. 2022. "What Do We (Not) Know on Forest Management Institutions in Sub Saharan Africa? A Regional Comparative Review." *Land Use Policy* 114 (2022): 105931. doi:10.1016/j.landusepol.2021.105931.
- Kimengsi, J. N., and M. Silberberger. 2022. "How Do Endogenous Cultural Institutions (Not) Shape Peasant Farmers' Climate Adaptation Practices? Learning from Rural Cameroon." SSSRN. https://papers.ssrn.com/sol3/papers.cfm?abstract_id_3822319.
- Kimengsi, J. N., and R. A. Balgah. 2021. "Colonial Hangover and Institutional Bricolage Processes in Forest Use Practices in Cameroon." *Forest Policy and Economics* 125 (2021): 102406. doi:10.1016/j.forpol.2021.102406.
- Kimengsi, J. N., C. E. Abam, and G. W. Forje. 2022. "Spatio Temporal Analysis of the 'Last Vestiges' of Endogenous Cultural Institutions: Implications for Cameroon's Protected Areas." *Geoforum* doi:10.1007/s10708-021-10517-z.
- Kimengsi, J. N., R. Owusu, I. N. S. Djenontin, J. Pretzsch, L. Giessen, G. Buchenrieder, M. Pouliot, and A. N. Acosta. 2022. "What Do We (Not) Know on Forest Management Institutions in Sub Saharan Africa? A Regional Comparative Review." *Land Use Policy* 114 (2022): 105931. <https://doi.org/10.1016/j.landusepol.2021.105931>.
- Kimengsi, J. N., J. Pretzsch, A. K. Mukong, and S. Ongolo. 2019a. "Measuring Livelihood Diversification and Forest Conservation Choices: Insights from Rural Cameroon." *Forests* 10 (2): 81-16. doi:10.3390/f10020081.
- Kimengsi, J.N., and R. A. Balgah. 2017. "Repositioning Local Institutions in Natural Resource Management: Perspectives from Sub Saharan Africa." *Journal of Contextual Economics* 137 (1-2): 149-172. doi:10.3790/jce.137.1-2.149.
- Klooster, D. 2003. "Campesinos and Mexican Forest Policy during the Twentieth Century." *Latin American Research Review* 38 (2): 94-126. <http://www.jstor.org/stable/1555421>. doi:10.1353/lar.2003.0018.
- Haller, T., G. Acciaioli, and S. Rist. 2016. "Constitutionality: Conditions for Crafting Local Ownership of Institution Building Processes." *Society and Natural Resources* 29 (1): 68-87. doi:10.1080/08941920.2015.1041661.
- Mapfumo, P., F. Mtambanengwe, and R. Chikowo. 2016. "Building on Indigenous Knowledge to Strengthen the Capacity of Smallholder Farming Communities to Adapt to Climate Change and Variability in Southern Africa." *Climate and Development* 8 (1): 72-82. doi:10.1080/17565529.2014.998604.
- Mbeng, E. and U. H. Buba. 2017. "Community Livelihoods versus Biodiversity Conservation. Constraints to Sustainability of the Santchou Forest Reserve in the Western Highland Region of Cameroon." Paper presented at the 6th Symposium for Research in Protected Areas, November 2-3, Salzburg. http://www.parcs.at/npa/pdf_public/2018/36388_20180524_114308_115_Mbeng_FINAL_4p_pag.pdf.
- Meli, F., and V. Meli. 2015. "Modelling Drivers of Forest Cover Change in the Santchou Wildlife Reserve, West Cameroon Using Remote Sensing and Land Use Dynamic Degree Indexes." *Canadian Journal of Tropical Geography* 2 (2): 29-42.
- Namanda, S., R. Amour, and R. W. Gibson. 2013. "The Triple S Method of Producing Sweet Potato Planting Material for Areas in Africa with Long Dry Seasons." *Journal of Crop Improvement* 27 (1): 67-84. doi:10.1080/15427528.2012.727376.
- Nyirenda, C. 2020. "Face to Face with the 'Rainmaker', the Legendary Mbona." Accessed 4 August 2021. <https://mbc.mw/radio/2/item/4794-face-to-face-with-the-rainmaker-the-legendary-mbona>.
- Osei Tutu, P., M. Pregernig, and B. Pokorny. 2015. "Interactions between Formal and Informal Institutions in Community, Private and State Forest Contexts in Ghana." *Forest Policy and Economics* 54 (2015): 26-35. doi:10.1016/j.forpol.2015.01.006.

- Osei Tutu, P. 2017. "Taboos as Informal Institutions of Local Resource Management in Ghana: Why They Are Complied with or Not." *Forest Policy and Economics* 85: 114 123. doi:10.1016/j.forpol.2017.09.009.
- Ostrom, E. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. New York: Cambridge University Press.
- Pacheco, P., and J. Heder Benatti. 2015. "Tenure Security and Land Appropriation under Changing Environmental Governance in Lowland Bolivia and Pará." *Forests* 6 (12): 464 491. doi:10.3390/f6020464.
- Rahman, H M Tuihedur, Swapan Kumar Sarker, Gordon M. Hickey, M. Mohasinul Haque, and Niamjit Das. 2014. "Informal Institutional Responses to Government Interventions: Lessons from Madhupur National Park, Bangladesh." *Environmental Management* 54 (5): 1175 1189. doi:10.1007/s00267 014 0325 8.
- Saunders, B., J. Sim, T. Kingstone, S. Baker, J. Waterfield, B. Bartlam, H. Burroughs, and C. Jinks. 2018. "Saturation in Qualitative Research: Exploring its Conceptualization and Operationalization." *Quality and Quantity* 52 (4): 1893 1907. doi: 10.1007/s11135 017 0574 8.
- St. Bernard, G. 2007. "Measuring Social Vulnerability in Caribbean States." Paper Presented at 8th SALISES Annual Conference Crisis, Chaos and Change: Caribbean Development Challenges in the 21st Century, Trinidad And Tobago.
- Tesfaye, Y., A. Roos, B. J. Campbell, and F. Bohlin. 2012. "Factors Associated with the Performance of User Groups in a Participatory Forest Management around Dodola Forest in the Bale Mountains, Southern Ethiopia." *Journal of Development Studies* 48 (11): 1665 1682. doi:10.1080/00220388.2012.714123.
- Wartmann, F. M., T. Haller, and N. Backhaus. 2016. "Institutional Shopping" for Natural Resource Management in a Protected Area and Indigenous Territory in the Bolivian Amazon." *Human Organization* 75 (3): 218 229. doi:10.17730/1938 3525 75.3.218.
- Yeboah Assiamah, E., K. Muller, and K. A. Domfeh. 2017. "Institutional Assessment in Natural Resource Governance: A Conceptual Overview." *Forest Policy and Economics* 74: 1 12. doi:10.1016/j.forpol.2016.10.006.
- Yeboah Assiamah, E., K. Muller, and K. A. Domfeh. 2019. "Two Sides of the Same Coin: Formal and Informal Institutional Synergy in a Case Study of Wildlife Governance in Ghana." *Society and Natural Resources* 32 (12): 1364 1382. doi:10.1080/08941920.2019.1647320.
- Yenshu, E. V. 2011. "Ethnicisation du Domaine Public et Construction de L'état: Pistes Pour Transcender Une Antinomie Afrique et Développement." *CODESRIA* 36 (2): 249 275.
- Yoon, D.K. 2012. "Assessment of Social Vulnerability to Natural Disasters: A Comparative Study." *Natural Hazards* 63 (2) : 823 843. doi:10.1007/s11069 012 0189 2.
- UNDP. 2014. "Human Development Report 2014 (Technical Note)." New York: United Nations Development Program.
- Zenger, T. R., S.G. Lazzarini, and L. Poppo. 2001. "Informal and Formal Organization in New Institutional Economics." Accessed 15 February 2018. <http://www.toddzenger.com/wp-content/uploads/2015/08/InformalFormalOrg.pdf>