Original Research Article

Forest governance effectiveness of community- and government-managed forests in Cameroon

Abstract

Effective implementation of forest governance principles such as transparency, participation, accountability, coordination, capacity, user rights protection and security driven by positive government interventions are instrumental for sustainable forest management. The study used satellite-derived data to explore forest cover loss in community forest (CF) and government-managed forest in Cameroon from 2001 to 2014. The study also examined the extent to which community forest rights are legally recognised and protected and how government interventions undermine or promote CF management effectiveness in Cameroon. The rational was to understand the forest outcome of different forest management approaches with varied user rights and management objectives. This is considering that community forest managers have been seen as better managers of forests than government agencies, if their full rights are well recognized and protected. We used semi-structured open-ended questionnaire, followed by focus group interviews with CF management institutions and document review for data collection. Forest cover loss showed significant increasing trends and was higher in CF than in other forest management types from 2001 to 2014. Stakeholder perceptions of community forest rights and government interventions varied between CF management institutions. Community forest rights such as rights to full ownership and control, full management, unlimited duration, alienation, and due process and compensation are not legally recognized and/or protected in community forestry in Cameroon, producing negative forest outcomes. Negative government interventions such as imposing excessive bureaucratic obstacles and initial financial investment in the processing of application files for CF applications and commercial user rights of timber harvesting, colluding with local elites, individuals and corrupt municipal and administrative authorities, and retaining full administrative ownership and control of CF land and resources, also produces negative forest outcomes. The non- recognition and protection of higher level community forest rights and excessive negative government interventions in CF management contributes to undermining community's willingness and readiness to prevent deforestation activities and engage conservation activities such as tree planting for long term benefits. Therefore, recognizing, strengthening and protecting all the community forest rights proposed by the Rights and Resources Initiative and avoiding negative government intervention in CF management are helpful strategies in improving the conservation and local development contributions of CF in Cameroon and in the Congo basin region.

Keywords: Forest rights, community forests, forest loss, forest management, production forests, government intervention/action

1. Introduction

Forests cover 3.1%, about 4 billion ha, of the Earth's land area and are among the world's most productive land-based ecosystems, supporting the livelihoods of about 1.6 billion people, who depend on forests for timber, food, fuel, jobs and shelter (UN, 2019). Some 3 billion ha (76%) of the world's forests are publicly owned (UN, 2019; World Bank, 2016). Governments in the Congo Basin forest region retain 99% of the legal administrative control and ownership of the forest, as is also the case of the Peninsular of Southeast Asia and the Russian Federation (RRI, 2014).

Over the past three decades, there is increasing interest by central governments to devolve and entrust forest resources management to communities following the community forestry approach (Andersson *et al.,* 2006, Parkins, 2006). Community forest (CF) are seen as government-recognised land held collectively by either local or indigenous communities based on a shared history, language, culture, or lineage, and governed by customary rights, rules, and institutions that pre-date most modern governments, and continue to adapt to changing circumstances (Stevens *et al.,* 2014). Government-recognised CF cover about 513 million ha, about 12.8% of the world's forests (RRI, 2014; FAO, 2010). About 40% of the world's extreme poor in rural areas live in forests and savannas, with some 1.5 billion local and indigenous people having community-based tenure over forest resources to support their livelihoods (UN, 2019).

Deforestation and forest degradation continue to take place at alarming rates due to mainly agricultural expansion of subsistence and commercial crops. However, tropical deforestation rate has decreased over the past three decades, from 16 million hectares per year in the 1990s to 10 million hectares per year between 2015 and 2020 (FAO 2020). Evidence suggests that local and indigenous communities are better protectors of forests than timber companies operating concessions, large scale farmers operating agro-industrial plantations, and even government agencies (Stevens *et al.,* 2014; World Bank, 2016).

However, the forest rights of local and indigenous communities in most developing countries are typically highly variable, weak, insecure, and lack government legal recognition and protection (Stevens *et al.,* 2014; Beauchamp & Ingram, 2011). This generally undermines the socio-economic and environmental performance objectives of CF in developing countries, particularly their contribution to the reduction of global forest loss and climate change mitigation (Stevens e*t al.,* 2014; Bluffstone *et al.,* 2012; Beauchamp & Ingram, 2011; Ezzine *et al.,* 2011).

In Cameroon, the CF approach is aimed directly at reducing forest loss and improving local livelihoods and economic development in various communities. Because local communities are seen as better managers of forest than government agencies, good forest governance landscape securing full recognition and protection of forest rights for local communities is invaluable for the success and sustainability of CF management. However, community forestry in Cameroon has largely failed to achieve its goals of promoting the sustainable management of forests, participation by local communities in forest management, and poverty alleviation due to poor governance (Piabuo *et al.,* 2019) and equity challenges (Essougong *et al.,* 2019) over the past 20 years. This suggest that good forest governance significantly determines the success of CF management in Cameroon (Piabuo *et al.,* 2019).

In this study, CF are seen as social-ecological systems, where their management incorporates local knowledge systems of community managers with institutional and governance systems in the governance of the forest land and resources. This is such that changes in the social-ecological system can be qualitatively associated with local institutional perceptions of the institutional and governance systems of CF. Other studies have incorporated land use and land cover change quantitative data with stakeholder perceptions qualitative data to better understand changes in social-ecological systems in a sub-region in Cameroon (Ewane, 2021) and in rural Brazil and France (Kohler *et al.,* 2015). No study in Cameroon has attempted to develop a link between government legal recognition and protection of CF rights, government intervention and forest loss in CF with reference to government-managed forest types to the best of my knowledge based available web literature.

Linking forest loss and the recognition and protection of CF rights will allow to demonstrate that sustainable management of CF somehow depends on its effective and full rights recognition and protection. It will also inform strategic policy efforts to achieve joint forest-focused conservation and livelihood development benefits in CF management in Cameroon. Therefore, the purpose of study is to investigate the relationship between forest loss, forest rights and government interventions in CF and government-managed forest types in Cameroon. The specific objectives are: 1) to examine forest cover change inside CF with reference to government-managed forest types such as production forest (PF), protected areas (PA) and forest reserves (FR) from 2001 to 2014; 2) to examine institutional perceptions of the extent of

government recognition and protection of CF rights; and 3) the extent of government interventions in protecting or undermining CF rights and its implications on forest loss.

1.1 Forest management and regulations in Cameroon

The government of Cameroon embarked on extensive legal and institutional interventions in forest management in an effort to reverse the high deforestation rates and prevent forest degradation through the enactment of the Forestry Law of 1994 and its decree of application on Wildlife of 1995. In particular, the Ministry of Forestry and Wildlife (MINFOF) of Cameroon, with technical support from the World Resources Institute (WRI), partnered and instituted the use of remote sensing and GIS to improve on forest monitoring and forest information management in 2002 (MINFOF and WRI, 2012). This has significantly changed the landscape of sustainable forest management in Cameroon, in terms of public access to forest monitoring and evaluation information.

The 1994 Forestry Law of Cameroon subdivides the National Forest Estate (NFE) into the Permanent Forest Estate (PFE) and non-Permanent Forest Estate (nPFE), each with specific use rights, management objectives and management type (Table 1). Government commitment to sustainable forest management in Cameroon have improved, evident through the increase in the creation of PA, PF, FR, council forest, hunting zones, and wildlife sanctuaries since 1994. These different forest management types fall within the PFE of Cameroon and are managed by the government. The PFE consists of both forested and non-forested lands designated to remain as either forest and wildlife habitat, and is targeted to cover a minimum of 30% of the national total land area as stipulated by the 1994 Forestry Law.

The creation of PA in Cameroon is seen as forest-focused conservation interventions aimed at directly addressing forest loss by seeking to prevent forest conversion. Production forests are forest concessions (also called forest management units) within the PFE of Cameroon allocated to commercial logging companies for a period of 15 years, renewable once, and may cover an area of up to 200,000 ha (MINFOF & WRI, 2012). It should mentioned here that from 2001 to 2014, some CF and forest reserves were merged and upgraded to the status of PA.

Table 1. Forest management types and user rights in Cameroon

National forest estate classification (67%)	Forest management type	Area cover (ha, %) of national total area in 2011	Main objective	Forest use rights
Permanent forest estate (35%)	Production forests	6,745,023 ha (17%)	- Protection and conservation of biodiversity - Sustainable production and supply of forest and wildlife resources - Promote rural development	- Right to withdraw timber by selective logging harvesting method. - Right to annual allowable cuts (AACs). - Right to enrichment planting to maintain permanent forest cover. - Right to allow communities to withdraw and use NTFPs
	Protected areas (National Parks)	4,761,683 ha (16%)		
	Forest reserves	492,166 ha (1%)		
Non-permanent forest estate (32%)	Community forests	1,533,325 ha (2%)	- Protection and conservation of biodiversity - Promote community participation - Promote rural development - Promote community livelihoods	- Right to use and withdraw timber and non-timber forest resources for commercial and subsistence purposes. - Right to access CF land. - Right to manage forest resources according to SMP, monitoring of exploitation activities, and planned reforestation activities. - Right to exclude members of other village communities from CF. - Right to marketing of timber and non-timber forest products derived from the CF.

Source: Forestry Law 94/01 of 1994 and MINFOF &WRI (2012; 2015). For the PFE forest management type, the information in the column on tenure/land use rights is mainly applicable to production forest and forest reserves.

According to Cameroon's 1994 Forestry Law, a CF is "a forest forming part of the nPFE and not exceeding 5000 ha, which is covered by a management agreement between one or more village communities and the forestry administration. CF are managed by the village communities concerned, with the help or technical assistance of the Forestry Administration" [Article 3(11) of Decree 95/531/PM of 23 August, 1995]. These "help" or "technical assistance" in CF

management from the government forestry and even non-forestry administration is exercised through various forms of government interventions. CF are governed by a simple management plan prepared by recognized community entities, revised every 5 years and renewable, and approved by the state, in which local communities are attributed some forest use rights (MINEF, 1998; MINFOF, 2009; MINFOF & WRI, 2012). These forest rights in CF management in Cameroon are enshrined and legally recognized in the Forestry Law of 1994.

The goals of the CF management approach in Cameroon include promoting sustainable management of forests, participation by local communities in forest management and poverty alleviation through improved local governance of the forest resources (Essougong *et al.,* 2019; Lescuyer, 2013; Porter-Bolland *et al.*, 2012; MINFOF & WRI, 2012). It should be noted that areas within CF may be converted into other land uses such as agriculture unlike is the case with PF, PA and FR (MINFOF & WRI, 2012).

2. Methodology

2.1 Study region

Cameroon is located in west and central Africa and is a major stakeholder in the sustainable management of the rainforest-rich Congo Basin. The study is mainly focused on CF and PF in Cameroon (Figure 1a and b). Both forest management types allow for somehow similar forest use rights to local communities such as collecting non-timber forest products (NTFPs) to sustain community livelihoods compared to PA. The three CF used as case study include the Bimbia-Bonadikombo, Bakingili and the Etinde CF, located in Limbe, West Coast and Buea sub-divisions, respectively, of Fako division in the Southwest region of Cameroon (Figure 1c and d). The Bimbia-Bonadikombo, Etinde and Bakingili CF were designated with an administrative land surface area of 3,735 ha, 4,806 ha, and 922 ha, respectively, covering several villages (Figure 1d). All three CF were created in 2001 and each operate under an approved simple management plan (SMP) since 2002. Each CF has several compartments that fall within village communities where each CF is located (Figure 1d).

These three CF were used as case studies to examine institutional perception of the extent of recognition and protection of CF rights in Cameroon. These three CF were chosen because we were able to secure the voluntary willingness, readiness, accessibility, availability and participation of the operational CF management institutions. Other CF management institutions

in the Southwest region of Cameroon were targeted but we were unable to secure their voluntary participation in the institutional survey due to heightened insecurity driven by the ongoing Anglophone Separatist conflict in the Southwest and Northwest (English-speaking) regions of Cameroon. The management committee members of these three CF are composed of representatives of the various villages having compartments in each CF.

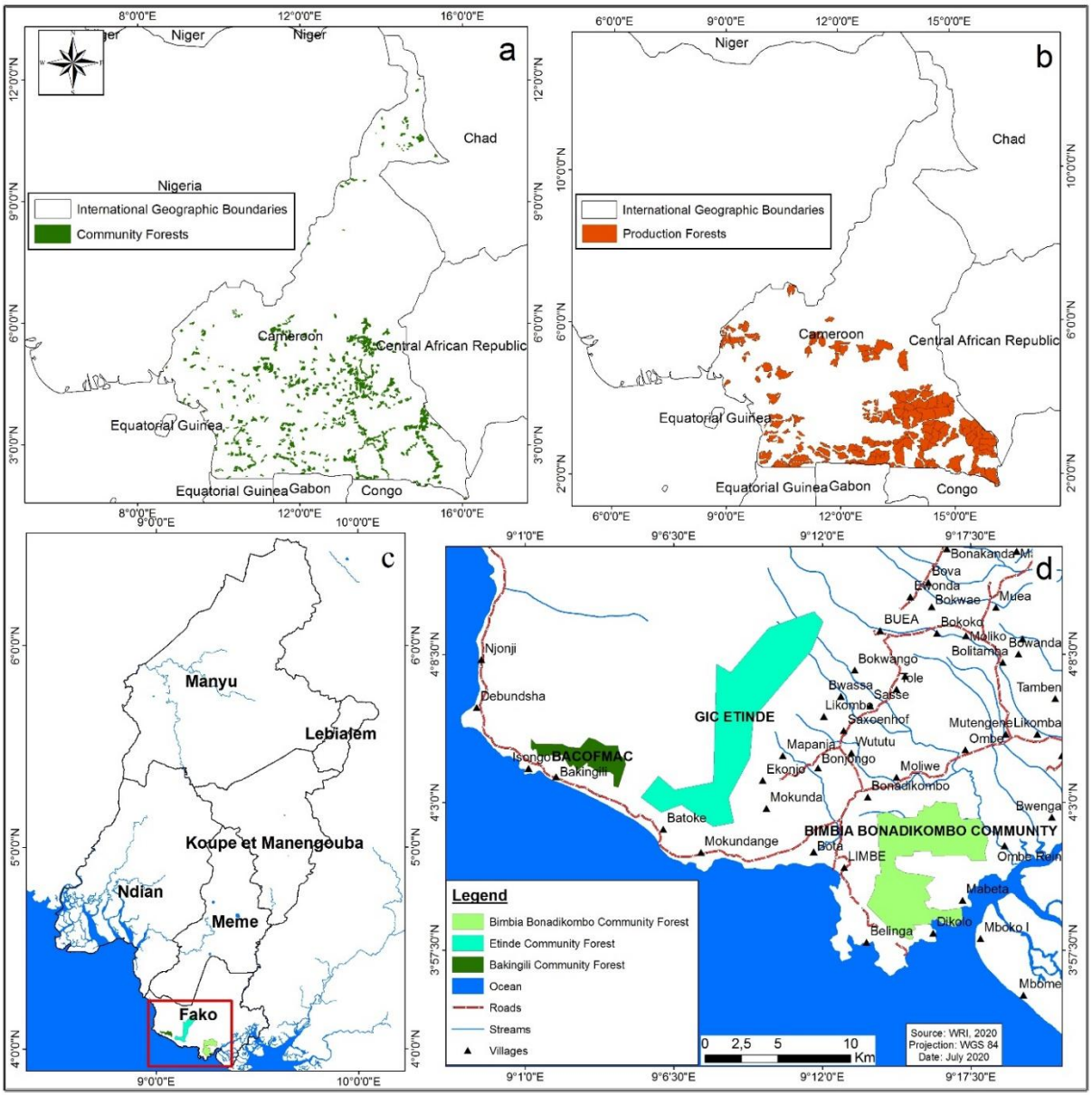

Figure 1. Location of a) community forests, b) production forests, c) divisions in the South west region with Fako division as case study area, and d) Bimbia-Bonadikombo, Bakingili and Etinde community forests in Fako division of the Southwest region of Cameroon.

2.2 Data collection

Data on forest loss were obtained annually at 30m resolution from the online Interactive Forest Atlas Maps of Cameroon, jointly developed and managed by the MINFOF and WRI and supported by ArcGIS. Forest was considered to be tree cover with greater than 30% canopy density across all the selected forest management types. This Geographic Information System GIS platform uses modern remote sensing technology to provide a complete cartographic database containing up-to-date forest management types (PA, PF, FR, and CF) and related activities in Cameroon since 2002 (MINFOF and WRI, 2012).

Basic spatial analysis of the different forest management types of interest in the GIS online platform was conducted to obtain the needed data on forest cover change. In the platform of the Interactive Forestry Atlas of Cameroon, we used the analysis tab, data and layer tools to extract data on annual total tree cover loss (forest loss) from 2001-2014, total tree cover gain from 2001 to 2012, forest cover composition, and other details for each targeted forest land use allocations. Data on tree cover gain (forest gain) were available only for the overall period of 2001 to 2012; and were not disaggregated annually like data on tree cover loss. The data on forest cover change (loss and gain) for each of the forest management type under study from 2001 to 2014 is available, respectively in the WRI and MINFOF online GIS database platform at: http://www.wri.org/resources/maps/forest-atlas-cameroon or https://cmr.forest-atlas.org/map.

The forest management types, their main objectives and tenure/land user rights is presented in Table 1. Data on forest loss were obtained from a total of 409 out of the 446 allocated CF for which data were available (Figure 1a). The CF with no data were mostly those located in the non-forest zones of the northern regions of Cameroon. Data on forest loss were also obtained from a total of 32 PA (National parks), 153 PF (Forest management units) and 51 FR, for which data were available in order to situate forest loss in CF into the context of overall forest management and forest loss in Cameroon. The data on forest cover change under the different forest management types were accessed online in March and April 2017.

Data on institutional analysis were collected using a semi-structured open-ended questionnaire administered to 39 members of the three case study CF management institutions following a purposeful or targeted sampling technique. This was followed by three separate focus group interviews with key members of each of the CF management institutions to harmonise and reach consensus on institutional perceptions on the management of each CF. The

contents of the semi-structured open-ended questionnaire and focus group discussion sessions were focused on the CF rights framework, government actions that secure and protect CF rights, government actions that undermine and erode CF rights, the challenges, level of satisfaction, and benefit-sharing mechanisms in the management of the CF. The completion of the focus group discussion sessions involved 12 members of the Bimbia-Bonadikombo CF, 10 members of the Etinde CF, and 9 members of the Bakingili CF institutions. The questionnaire and focus group data collection took place from August 2018 to March 2019.

The focus group discussion was aimed to allow the participants from each CF institution to reach a consensus and harmonise their responses to the questions. Semi-structured open-ended questioning and focus group discussion were used to guard against misunderstanding of complex and confusing questionnaire items and to ensure that informed and reliable answers for each question and shared experiences of the CF representatives were obtained. Additional informal conservations were held with twelve practitioners working with local environment and development NGOs in Buea, the Southwest region, as stakeholders who are familiar with forest management and conservation in Cameroon. The idea was to obtain their perceptions and gain perspectives on the recognition and protection of CF rights and government interventions impacting CF management in Cameroon. Literature review of forestry legal and technical documents and forest annual reports were undertaken to provide a better understanding of the laws and regulations related to forest management and forest rights in Cameroon.

2.3 Data analysis

For the forest cover change analysis, a One-way ANOVA with Tukey post hoc test was used to analyse variations in forest cover in the CF and government-managed forest types (PF, PAs and FR) from 2001 to 2014 in SPSS version 22. A Mann-Kendall trend tests was used to analyse trends in forest loss in three case study CF from 2001 to 2014 in XISTAT version 2020. The level of significance of 0.05 was used for all the statistical analysis.

For the institutional analysis, the perceptions of CF management members on government actions and CF rights were analysed qualitatively and presented in a matrix format. The idea was to establish a proximate association (not causation) between weak and no legal government recognition and protection or erosion of CF rights and forest loss in CF with reference to other forest management types, particularly PF. Results of the institutional

perceptions of CF rights and government interventions were classified into two categories. The first category was labelled as "forest rights fully recognised and protected leads to positive forest outcome (√)" or "forest rights not fully recognised or protected leads to negative forest outcome (X)". Positive forest outcome is seen as increased forest cover and decreased deforestation and carbon dioxide emission while negative forest outcome is seen as decreased forest cover, increased deforestation and carbon dioxide emission (Stevens et al., 2014).

2.3 Conceptual framework on community forest rights in community forestry

The study is guided by the forest governance framework of CF rights recognition and protection and government intervention actions in CF management developed and proposed by the Rights and Resources Initiative (RRI, 2012) and applied by Stevens et al., (2014). This CF rights framework was used because it is a best fit to assess CF governance using rights recognition, protection and government intervention indicators in relation to forest loss or gain. Other studies have used the five principles of good governance including transparency, participation, accountability, coordination and capacity as key performance indicators of CF (Davis *et al.,* 2013; Piabuo *et al.,* 2019).

Community forest rights are customary and/or legally recognized user rights exercised by local communities over their forests (Stevens *et al.,* 2014). Community forest rights are defined using key recognition and protection indicators such as access to/through the forest, withdrawal and use of timber, management, due process and compensation, duration, alienation, withdrawal and use of NTFPs, exclusion of illegal users, and ownership rights (RRI, 2012; Stevens *et al.,* 2014). The forest cover impact of the extent of legal recognition and protection of CF rights can be assessed by comparing the amount of forest cover loss in CF to other forest management approaches such as PF, PA, and FR (Stevens *et al.,* 2014). The CF rights framework is based on the premise that no or weak legal recognition and protection of CF rights and negative government actions undermines and erodes sustainable CF management resulting in increased forest loss and forest degradation.

Government actions in CF management can either be positive or negative. Positive government actions include documentation, enforcement, and provision rights. Negative government actions include exercising excessive bureaucracy, exercising complicity actions, granting mineral and oil concessions within a CF, colluding with local elites, retaining

administrative control and ownership of forest resources and land, and imposing high initial cost of investment for CF application. Thus, positive government actions "protect CF rights by securing the rights or helping the community obtain the full benefits of their legal rights while negative government actions weakens CF rights by neglecting to protect or undermining their rights" (Stevens *et al.*, 2014).

3. Results

3.1 Comparison of forest cover loss in different forest management types

Results of total forest area, total and mean forest loss, net forest loss and forest gain for CF, PF, PA, and FR for the period of 2001 to 2014, with statistically significant differences in forest loss between the forest management types is presented in Table 2. Total forest loss and mean forest loss varied significantly ($p<0.05$) between CF and other forest management types from 2001 to 2014 based on a One-way ANOVA as expected. Interestingly, forest gain was appreciably high in CF (Table 2). Total forest loss was highest in CF and PF, with significantly higher mean and total percentage of forest loss in CF than in the other forest management types. Forest gain in terms of cumulative percentage was lower in CF than in PF and PA, except for FR. However, forest gain in terms of number of hectares was higher in CF than in PA and FR, except for PF. It should be mentioned here that the aim is not to compare forest loss in CF with that in the other forest management types. The idea is to provide some context on how forest loss varies with different forest management types in Cameroon since geographical settings, forest qualities, and local historical contexts are different between the forest management types.

Annual forest loss in the Bimbia-Bonadikombo, Bakingili and Etinde CF showed some increasing trends from 2001 to 2018, with the most significant trend observed in the Bimbia-Bonadikombo CF (Figure 2). The observed increasing trend in forest loss in the three CF is consistent with the widespread prevalence of illegal timber, fuel charcoal harvesting and farming activities and land grabbing by a local agro-industrial company as reported by the CF institutions. These illegal activities occur mostly with the complicity of some corrupt local elites, and municipal and public administration authorities, particularly in the Bimbia-Bonadikombo and Bakingili CF. The Bimbia-Bonadikombo CF is surrounded by more densely populated villages, significantly higher settler and heterogeneous population and easily accessible due to

the low-lying topography and more urban location, which makes it vulnerable to encroachment activities.

Table 2. Forest cover change in different forest management types in Cameroon (2001 to 2014)

Forest management type	Total forest cover (ha)	Forest gain (ha)	Forest gain (%)	Total forest loss (ha)	Net forest loss (ha)	Total forest loss (%)	Mean forest loss (ha)	Mean forest loss (%)
CF	1,454,263	2,632	7.7a	34,257s	31,625	5.66a	2,447	0.40a
PA	4,550,516	1,464	17.1b	8,549s	7,085	0.23b	611	0.02b
PF	8,575,756	4,309	10.1a	42,483s	38,174	0.58b	3,035	0.04b
FR	1,049,863	403	6.5a	6,231ns	5,828	1.20c	445	0.08c

Data extracted from the Interactive Forest Atlas Map of Cameroon in March 2017 available online at: (http://www.wri.org/resources/maps/forest-atlas-cameroon or https://cmr.forest-atlas.org/map), developed and managed by the MINFOF (Ministry of Forestry and Wildlife) and WRI (World Resources Institute). CF= Community Forests; PA= Protected Areas; PF= Production Forests; FR= Forest Reserves. Different letters between rows indicate statistically significant differences at 0.05 using Tukey post hoc test. s= significant difference in annual forest loss within a forest management type and ns= non-significant difference in annual forest loss within a forest management type based on Tukey post hoc test.

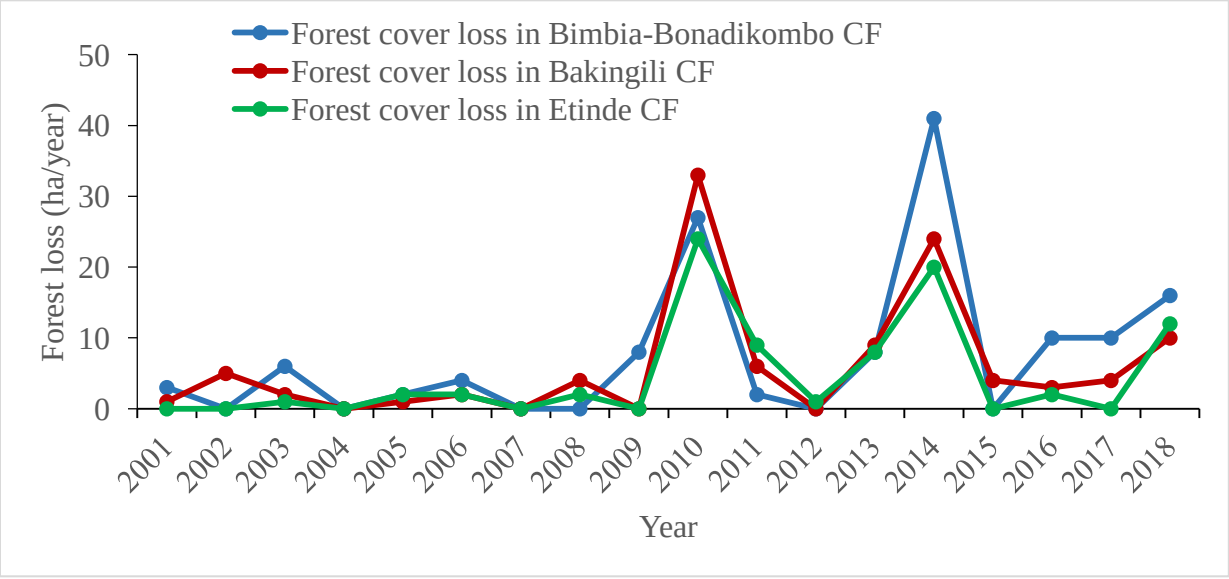

Figure 2. Trend in forest loss in the Bimbia-Bonadikombo, Etinde and Bakingili CF case studies. Blue line indicate Mann Kendall's tau = 0.355, S= 51.000, Var(S) = 665.667, p-value=0.053 for annual forest loss in the Bimbia-Bonadikombo CF. Red line indicate Mann Kendall's tau=0.299,

S=44.000, Var(S)=682.667, p-value=0.100 for annual forest loss in the Bakingili CF. Green line indicate Mann Kendall's tau=0.296, S=41.000, Var(S)=643.000, p-value=0.115 for annual forest cover loss in the Etindi CF.

The lower prevalence in illegal forest exploitation activities in the Bakingili and Etinde CF reported by the CF representatives could be attributable more to the dominant native and homogeneous rural population, lower population density villages, remoteness and mountainous topography of the CF.

3.2 Institutional perceptions of community forest rights recognition and protection in community forest management

Evidence suggest that even the CF rights that are legally recognized in the 1994 Forestry Law are frequently undermined or manipulated by government administration and poorly understood by CF management (Table 3). Only the access rights was reported by the CF representatives to be fully protected by the government forestry and administrative agencies. The Bimbia-Bonadikombo, Bakingili and Etinde CF institutions indicated that they have full right of access to enter and pass through the forest. In addition, they have full right to withdraw and sell timber and non-timber forest products to generate income for local development projects only after securing permission from MINFOF regional authorities (Table 3), but they do not have full right to legally issue small logging contracts to companies in the CF.

The Bimbia-Bonadikombo, Bakingili and Etinde CF institutions also agreed that they have full right of exclusion, that is, the right to legally refuse access to and use of the forest by members of other village communities according to the definition of exclusion in CF management in the 1994 Forestry Law of Cameroon. However, the implementation of such rights are often manipulated and challenged by corrupt local elites and municipal and public administration officers, particularly in the Bimbia-Bonadikombo CF. The CF institutions indicated that they do not have the legal right to exclude timber, agro-industrial or mining companies contracted by local elites or the government, especially in cases where the government sides with encroacher. This is because the right to exclusion of government activities in the CF is not enshrined in their simple management plan. Local managers of CF use billboards and periodic patrol to restrict individual illegal exploitation activities in CF.

Table 3. Institutional perceptions of community forest rights recognition and protection in community forest management

Community forest rights	Bimbia-Bonadikombo CF	Etinde CF	Bakingili CF
Access	√	√	√
Withdrawal and use of timber forest resources	X	√	√
Withdrawal and use of non-timber forest resources	√	√	√
Management	X	√	√
Due process and compensation	√	X	√
Alienation	X	X	X
Unlimited duration	X	X	X
Exclusion	√	√	√
Ownership	X	√	√

√ = Forest rights fully recognised and protected (leads to positive forest outcome), X = forest rights not fully recognised or protected (leads to negative forest outcome). Positive forest outcome is seen as increased forest cover and decreased deforestation and carbon dioxide emission while negative forest outcome is seen as increased deforestation and carbon dioxide emission (Stevens *et al.,* 2014).

The results thus indicate that the communities of the Bimbia-Bonadikombo, Bakingili and Etinde CF do not enjoy the full right of exclusion as defined and promoted by the Rights and Resources Institute (2012) in the CF management. The definition of exclusion rights in the 1994 Forestry Law of Cameroon points to the exclusion of only members of other communities, not other encroachers such as small and large timber, mining and agro-industrial companies. The CF rights that are legally recognized and protected by the government are enshrined in the simple management plan and final management agreement signed between the government and the designated local communities.

Furthermore, the Bimbia-Bonadikombo CF institution believed that they have the full right to follow due process and demand compensation from the government if the government makes effort to take one, several, or all of the CF rights, (Table 3). However, the right to due process and compensation is not documented in their approved simple management plan. In contrast, the Bakingili and Etinde CF institutions conceded that they have no right to follow due process and demand compensation directly against government's effort to take one, several, or all of the CF rights. This is because this right is also not enshrined in their approved simple

management plan. The Bakingili and Etinde CF institutions conceded that even if they had the legal right, the compensation procedure can be so complicated because the state is the owner of all land according to the 1976 Land Law of Cameroon.

In addition, corruption and bureaucratic bottlenecks make such legal procedures against the state unattainable. However, they have the right to due process and compensation if the illegal encroacher is a private individual, timber company or agro-industrial company such as a partly government-owned corporation such as the Cameroon Development Cooperation (CDC), who has long standing land grabbing presence in the area. The observed differences in the responses of the CF representatives on the right to due process and compensation might have been influenced by differences in local perceptions and experiences on government complicity with CF encroachers and accountability to local communities by CF managers.

The CF representatives agreed that they do have full legal right to make decisions about the management of the forest resources as the designated local managers of the CF following the simple management plan (Table 3). The government as a regulatory body intervenes in the management of CF by providing administrative support and management directives to the local managers of CF. The government require that local communities undertake annual harvesting inventory of proposed harvestable trees following a minimum cutting diameter of 60 cm. In addition they must obtain a "way bill" or lessez-passez and permission document from MINFOF regional office to officially exploit and evacuate their timber and non-timber products from the CF in order to ensure the sustainable management of CF. Although local communities have full legal right to manage their forest resources, the government retains unilateral decision making power over the management and use of forest land and resources as enshrined in the 1994 Forestry Law of Cameroon.

The CF representatives further assured that they do not have unlimited duration to exercise their forest rights as per their approved simple management plan and the 1994 Forestry Law of Cameroon. The 1994 Forestry Law only allows for conditional ownership of the CF by designated communities for a period of 25 years renewable. The CF representatives also indicated that they do not have full legal right to alienation as per their simple management plan and the 1994 Forestry Law. That is, they do not have the right to sell the forest to another person or organisation with conservation or development goal, use the CF as collateral for a loan or lease part of the CF to another.

Furthermore, the CF representatives stated that they have no legal right of ownership of the CF land and resources as per their approved simple management plan (Table 3). However, the Bakingili and Etinde CF institutions believed that they have full ownership of the CF land and resources (despite not backed by their simple management plan). This is simply because they see the forest as their biological and cultural heritage according to their customary tenure rights. However, local communities' rights to due process and compensation, alienation, unlimited duration, full exclusion, and full ownership and control of CF land and resources do not feature in the 1994 Forestry Law, and thus are not legally recognised and protected in CF management in Cameroon.

3.3 Institutional perceptions of government intervention actions protecting or undermining community forest rights in community forest management

Stakeholders of the three CF institutions indicated that they receive sufficient help in the mapping, demarcation and registering of the CF from staff of a government and German Agency for International Cooperation (GIZ) coordinated project called the Mount Cameroon Project (Table 4). The project paid for and facilitated the application process and approval of their simple management plan. According to the CF representatives, the demarcation and survey of the proposed CF boundary and the establishment of the CF land use plan, for example, was completed by the Mount Cameroon Project and the then Ministry of Environment and Forestry, after consultation with the natives as stated in their simple management plan.

Representatives of the three CF indicated that the government does not provide technical assistance or financial incentives to improve sustainability and market access of their exploited forest products or financial and material incentives to support the implementation of reforestation activities (Table 4). In addition, the government does not provide full access to information, and financial and legal resources to support the management of their CF. The high level of corruption, bureaucracy, bottle necks and lack of transparency within the forest administration of Cameroon hinders the flow of allocated financial resources from the central government to CF management units to support the sustainable management of CF. The central government imposes excessive bureaucracy and high initial cost of investment in the processing of application files for a simple management plan, and in granting commercial user rights for forest harvesting. The central government also retains administrative control and ownership over CF

land and resources. However, such inherent bureaucratic obstacles, financial and technical demands were circumvented by staff of the GIZ funded Mount Cameroon project, with the aim of reducing possible forest capture by corrupt community elites and promoting community land governance.

The Bimbia-Bonadikombo and Etinde CF institutions held that the cost involved in acquiring the CF is still greater than the economic benefits they have obtained from 2001 to 2019 from the CF. With institutional perceptions of excessive negative government intervention in CF management, local people may become even less incentivised for conservation activities. As a consequence, illegal encroachers may continue to practice indiscriminate wood extraction and unsustainable farming activities, leading to increasing forest cover loss.

Table 4. Institutional perceptions of government intervention actions in community forest management

Government intervention	Bimbia-Bonadikombo CF	Etinde CF	Bakingili CF
Positive government actions			
Documenting rights: e.g. mapping and registering a CF.	√	√	√
Enforcing rights: e.g. expelling illegal settlers and loggers.	√	√	√
Provision rights: e.g. technical assistance and incentives.	X	X	X
Provision rights: e.g. access to information and legal resources.	X	X	X
Negative government actions			
Excessive bureaucracy: e.g. delaying approval of use and withdrawal of CF timber and non-timber resources.	X	X	X
Complicity actions: e.g. Failing to act against illegal exploiters.	X	√	√
Granting mineral and oil concessions within a CF	√	√	√
Colluding with local elites to exploit high-value forest resources.	X	√	√
Retaining administrative control and ownership of forest resources and land.	X	X	X
Imposing high initial cost of investment to harvest timber.	√	√	√

√ = Positive government intervention (lead to positive forest outcome), X = Negative government intervention (leads to negative forest outcome). Positive forest outcome is seen as increased forest cover and decreased deforestation and carbon dioxide emission while negative forest outcome is seen as increased deforestation and carbon dioxide emission (Stevens *et al.*, 2014).

The Bakingili and Etinde CF institutions further indicated that the government or community elites have not sided with illegal exploiters or granted concessions or support to mining, timber or large-scale plantation companies to operate in their CF. In the few cases where illegal users of the above two CF have been reported to the regional forest and wildlife delegation officers, the forest law enforcement officers helps in expelling the illegal users from the CF. However, delays in emergency response are commonly observed in cases of government authority or community elite complicity with individual small scale chainsaw millers. In the Bimbia-Bonadikombo CF, a decentralized government administrative official was reported to unsuccessfully colluded with community elites who intended to engage in agro-industrial plantation development in the CF. In contrast, these authorities often successfully colluded with illegal commercial chainsaw timber and charcoal exploiters for their financial gains in the Bimbia-Bonadikombo CF.

The differences in the CF institutional perceptions could be explained by differences in the population composition of villages (native and settler villages) having compartments in each CF. Most of the villages having compartments in the Bimbia-Bonadikombo CF are dominated by settlers who have no cultural or biological connection with the forest land. They reportedly engage more in illegal activities such as illegal timber, charcoal exploitation and agricultural expansion that increases forest cover loss. Furthermore, the CF representatives revealed that they sometimes find it difficult to identify and define who a community member is and who has the right to use the forest resources due to the highly heterogeneous nature of the villages' population of natives and settlers compared to the situation in the Etinde and Bakingili CF. The Etinde and Bakingili CF institution also reported that they faced isolated cases of illegal exploiters of timber and charcoal by community members. However, the illegal exploiters are easily apprehended and sanctioned by the traditional council headed by the chief due to the highly homogeneous population with government intervention.

Therefore, the reported negative government actions such as not providing technical assistance, financial incentives, access to full information and legal resources; delays in approving the withdrawal and use of timber; colluding and complicity with community elites and public administrative officers engaged in illegal exploitation activities; and retaining full administrative control and ownership of CF land and resources undermines the success and sustainability of the CF management. This may constitute a push factor towards continuing and increasing deforestation and forest degradation activities in the CF by the local population.

4. Discussion

4.1 Dynamics in forest loss in community and govern-managed forest types

Annual and cumulative rates of forest cover loss in percentage of forest area were higher in CF than in the other forest management types. Verheggen *et al.,* (2016) reported higher rates of forest cover loss in CF, compared with annual rates of forest loss from <0.02% to greater than 0.1% in PF and rates of 0.01% to 0.03% in PA of Cameroon for the period 2001 to 2012. The higher rates of forest loss in CF could partly be explained by their allocation mostly in disturbed forest areas, located near roads and villages, which may be cleared following agriculture encroachment, leading to significant forest loss within them compared to PF (Essougong *et al.,* 2019; Verheggen *et al.,* 2016; Bruggeman *et al.,* 2014; Ezzine de Blas *et al.,* 2011).

Most CF areas in Cameroon have experienced decades of progressive uncontrolled human encroachment activities, such as large-scale indiscriminate industrial logging, small-scale illegal chainsaw timber exploitation, fuel wood and charcoal production, agricultural expansion and urbanisation pressure, driving higher forest loss in CF than in government-managed forest types (Verheggen *et al.,* 2016; Carodenuto *et al.,* 2015; Ernst *et al.,* 2013; MINFOF & WRI, 2012; Hosonuma *et al.,* 2012). In particular, conversion of forest to agricultural land use is not explicitly excluded in the simple management plan of CF in Cameroon and fuel wood collection and illegal timber extraction are highly prevalent (Bruggeman *et al.,* 2014; Lescuyer, 2013; Cerutti & Lescuyer, 2011; Cerrutti & Tacconi, 2006). Thus, agricultural and timber exploitation activities are by far the most important economic benefits of local communities at the expense of biodiversity conservation and carbon sequestration in CF (Beauchamp & Ingram, 2011) and other forest management types in Cameron (Ewane, 2021; Ewane *et al.,* 2021; Ewane and Lee; 2020; Ewane *et al.,* 2015).

The observed high figures of forest cover gain in CF is attributable to the obligatory reforestation through tree planting of mostly economic tree species. Stakeholders of the Bimbia-Bonandikombo, Etinde and Bakingili CF institutions reported that they engage in extensive reforestation involving the nursing and planting of economic and medicinal trees such as *Prunus africana, Entandrophragma angolenses, Microberlinia bisulcata, Lophira alata, Afrostyrax lepidophyllus,* and *cedrela odorata L.*, which have high market value. This, coupled with commitment to silviculture practices (selective timber harvesting for subsistence purposes) by the CF institutions (as stated in article 1.5.1 of the final management agreement), might have also contributed to the increased forest gain in CF in general.

Production forests are forest management units where strict inventory of tree species to be harvested are conducted based on the minimum cutting diameter and annual allowable cuts, thus are more effective at reducing forest loss than CF (Verheggen *et al.,* 2016; Bruggeman *et al*., 2014; Carranza *et al.,* 2014; Nolte *et al.,* 2013; Gaveauet et al., 2009; Andam *et al.,* 2008). This is because PF are managed by the government for timber production through forest concessions to sustain the national economy but with priority of biodiversity conservation. Production forestry follows a strict selective logging by timber companies and exclusion of gainful human activities by the local population (Ernst *et al.,* 2013; Lescuyer, 2013; MINFOF & WRI, 2012). In PF management, the government is more interested in protecting the commercial logging rights of private companies than protecting and safeguarding the forest rights of the local communities who depend on the sale of NTFPs to sustain their livelihoods (Merlet & Fraticelli, 2016). However, the comparatively higher forest loss in PF and FR driven by illegal chainsaw milling and poaching activities, which are commonplace within these forest concessions, supplying the domestic and regional timber and wildlife markets (Pye-Smith, 2010).

The higher percentage of forest loss in FR than in PF and PA suggests that FR less effective in reducing forest loss. Forest reserves as components of PF are technically designated for the production of timber and face significantly greater pressure from illegal timber exploitation and agricultural encroachment of cocoa and food production by adjacent local communities (Ewane *et al.,* 2015).

4.2 Government intervention in community forest management and implications to forest loss

The results in this study reveal that out of the nine CF rights proposed by the Rights and Resources Initiative (2012), only five are legally recognized by the 1994 national Forestry Law. The government of Cameroon legally recognizes communities' rights to access, withdrawal and use of timber and NTFPs, management, exclusion and trade of timber rights (Forestry Law of 1994; Mbile *et al.,* 2009; Oyono, 2009). Thus, besides negative government intervention actions in community forest rights implementation, the degree of CF rights recognition and protection in Cameroon generally limited by the 1994 Forestry Law.

Even the above lower rights that are enshrined in the approved simple management plan and national Forestry Law were reported to often being undermined, manipulated and not fully protected by designated state forestry and administrative agencies. Studies have reported that deforestation is lowest and forest health is highest when communities make their own rules and retain management authority of the community or indigenous forest (Blomley, 2013) as is the case in Tanzania, Honduras, and Nicaragua (Hayes & Persha 2010). Encroachment and deforestation are lower when communities have full legal right to exclude illegal settlers such as logging and mining companies from the forest (Larson *et al.,* 2010). Securing and protecting CF rights have had positive forest outcomes in terms of increased forest cover and reduced CO2 emission in some countries of Africa (Niger and Tanzania), Latin America (e.g. Brazil, Mexico, Guatemala and Bolivia) and Asia (Nepal) (Steven *et al.,* 2014).

Furthermore, traditional rulers and community elites are important stakeholders in CF management in Cameroon. But their role in driving the success and sustainability in CF management has been reported to be both positive and negative. In some case studies, enlightened local elites in Cameroon have been reported to be drivers of positive forest outcomes for many communities, especially when chiefs are usually presidents in the CF management committee (Piabou *et al.,* 2019). However, local elites and Chiefs have also been reported to engage in financial misappropriation and capture of CF land and resources to their individual interest at the expense of community rights and interests for which the CF was created by law. This is particularly when they invested financially and technically in the preparation of the application file and the simple management plan of CF (Essougong *et al.,* 2019; Piabou *et al.,* 2019; Nkemnyi *et al.,* 2016; Ezzine de Blas *et al.,* 2011; Oyono, 2009; Oyono *et al.,* 2007). This

has left some local managers of CF more accountable to various local elites and administrative authorities to maximise personal economic benefits, rather than serving their village communities for posterity (Oyono *et al.,* 2007). This goes contrary to the socio-economic objective of the CF approach that aims to "provide financial benefits and development opportunities to forest communities through a decentralization of forest management to stimulate a democratic and community-level management of resources" (Bruggeman *et al.,* 2015).

Therefore, the success of CF management in Cameroon is limited by non-recognition of some high level forest user rights in the 1994 Forestry Law and non-protection of some of the rights enshrined in the approved simple management plans of CF. These include tenure insecurity following the limited duration of management operation, lack of ownership of the forest land and resources, the lack of alienation and due process and compensation. The government of Cameroon reserves the right to suspend a management agreement and take over the forest concerned if she thinks that the CF is not well managed by a designated CF management entity (Essougong *et al.,* 2019; Oyono, 2009).

The non-recognition of these high level user rights in CF management in Cameroon may trigger unsustainable human exploitation activities in CF to achieve the maximum economic benefits within the legal tenure period, leading to increasing forest loss in some CF. This obvious lack of tenure security may further decrease community willingness to engage in enrichment planting as part of their reforestation obligations and may increase unsustainable exploitation practices and the chances of deforestation by the local population in CF. This is consistent with the observation that tenure insecurity does not motivate people to invest in sustainable land-use practices (Holden & Otsuka, 2014).

Therefore, the failure of the 1994 Forestry Law of Cameroon to give local communities higher levels of CF rights could be seen as a fundamental issue in the sustainable management of CF, consistent with findings of other studies (Mandondo, 2003; Brown, 2002; Oyono, 2009). Higher rates of forest cover loss in CF over the past two decades in Cameroon may be attributed to no or weak recognition and protection of only some and not all of the established legal forest rights of indigenous and local communities, consistent with the findings of other studies (Zulu *et al.,* 2014; Naughton-Treves & Wendland, 2014; Stevens *et al.,* 2014; Robinson *et al.,* 2013). Results from other studies indicated that forest loss is higher in CF when government colludes with local elites to capture high-value forest resources (De Wit & Stevens, 2014).

In addition, forest loss increases in CF when the government fails to act against or side with illegal exploiters (Community Forest Association, 2013), grant mineral and oil concessions within a CF (Oxfam, 2014), or imposes excessive bureaucracy in the application process for awarding CF (Larson, 2011). Negative government actions and no or weak legal recognition of forest rights have been associated with increased forest loss in Colombia, Ecuador, Honduras, Nicaragua, Peru, Indonesia, and Papua New Guinea (Stevens *et al.*, 2014). These can be crucial in the viability of CF and its capacity to positively impact livelihoods in forest-dependent communities in Cameroon (Beauchamp & Ingram, 2011).

The CF institutions expressed delightfully that they enjoy good cooperation and less conflict of interest in the participatory management of the CF, a formidable asset for the sustainable management of CF. Stakeholders of the three CF institutions indicated that the situation with the designation of a CF offers increased forest protection and benefits more people and user groups (subsistence hunters and farmers, NTFP exploiters, and sawn wood exploiters) than a situation before the creation of the CF. Bruggeman *et al.*, (2015) reported that community members associated CF with strong decrease in forest protection and losses of community livelihoods, more than strong increase in forest protection and high benefits to local communities from CF. In addition, the CF institutions reported more equitable sharing of the benefits accruing from the sustainable exploitation of the forest resources. This suggest some downward accountability by the local managers in the forest benefit sharing and increased regulation and sustainability in the management of CF in Cameroon (Beauchamp & Ingram, 2011; Brown, 2002).

Globally, non-governmental organisations (NGOs) play important role in conservation and livelihood development in CF management. The Environment and Rural Development Foundation (ERuDeF), a vibrant national NGO has been instrumental in promoting best practices and better user rights for forest dependent communities to achieve joint conservation and livelihood development objectives. Government forest agencies such as the Mount Cameroon National Park Service implementing GIZ funded projects under the Programme for the Sustainable Management of Natural Resources (PSMNR-SWR) are also providing capacity building and technical support to the Bimbia Bonadikombo, Etinde and Bakingili CF managers to promote the sustainable forest management. Their combined efforts would contribute to reducing forest loss and improving local development. Therefore, positive government

interventions in CF management is invaluable to streamline CF governance objectives and implementation actions to contribute to positive forest outcomes in line with the national biodiversity strategic action plan and national forest policies.

The differences in perceptions on user rights entitled to CFs among the three CF representatives highlights a clear gap and the lack of common understanding on the Forestry laws governing CF management in Cameroon. Thus, education and sensitization on what forest rights are enshrined in the 1994 Forestry Law and applicable to CF management is urgently needed for CF managers and local population. More lobbying by NGOs and CF managers for improved recognition and protection of forest rights is invaluable for the realisation of joint conservation and livelihood development benefits in CF management.

Therefore, CF rights such as unlimited tenure, ownership, alienation and trade, due process and compensation should be officially and legally added and strengthened in the national Forestry Law and simple management plan of CF. It will not only help in reducing the chances of deforestation activities by local communities in CF, but also will be a good motivator for community-led tree-planting activities, which requires investment and confidence in the ability to reap long-term benefits. The study provides supporting evidence that CF contributions to attaining the SDGs, relating to conservation and incentivising local development has been largely underwhelming for over two decades of community forestry in Cameroon. The ongoing Anglophone separatist conflict in the two English-speaking regions of Cameroon threatens effective forest governance in this part of the country.

4. Conclusions

The study explored forest loss in community- and government-managed forest types in Cameroon from 2001 to 2014, using satellite-derived data of forest cover change in an interactive GIS platform, developed and managed by MINFOF and WRI. The legal recognition and protection of community forest rights is associated with communities' willingness and readiness to prevent deforestation. Thus, the study evaluated the extent to which CF rights are legally recognised and protected in the community forestry approach, and whether government actions protect or undermine CF rights in relation to forest loss in Cameroon.

The significantly increasing trend in forest loss in CF from 2001 to 2014 is due to higher levels of diffuse agricultural expansion and illegal timber and fuelwood/charcoal exploitation

activities in CF compared to other forest management types, with more restricted forest user rights to communities. Community forest has not contributed to reducing deforestation and increasing local development in Cameroon as expected, since its inception more than 20 years ago. Mainly, government recognition and protection of only some of the CF rights might contribute to increasing deforestation activities by the local communities. They may become even less incentivized to engage in biodiversity conservation and ecosystem restoration activities based on prevailing conditions.

In addition, negative government actions in CF management might further contribute to undermining the willingness and readiness of local communities to prevent deforestation and engage in enrichment planting of trees as part of their CF management obligations. Therefore, all the recommended CF rights should be legally recognized, protected and strengthened by the government of Cameroon to increase success and sustainability in CF management and its expected contributions to biodiversity conservation and livelihood development in Cameroon.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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