

Article

Community-Based Actors and Participation in Rangeland Management. Lessons from the Western Highlands of Cameroon

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Abstract: Participation is a key component in socioecological systems (especially rangeland) governance. Yet, in many parts of sub-Saharan Africa (SSA), this attribute is yet to be fully understood and/or mainstreamed in natural resource management. This suggests the need for renewed learning on how actors are (dis)engaged in rangeland governance. With a litany of studies focusing on rangeland transformation, complementary evidence which unpacks actor's participation in rangeland management are required in SSA. Through a survey of 333 households from 12 pastoral communities in Cameroon's Western Highlands, this paper (i) maps the interactions of rangeland actors, (ii) analyzes actors' participation in rangeland institutions and in the implementation of management approaches, and (iii) discusses their potential implications for rangeland governance. Using the socioecological coevolution approach as analytical lens, the study revealed the following: (1) state and non-state actors demonstrate overlapping interests, and form temporary alliances to pursue these interests, (2) pastoral households' participation demonstrate a wavy tendency—with activity-specific participation in decision making and grazing activities (facilitated by catalyzing agents) as opposed to nominal and passive participation in arbitrary boundary setting. (3) The wavy participation spectrum translates to suboptimal resource use, differential and fragmented engagements, and adaptation to changing resource circumstances. The results enhance our understanding of actor dynamics in socioecological systems, and provides relevant information to support Cameroon's environmental management policy with emphasis on her cattle rearing kingdoms.

Keywords: socioecological systems; actors; interests; participation; conflicts



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1. Introduction

Natural resource management at local levels should, in principle, be advanced by local stakeholders, in a bid to address socio-environmental issues [1]. This could potentially optimize natural resource use, and strengthen bottom-up processes [2,3]. Sustainable natural resource management depends, in part, on the existence of regulations, and the degree of compliance by appropriators [4,5]. Viewed as structures (e.g., community-based groups) and processes (e.g., customs) [6], their governance spectrum, actors and the interplay of institutions are primordial [7]. These account for diverse resource management outcomes [8–10]. The structural component of community-based governance (institutions) has been linked to power asymmetries, in which powerful actor groups define local resource management processes—largely to their favor [11]. Communities that depend on socioecological systems for their livelihoods present a useful justification for the strengthening of local resource governance systems. This is further justified by the failed centralized systems that hardly considered the complex interactions, needs and interests of local resource users around socioecological systems (SESs) [10,12–15]. Put succinctly, such failed processes are partly attributed to the “misconceptions about local power processes, and the inability of those involved to use traditionally developed institutional settings or to transform them

in a participatory way to create local ownership of the process and its outcomes” [2,16]. Therefore, in-depth empirical evidence on the dynamics around SESs remains primordial. SESs denote complex systems involving resource systems (rangelands in this case), their resource units (e.g., pasture), appropriators (e.g., pastoralists), and governance systems (e.g., rangeland management rules) that continually interact to produce (sub) optimal outcomes [17]. These systems provide a useful landscape to understand the ramifications of the socioecological coevolution framework [18,19]. The socioecological coevolution framework explains the points of connection between the social system (e.g., community of graziers), their decisions and the governance parameters (institutions) that shape them, and the ecological system—rangelands [18]. This interaction is mirrored through the nature and magnitude of rangeland access, use and management by rangeland actors. These interactions occur at the interface (management segment) of the framework. The model provides a useful lens to appreciate current levels of pastoralists’ engagement in decision making, and in the enforcement of rangeland management guidelines, with a view to discuss potential evolutionary pathways for both natural and human systems in communities.

Diverse local resource management approaches exist in several contexts of the Global South, including Asia [20–23], Latin America [24,25], and Africa [26–29]. In North Africa, this manifests through the application of community-based approaches in rangeland management and the livelihood sustenance of pastoralists in Morocco [1]. In Sub-Saharan Africa, it is exemplified through participation in irrigation that rewards farmers paying dividends i.e., participatory approaches to irrigation development in Tanzania [27], the rediscovery of practical, low-cost soil and water conservation methods (tassa) in semiarid West Africa, especially Niger [28], and in the prevention of land conflicts by providing a step-by-step support in decentralizing the land administration system in Madagascar [30]. In Cameroon, participatory tree domestication [31], irrigated rice cultivation [32,33], ‘night paddocking’ for soil fertility restoration [34], and forest conservation [20], all depict local resource management mechanisms. In such schemes, the role of community-based actors through their participation is crucial; their interactions in resource management offers new management models which are grounded on grassroots institutions.

Participation is critical for achieving optimal management outcomes around SESs (including rangelands). Though it is not a universal requirement, participation is a quality of some modes of governance, such as community-based or other decentralized governance models [20,35–37]. In the context of this study, participation denotes the engagement of rangeland actors (mainly pastoralists) in decision-making, and in the eventual application of guidelines for the sustainable management of rangelands. This process requires the collective engagement of all pastoralist households that stand to benefit from the resource system. Participation is very important considering the demographic pressure on rangeland ecosystems, coupled with climatic caprices. Moreover, there is rising interest not only from traditional pastoral groups, but also from state and non-state actors. Agrawal [35] developed a typology of participation with six levels, to describe who is expected to be involved, the goals of participating in an activity and the means to attain these goals. The first level prescribes nominal participation, often simply characterized by membership to a group [38], followed by passive participation that involves attending meetings without engaging in decision-making, soliciting opinions from the participants, but not really using them to inform decision-making (consultative participation). The fourth level is activity-specific participation, where one is requested to complete predetermined tasks. At the fifth level, there is active participation, where one may offer unsolicited opinions and initiate certain activities. The highest level is interactive participation, which involves affording all participants an equal opportunity to make decisions which are crucial to the functioning of the group, and in the achievement of organizational goals [35].

Of significance to this study is the notion of [35] that participation significantly influences in several ways resource use and environmental programs. Participation can be used to (a) enhance performance, (b) promote joint planning and problem solving, and (c) enhance social inclusion, improve equality and reduce vulnerability [39]. Intrinsically,

stakeholder involvement in communal governance processes portray different levels of participation, depending on the level of organization in pastoral communities [40]. Participation has been echoed in science and policy circles, as an ingredient in community-based development processes [41–43] and natural resource (esp. rangelands) governance processes [20,35,44]. Despite its romanticization, the ramifications of this governance attribute is yet to be effectively mainstreamed in the regulation of natural resource access, use and management in many parts of SSA. The balance-sheet is telling; fragmented policy design and implementation, conflictual land uses, and agro-pastoral conflicts [33,45,46] with their attendant consequences. To define new management pathways, up-to-date scientific knowledge are required in different contexts on the typology of rangeland actors' participation in several governance processes, including decision-making and the subsequent implementation of rangeland management approaches. This paper provides evidence from 12 rangeland communities in Cameroon's western highlands. Using a mixed methods approach, the study: (1) maps the interactions of rangeland actors, (2) analyzes actors' participation in rangeland institutions and management, and (3) discusses their potential implications for rangeland governance. The results provide new theoretical insights on the dynamics around the interface in the socioecological coevolution framework. This paper is structured as follows: Section 1 presents the introduction of the paper, while Section 2 discusses the analytical framework which is anchored on the socioecological coevolution model. Section 3 explains the methods of data collection and analysis, while Section 4 presents and discusses the results.

2. Analytical Framework

The Socioecological Coevolution Model

The socioecological coevolution model is an emerging concept to further shed light on the engagement of resource users in socioecological systems in the design and management of the resource system [47,48]. It is a systems approach that analyzes the interactions between the social system and the natural environment [49,50]. The model is rooted in two main theoretical perspectives [51]: the first perspective is related to the theory of coevolution between the social system and the natural environment [52,53]. The second theoretical perspective of the socioecological coevolution model is related to maintaining the resilience (Figure 1) of a system [51]. The term 'resilience' here refers to the ability of a system to absorb disturbances while still retaining its primary functions and structural components [54]. Due to the dynamic and unpredictable nature of the socioecological system, it is difficult to establish rigid management approaches that aim to control a particular situation [55]. By clarifying the interactions between the social and natural systems (shaped by governance parameters such as participation), the model explores evolutionary pathways for rangeland resource users (through decision making and the enforcement of regulations), and on the improvement of the ecological set up of rangelands.

The model is an important tool to shed light on the sustainable management of natural resources in the face of uncertainty and unexpected changes [56]. It provides a lens to appreciate the dynamic linkages between rangeland resources and existing institutions with indigenous strategies. In this context, our emphasis is on the dynamics around the interface of the framework. It is at the interface that actors within the social system interact to shape rangeland management. The framework also symbolizes the co-evolutionary relationship between the society and the natural environment, and respects the carrying capacity of the ecosystem [57].

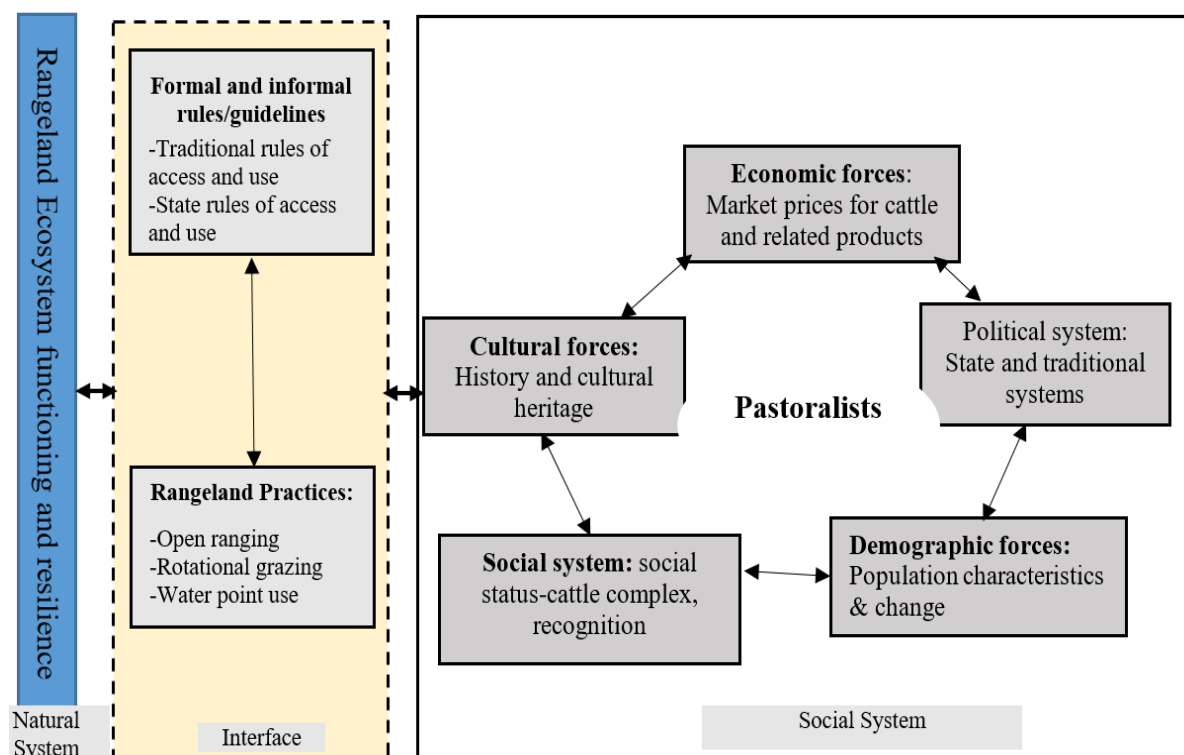


Figure 1. Socio-co-evolution in rangelands of the Western Highlands. Source: Derived based on [51–53].

3. Methodology

3.1. Description of Study Area

The Western Highlands of Cameroon has a cultural landscape which is typical of the grassfields. Its vegetation is dominated by herbaceous savannah from particular edaphic conditions and fire climax that extends across the highlands. Grass composition is largely dominated by *Hyparrhenia*, then *Sporobolus pyramidalis* or *Panicums* with a mix of *Lophira*, *Termanalia*, and *Daniella phragmitoides*. The population density stands at 100 persons per square kilometer, suggesting the need for increased application of natural resource management regulations to enhance sustainability. The cattle population is estimated at 506,548 heads, grazed on communal lands (MINEPIA 2018) with over 59 cattle heads per household. The socio-spatial organization of grazing communities in the region shows over 68 grazing communities (Ardorates) found in the seven divisions of North West Cameroon (Mairomi, 2016). From these communities, 12 were purposively selected and grouped into four clusters (Table 1); cluster 1: Kukube, Dumbo, Akwinto (Donga Mantung), Cluster 2: Berlem, Itoh, Ndzeng (Bui), Cluster 3: Fungom, Upkwa, Waidodown (Menchum), and Cluster 4: Ndawara (Ngoketunjia), Ntunir, and Tan. The cluster sampling procedure was employed because the study units cut across the different altitudinal zones; high altitudes (>1500–3000 m), mid-altitudes (1000–1500 m), and low altitudes (<1000 m). Pastoral communities were thus selected and clustered based on site topographic differences, to cover the major units in the area. The pastoral population is organized into grazing communities (Ardorates) with community leaders (Ardors). The region is also characterized by significant ethnic and cultural diversity [38]. While farming is largely practiced by the native Tikar population, pastoral activities, notably, cattle rearing is handled by the Fulani. Through participation in management, collective choice arrangements have been practiced and continue to evolve to suit circumstances with different outcomes in this region.

Table 1. Questionnaire distribution in the target clusters.

Cluster 1, Dumbo: Large grazing acreage, stocking density (2–4 Tropical Livestock Units per hectare), large cattle ownership per household over 100 heads. First cattle production hub in the region		Cluster 2, Bui Plateau: High elevation pastoral grounds (1500–3000 m); plateaus, hills, relatively big pastoral population, small grazing areas rapidly dwindling, high stocking density 3–6 TLU/ha, high weed infestation (Agogo)		Cluster 3, Jakiri-Ndawara stretch: High elevation pastoral grounds (1500–3000 m); plateaus, hills, relatively big pastoral population, small grazing areas rapidly dwindling, high stocking density 3–6 TLU/ha, high weed infestation (Agogo)		Cluster 4, Menchum: Moderate to large grazing areas, 2–3 TLU/ha stocking density, mid altitude (1150–1600 m), relatively bigger pastoral communities. Moderate weed infestations of mixed <i>Chromolaena odorata</i> and Brackern fern	
Locality	Households and No. of Questionnaires	Locality	Households and No. of Questionnaires	Locality	Households and No. of Questionnaires	Locality	Households and No. of Questionnaires
Dumbu	111 (35)	Berlem	127 (35)	Ntunir	119 (34)	Upkwa	108 (30)
Kukube	92 (27)	Ndzeng	84 (26)	Tan	52 (22)	Fungom	122 (33)
Akwinto	117 (34)	Itoh	62 (22)	Ndawara	46 (22)	Waidodown	88 (27)

Source: Authors' compilation, 2018.

3.2. Methods

A mixed-method approach was used in data collection and analysis. The preparation and design of the research instruments (questionnaire and interview guide) was done between the months of January and April 2018. During this period, preliminary field studies were undertaken and necessary adjustments made to the research instruments. The questionnaire was composed of 17 questions; 10 open-ended questions for pastoralists and 7 closed-ended questions (Appendix A and Section A). The questionnaire was organized into the following sections: section one centered on community-based actors and their interactions, section two focused on participation in rangeland resource use and management. The third section captured questions linked to compliance in collective choice arrangements, while section four dwelt on the implications of state and nonstate actors in rangeland management. Primarily, we selected four clusters (Table 1). From each cluster, three pastoral communities or *Ardorates* (grazing units) were randomly selected. In total, there were 12 pastoral communities grouped into four clusters. The clusters are spatially distributed to cover the four main cattle rearing Divisions of the Bamenda Highlands, these include Menchum, Bui, Donga Mantung, and Ngoketunjia Divisions. Pastoral households and cattle statistics from the Divisional and Regional Service of Surveys and Statistics of the Ministry of Livestock, Fisheries and Animal Husbandry (MINEPIA) were consulted. A sample frame of 0.3 was used in which 333 pastoral households were sampled. The survey targeted pastoralists above the ages of 20 who could better appreciate the grazing practices and institutional changes within their grazing zones. The procedure was also gender sensitive, as 16% of the questionnaires were administered to women. The respondents also cut across small to wealthy pastoralists. The administration of the questionnaire followed a systematic random sampling approach. The first author selected respondents using a skip or interval, i.e., after every 2 or 3 households, a pastoralist household was targeted. Therefore, not every household was involved in this process. A translator facilitator some of the interviews as both Pidgin English and the Fulbe languages were used.

Open-ended questions were analyzed through categorized themes from where extracts were taken. For instance, themes linked to pastoralists' interactions and participation (following Agrawal's typology) were derived and used to develop the narratives. The close-ended survey data was quantified into simple statistics (e.g., percentages), and presented using tables and charts. Vital quantitative information was retrieved relating to rangeland use, participation, cattle movement, access and stocking units, cattle distribution, grazing practices, and pastures. Data obtained was presented in tables, charts and in percentages. This information was complemented by direct field observation and interviews. Interviews were used to complement the questionnaire-based survey findings espe-

cially on issues related to management and stakeholder involvement. As such there were 17 interviews; 2 in Berlem, 2 in Fungom, 3 in Kukube/Dumbo, 3 in Upkwa/Waidodown, and 2 in Ndawara and Ntunir. After the survey of pastoralists, the issue of overlapping interest was consistently raised by the respondents. To ensure better comprehension of this phenomenon, data triangulation was done, in which state actors and catalyzing agents were interviewed. Thus, five officials of some catalyzing agents were interviewed including the SNV, and HEIFER international. Furthermore, The Divisional Delegates of Cameroon's Ministry of Livestock, Fisheries and Animal Husbandry (MINEPIA) for Menchum, Bui and Donga Mantung Divisions, were interviewed, using an interview guide (11 items). Key informant interviews targeted some key persons such as *Ardos*, livestock delegates and some elderly pastoralists, focusing on some key aspects notably participation, grazing strategies, access, user rights, control, and adaptation. Qualitative data was obtained, transcribed into extracts, and categorized for retrievals. Our analysis was conducted through narratives and thematic analysis, relating to pastoral resources protection, participation, compliance, decision making processes, and conflict management. We extracted recurrent themes relating to rangeland management, stakeholder involvement, interaction of actors, and their implications. Different variables were also used to analyze the different objectives (Table 2); domain of interest for the interactions of rangeland actors (objective 1), actors' participation in rangeland use practices (objective 2) and the actual and potential impacts on rangeland governance processes (objective 3).

Table 2. Analytical variables.

Objective	Variables	Indices
Map interactions of rangeland actors	Domain of interest	Disease control, pasture, conflict management, advocacy, livelihood, grazing
Actor's participation in rangeland institutions and management approach	Rangeland use practices (means)	User boundaries, integration or eviction, rangeland loss or enhancement, altered fire regimes, stocking density, range infrastructure
Actual and potential impact on rangeland governance	Management processes	Stakeholder engagements, design, implementation, rule enforcement knowledge sharing, use outcomes

Source: Author's elaborations, 2018.

4. Results

4.1. Community Actors and Resource Stakes

The rangelands of the Western Highlands of Cameroon are characterized by a diverse group of actors in different grazing communities. We thus had a retrieved distribution of 20–30 years (16%), 31–40 years (24%), 41–55 years (32%), 56+ (28%). First, there are pastoralists notably the Mbororo and Aku (Fulani) who hold different cattle species such as the White Fulani, the Red Fulani and the Gudali. These are the major stakeholders settled in the diverse landscape of the region with their various households grouped into communities with grazing acreages. Coevolution has been key as resource users have been directed to shift from pastoral nomadism that was successful in the precolonial and early post-independence periods, providing rest and rotation. This became problematic with time, giving way to sedentary pastoralism due to limited land and changing demographics. Land management has remained wavy as state tenure laws (especially the 1974 land ordinance) created tenure duality with the customary tenure. This created difficult circumstances to delineate land for full managerial purposes as rangelands were categorized under the state domain. Land appropriation became precarious. Though informal, grazing strategies are evolving and adapting to social and environmental circumstances. The wavy tendency refers here to the irregular, and at times passive and poor engagement of pastoralists in rangeland management initiatives due to (de)motivating factors like unclear tenure, and produces fragmented results.

Secondly, there are state and non-state actors with overlapping interests. We have the state and its various departments involved in livestock management with plural objectives;

disease management, pasture improvement, livestock infrastructure, livestock development, and animal fattening. The state created MINEPIA to harness livestock production in the country. This ministerial department is found at regional, divisional and sub-divisional levels. However, its activities are limited to disease management through vaccination and to a lesser extent, on the creation of pasture demonstration centers. Other state agencies are CDENO, the Livestock development organization (SODEPA), the North West livestock development Fund Grassfield Participatory and Decentralized Rural Development Project (GP-DERUDEP). Due to limited support offered to pastoralists, nonstate actors (catalyzing agents) are greatly involved in participatory approaches and some being very daring and implicated in improving resource use outcomes. The overlapping roles with state actors are evident in field initiatives. Evidence based overlap in interest and functionality is noticed in conflict management, the infusion of technology, pasture, and livestock infrastructure improvement and in land use reforms (Table 3). In some cases, these points of contacts are not rosy, creating conflicts and in others, there are points of complementarity. While unclear boundaries continue to exist due to poor state tenure laws, the role of MINEPIA and administrative officers (divisional officers) is often conflicting with those of agencies like the Netherlands Development Organization (SNV) creating dialogue platforms, farmer–grazier commissions, and carrying out sensitization on land management policies for resource users. Nevertheless, complementarity is viewed in the activities of MINEPIA and SNV with regards to the building of the pastoral code of Cameroon (draft law on pastoralism). The SNV on several fronts, sensitizes pastoralists on land tenure and advocates for better land use security. This led to the setting up of over 48 dialogue platforms in the North West Region that reduced farmer–grazier conflicts by 65% between 2002 and 2016.

Table 3. Overlapping interest of state and non-state actors.

State Actors	Overlapping, Conflicting and Complementary Domains, Interest/Interventions		Catalyzing Agents
	State Actors	Non-State Actors	
MINEPIA	Land Use Conflict Management (Overlapping and Conflicting)		SNV
	Farmer–grazer commissions	Dialogue platforms	
	On the one hand the state through MINEPIA with administrative authorities create farmer–grazer commissions to solve conflicts on boundaries. Duties performed by dialogue platforms created by the SNV further sensitizing users on land matters. More coordination and complementarity needed for better institutional results		
MINEPIA, SODEPA	Pasture Improvement (Complementary but Lagging)		TDCS, SNV, APSS, SHUMAS
	Demonstration centers	Reseeding, participation in pasture/agroforest	
	The actions of MINEPIA and SODEPA are limited to teaching pastoralists how to grow pastures in few demonstration centers not often attended by all pastoralists. This is complemented by some non-state actors that work together with pastoralists to plough, reseed, grow pastures and trees. Still limited in few grazing areas		
SODEPA, MINEPIA	Technology Infusion (Overlapping)		TDCS, APSS, HEIFER
	Hybridization, insemination, exotics and local breeds, livelihood improvement	Hybridization, artificial insemination exotics and local breeds, livelihood improvement	
	Virtually the same role for state and non-state actors in different areas in improving breeds with more resistance and productivity. While SODEPA activities are limited, catalyzing agents are reaching out to pastoralists. The TDCS inseminates in all its dairy districts. The overlap demands more collaboration to effectively assist pastoralists		

Table 3. Cont.

State Actors	Overlapping, Conflicting and Complementary Domains, Interest/Interventions		Catalyzing Agents
	State Actors	Non-State Actors	
GP-DERURDEP, CDENO, MIDENO, Local councils	Livestock Infrastructure (Overlapping and Complementary)		USAID, EU
	Dips for disease control, cattle crouches, water schemes, construction of fences	Dips for disease control, cattle crouches, local participation and partnerships in materialization	
	Individual sponsored initiatives in most cases but some few short-term alliances between state actors and non-state actors to materialize some schemes.		
MINEPIA	Land Use Reforms (Complementary)		SNV
	Land use governance, policy changes and advocacy for the draft law on pastoralism	Institutional/resource use governance, advocacy pastoral code, policy reforms, institutionalization	
	Land use reforms advocated by state and non-state actors to improve tenure, grazing rights, map transhumance tracks, manage pasture and water. A draft law realized by the two for governance on pastoralism		

Source: Author's elaboration derived from interviews, 2018.

More so, there are catalyzing agents. By catalyzing agents, we refer to conservation and development non-governmental organizations (NGOs) who, despite their incomplete neutrality in the institution-building process, support the creation of a relatively open platform for local debates, thereby reducing transaction costs for organizations and catalyzing communicative action that can enhance social learning in co-management [48]. They include the Netherlands Development Organization (SNV), the United States Agency for International Development (USAID), HEIFER Project International (HPI), Association pour la promotion d'Elevage au Sahel et en Savane (APESS), dairy cooperatives, and NGOs like Strategic Humanitarian Services (SHUMAS).

Pasture cultivation notably *Briachiaria ruziziensis*, *Pennisetum clandestinum* and *Guatemala* is promoted to provide sufficient on-site pasture and reduce movements. MINEPIA, as a state actor, promotes the creation of pasture demonstration centers without visible landmark support to grazing communities. Its contributions remain piecemeal as pastoralists complain of limited trickle down. On the contrary, the Tadu Dairy Cooperative (TDC) actively participates with graziers, in carving out key areas, providing seeds for reseeded and contributing barbed wire for fencing. Other catalyzing agents like the USAID provide funding for reseeded, organize meetings to train pastoralists on hay production, and follow-up on pasture harvest. The interaction of actors in the interface with rangeland resources through participation in management is presented in Figure 2. The dynamics of institutions around the interface impacting collective choice arrangements is very important in resource use.

The actions of these agencies complement the actions of SODEPA which pastoralists acknowledge is still limited. However, those of organizations like HEIFER and TDC reignites the zeal to participate and improve pasture and water management. This is justified by the fact that with improved species and the quest for household incomes by women through milk collection, a more integrative participation is instilled within the pastoral landscape. Despite the well-meaning efforts from state and nonstate partners to improve pastoral security, these initiatives are mainly ephemeral and fragmented. Furthermore, their project-oriented focus with a short time span, and the lack of strategic planning, limits positive outcomes [38]. Additionally, there has been poor coordination amongst various actors, with the result being that some of the good practices developed were hardly shared, up-scaled or replicated.

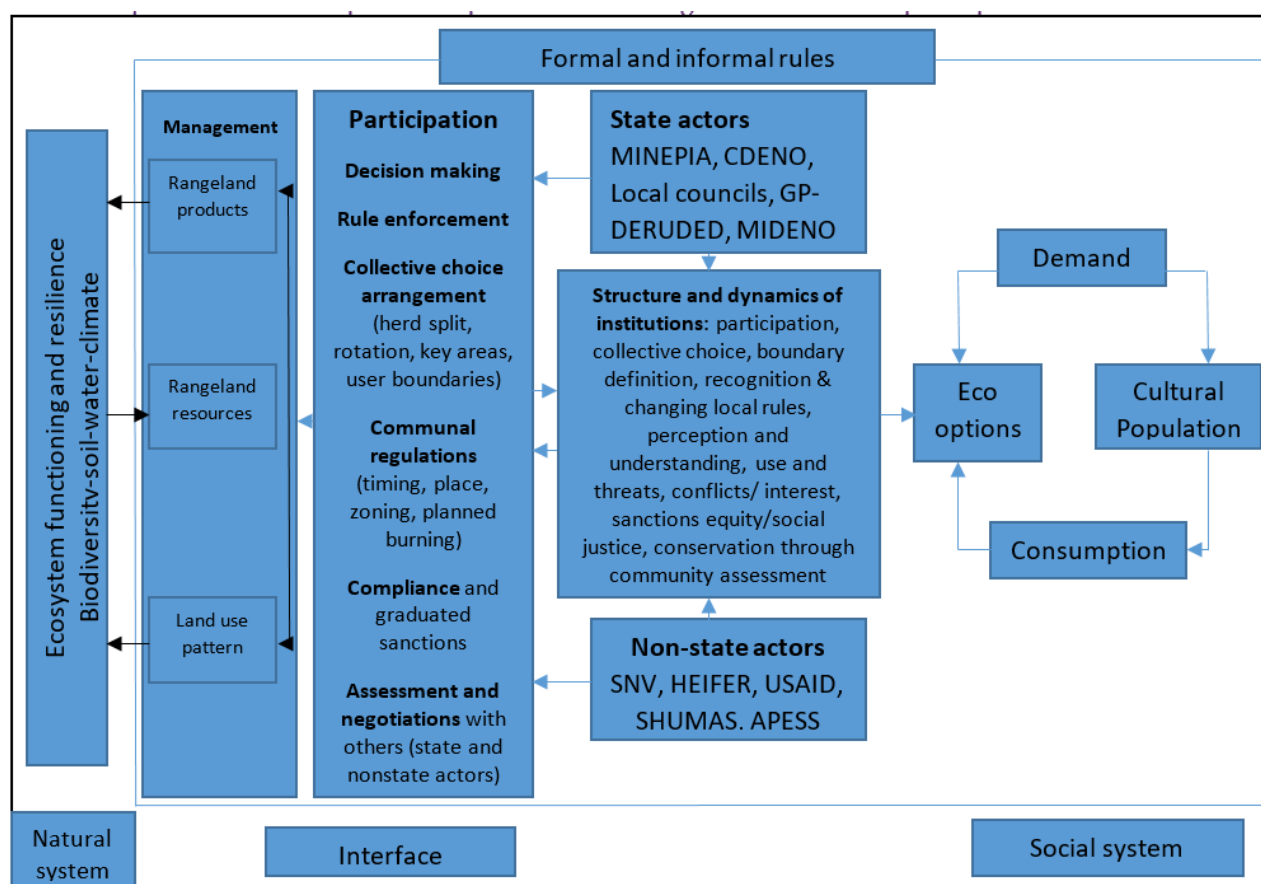


Figure 2. Socio-co-evolution in rangelands of the Western Highlands. Source: Derived based on [51–53].

4.2. Social Fencing and Resource Use

In the socio-spatial disposition of *Ardorates*, grazing communities identify resource users as pastoralist and are well known within their zones. Who has access to grazing, where and when to graze, is regulated in the community. Entry into most grazing areas was highly controlled, as most of the pastoralists take part in reporting and controlling pastoral resources. Additionally, limits are set for cattle holdings as they hardly go beyond 400 heads (for the larger units like in Akwinto) and if beyond, the grazer sends them to other grazing areas. However, in smaller grazing areas, it is set at 200 heads. Through participation to conserve the environment, such limits are set within the community. However, the absence of a clear cut physical boundary (Table 2) retards effective governance and management of these rangelands. The interest in physical boundary delimitation revolves around identifying grazing acreage for pastoral communities (*Ardorates*), mapping limits between pastoral areas and neighboring farming zones and strengthening limits. Moreover, land conflicts especially farmer–grazier conflicts have been recurrent. However, participation to some extent, remains nominal and passive because of conflicting boundary recognition by resource users. As such, pastoralists may participate in decision making but not in implementing rules, despite recognizing the limits. An *Ardo* in Ntunir notes “we know our boundaries and participate to respect them, but in some cases, we cannot make them very rigid especially when it comes to seasonal movements due to the spatiotemporal variability of resources and the use of cattle tracks. During grazing, some grazers transcend their limits” 17th March/2017/Ntunir. As such, pastoralists partake in decision making but only respect boundaries to some extent. The greatest efforts to improve boundaries by pastoralists were made with the collaboration of SNV, in sensitizing and assisting communities (over 48 communities). However, some short-term alliances between state and nonstate actors provided better case scenarios for participation by pastoralists. Only in the Itoh grazing

community with the assistance of the Africa 2000 NGO and MINEPIA, that pastoralists have well materialized boundaries with active participation in communal rules. However generally, boundaries recognized by pastoralists, remain unclear (Figure 3).

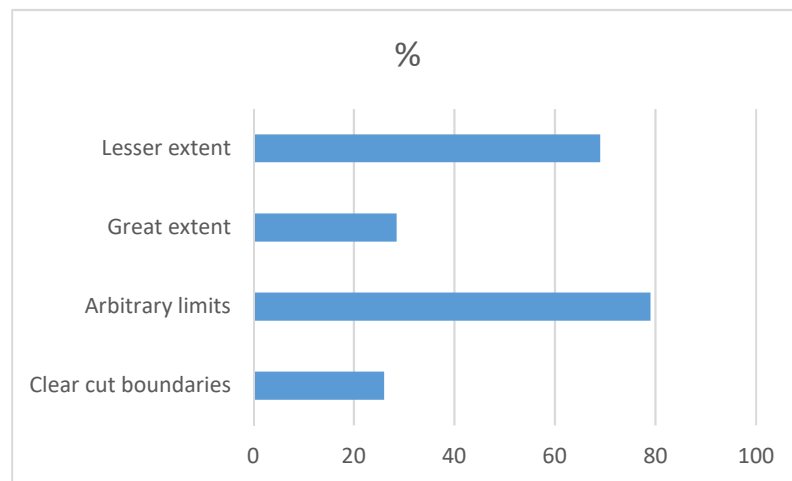


Figure 3. Respondent perception on boundary definition. Source: Field work, 2018.

Pastoralists confirmed at over 79% of not having clear cut boundaries. It was reconfirmed that to a lesser extent (69%), there are arbitrary demarcations. In fact, only 26% admitted that there are well defined boundaries (replicated at 28.5% of unclear limits) and these demarcations were noted in few instances with barbed wire fencing and live hedging. It was only in the Itoh community that virtually every grazer admitted having clear boundaries with a grazing permit. With the aid of local councils (that demarcate grazing units for Jangali assessment, cattle tax) and catalyzing agents notably the SNV through advocacy with MINEPIA in short term alliances, boundaries are increasingly being mapped and secured. Huge communal efforts, complemented by state and nonstate actors, have shaped community norms to Agrawal's high level of interaction and equality among resource users. Nevertheless, the precariousness around land appropriation has had different impacts on the rangeland landscape (Table 4). The short-term complementarity in such cases sheds light on the need for coordination in participation with pastoralist in rangeland settings. This could have greater implications for rangeland policy in Cameroon.

Table 4. Problems related to arbitrary land boundaries.

Problems of Poor Boundary Demarcations					
Cluster	Locality	Conflicts	Dwindling Rangelands	Land Grabbing	Unsecure Tenure
Cluster 1	Dumbo 35	22	19	10	24
	Kukube 25	16	20	11	19
	Akwinto 32	19	23	13	16
Cluster 2	Berlem 35	20	25	23	19
	Ndzeng 26	15	21	10	14
	Itoh 22	08	09	11	08
Cluster 3	Ntunir 30	17	24	08	20
	Tan 20	08	14	09	14
	Ndawara 22	17	20	22	20
Cluster 4	Upkwa 28	18	21	20	13
	Fungom 33	19	25	11	13
	Waidodown	14	19	18	17
333		192 (58%)	233 (70%)	166 (50%)	197 (59%)

Source: Field work, 2018.

Dwindling range space (70%) is the main aspect noted around unclear boundaries. Rangeland loss is tagged with other land uses, especially cropland encroachment with population growth over the years. Other related implications are conflicts (58%), land grabbing (50%), and unsecure tenure (59%). Conflicts among land users especially between pastoralists and farmers have increased over the years. Yet, these problems are handled at the level of grazing communities with informal rules and disciplinary sanctions that are not really binding.

4.3. Participation in Grazing Strategies

Participation through community-based resource management manifests through consensus-based informal arrangements in grazing communities (*Ardorates*). The first level is in decision making. Pastoralists were observed to be highly participating in crafting rules for rangeland management in different *Ardorates*. This stood at 95% (Cluster 1), 97% (Cluster 2), 97% (Cluster 3), and 94% (Cluster 4). Participation in consensus informal arrangements is even higher when catalyzing agents providing short term funding and technical assistance. Being Muslim inclined, most Fulani meetings are organized on Fridays after their prayer sessions with the community leader (Ardo) serving as chairman. Rule enforcement by the community is not highly binding and participation is not significant. Here, participation is more context specific (Agrawal's fourth level participation) according to the resource use aspects involved with the interest of the pastoralist. This is explained by flaws like boundary issues, individualistic tendencies, getting the best of community resources, and the absence of very binding disciplinary sanctions. Enforcement of rules by the Ardo and some Elders was much easier for herding practices. Moreover, short term alliances of pastoralists with local councils and catalyzing agents like the SNV, resulted in stricter rule enforcement. It is in this context that stakeholder complementarity needs to be reinforced between the state and nonstate actors to affect policy on rangeland and environmental management.

Participation observed at the level of grazing management portray succinct measures of pastoralist in rangeland management. This applies to the use of traditional technologies (Table 5). Some of these include herd splitting (77%), avoiding areas recently vacated by other pastoralists (73%), rotation in grazing (82%), reserved key areas (51%), and the use of browse in animal treatment. Pastoralist engagement in grazing practices are situated in Agrawal's fourth level (activity-specific participation) with compliance to communal rules and execution of certain tasks. Table 5 paints a picture of some of the resource use tasks.

Table 5. Indigenous strategies of self-governed institutions used in grazing.

Indigenous Strategies Used in Grazing					
Cluster	Locality	Herd Splitting	Evasion of Recently Vacated Areas	Rotation in Grazing	Reserving Key Areas
Cluster 1	Dumbo 35	28	24	33	12
	Kukube 25	18	15	23	14
	Akwinto 32	24	22	32	17
Cluster 2	Berlem 35	30	28	29	15
	Ndzeng 26	20	26	22	11
	Itoh 22	19	22	22	22
Cluster 3	Ntunir 30	17	13	10	20
	Tan 20	16	16	18	11
	Ndawara 22	17	14	18	8
Cluster 4	Upkwa 28	21	24	22	14
	Fungom 33	30	22	27	16
	Waidodown	19	18	18	10
Total	333	259 (77%)	244 (73%)	274 (82%)	170 (51%)

Source: Field work, 2018.

Communal regulations relate to grazing, timing, place, and zone that regulate management. As more than 90% of pastoralists reiterated that they know when, where, and the time to graze, this has enhanced grazing in their various communities. Due to such rules, zoning has been developed that has made provisions for temporal restrictions in grazing, resting, pasture rotation, protection of water catchments and boundaries to fit rotation in grazing. Over 82% of pastoralists attest to rotation in Ardorates to provide rest, ensure pasture regeneration and growth and most importantly to avoid degradation. Nevertheless, in some localities, there are signs of degradation either related to carrying capacity or reckless exploitation of pastures especially in slopes.

Other key technologies applied through participation are enclosures that involve permanent or temporary access, control of livestock to a designated area by physical or social fencing and rotational grazing that subdivides grazing into a number of physical enclosures or mostly with social fencing. The few cases of fences realized through communal efforts especially with the support of catalyzing agents exclude cattle from cropland and others from a given area. Though costly when physical fences are constructed, sequence grazing in rotation with changes in pasture rotation provide rest for optimum pasture growth and avoids overgrazing. Through meetings in Ardorates, pastoralists are sensitized on herd splitting and the heritage of Fulani pastoral grazing. About 84% of the pastoralists practice herd splitting. The reasons advanced include the grouping of animals of a particular age, type (white Fulani, Gudali, Red Fulani, exotics like Brahman and Holstein Friesian and crossbreeds of exotics and local Fulani cattle), sick and lactating animals, bulls and heifers. From open ranging to more engaging attitudes, indigenous strategies have shaped resource use over time. In few areas fully demarcated with full user rights or security like the Itoh community in Oku, every grazer with more than 50 heads of cattle practices herd splitting. Key areas are often reserved around settlement to facilitate easy follow-up of pregnant, sick, and lactating animals that need special attention to reduce risk vulnerabilities.

Water management for pastoralists has hardly been a problem except during the dry season (spatiotemporal variability) when transhumance is practiced. It is noticed that indigenous knowledge especially past experiences play a great rule in its management. A key informant recounts that *“past problems like concentration in particular spots led to trampling, degradation and even landscape change with bare surfaces. . . we therefore separate herds and direct them to different river valleys and also include the respect of turns to reduce such problems”* Male respondent in Yaya/Akwinto/20 March 2017. Participation is noticed in watering which is often done at mid-day. These ensure the efficiency and resilience of their grazing strategies (Table 5). The norms put in place to ensure equitable water harvest provides for the separation of herds to different streams to avoid concentration and trampling of riverbanks, slopes and paths used to these streams [7]. Thus, in some Ardorates, some graziers move their cattle first to streams and on leaving before others can come in. In others, cattle herds are directed to different locations within the same grazing unit. More than 86% of pastoralists agreed to the respect of this norm and 81% accepted that they are always reminded by “Ardors” to respect this rule. Due to changing resource circumstances and demographics, informal institutions existing in Ardorates have strengthened existing norms (unwritten rules) regarding cattle movement and water harvest. Ardors enforce them with some elders. Field evidence indicates active participation from pastoralists with higher interactions, and the sharing of ideas in practice. Through weekly and monthly routine meetings, pastoralists have shaped informal strategies according to context to optimize use, reduce degradation and conflict.

Key interviews brought to light the fact that in herd splitting, there is zoning in “Ardorates” that defines the timing and grazing location (Table 6). The indigenous ecological knowledge is well rooted in the diversity of the landscape and the different pastures, browse according to context relating to grass composition. To adapt to the dynamic topography, smaller ruminants like goats and sheep are grazed at higher altitudes like Mount Oku (2000–3010 m) to reduce degradation of some peculiar (endemic) species like *Alchemilla fischeri*, *Agrostis manii*, *Habenaria obovate* (2600–3000). Moreover, these high alti-

tude areas are basalt pavement grassland, rocky grassland, summit grassland and scrub, more adapted to smaller animals notably goats and sheep. Pastoralists view herd splitting and zonation as a way of finding a compatible and equitable strategy in grazing that ensures flexibility in their ecosystem.

Table 6. Community rangeland practices.

Locally Crafted Rule (Technique)	Practice	Significance
Rotation in grazing	Timing, place and zone; avoiding areas recently vacated by others	Sequence grazing, rest and fallow, regeneration and optimum pasture growth, reduction in overgrazing and ensuring sustenance
Herd splitting	Division into groups of 50–100 heads, animals of the same age, types (Red Fulani, White Fulani, Gudali, Exotics, bulls)	Avoiding concentration Planning reproduction, rational grazing
Boundary definition (enclosure)	Social and physical fencing, river valleys, hill summits, user boundaries	Identification, exclusion of others, control of access, limits concentration and encourages spatial cover, reduction in conflicts
Reserves	Small enclosures with better pastures or browse (especially for treatment), improve species like Guatemala, agroforest trees	Pasture for lactating and sick animals, improve breeds, resilience against shock and reduction in losses
Water management	Inherent community grouping, partitioning into groups, respect of turns	Certainty of access, avoids concentration, reduction in trampling of slopes and riverbanks
Planned burning	Patchy burning according to sections with instructions from the Ardorate	Fence protection, reduction in environmental destruction, pasture regeneration and elimination of disease pest niches, fire mastery
Zonation	Herd split according to ruminants, small ruminants more in altitude	Reduction in degradation and spatial coverage for effectiveness

Source: Adapted from [7].

4.4. Compliance to Rules

Rule compliance is varied and relies much on tenure problems and security. This could be viewed across different clusters with compliance being significantly higher in Cluster 2 especially in the Itoh grazing community (92%) where collaboration with Africa Network NGO secured the community a grazing permit through participation. Aspects of Agrawal's fifth and sixth levels of participation are manifested here with active involvement and interaction amongst pastoralists. Compliance stood at more than 70% and security gave more incentives for the respect of communal rules. It is noticed that social fencing (user rights, 68%), rotation in grazing (75%), and restrictions to fire use (62%) were relatively higher (Figure 4). However, problems around use, and contributions in water schemes are still limited. Water managed as a community resource recorded high levels (active) of participation in water harvest by pastoralists. The respect of place and time of water harvest stood at 82% (Cluster 1), 89% (Cluster 2), 81% (Cluster 3), and 79% (Cluster 4). It was relatively low for initiatives in livestock infrastructures like crotches. It is in such domain where state actors like GP-DERUDEP, CDENO and non-state actors like USAID provide financial and technical assistance.

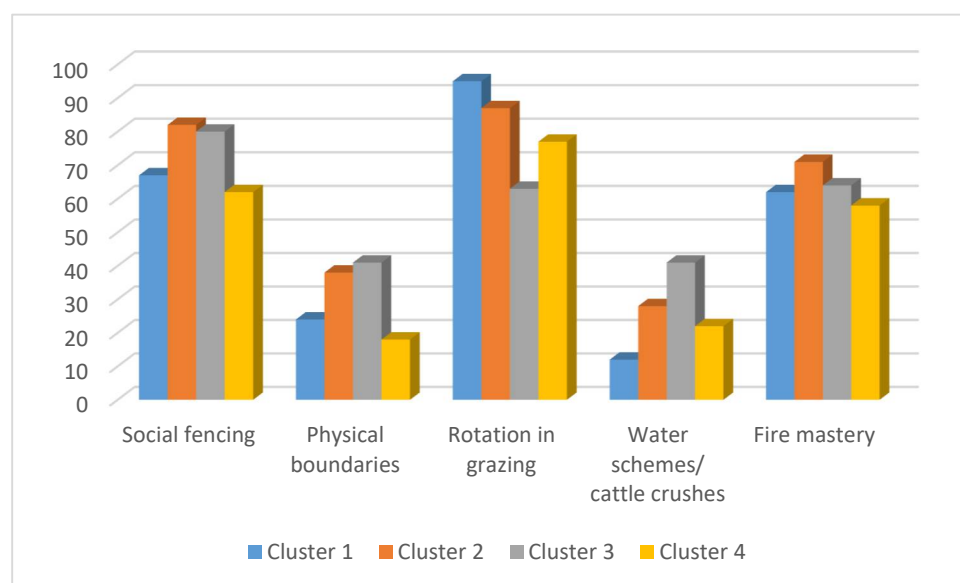


Figure 4. Percentage respondents in participation for communal rules. Source: Authors elaborations, 2018.

Relating to fire use, community fire use during the dry season for clearing old rank grass, to control disease and pests, and for pasture regeneration is increasingly mastered through participation. Collective labor is employed in creating fire breaks. In areas where there are fences, creating fire breaks to protect these fences is made compulsory, with individual pastoralists obliged to make contributions ranging from 2000FCFA to 6000FCFA. Unplanned indiscriminate burning was noted in the past with different atrocities destroying fences, biodiversity and water catchments. Today, indigenous strategies in community commitments use fire for pasture regeneration, clearing of old rank grass and disease pests are managed with rules from Ardorates on the time and place to burn. Most respondents (88%) noted that burning is slated for the dry seasons, between late February and early March. Hot and destructive fires of January and early February are therefore avoided with growing climate change impacts noted during this period of seasonal transition. The respect of this rule is enforced by the Ardos and to some extent MINEPIA delegates. Burning is totally prohibited around key pasture reserve areas and water catchments. This critical examination demonstrates evolutionary changes in socioecological knowledge and adaptations to resource situations. The modification in rules empowers the community, promotes shared values and commonality of interest, and reinforces advocacy for more inclusive rangeland policy.

4.5. CBMs and Coevolution in Rangeland Governance

Through Community Based Management (CBM) and participation, there has been evolution in the processes and strategies nursed within indigenous institutions adapting to evolutionary resource circumstances. There has been a swap from pastoral nomadism practiced when the land was not yet sufficiently taxed and movement provided the necessary rest to sedentary pastoralism with only seasonal migration to transhumant sites. Cattle population increases and human population growth warranted settlements within grazing units and more responsibility and identification of resource users. Secondly there has been a move from open grazing systems where user rights were not secured and where grazers from other areas could move to other locations in search for pastures to the growing security in user rights in tenure. In fact, each grazing unit now has a clear cut number of pastoralists though physical boundaries are still problematic. Thirdly, due to the delimitation of boundaries, community collective choice arrangements relating to grazing practices (herd split, rotation, zonation,) has been promoted. In some cases, it

includes better pastures (*Brachiaria ruziziensis*), agroforestry (Caliandra), the modification of water regimes and crossbreeding of local cattle with exotics for better performance. The role of catalyzing agents in improving decision making, resource base and livelihoods has been unprecedented. Fifth, due to sedentarization, there has been greater adaptation and resilience with spatiotemporal variability of resources, and the mapping of transhumant cattle tracks and grazing dates relating to climate variability. Moreover, grazing communities through CBMs are providing better platforms to address power asymmetries with multiple stakeholders and interests in rangelands. Sixth, dialogue platforms manage interest and conflicts for better resource use outcomes as more graduated sanctions are born relating to resource use and discipline.

4.6. Community Participation and Imprints of Catalyzing Agents

The adherence of community members to consensus based or collective choice arrangements are limited in rangelands due to tenure security problems, dwindling range and the degradation of the commons. Most respondents noted that with their grazing areas facing different problems such as degradation, weed infestation (more than 62% of rangeland is weed infested, [33]), range loss and boundary issues, predatory behavior continues in circumstances where every grazer strives to get the best of the communal lands. Nevertheless, community-based participation is enhanced with catalyzing agents targeting more grassroot initiatives. These agents notably the SNV, HEIFER, SHUMAS, TDCS, USAID, and UNDP facilitate participation (Figures 5 and 6) in decision making (10%), pasture and water (7%), conflict management (25%), advocacy on tenure security (28%), and technical and financial assistance (30%). Worth noting is the fact that the contributions of catalyzing agents build more tenure security (dialogue platforms helping in boundary recognition, sensitizing and advocacy on tenure), invest in more community incline projects, and provide prospects in funding. This explains why besides participation (92%) in communal grazing strategies in rangeland governance among pastoralists, that of catalyzing agents is recognized through participation (67%) amongst pastoralists and those of government agencies at 33% (Figure 3).

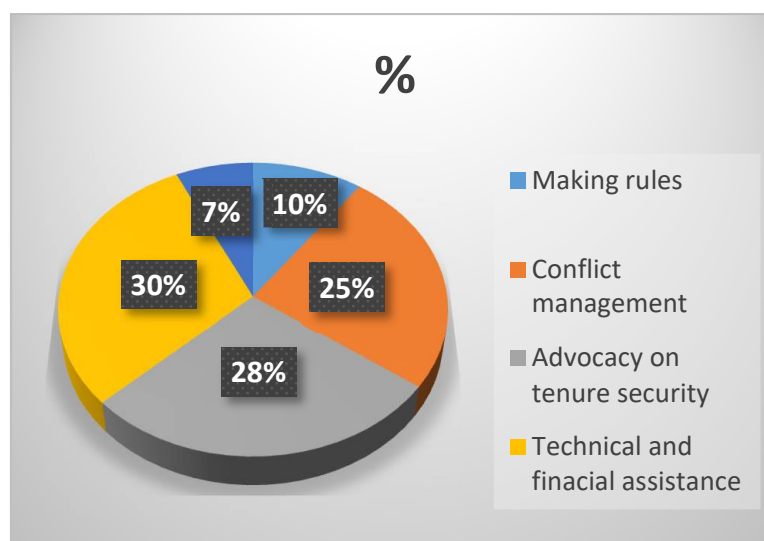


Figure 5. Contributions of catalyzing agents to community-based management. Source: Field work, 2018.

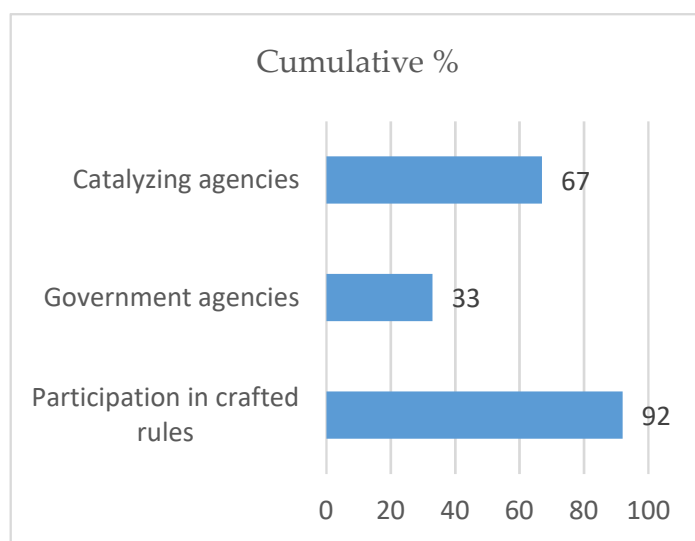


Figure 6. Respondents' appreciation of state, nonstate actors and community engagements.

5. Implications of Actor's Overlapping Interests and Differential Levels of Participation

Differential and fragmented engagements translate to an overlap and in differential levels of participation for state and non-state actors. Implicated at different levels with diverse interests, there is a growing tendency for actors to pursue their individual interests—this precipitated fragmentation in their engagements. With such context specific interest engagements, pastoralists participate more at the decision-making level and where their interest matters most. However, they become passive where arbitrary boundaries exist. Instead of the multiple stakes to be consolidated, actors have often been seen in their individual quest adopting a divided approach. Secondly, short-term alliances result in some instances and facilitate their engagements. For instance, the SNV and MINEPIA had to ally farmer–grazer commissions and dialogue platforms in some instances to address conflicts related to boundary issues, sensitize pastoralists and farmers as well as build on these experiences for advocacy in land use reforms. Thirdly, there are different resource use outcomes. Where a more coordinated scenario occurs, pastoralists are more active and interactive getting the best they can from state and non-state actors. The results are better land use and rangeland products. In other instances, participation is engaged when catalyzing agents provide technical support and especially funding. However, when short term support is withdrawn, divisive individualistic tendencies resume. Nevertheless, due to changing socioecological circumstances, pastoralists are strengthening their indigenous resource use through grazing strategies and compliance to informal rules in Ardorates. Nevertheless, consolidating actor complementarity and coordination across stakeholders in rangeland management is a big lesson for Cameroon's environmental management policy.

6. Discussion

Participation in community-based resource management is key for rangeland settings. The socio-co-evolution model provides a useful analytical lens on how resource users continue to adapt community knowledge to resource use in community structures. Despite problems witnessed, social and ecological knowledge of institutional structures play a key role in adapting changing resource circumstances, improving livelihoods and building resilience with multiple stakeholders in rangeland settings. There is a wavy history of institutions especially in Sub-Saharan Africa. The manifestations of informal institutions which took the form of consensus-based decentralized systems [58–60], was quite effective in regulating resource use for the amaZulu and amaSwati people, and the Batswana people [61,62]. It equally shaped access and use rules for natural resources in Mali [63] and Botswana [8]. The case of the Western Highlands of Cameroon is rooted in grassroot

pastoral communities living a communal life and having a rich pastoral heritage. The limited technical, institutional, and financial capacity of the state saw the streaming in of outside catalyzing agents, whose actions were further compromised by state influence [20]. State and nonstate actors demonstrate overlapping interests, and often form temporary alliances to pursue these interests. However, unclear circumstances like tenure problems push pastoral household's participation to demonstrate a wavy tendency with significant participation in decision making and grazing activities (especially with implication of catalyzing agents), and nominal or passive participation in the respect of rules in boundary use. This wavy participation spectrum affects current rangeland management in terms of suboptimal resource use, differential and fragmented engagements, adaptation to changing resource circumstances, and conflicting outcomes. In this study, we derived the following key lessons: (1) there are grazing units (Ardorates) with a wealth of historical experience well located in time and space in the western highlands of Cameroon, among Fulani graziers. They are continuously harnessed in communal grazing management through conceived strategies. (2) Bottom-up strategies conceived through participation in decision making for collective choice arrangements work more efficiently in sustainable rangeland management by indigenous institutions, and guarantees optimum resource use outcomes and livelihood improvement. (3) The survival of CBMs depends on social control and daily organization management (grazing controls), intimate knowledge of the physical environment, resource management techniques, and the sociopolitical status quo defining tenure issues. (4) Community grazing units provide a good base and platform to instill dairy cooperatives that manage milk and the interest of pastoralists as well as household incomes. Nevertheless, through coevolution, herding practices in community-based management continue to build resilience and adaptation to changing socioecological context with different stakeholders. Through commitment, informal institutions at the interface of rangeland environments and socioeconomic systems provide different approaches to changing resource circumstances to optimize resource use and outcomes.

7. Conclusions

This paper explored the interactions of state and nonstate actors around rangelands in the western highlands of Cameroon. Furthermore, the paper investigated actors' participation in rangeland institutions and management, and discussed their actual and potential implications for rangeland governance. Based on the analysis, the following conclusions are drawn: firstly, the multiplicity of actors around natural resource sites (rangelands in this case) is both a blessing and a curse; as a blessing, a handful of actors render complementary activities which contributes to improve upon the health of rangelands. Some of these complementary actors and activities include state agencies (SODEPA, MINEPIA) and non-state actors (SNV, HEIFER) involved in tenure advocacy and conflict management, pasture improvement, disease management, and improving institutional strategies. As a curse, the multiple overlap and conflictive interests and actions, transform rangelands into veritable natural resource battlefields [18], putting the sustainability of these systems to question. Understanding how to consolidate actor complementarity represents one future avenue of research to be prioritized. Secondly, a disconnect exists with regards to actor's engagement in decision-making and in the management of rangelands; while pastoralists participate sparingly in decision-making, they are even more engaged at management level (field-based activities). This creates a gap in the coevolution of rangelands. Thirdly, pastoralist participation and institutional performance at the level of grazing communities (Ardorates) show differential and fragmented engagements depending on how harnessed the resource base is. Consolidating the resource base is an important axis to improve rule enforcement and compliance. There is a necessity for inclusive, workable and participatory legislation [64]. On this basis, more research can focus on how government policy and institutions can be more implicated in community driven initiatives in rangeland management and improvements of livelihoods.

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Appendix A. Questionnaire on Community-Based Participation in Rangelands of North West Cameroon

This questionnaire is formulated to ease the collection of data relating to community-based participation in pastoral communities of the North West region. Hence, all information collected shall be strictly confidential and use only for academic purposes and enrichment of literature on the subject matter.

Identification of Respondents

- 1 (a) Sub-division..... (b) Village of study.....
- 2 2.1 Sex: Male ☐ Female ☐
- 2.2 Approximate age: (i) <25 ☐ (ii) 25–30 ☐ (iii) 31–35 ☐
- (iv) 36–40 ☐ (v) 41–45 ☐ (vi) 46–50 ☐
- (vii) 51–55 ☐ (viii) 56–60 ☐ (ix) 61+ ☐
- 3 Level of Education:
- (3.1) Informal ☐ (3.2) Primary ☐ (3.3) Secondary ☐
- (3.4) Others (specify).....
- 4 Ethnic group.....
- 5 Occupation (a) animal production (b) food crop production (c) both
- 6 Which do you practice in animal production (a) cattle rearing (b) sheep (c) goat (d) all

Section one: community-based actors and their interactions

- 7 Who are the various stakeholders assisting in your grazing area?.....
- 8 For those actors you identify, what activities do they engage in?.....
- 9 How do they work with pastoralists?.....
- 10 How does catalyzing agents contribute to community-based management. (a) market rules (b) conflict management, (c) advocacy on tenure security (d) technical and financial assistance

Section two focused on participation in rangeland resource use and management.

- 11 What are the various communal grazing strategies practiced in your grazing zone and how do they operate?.....
- 12 Which is more involved in participatory resource use (a) catalyzing agents (b) government agencies (c) participation in locally crafted rules
- 13 In participation in pasture resource use, which aspect is most engaging (a) social fencing (b) physical boundary (c) rotation in grazing (d) water scheme (e) fire mastery
- How are cattle numbers, movements and water managed in your grazing site?.....

Section three: compliance in collective choice arrangements,

14. Are boundaries clearly demarcated? (a) lesser extent (b) great extent, (c) clear cut and (d) arbitrary
- 15 (a) What are the problems of poor boundary demarcation? (a) conflicts (b) dwindling rangelands (c) land grabbing (d) insecure tenure
- (b) Why are some pastoralist not respecting communal rules?.....

Section four implications of state and non-state actors in rangeland management

16 What are the most respected local strategies in grazing management?

Herd split (b) rotation in grazing (c) reserving key areas (d) avoiding areas recently vacated by others

17 (a) How has MINEPIA and other actors impacted the management of your grazing areas?

(b) Has grazing and infrastructure been improved with their presence?.....

A. List of Abbreviations

Organization	Related Activities
MINEPIA Ministry of livestock, fisheries and animal development	Livestock development (native and exotics), disease management, pasture improvement, conflict resolution, tenure and grazing policy, collaboration with pastoralists in providing livestock infrastructure and improving policy
Netherlands development organization SNV	Dialogue platforms and conflict management, recognition of local knowledge and promoting local strategies in situ, collaboration with pastoralists in pressing for higher state recognition in bottom-up processes for policy reforms in land tenure, securing and formalizing where possible customary systems.
USAID United State Agency for International Development, EU European Union,	Participation in realizing livestock infrastructure like fences, cattle crouches, water schemes
HPI HEIFER Project International, APSS Association pour la promotion de l'élevage au Sahel et en Savane, TDCS, Tadu Dairy cooperative,	Empowering women in milk collection and handling, cut and carry feeding systems, engaging women more in participating in grazing management decisions, conservation agreements for reserve areas, rest and rotation, crossbreeding
SHUMAS, Strategic humanitarian services	Improve livestock strategies; agroforestry, pastures, also training women on zero grazing and Biogas production
GP-DERUDEP, Grassfield participatory and decentralized project MIDENO, North West Livestock development fund	Providing funding for construction of livestock infrastructures Negotiation and collaborative management, participating with pastoralists in building boundaries, fencing and others, crossbreeding and infusion of technology
SODEPA, Livestock development organization	Crossbreeding and infusion of technology, collaborating with pastoralists to manage pastures and grazing methods
MBOSCUA Mbororo cultural and development Ass	Evaluation of community grazing performance, strengthening local structures (customs and rules)

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