Community participation in decentralized management of natural resources: Case study of the mixed crop - livestock systems in the Sudano-Sahelian zone of West Africa

Technical report

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Abstract

A study was conducted in two districts (Bougouni and Koutiala) of southern Mali to document and analyse existing local conventions governing the management of natural resources in mixed crop-livestock systems. Participatory Rural Appraisal (PRA) and individual interviews were conducted to collect data on the existing local conventions and on the participation of local population in decentralized natural resource management. In total, the group discussions included 27 administrative and technical services, and 53 community leaders including women. The individual interviews involved 165 farmers including 54 women. Data collected during these interviews included among others the condition of natural resources in the study sites, farmers' level of knowledge of existing local conventions, strengths and weaknesses of existing local conventions, participation in the elaboration and implementation processes of local conventions. The results of this study showed that local conventions governing natural resources management exist in all study sites mainly in an informal (oral) form. The level of knowledge of the local conventions differed from one individual to another. Overall, level of knowledge of local conventions was higher in the district of Bougouni than in the district of Koutiala (a score of 3.16 compared to 1.70 on a scale of 0 to 4). In addition, women's level of knowledge of local conventions was lower than that of men. The results also showed that participation of community members in the elaboration processes and implementation of local conventions was very low in all study sites and tended to be dominated by a group of individuals, often community leaders and elites. These results suggest that women are marginalized in the elaboration processes and implementation of local conventions. Thus, promoting the participation of community members especially women's in the elaboration and implementation of local conventions processes is essential for a sustainable management of natural resources.

Keywords: community-based natural resource management; decentralization; elite capture; local conventions; land use plan, Sudano-Sahelian zone.

1. Introduction

In West Africa, as in most sub-Saharan African countries, natural resources form the basis for livelihoods of rural poor as they depend almost exclusively on agriculture and livestock (Issa, 2006). Many factors, such as the rapid increase in human population and increase in livestock population have resulted in the growing pressure on the natural resources in the region. This pressure on the natural resource base has led to a quantitative and qualitative reduction in productive land and other natural resources (Alinon and Kalinganire, 2008).

Critical to sustainable management of natural resources are the local institutions to manage these resources in line with the main thrust of the Decentralization reform. In the context of decentralization, local authorities are key actors in the management of natural resources as the State delegates management of community resources to local authorities. Community-based management of natural resources has been advocated by many technical and development practitioners in West Africa (Benjamin, 2004; Ribot, 2002; Gibson et al., 2000; Roe et al., 2009) as indispensable for sustainable natural resource management. According to Benjamin (2004), decentralized management is the key to achieving a more equitable and sustainable management of natural resources. Moreover, the same author observed that decentralized management of natural resources in West Africa-Sahel is often characterized by legal pluralism, that is, the coexistence and interaction of several normative orders with different sources of legitimacy and authority. However, traditional and customary structures have been largely excluded from the decentralized management process though the effects of the degradation of natural resources are most apparent at village level. To this end, in recent years, there has been emphasis in the literatures on the local participation in natural resource management in Africa (Ingles et al., 1999; Kellert et al., 2000; Barrett et al., 2001; Ribot, 2002). Several of these authors have shown that community participation is an essential component of efforts to bring about positive economic and environmental change in African communities. Strengthening local institutions in the management of their natural resources is therefore essential to maintain a healthy natural resource base for sustainable intensification of crop and livestock production systems.

In this context and to reduce the increasing pressure on natural resources and the associated degradation of ecosystems, local authorities and village communities have taken initiatives to develop and formalize local conventions with the support and advice of the State administrative

and technical services, and financial partners (Djiré, 2003). However, the multiplicity and the ambiguity of legality of local conventions have slowed down the effective implementation of decentralized management of natural resources (Benjamin, 2008; Leach et al., 1999).

Although significant works have been conducted on local conventions and decentralized natural resources management in West African Sahel, participation of community members in the elaboration and implementation processes has not been addressed adequately despite the importance of community members as custodians and users of the natural resources. In addition, most of the published studies on Decentralization reform in the region focused mainly on administrative officials at local and regional levels who are the key actors in the implementation of Decentralization reform. Given that the local populations are directly affected by the implementation of Decentralization reform as the users of natural resources in their communities, their voices should be made heard through adequate representation in the processes, which necessitates a better understanding of their perception. Therefore, we included community members in this study in order to know and assess their understanding of the existing local conventions and their level of participation in the elaboration and implementation processes. The objective of this study was to document and analyse existing local conventions governing the management of natural resources in the mixed crop-livestock systems of southern Mali.

To address the objective of this study, we looked at a number of research questions: Are there local conventions governing management of natural resources in the study sites? If yes, what types of local conventions (oral or written) exist and what are their spatial extents? What are the elaboration and implementation processes involved in the development of these conventions and who are the key actors and institutions involved? Are these conventions implemented and what are the challenges to their implementation? What are their strengths and weaknesses? Are community members adequately engaged in the elaboration and implementation processes of the existing local conventions, including women? And if not, how could their engagement be strengthened? Addressing these questions will help to identify innovative options that will facilitate better participation of community members in the elaboration and implementation processes of local conventions and consequently, proper use and management of natural resources in Sudano-Sahelian zone of West Africa.

2. Theories and trends in decentralized natural resource management[1]

Since the early 1990s, many West African countries have introduced political, economic, and institutional reforms, one of the most important of which is Decentralization reform (Manor, 1999; UNCDF, 2000). Through Decentralization reform, the government transfers some decision making power and responsibilities to sub-national institution at the provincial, district, city, town and village levels with the objective of promoting public participation in local governance (Crook and Manor, 1998). Basically, the key thrust of decentralization is rooted in democratic principles of representation and accountability that allow constituencies to effectively express their needs and preferences to local government officials and to hold these officials accountable.

Given the important role that natural resources play in the livelihoods of local population, particular attention has been given to the decentralization of natural resources management. According to Agrawal and Ostrom (2001), decentralized governance of natural resources is considered one of the key strategies for promoting sustainable management of natural resources at local level. The rationale behind decentralization of natural resources is that local populations are both better situated and more highly motivated than outside agencies to manage the resources in an ecologically and economically sustainable manner given the importance of these resources in their daily lives (Benjamin, 2004). The latter stresses again that by moving decision making closer to the local level, decentralization seeks to correspond with the interests and priorities of local population and thereby improve the efficiency and equity of government.

There is a body of literature that has emerged in the past two decades suggesting that Decentralization reform has created opportunities for collective actions (Brinkerhoff, 1995, Thomson, 1994, Gibson et al., 2000, Ostrom, 1990, Ostrom, 1999) over natural resource management. In addition, several studies (Agrawal and Gibson, 2001; Ostrom et al., 1994) have shown that institutions are a critically important tool for both explaining and influencing human

[1] This report focuses mainly on the management of natural resources such as land, forests, pastures, and watersheds. Decentralization is defined as a process by which powers are transferred from the central government to lower levels in a 'territorial hierarchy' (Crook and Manor, 1998). The term "institution" as used in this paper is: "A complex of norms and behaviours that persist over time by serving collectively values purposes" (Uphoff, 1986). Benjamin (2004) describes institutions in terms of rules, norms and strategies that emerge in communities from interacting livelihood strategies to structure patterns of collective action. The terms "local conventions" specifically constitute a nucleus of this study and when used it refers to an agreement, written or verbal, entered into by stakeholders in order to regulate the management of natural resources they use and for which they are responsible (Granier, 2010).

behaviour around natural resource use. An important facet of the institutions is the right they confer on those who use, manage and own natural resources. Institutionary theory stresses the dynamic nature of institutional arrangements as complex adoptive systems which are continuously adjusted by resource managers in response to contextual changes (Ostrom, 1990; Thomson, 1992; Young, 2002). However, it has to be emphasized that institutions alone cannot ensure the successful outcome of decentralization. Besides, the outcomes of decentralization depend very much on details of what power is transferred to whom, by what means, and how the decisions on natural resource use and management are made (Agrawal and Ribot, 1999; Ribot, 2002). In addition, the effective implementation of decentralization also depends on how well the specific institutional arrangements fit the sociological and ecological environments, and on the interplay of multiple institutions at different scales (Young, 2002).

Though Decentralization reform in Mali is often cited as a particularly successful example in West Africa (Charlick, 2001; Clark, 2000; Smith, 2001), Mali is confronted with many challenges as its Sahelian neighbours such as institutionalizing the balance of power between central and local governments, establishing effective local government with limited technical and financial resources, and reconciling traditional and modern legal traditions, including those related to natural resources. Analysis by Benjamin (2004) shows that while decentralization in Mali has created structures for increasing local participation in governance and natural resource management, it has undermined many of the traditional structures that organize social life in rural communities in such way that in some parts of Mali, many rural people perceive decentralization as a threat that may transfer existing power to control their community resources from their hands to the local government ("commune rurale"). Furthermore, some authors have suggested the capture of decision making mechanisms over the community resources by local elites, which has been reported to derail both decentralization and decentralized natural resource programme.

To strengthen local participation in decentralized natural resource management, the importance and pertinence of local conventions have been emphasized (Benjamin, 2004). This author explained that these local conventions provide a mechanism for managing local specificities through negotiated rules and management principles. His arguments support the idea that the local conventions present an opportunity to secure customary right by engaging local

government, and State authorities under legally binding constraints. Although local natural resource institutions include local conventions, the resources they govern and the manner in which they are governed without mechanisms to assure a full representation of local interests, there is a risk of undermining livelihoods security by further marginalizing already disadvantaged segments of the rural populations.

3. Methodology

3.1. Description of the study area

The study was conducted in Koutiala and Bougouni districts in the Sikasso region of Mali (Figure 1). Specifically, the study was conducted in six communities, namely Namposséla (-5.34 º long, 12.33 º lat), Sirakelé (-5.48 long, 12.51 º lat) and Zanzoni (long -5.57 º 12.61 º lat) located in Koutiala district and the communities of Diéba (-8 º long, 10.91 º lat), Sibilira (-7.76 º long, 11.44 º lat) and Yorobougoula (-7.91 º long, 11.52 º lat) located in Bougouni district. The two study sites are located in the southern part of Mali with Sudanian climate characterized by an alternation of dry and rainy seasons that last about six months each. Annual precipitation varies between 750 - 1100 mm and 900 - 1200 mm for Koutiala and Bougouni, respectively. The livelihood strategies of both districts are mainly based on agro-silvo-pastoral activities. Maize, millet, sorghum, groundnut and cowpea are the main food crops and cotton is the main commodity crop in both study sites. In fact, Koutiala is the capital of cotton production in Mali followed by Bougouni. Livestock play an important role in rural economy, especially through animal traction and income generation to meet household needs. The main livestock species raised in the study sites are cattle, sheep, goats and poultry. Bougouni district is traversed by many rivers which provide opportunities for irrigation and fishing. Forest area in Bougouni is much larger than in Koutiala. Secondary livelihood activities in Bougouni included gold mining and crafts.

Figure 1: Map of study sites in southern Mali

3.2. Administration of surveys on existing local conventions

Surveys on the strengths and weaknesses of existing local conventions and the level of participation of community members in the elaboration and implementation processes included participatory diagnosis of the existing local conventions using Participatory Rural Appraisal (PRA) and individual interviews of key stakeholders involved in natural resource management using a semi-structured questionnaire. Data collection was carried out between November 2013 and January 2014 in the dominant local language (Bambara) and French by the survey team including the first author of this report and 5 field assistants. The data collection involved three types of informants: farmers (indigenous and immigrant), community and traditional authorities as well as administrative authorities and technical services. During these interviews, we asked questions on the perceptions of these actors on existing local conventions including their strengths and weaknesses, the level of participation of community members and the benefits and limitations.

3.2.1. Group interviews

Group interviews were conducted using PRA with 80 people involving 27 respondents from the administrative and technical services, and 53 from community and traditional authorities. In

total, 8 group discussions were carried out consisting of 2 group discussions with administrative and technical services (one in each district), and 6 group discussions with community and traditional authorities (one in each community). Each group discussion took about 4 hours. Table I outlines the socio-professional profile of the participants in the focus group discussions conducted in the two districts on local conventions.

Table I: Socio-professional profile of the participants of the focus group discussions on local conventions in the study sites

District	Group	Community	Male	Female	Profile
Bougouni	Local administrative authorities		9	0	Technical services (Agriculture, rural extension agents, animal production and industries, veterinary service, forestry official, social development workers -Local administrative authority (district)
	Local community leaders	Diéba	10	3	Village elders, farmers, women's representatives, youth representatives, hunters, religious leaders
		Sibilira	10	2	
		Yorobougoula	6	2	
Koutiala	Local administrative authorities	-	9	1	Technical services (Agriculture, rural extension agents, animal production and industries, veterinary service, forestry official, social development workers) Local administrative authority (district)
	Local community leaders	Namposséla	9	2	Village elders, farmers, women's representative, youth representative, hunters, religious leaders
		Sirakéle	9	2	
		Zanzoni	9	2	

3.2.2. Individual interviews

A total of 165 farmers were interviewed in the 2 districts comprising of 76 (52 men and 24 women) and 89 (59 men and 30 women) farmers in Bougouni and Koutiala, respectively. The proportion by sex by district was 68% men against 32% women in Bougouni and 66% against 34% in Koutiala for men and women, respectively. Stratified random sampling on the basis of

gender and status of residence (indigenous and immigrant) in the village was adopted to select the individual farmers interviewed. Status of residence in the village is important in terms of access, control and use of the community's natural resources.

Information gathered during these interviews included farmers' perception on the condition of natural resources in their communities, types of local conventions governing natural resources management, level of knowledge of local conventions, participation in elaboration and implementation processes of local conventions, and strengths and weaknesses of existing local conventions.

3.3. Data analysis

The data were entered using Excel^{TM} 2010 and were analysed using SAS software (SAS, 1987). PROC MEANS was used to calculate means and standard errors for each variable. PROC REG was used to perform regression analysis to evaluate the relationship between the independent variables (age, sex, education, years of residence in the community and social group) and the response variables (level of participation in key steps in the elaboration and implementation processes of existing local conventions). The independent variables used in the regression analysis are explained in Table X and XV. T-test was used to compare the mean values of different parameters obtained from the two districts. Level of statistical significance was declared at $P < 0.05$.

4. Results and Discussion

4.1. Socio-professional profile of the respondents

The average age of respondents was 52 and 51 years for men in Bougouni and Koutiala, respectively; and 44 and 47 years for women in the two districts, respectively. Majority of respondents were illiterate, that is, cannot read and write (42% and 51% for Bougouni and Koutiala, respectively). Table II provides more details on the educational level of the respondents. The main ethnic groups of the respondents were Bambara (68%) and Fulani (30%) in Bougouni, and Minianka (90%) formed the major ethnic group in Koutiala (Figure 2). The relatively high proportion of the Fulani in Bougouni can be explained by their settlement over a very long time in the area. The respondents' ethnic groups correspond to the dominant ethnic groups in each study site. According to Diakité et al. (2009) the main ethnic groups in Bougouni

are the Fulani, the Bambara, the Sarakolé, the Malinke, the Dogon and the Bozo with dominance of Fulani and Bambara. According to Konate (2005), Koutiala is a cosmopolitan city with dominance of Minianka which constitutes more than 50% of the population of Koutiala followed by Bambara (20%) and Sarakolé (10%) ethnic groups.

Table II: Level of education of respondents in the study areas

District		Illiterate	Primary	Secondary	Koranic	Adult education	Total
Bougouni	N	32	16	2	6	20	76
	%	42	21	3	8	26	100
Koutiala	N	45	15	5	3	21	89
	%	50	17	6	3	24	100

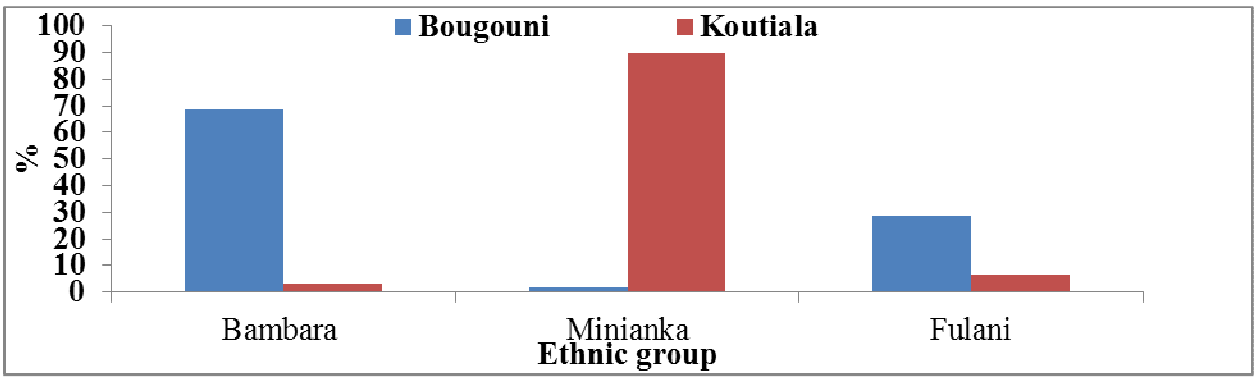

Figure 2: Dominant ethnic groups in Bougouni and Koutiala districts

Overall, respondents were crop and livestock farmers (Figure 3) with 49% and 63% of respondents in Bougouni and Koutiala, respectively who mentioned crop farming as their main activity. Mixed crop and livestock farming was practiced by 43% and 34% of respondents in the two districts, respectively. Livestock farming only was rarely cited by respondents as the main livelihood activity (1.3% and 1.1% respectively in Bougouni and Koutiala). These results are consistent with the observations by Scoones and Walmer (2000), and Coulibaly (2003) that mixed crop-livestock system is the most dominant in Sikasso region. A close look at the results showed that respondents in Koutiala are more involved in crop farming than those in Bougouni. This result can be explained in part by the presence of the Malian Company for Textile Development (CMDT) which provides inputs and services to farmers in the area. In Bougouni, mixed crop and livestock farming was more cited compared to Koutiala.

As presented in Table III, respondents belonging to the dominant ethnic groups in each study site were older than respondents belonging to ethnic minorities (Bambara in Koutiala and Minianka in Bougouni). The minority ethnic groups were often those who settled late in the communities.

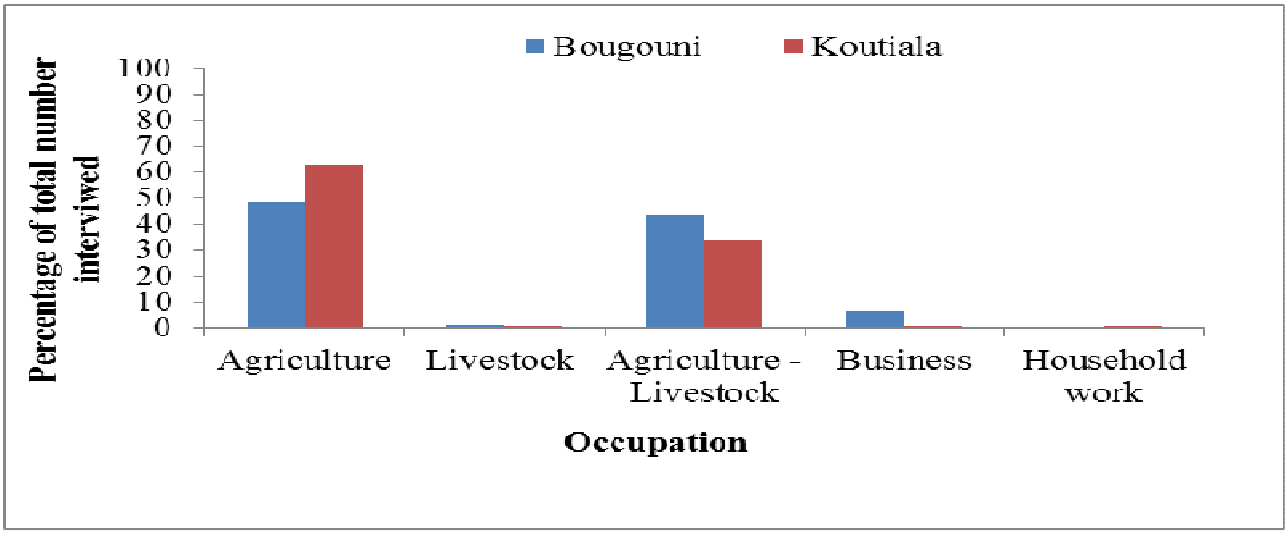

Figure 3: Occupation of the respondents in Bougouni and Koutiala

Table III: Age (year) of the respondents according to sex, ethnic group, level of education and occupation

	Variable	District	
		Bougouni	Koutiala
Sex	Male	52.29±1.69[a] (N=52)	51.37±1.42[a] (N=59)
	Female	43.96±2.04[b] (N=24)	47.17±1.66[a] (N=30)
Ethnic group	Bambara	49.88±1.66 [a](N=52)	39.67±0.33[b] (N=3)
	Minianka	35.50±6.50[a] (N=2)	50.20±1.17[b] (N=80)
	Fulani	50.40±2.66[a] (N=22)	51.83±4.32[a] (N=6)
Level of education	Illiterate	52.16±2.24[a] (N=32)	51.18±1.70[a] (N=45)
	Primary	45.0±2.92[a] (N=16)	45.13±1.99[a] (N=15)
	Secondary	57.00±3.00[a] (N=2)	49.40±1.86[a] (N=5)
	Koranic	59.17±3.42[a] (N=6)	58.00±3.60[a] (N=3)
	Senior literacy	45.80±2.39[a] (N=20)	49.76±2.35[a] (N=21)
Occupation	Crop farming	50.21±2.05 (N=37)	50.12±1.38 (N=56)
	Livestock farming	45.00 (N=1)	40.00 (N=1)
	Mixed crop-livestock farming	50.91±1.95 (N=33)	50.67±1.92 (N=30)
	Small commerce	38.20±5.84 (N=5)	29.00(N=1)
	Household work	-	50.00(N=1)

4.2. Availability of natural resources in the study sites

There were differences in terms of availability of natural resources in the two districts (Figure 4). Crop land and fallow were respectively in abundance and moderately available in the district of Bougouni. Rangelands were also moderately available in Bougouni. Although land is generally available in Bougouni, one participant observed that there is a growing concern of increased pressure on the land. In contrast to Bougouni, crop land and fallow land were rarely available and fallow has disappeared in Koutiala district. Population growth and the associated expansion of crop land may explain low availability of land in Koutiala. In support of these results, Bagayoko et al. (2006) observed that land in the villages in Koutiala district is saturated due to relatively high human and animal densities, and the associated expansion of cropping area at the expense of grazing and fallow land. On the other hand, availability of protected land is almost the same in the two districts. These protected lands were sparsely available. Besides, the extent of degraded land was moderate in both areas. Farmers believe that land degradation is a result of bad climatic conditions and anthropogenic factors. The traditional agronomic practices by farmers and the use of plough were also mentioned as cause of land degradation. Erosion can also be another cause of land degradation in Bougouni and Koutiala. To corroborate this, one of the participants said: "Many of our lands are full of gravels and rocks, and we cannot do anything about it." This observation agrees with report by Doumbia (2000) that lands in southern Mali are full of gravels and sand. Figure 5 shows the status of land quality in the two study sites suggesting that the quality of crop land, fallow land and rangeland were good, very low and moderate, respectively in Bougouni; and low for crop land, and very low for fallow land and rangelands in Koutiala district. Overall, land quality is better in Bougouni than in Koutiala. Indeed, increasing pressure on cultivated land and the associated shortening of fallow period may explain the poor quality of land in Koutiala. Farmers themselves speak of soil "fatigue" and the associated decline of yields. This observation is confirmed by Issa (2006) who argues that due to population pressure, the expansion of cultivated areas occurs even on land that is unsuitable for crops. The variability in terms of availability of natural resources observed in the study areas agree with observation by Hilhorst (2008) who observed that the primary productivity of natural resources in the Sahel varies between areas, seasons and years, primarily in response to changes in rainfall.

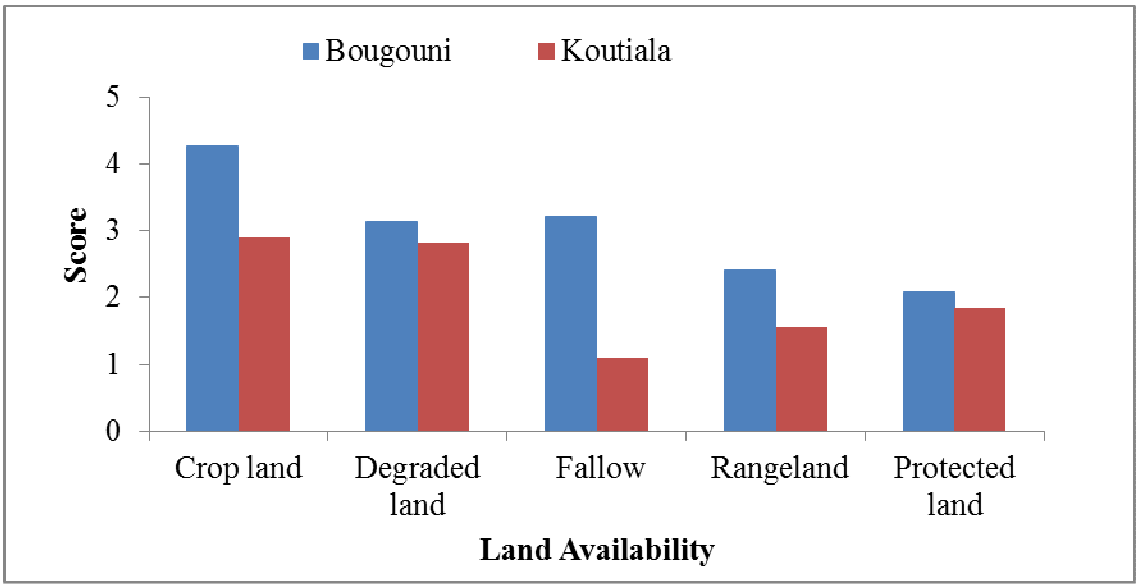

Figure 4: Availability of various types of land according to respondents
On a scale of 0 to 5 (0= don't know; 1 = not available; 2 = rarely available, 3 = moderately available; 4 = abundant; 5 = very abundant).

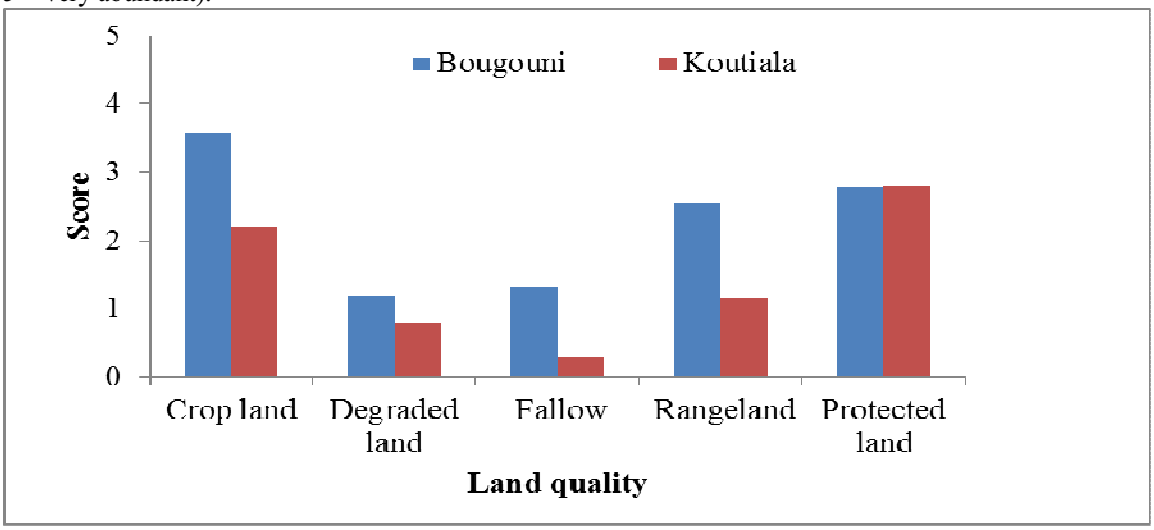

Figure 5: Quality of different types of land in the study sites according to the respondents
On a scale of 0 to 5 (0 = don't know; 1 = very low, 2 = low, 3 = moderate, 4 = good, 5 = very good)

As presented in Table IV, the attributes of vegetation for grazing was better in Bougouni than in Koutiala and this seems obvious as the area possesses good natural resources. Specifically, the types of grasses found in vegetation were annual and perennial. Dominance of annual grasses compared to perennial grasses was reported in both districts. However, it has to be observed that the quality is average and low in both districts, respectively. Vegetation in Bougouni had a very good proportion of annual grasses compared to vegetation in Koutiala. This was in contrast to

Koutiala where perennial grasses dominated compared to Bougouni district while annual legumes were also higher than perennial legumes. Our results are similar to those obtained in a study conducted in northern Ghana by Panyan et al. (2012) who reported that annual grasses and legumes were dominant compared to perennial. In addition, Bougouni had a higher score for shrubs population than Koutiala. Overall, except for perennial grasses, the score for perennial legumes, and annual grasses and legumes was higher in Bougouni than in Koutiala. The incidence of uncontrolled bush fire is virtually non-existent in Koutiala due to scarcity of annual and perennial herbaceous species in the district as observed by one of the respondents that: "Oh, there is not even vegetation; what can we burn?". This is not the case in Bougouni, where the incidence of uncontrolled bush fire tended to be high. The origin is not often known and farmers often attribute this to transhumant herders. The quality of the vegetation was average in both districts.

Table V shows the availability, accessibility and quality of water for human and animal consumption in Bougouni and Koutiala. From the results, it appears that rain and standing pool water was available according to seasons but this availability was insufficient in both districts. The results showed a significant difference in the availability of rainwater in both districts as rainwater was more available in Bougouni than in Koutiala. In the same context, accessibility to rainwater was better in Bougouni (easy access) than in Koutiala (difficult access). This is due to the availability of rainwater collection infrastructures in Bougouni. The quality of rainwater was observed to be average in both districts. As for the quality of standing pool, it was rated low by farmers in Bougouni and very low by farmers in Koutiala. The well was the most available and moderately accessible means to get water in both districts. Although the quantity of well water was observed to be sufficient, it seems to be seasonal. Quality of well water was reported to be average and good by farmers interviewed respectively in Bougouni and Koutiala. Both districts also had access to water from hand pump. Indeed, hand-pumped water was available throughout the year but was reported to be insufficient in Koutiala while in Bougouni it was reported to be seasonal and sufficient. Koutiala is a bit ahead of Bougouni in terms of the availability of tap water. Tap water was reported to be unavailable in Bougouni. Although tap water was available in Koutiala, its accessibility was recognized as very difficult. The location and the high cost may explain this low accessibility.

Table IV: Features of natural vegetation in the study sites according to the respondents (means ± standard error)

Variable of natural resources	Bougouni	Koutiala
Annual/seasonal production	3.13±0.07[a]	2.91±0.10 [a]
Quality / palatability	3.14±0.09 [a]	3.08±0.12 [a]
Presence of invasive weeds	3.40±0.07 [a]	2.85±0.08[b]
Dominance of annual grasses	3.21±0.09 [a]	1.97±0.10 [b]
Dominance of perennial grasses	0.96±0.15 [a]	1.83±0.13 [b]
Dominance of annual legumes	3.14±0.07 [a]	2.43±0.11 [b]
Dominance of perennial legumes	2.54±0.13 [a]	2.26±0.14 [a]
Shrubs population	3.96±0.07 [a]	2.61±0.13 [b]
Incidence of controlled bushfires	1.50±0.14 [a]	0.87±0.09 [b]
Incidence of uncontrolled bushfires	3.58±0.14 [a]	0.75±0.06 [b]

[a, b] Means on the same row with different superscript letters are statistically different, P <0,05. Score: 0 = don't know; 1 = very low; 2 = low; 3 = average; 4 = good; 5 = very good.

Table V: Water availability, quality and accessibility for human and animal consumption in the study sites (means ± standard error)

	Availability		Quality		Accessibility	
Source	**Bougouni**	**Koutiala**	**Bougouni**	**Koutiala**	**Bougouni**	**Koutiala**
Rainwater	2.37±0.10 [a]	2.04±0.07 [b]	2.87±0.13 [a]	2.80±0.18[a]	3.08	2.43
Standing pool	1.95±0.11 [a]	1.80±0.10 [a]	1.54±0.15 [a]	0.78±0.11 [b]	2.32	1.51
Well water	3.45±0.15 [a]	3.28±0.12 [a]	3.87±0.08 [a]	3.15±0.10 [b]	3.57	3.2
Pump water	2.64±0.24 [a]	3.98±0.17 [b]	2.12±0.28 [a]	3.76±0.19 [b]	1.13	2.27
Tap water	0.99±0.01 [a]	2.28±0.20 [b]	-	1.79±0.26	0	5

[a, b] Means on the same row for each variable with different superscript letters are statistically different at P <0,05.

For availability (0 = don't know; 1 = non - available; 2 = seasonal and insufficient quantity, 3 = seasonal and sufficient quantity; 4 = available all year long, but insufficient quantity; 5 = available all year long and sufficient). For accessibility (0 = don't know 1 = very difficult access, 2 = difficult access; 3 = fair access, 4 = easy access; 5 = very easy access). For quality (0 = don't know 1 = very low, 2 = low, 3 = average, 4 = good, 5 = very good).

4.3. Analysis of the existing local conventions governing natural resource management in the study sites

4.3.1. General information on existing local conventions in the study areas

In Table VI, we presented a summary of the different types of existing local conventions in the six study communities in Koutiala and Bougouni. Local conventions existed in all communities studied which agree with observation by Dicko (2002). However, most of these local

conventions existed in an informal or oral form. Indeed, out of over twenty local conventions we identified in all study communities, only 3 were formal. In this sense, Granier (2010) argues that local conventions have always existed in African society and that the only difference today is the involvement of the government. He adds that currently, these local conventions have a clear tendency to move from a status of illegitimate tool to that of legal tool. Formal local conventions tend to cover a very large area even extending to two or more villages and or districts. The main coverage of almost informal existing local convention is often limited to the village; as consequence, they are not known outside their communities (Hilhorst, 2008). In addition, our results revealed that most informal local conventions were established as far back as the establishment of the villages. They are mostly the initiative of community members who decided to set regulations to better manage the resources in their territories and protect them against external users (Hilhorst 2008). Even though local conventions exist in both study sites, the level of knowledge of community members differed from one individual to another; and from one community to another depending on sex, age and ethnic group. Overall, the level of knowledge of local conventions was higher in Bougouni than in Koutiala. The average score for the level of knowledge of local conventions was good (3.16 out of maximum of 4) in Bougouni and average (1.70) in Koutiala (Table VII and Figure 6). In support of this, 58% of farmers in Bougouni as against 10% in Koutiala confirmed to have a very good knowledge of local conventions. In addition, 34% of farmers in Koutiala as against only 8% in Bougouni maintained to have no knowledge of the existing local conventions in their communities (Figure 6). Coulibaly and Sanogo (2006) also affirm that all those involved in the use and management of natural resources do not have the same level of knowledge nor the same perception on the local conventions.

Table VI: Summary of the different types of existing local conventions on natural resources management in the study sites

District	Interviwed Group	Name of the local convention	Written/ Oral	Date of establishment	Natural resources addressed	Coverage
Koutiala	Local administrative authority	SIWAA	Written	May 1997 (formalization date)	Land, common pasture, forest, transhumance, conflict management, bush fire, hunting	Inter-District
	Sirakéle Community	CPC	Oral	Since the creation of the village	Forest (harvest products: Néré; shea butter)	Village
		CGC	Oral	Since the creation of the village	Conflict over land, pasture, transhumance	Village
		CGPE	Written	2007	Water	Village
	Nampossséla Community	SIWAA	Written	1989	Land, common pasture, forest, transhumance, conflict management, bush fire, hunting	Inter-District
		KOMO	Oral	Since the creation of the village	Water (fishing)	Village
		CAT	Oral	Since the creation of the village	Land management	Inter-Village
	Zanzoni Community	CGT	Oral	Since the creation of the village	Transhumance	Village
		CGC	Oral	Since the creation of the village	Conflict over land use, common pasture, water and forest	Village
		CTT	Oral	Since the creation of the village	Land	Village
		CGF	Oral	2003	Forest	Inter-district
Bougouni	Local administrative authority	CGRN	Written	November 2010	Land, common pasture, forestry, water, conflict, bush fire, wild resources (fauna and flora, wild fruit)	Inter-district
		CPC	Oral	Since the creation of the village	Wild fruit harvest	Inter-village
		CAP	Oral	2006	Land, forest	Inter-Village

Sibilira Community	CGF	Oral	1993	Forest	Village
	CGPC	Oral	2011	Pasture, conflict management	Village
Yorobougoula Community	CGRN	Written	November 2010	Land, pasture, forest, water, conflict, bush fire, fauna and flora	Inter-District
	CGF	Oral	2007	Land, forest, hunting, bush fire	Inter-Villager
Diéba Community	CGF	Oral	Since colonial period	Forest	Village
	CGP	Oral	In the 1960s	Pasture	Village
	CGM	Oral	Since the creation of the village	Ponds with various fish species	Village

Acronyms: SIWAA (SIWAA Convention); CGPE: Convention on management of watering points, CGT: Convention on land allocation - land tenure security, CPC: Convention on the regulation of wild fruits, CGC: Convention on conflicts management, KO-MO Convention on collective fishing, CGT: Convention on transhumance management, CTT: Convention on land tenure, CGF: Convention on forestry management, CGRN: Convention on natural resource management, CAP: Convention on Protected Areas, CGPC: Convention on rangeland and conflicts management, CGP: Convention on rangeland management, CGM: Convention on standing pools management.

Table VII: Level of knowledge of local conventions by the respondents in Bougouni and Koutiala

	Average	Male	Female
Bougouni	3.16±1.21	3.47±0.96	2.50±1.44
Koutiala	1.70±1.44	1.81±1.46	1.57±1.38

Rating (0 = none, 1 = low, 2 = average, 3 = good, 4 = very good)

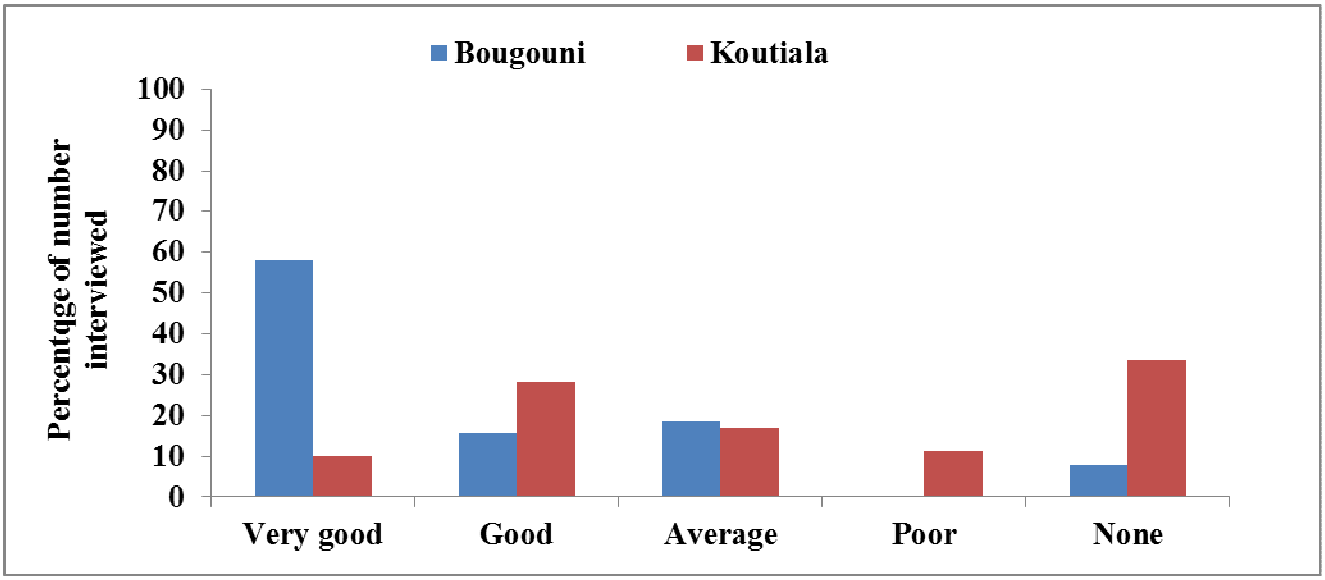

Figure 6: Level of knowledge of the different local conventions by the respondents in Bougouni and Koutiala

Results presented in Figure 7 showed that men compared to women had a higher knowledge of local conventions. Specifically, 67% of men as against 38% of women interviewed in Bougouni had a very good knowledge of local conventions. This percentage was 12% for men as against 7% for women in Koutiala. According to the results, 38 and 27% of women interviewed in Bougouni and Koutiala, respectively reported having an average level of knowledge of the existing local conventions in their communities. Seventeen and 40% of the respondents in Bougouni and Koutiala, respectively reported that they did not even had any knowledge about the existing local conventions.

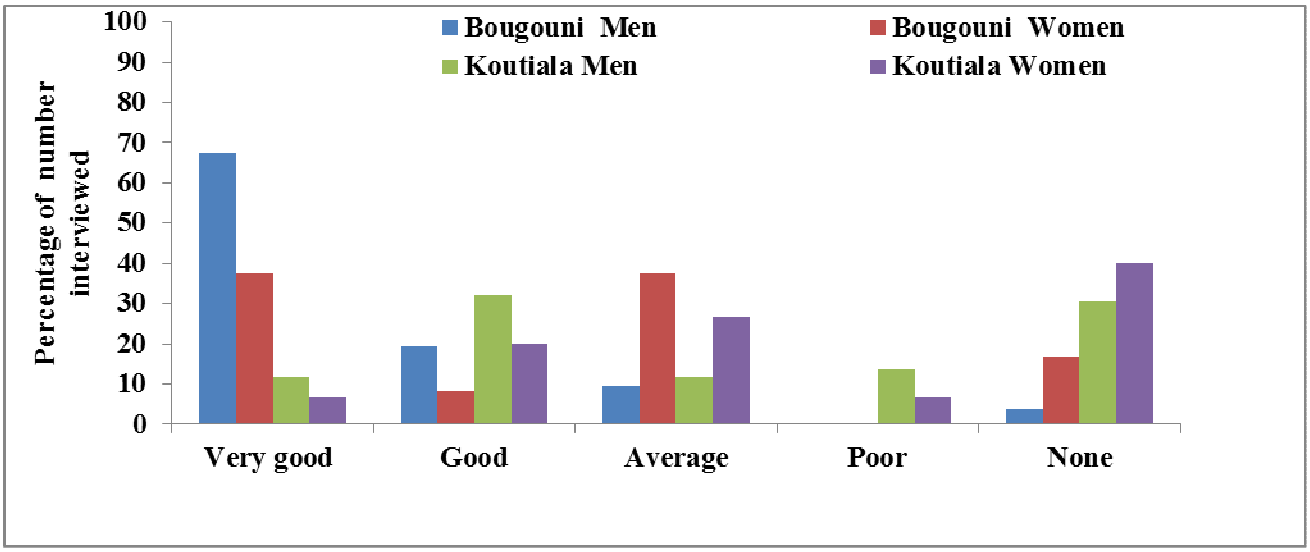

Figure 7: Level of knowledge of local conventions according to gender in Bougouni and Koutiala

The results of focus group discussions conducted in the different communities with community leaders, administrative authorities and technical services showed that the level of knowledge of local conventions by administrative authorities and technical services was also generally low compared to that of community (traditional) leaders (Figure 8). Generally, these technical agents had knowledge of formal (written) local conventions since the latter had been established following formal processes requiring their involvement. On the contrary, these agents had almost no knowledge of existing local conventions in the communities as they are largely oral and informal. This may demonstrate the tense relation between the communities, and State technical agents and administrative services that have been reported by Hilhorst (2008). To support this point, one of the community participants said: "Forestry officials are our enemies, they do not mean good for us; what they want is money." Another participant added: "The mayor of the local government came here to sow discord." Based on these comments, one can imagine the relations between communities and administrative and technical services. Between communities, the level of knowledge of local conventions by community authorities was higher in the villages of Diéba and Namposséla than in other study villages. We can attribute this high knowledge of local conventions in the above villages to a good organization that we observed during the conduct of the field surveys. When comparing the two districts, the level of knowledge of local conventions was higher for the community authorities in Koutiala than in Bougouni. This result may be explained by the fact that farmers are less involved in the elaboration and implementation

processes of local conventions in Koutiala as they often involve more community authorities (See the results on the elaboration processes and implementation of local conventions).

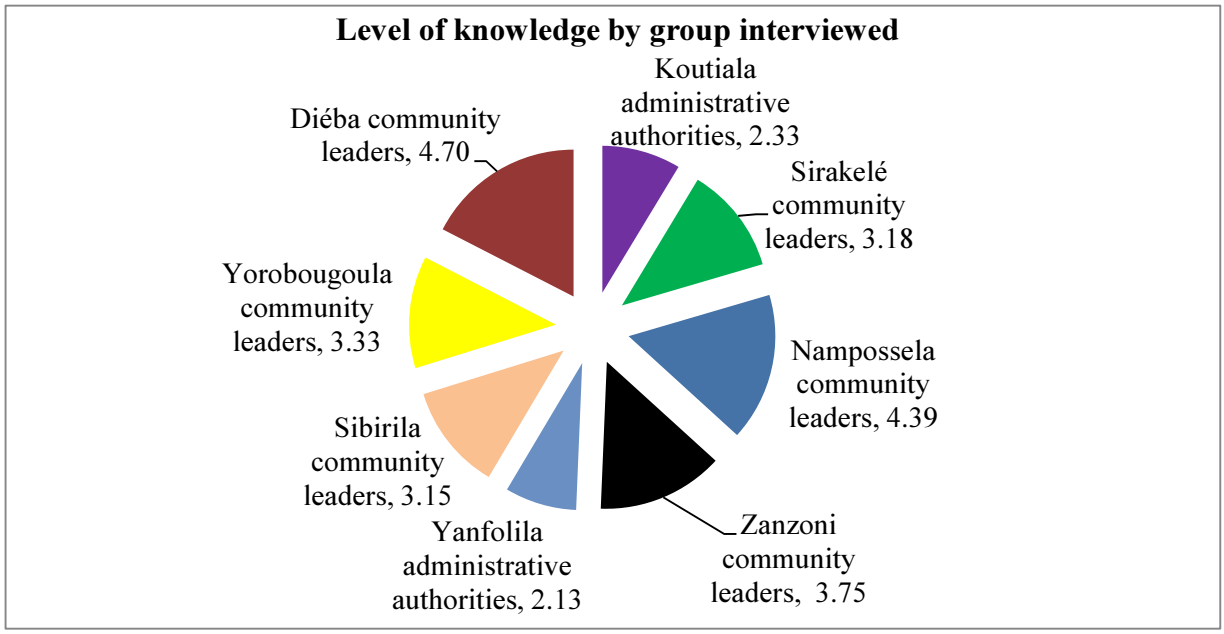

Figure 8: Level of knowledge of local conventions by group interviewed
Score: 1=very low, 2= low, 3= average, 4 = good, 5= very good

Participants in the focus group discussion were asked about the importance of local conventions in the management of natural resources and they confirmed that local conventions played a big role in the management of natural resources. Indeed, they maintained that local conventions were a fundamental planning tool for natural resource management. According to the respondents, the local conventions facilitated management of conflicts between people, defined rules, procedures and agencies to manage natural resources, and clarified the role of everyone. They also affirmed that local conventions can reduce natural resource degradation, defend the interests of the community and consequently improve the lives of the rural populations. These conventions can create a favourable environment for investment in natural resource management in the community and can facilitate the development of a long-term plan for the use and management of the community natural resources. They added that it is easy to attract technical and institutional support to enhance sustainable management of natural resources when local conventions are established and this can promote generation of revenue. Finally, according to the respondents, local conventions strengthened cooperation and solidarity within the community.

The importance of local conventions for sustainable management of natural resources has also been reported by many authors including Granier (2010), Dicko (2002) and Djiré (2004).

4.3.2. Community participation in the elaboration processes of local conventions

4.3.2.1. Level of participation in the elaboration processes of existing formal local conventions

There are no standard procedures for the elaboration of local conventions as they differ depending on the type of local conventions and strategies adopted by the different stakeholders. Overall, 5 steps were identified for elaboration processes of formal local conventions. These steps were:

1. Diagnosis of existing local convention: - strength and weakness, what work or not, analysis of natural resource management practices, identification of key natural resource issues to be addressed by the local conventions.
2. Awareness: Awareness building concerning the elaboration processes, community mobilization of local actors for meetings on elaboration of local conventions, involvement in committees for the elaboration and dissemination of information on the elaboration processes.
3. Resources: Mobilization of resources for the elaboration - mobilization of financial resources, solicitation of technical support for the elaboration of the local conventions (contact with technical services, NGOs, projects etc.) and solicitation of judicial support for the elaboration of the local conventions.
4. Formalization: Writing/documentation of the oral local conventions, validation of the local conventions, participation in the formalization (signing) of the local conventions with the local administrative authorities.
5. Development of proposal of good natural resource management: Participation in the delimitation and/ or mapping of village territory for the local conventions, development of land use plan for the community, elaboration of rules of access, use and management of the natural resources and development of annual plan for management of natural resources.

Various elaboration processes of local conventions in Mali have been described by Dicko (2002), Djiré (2003) and Ouattara et al. (2011). These authors have also developed a methodological

guide for the elaboration and implementation of local conventions. However, the methods described all converge towards the 4 steps that we have identified.

From results in Figures 9 and 10, the level of community participation in the elaboration of local conventions was very low in both districts. According to the results 59%, 57%, 97%, 80% and 72% of the respondents in Bougouni maintained not to have participated in the steps of diagnosis, awareness, resource mobilization, formalization and development, respectively in the elaboration of existing local conventions in their communities. The results were 68%, 72%, 85%, 80% and 76% for the 5 steps in Koutiala, respectively. A closer look at the results of this study showed that the elaboration processes of local conventions involved few individuals who are mainly elites and powerful people in the communities (Shackelot et al., 2002, Granier, 2010, Anderson and Metita, 2013). In general, resources are managed according to established norms and cultures since the founding of the communities (Coulibaly and Sanogo, 2006). The latter suggested that customary institutions remain strong and functional at the community level. The results of our study are also supported by those of Onibon et al. (1999) which suggest that natural resources are governed by traditional norms and rules throughout the Francophone countries of West Africa.

In comparing the two sites, we find that the level of participation of community members in the elaboration processes of local conventions was lower in Koutiala than in Bougouni. We could attribute this to the mobilization and the will of the population in Bougouni to protect their resources from abusive use. Bashir et al. (2007) argue that the biggest motivation of farmers in developing local conventions is the protection of their resources from external users. They added that many farmers are involved in the development of local conventions in the areas experiencing a multiplicity and diversity of users of resources from outside. An additional argument that can be attributed to the high rate of participation in Bougouni is that this district is inhabited by many foreigners who have settled there of late. The latter are still considered foreigners and therefore have less rights over the community's natural resources compared to the indigenous peoples. Therefore, the need to defend their rights over their natural resources might have encouraged the indigenous population in Bougouni to participate more actively in the development of local conventions to govern their use and management. Moreover, the results further showed that more people were involved in the early development process of local conventions, particularly the participatory diagnosis and awareness building. The involvement of stakeholders in the process

of mobilizing resources was very low in both districts as only between 1 and 9% of the respondents reported to have participated. The lack of formalization for most local conventions as explained by some respondents is attributed to the importance accorded the oral traditions by the different communities as demonstrated by a comment of one of the respondents that: "The spoken word is sacred, and respect is given to decisions made by the village head without using paper"! This may then justify their low involvement in mobilizing necessary resources for the formalization of their oral conventions. Other respondents, however, attributed this lack of formalization of the oral local conventions to lack of financial, technical and legal resources.

Table VIII shows the degree of participation in the different elaboration processes of existing local conventions by gender.

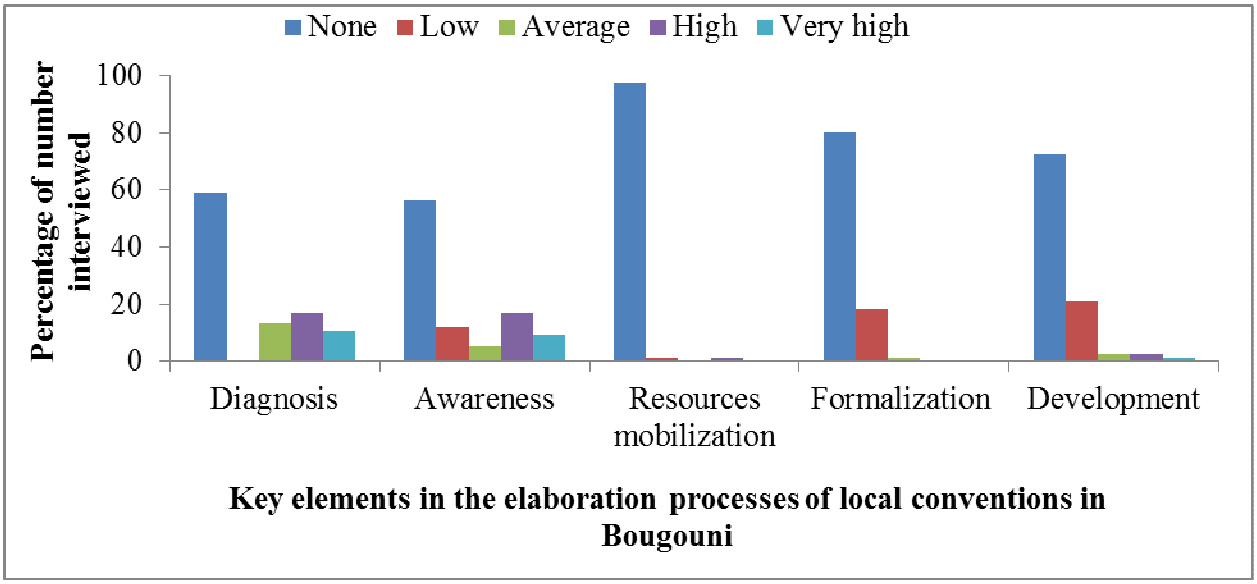

Figure 9: Level of participation of the respondents in the elaboration processes of the existing local conventions in Bougouni district

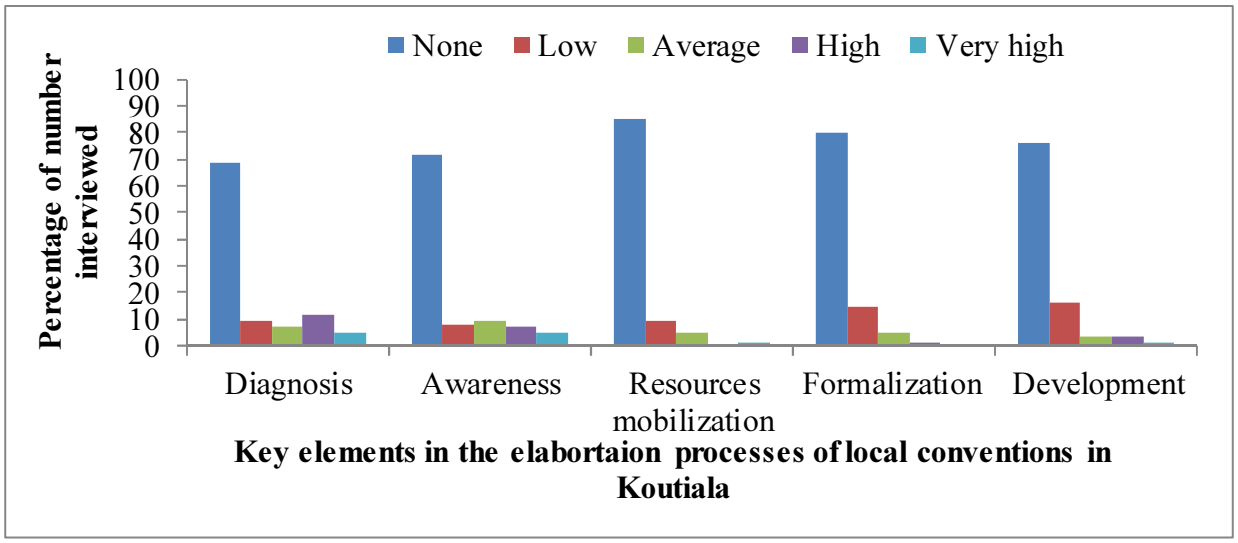

Figure 10 : Level of participation of the respondents in the elaboration processes of existing local conventions in Koutiala district

Table VIII: Participation in the elaboration processes of existing local conventions in the study sites by gender

Variable	Bougouni		Koutiala	
	Male(N=52)	Female(N=24)	Male(N=59)	Female(N=30)
Diagnosis	1.52±0.22 [a]	0.50±0.22[b]	0.98±0.18 [a]	0.27±0.13[b]
Awareness	1.40±0.21 [a]	0.46±0.21[b]	0.86±0.17 [a]	0.20±0.10[b]
Resource mobilizations	0.07±0.06	0	0.31±0.10 [a]	0.07±0.05[b]
Formalization	0.27±0.06 [a]	0.08±0.08[b]	0.37±0.09 [a]	0.07±0.05[b]
Development	0.56±0.12 [a]	0.04±0.04[b]	0.53±0.12 [a]	0.07±0.05[b]

The score for the level of participation was 0 = none, 1 = low, 2 = average, 3 = high, 4 = very high. Means in the same row with different superscript letters are statistically different at P <0.05

The results showed that women's participation in the elaboration processes of existing local conventions in the study sites was generally low despite the fact that women are major users of natural resources in the communities. The level of participation of women in the elaboration processes of the existing local conventions was significantly lower than participation by men, which suggest the domination of the processes by men. This low level of participation by women can be partly explained by socio-cultural reasons as in most African tradition, especially in Malian culture, women are not considered responsible for management of natural resources in the community. In general, man as the household head represents the woman and he is responsible for the actions of his wife. In addition to socio-cultural factor, low level of

participation of women can be attributed to general low level of education among women, and lack of information and awareness of the elaboration processes of local conventions. Results from the study by Sanogo and Coulibaly (2006) on the role of women in participatory management of natural resources in Southern Mali support our findings as these authors observed that women are not directly concerned by the management of natural resources and are almost excluded from many activities. They also added that in the domain of natural resource management, very little attention is given to the roles of women by the local administrative and customary authorities. For example, women do not often take part in village meetings and when present, many socio-cultural barriers limit their participation. Some authors such as Buhjn (1994) and Fané (1998) observed that women cannot in any way decide in the presence of men in Malian societies; so, even if they attend community meeting, they cannot participate actively.

Table IX shows the level of participation in the elaboration processes of local conventions differed by ethnic group. Indeed, members of non-indigenous ethnic groups were more involved than members of indigenous tribes. In this context, the level of involvement of the Minianka ethnic group considered non-native in Bougouni was high (4) in the diagnosis and awareness stages and average (2) in the development stage of local conventions. Moreover, their involvement in the processes of formalization and resource mobilization was zero as formalization and resource mobilization are often dominated by the indigenous people. However, the level of participation of the Bambara indigenous ethnic group in Bougouni area was generally low for all steps in the elaboration processes. Nevertheless, Bambara's level of participation in the formalization and resource mobilization processes was higher than level of participation of Minianka ethnic group. Similar results were obtained in Koutiala where the level of participation in the diagnosis, awareness and development stages of elaboration processes by the indigenous Minianka ethnic group was lower than that of Bambara ethnic group who can be considered as foreigners in the area. This commitment of non-indigenous peoples in the two districts in their participation in the elaboration processes of local conventions could be explained by their need for strong representation to ensure their access to natural resources in the communities and to avoid total domination by the indigenous ethnic group (Coulibaly and Joldersma, 2006). The opposite is the case for the indigenous population as they enjoy the rights of access and control of resources in the communities, which may explain their low level of participation in the elaboration processes. Thus, considering themselves as the owners and

managers of inherited resources, the indigenous people seem not to be too concerned regarding their participation in the elaboration processes of local conventions.

Table IX: Participation of the different ethnic groups in the elaboration processes of local conventions in the study sites

Variable	Bougouni			Koutiala		
	Bambara	Minianka	Fulani	Bambara	Minianka	Fulani
	N=52	N=2	N=22	N=3	N=80	N=6
Diagnosis	1.29±0.21	4.00	0.73±0.27	1.00±1.00	0.68±0.13	1.50±0.67
Awareness	1.27 ±0.20	4.00	0.45±0.23	1.33±1.33	0.54±0.12	1.67±0.56
Resource mobilization	0.02±0.02	0	0.14±0.14	0	0.21±0.07	0.50±0.34
Formalization	0.27±0.07	0	0.09±0.06	0.33±0.33	0.25±0.07	0.50±0.22
Development	0.40±0.09	2.00	0.23±0.19	1.00±1.00	0.33±0.08	0.67±0.83

The score for the level of participation was 0 = none, 1 = low, 2 = average, 3 = high, 4 = very high

Table XI shows the results of the regression analysis on the effect of independent variables as explained in Table X on the level of participation by the respondents on elaboration processes of local conventions in the study sites. The results of regression analysis showed age, gender, level of education and ethnicity appeared to influence the level of participation of the community members in the diagnosis and awareness stages of the elaboration processes of local conventions in Bougouni. The results suggest that a female is less likely to participate in the elaboration processes of local conventions and that older people are more likely to be involved. The results further showed that a high level of education is negatively correlated to the level of participation by the community members and members of the non-indigenous ethnic group (Minianka) were more likely to be involved in the diagnosis and awareness stages of the elaboration processes in Bougouni. The results further showed that age is positively correlated to participation in the formalization process in Bougouni. Resource mobilization in Bougouni is influenced by age, years of residence, female gender and Minianka ethnic group (Table XI). Similar results were found in Koutiala where five factors namely age, years of residence in the community, female sex, Minianka ethnic group and high school education had a significant influence on the stakeholders' level of participation in the elaboration processes of local conventions. Age had positive influence on the level of participation in the diagnosis and formalization processes and the number of year of residence in the community also had a positive influence on the level of participation in the diagnosis, awareness, conventions development, and also resource mobilization. Being a woman had a negative influence on the level of participation in diagnosis

process. Minianka, though the major ethnic group in Koutiala, had a negative influence on the level of participation in awareness and local conventions development. The results further showed that high (secondary) school education tended to have a positive influence on the level of participation in formalization, development and resource mobilization processes. Koranic education had a positive influence on participation in resource mobilization for local conventions in Koutiala. This could be attributed to the dominance of Muslim religion in the district and the general respect for those with good Koranic knowledge who are often the religious leaders. Overall, the regression analysis revealed that the level of participation in the different stages of elaboration of local conventions depended on a number of factors and these factors varied from one district to another subject to traditional and socio-cultural context of the community. Hence, for a full participation of local users and for better management of natural resources, development of local conventions should take into account the value principles from local traditions while incorporating aspects of principles from modern thinking of property rights (Dicko, 2002).

Table X: Description of the independent variables used in the regression analysis of level of participation in the elaboration processes (diagnosis, awareness, resource mobilization, formalization and development) of local conventions in the study sites

Independent variable	Description
Age	Age of respondents (year)
Residence	Year of residence by the respondent in the community
Female	1 if sex is female, 0 otherwise
Illiterate	1 if level of education is none, 0 otherwise
Secondary	1 if level of education is secondary school, 0 otherwise
Koranic	1 if education is only Koranic, 0 otherwise
Minianka	1 if ethnic group is Minianka, 0 otherwise
Fulani	1 if ethnic group is Fulani, 0 otherwise

Table XI: Results of the regression analysis of the level of participation of community members in the elaboration processes of local conventions in the study sites

Independent variable	Bougouni					Koutiala				
	Diagnosis	Awareness	Resources	Formalization	Development	Diagnosis	Awareness	Resources	Formalization	Development
Age	0.07***	0.05***	0.02***	0.02***	0.03***	0.02*	-0.01	0.01	0.01**	0.01
Residence	-0.01	-0.01	-0.02***	-0.01	-0.02***	0.01***	0.02***	0.01*	0.01	0.01**
Female	-0.65*	-0.75**	-0.21**	-0.10	-0.53***	-0.34*	-0.36	-0.07	-0.18	-0.16
Illiterate	-0.14	-0.29	0.06	-0.14	0.13	-0.07	-0.28	0.18	0.08	-0.08
Secondary	-2.04**	-2.14**	-0.33	-0.52	-0.92*	0.95	0.29	1.01***	0.63**	1.15***
Koranic	0.60	-0.21	-0.06	0.11	0.28	0.67	0.62	0.79**	0.29	0.39
Minianka	2.53**	2.52**	-0.43*	-0.19	1.05*	-0.88	-1.16*	-0.02	-0.29	-1.04**
Fulani	-0.88***	-1.02***	0.11	-0.25**	-0.25	-0.17	-0.20	0.24	-0.02	-0.70
Constant	-1.51**	-0.29	-0.20	-0.35	-0.35	0.23	1.39*	-0.36	-0.05	0.80
R^2	0.47	0.37	0.33	0.26	0.26	0.21	0.21	0.21	0.15	0.24

*** Significant at the 1 % level, ** significant at the 5 % level, * significant at the 10 % level

4.3.2.2. Analysis of stakeholders involved in elaboration of local conventions in the study sites

Stakeholders involved in the elaboration processes of local conventions in the study sites varied according to the types of local conventions and their responsibilities also differed (Table XIII). In general, there was more diversity in the types of stakeholders involved in written local conventions than in oral local conventions as the former generally involved administrative officials and State agencies and sometimes development agencies (Bengaly et al., 2005). The elaboration processes of these written local conventions tend to conform to the purpose of decentralization which often involves a diversity of actors. Unlike written conventions, oral conventions are based on compliance with local customs and their development involved mainly community leaders, household heads and to a lesser extent Forestry services if it concerns forest management. Our results agree with observation by Coulibaly and Sanogo (2006) that all the stakeholders involved in the use and management of natural resources do not have the same responsibility and the same status, and even less the same interests. Thus, the participation of these stakeholders in the development of local conventions is often limited to certain groups while some stakeholders are simply marginalized (Bashir et al. 2007). Furthermore, the religious leaders especially the Imams play an important role in the elaboration processes of local conventions. In agreement with our results, Benjamin (2004) states that the religious leaders are normally consulted along with the chiefs in all decision making concerning natural resource management in the community.

4.3.2.3. Constraints in elaboration of local conventions

There are a number of constraints facing the elaboration processes of local conventions as reported by the technical and administrative services, and the communities (Table XII). The community (traditional) authorities reported that lack of technical and financial support was the major constraint to the elaboration of local conventions whereas the State technical services disagreed with this. This difference in perception between these two types of stakeholders can be explained by the weak involvement of technical services in the elaboration of oral (informal) local conventions as they were mainly involved in the development of formal local conventions which in most cases were financially supported by development agencies. Other constraints reported by the technical services as well as the communities included low level of participation

by the local population and the system of representation in the community which does not often encourage active participation. Active participation of key stakeholders involved in the use of natural resources including women is essential for effective and sustainable management of natural resources in the community. The participation of the community is particularly important for ownership of the local conventions and enforcement, and to avoid the mistakes of many written conventions which are often seen as rather very technical and too formal to enforce (Dicko, 2002).

Table XII: Challenges in elaboration processes of local conventions in the study sites

Constraints	Administrative authorities	Community authority
Lack of necessary resources and support	5	2
Diagnosis of natural resources	3	4
Community mobilization and awareness	4	5
Lack of clarity regarding the responsibilities of the different stakeholders involved in natural resources management in the community	4	5
Lack of community participation	3	4

The score ranged from 1 to 5 where 1= strongly agree, 2 = agree, 3 = neither agree nor disagree, 4 = disagree, 5 = strongly disagree

Table XIII: Key stakeholders involved in the elaboration processes of local conventions in the study sites

Main stakeholders involved in the elaboration processes of written local conventions in the study area			
Natural resource theme	Name of local conventions	Stakeholder	Role
Land management, forestry, rangeland management, water, transhumance, conflict management, hunting, wild fruit harvest, bush fire, conservation and use of fauna and flora	SIWAA CGRN CGPE	Local administrative authorities	Supporting communities in elaboration processes, monitoring the development of local conventions, resource mobilization and building community awareness
		Community leaders	Information and mobilization of the population, advisory role, facilitating compliance with local conventions by community members.
		Community members (indigenous, immigrants)	Involvement and participation in the local conventions elaboration meetings, participatory diagnosis of the main problems of natural resources to be addressed by local conventions
		Technical services (Agriculture, forestry, animal production and industries, rural extension agents, veterinary service, , social development workers)	Technical support and guidance, organization of meetings, problem diagnosis, documentation of local conventions.
		Legal authority	Legal support, documentation of local conventions, harmonization with national law
		NGOs	Diagnosis of the major problems, financial support, technical support, organizing training
		Research institute through project	Diagnosis of the major problems, financial support, technical support, capacity building, organizing training

Main stakeholders involved in the oral local conventions in the study sites			
Natural resource theme	Name of local conventions	Stakeholders	Roles
Rangeland, wild fruit harvest, conflict, land management, transhumance, forests, water	CGPC CGC KO MO CAT CGT CGF CGM	Community leaders	Mobilization and awareness of the community members, coordinating and chairing meetings, approval of rules established for use of natural resources, harmonization of established rules with the traditional rules.
		Neighbouring Communities	Collaboration with the village council, participation at meetings, building awareness and information dissemination (restitution)
		Household heads	Identification of the main problems to be addressed, participation at meetings, proposition of rules for access, use and management of natural resources, information sharing and creating awareness among family members, family representation at meetings
		Women representative	Attend meetings, dissemination of information and building awareness, identification of key issues to be addressed
		Youth representative	Attend meetings, mobilization and awareness, dissemination of information
		Hunters	Attend meetings, dissemination of information
		Religious leaders	Mobilization, dissemination of information, traditional blessing and advisory role, resource mobilization
		Technical service	Technical support and guidance
		Local administrative service	Ensuring compliance of oral conventions with national laws, resource mobilization

4.3.3. Community involvement in the implementation processes of local conventions

4.3.3.1. Level of participation in the implementation of existing local conventions

The same trends observed in the elaboration processes of local conventions were also observed for the implementation of existing local conventions in the study sites. As in the elaboration processes, the level of participation of community members in the implementation processes of local conventions was very low (Figures 11 and 12). The results showed that 33%, 70%, 74% and 97% of the respondents in Bougouni reported to have never been involved in the mobilization of community members, enforcement of local conventions, monitoring and evaluation, and resource mobilization, respectively. Similar results were observed in Koutiala regarding low level of participation of the community members in the implementation processes of local conventions. Comparing the results from the two districts, the level of participation by the community members in the implementation of local conventions was higher in Bougouni than in Koutiala. The desire to protect their resources from external users, especially from the transhumant herders, might partly explained the higher involvement of community members in Bougouni.

In addition, the low level of participation in mobilization of community members and dissemination of information might be attributed to lack of understanding of the local conventions and the associated non-enforcement. According to the respondents, there was virtually no mechanism for monitoring and evaluation of the existing local conventions in the two study sites except for few attempts by a group of hunters who tried to monitor compliance with the local conventions which often lacked support from the administrative authorities. In addition, lack of financial and material resources was cited as a constraint hindering effective monitoring and evaluation of the established local conventions. The level of participation by women in the two districts was low compared to that of men (Table XIV). The details about factors influencing the community member's participation in implementation processes of local conventions are shown by the results of regression analysis in Table XV. As shown in Table XVI, the level of participation of the respondents in implementation processes of local conventions in Bougouni seemed to be influenced by 4 main factors namely age, year of residence in the community, sex and education level. Among these factors, age seemed to be positively correlated to participation in the implementation processes of local conventions.

Actually, older people are more likely to be involved in the implementation processes. The older people are more engaged because they have more responsibility in the community. Surprisingly, long years of residence in the community tended to result in lesser involvement in the implementation processes. This lack of engagement by long-time residents in the community may be attributed to lack of any threat to their access rights to the natural resources. The results suggested that people with a secondary school education were also not involved in implementation of local conventions. This might be explained by their involvement in off-farm activities which essentially made them unavailable to participate in the implementation processes of the local conventions. While four factors tended to influence the level of participation in the implementation of local conventions in Bougouni, only one factor namely ethnic group seemed to influence the level of participation in Koutiala. The results showed that people from the indigenous ethnic group were less likely to be involved in implementation processes of local conventions. The same explanation as in Bougouni district could be given for the behaviour of the indigenous people.

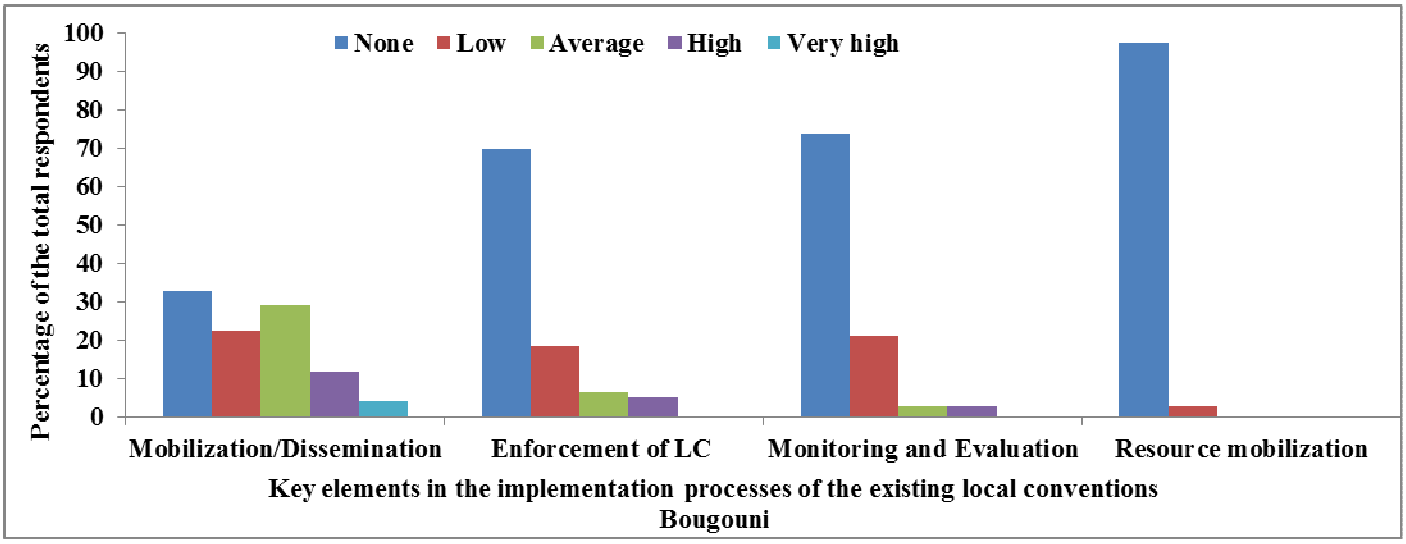

Figure 11: Level of participation by the community members in the implementation processes of local conventions in Bougouni

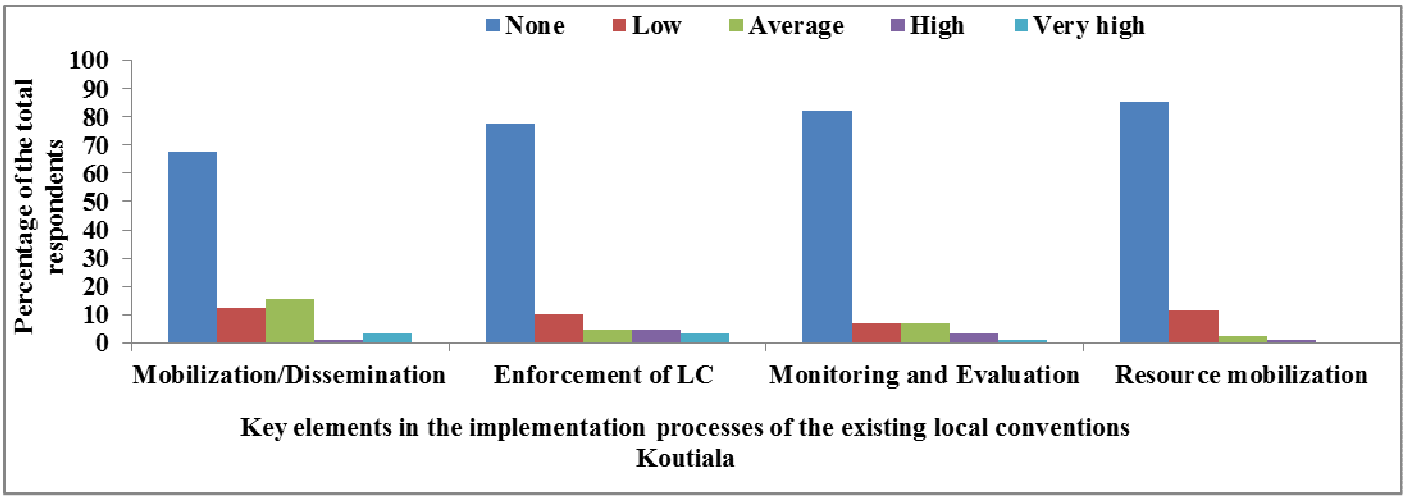

Figure 12: Level of participation by the community members in the implementation processes of local conventions in Koutiala

Table XIV: Influence of gender on the implementation[2] of existing local conventions (LC) in Koutiala and Bougouni districts

Variable	Bougouni		Koutiala	
	Male (N=52)	Female (N=24)	Male (N=59)	Female (N=30)
Mobilisation/Dissemination	1.60±0.16[a]	0.71±0.19[b]	0.78 ±0.15 [a]	0.27±0.11[b]
Enforcement of LCs	0.65 ±0.13 [a]	0.08 ±0.06 [b]	0.68 ±0.15 [a]	0.03 ±0.03[b]
Monitoring and Evaluation	0.48±0.10 [a]	0.04±0.04[b]	0.49 ±0.13 [a]	0.07 ± 0.05[b]
Resource Mobilisation	0.04±0.03	0	0.29 ±0.09 [a]	0.03 ± 0.03[b]

[a]Score for level participation varied from 0 to 4 where 0 = none, 1 = low, 2 = average, 3 = high, 4 = very high
[b]The means on the same row with different superscript letters are statistically significant at P <0.05

[2] Explanation of different aspects of implementation processes

Mobilization / Dissemination: Mobilization of community members and dissemination of information on local conventions: Dissemination and awareness of rules on local conventions, mobilization of local stakeholders for the enforcement of local conventions, and involvement in the implementation committees.

Enforcement of local conventions: Enforcement of fines / penalties for those breaking the rules, management of conflicts that result from the execution of local conventions, management of the revenues generated from the activities regulating natural resources management (taxes, fines, etc.), protection of marginalized and vulnerable groups' interests in the implementation of local conventions.

Monitoring and Evaluation: Implementation of the monitoring and evaluation mechanism of local conventions, evaluation of local conventions impact on natural resources management and livelihoods of local population, review of local conventions based on past experiences of their implementation, development of a business plan for the long-term viability of local conventions.

Resources Mobilization: Mobilization of financial resources for the implementation of local conventions, mobilization of technical and legal support for the implementation of local conventions.

Table XV: Description of independent variables used in the regression analysis of the level of participation of the community members in the implementation processes of local conventions (Mobilization / Dissemination, Enforcement of local conventions, Monitoring and Evaluation, Resources Mobilization) in the study sites

Independent variable	Description
Age	Age of the respondent (years)
Residence	Year of residence of the respondent in the community
Female	1 if sex is female otherwise 0
Illiterate	1 if illiterate otherwise 0
Secondary	1 if the level of education is secondary otherwise 0
Koranic	1 if the level of education is only koranic otherwise 0
Adult education	1 if it is adult education otherwise 0
Minianka	1 the ethnic group is Minianka otherwise 0
Fulani	1 if the ethnic group is Fulani otherwise 0

Table XVI: Results of the regression analysis of the level of participation of community members in the implementation processes of local conventions in the study sites

Independent variable	Bougouni				Koutiala			
	Mobilization/ Dissemination	Enforcement of Local conventions	Monitoring & evaluation	Mobilization of resources	Mobilization/ Dissemination	Enforcement of Local conventions	Monitoring & evaluation	Mobilization of resources
Age	0.06***	0.05***	0.04***	0.01***	0.002	0.001	0.01	-0.001
Residence	-0.02*	-0.02***	-0.02***	-0.01***	0.01	0.01	0.01	0.01
Female	-0.80***	-0.63***	-0.52***	-0.08**	-0.31	-0.40	-0.15	-0.16
Illiterate	-0.58**	-0.27	-0.20	0.04	-0.29	-0.16	-0.13	-0.06
Secondary	-2.85***	-1.53***	-1.16***	-0.15	0.06	0.56	0.57	0.59*
Koranic	-0.41	-0.41	-0.13	-0.03	-0.66	-0.16	0.06	-0.54
Adult education	-0.14	0.15	0.14	0.06	-0.33	-0.10	0.01	-0.18
Minianka	0.23	-0.56	0.10	-0.17	-1.10*	-0.97*	-0.81*	0.03
Fulani	-1.05***	-0.55***	-0.25*	0.03	-0.30	0.36	0.45	0.59
Constant	0.02	-0.51	-0.34	-0.10	1.29*	0.98	0.26	-0.001
R^2	0.51	0.41	0.40	0.28	0.17	0.25	0.28	0.19

*** Refers to significant at 1%, ** significant at 5%, * significant at 10%

4.3.3.2. Constraint to implementation of local conventions and proposed suggestions by the respondents

Overall, the low level of participation by the community members in the implementation of local conventions could be attributed to a number of reasons reported by the respondents such as lack of incentive for compliance by community members to the local conventions and lack of systematic updating of the local conventions in order for them to fit in with the changing contexts regarding natural resource governance and socio-cultural landscapes. Other constraints mentioned were conflicts of interests between administrative authorities and community leaders, lack of necessary financial and technical resources for monitoring and evaluation, lack of awareness of the rules and norms in the local conventions at the community level and ineffectiveness of the committees responsible for implementation of the local conventions. Lack of written documents, and limited recognition and acceptance (oral local conventions are not recognized outside of the community) were also reported as constraints to effective implementation of local conventions. These constraints are similar to those reported by Dicko (2002) and other authors (Lavigne Delville, 2001; Coulibaly, 1999; Ba and Ali, 1999; PAE, 2003). To address these constraints, the respondents proposed a number of suggestions to improve the implementation of existing local conventions (Table XVII).

Table XVII: Suggestions for effective implementation of local conventions according to administrative and community leaders interviewed in the study sites

Suggestion
1. Translation of written local conventions into local languages
2. Strengthening the capacity of different stakeholders at all levels
3. Establishing framework for dialogue between the community, technical services and administrative services
4. Establishment of a committee to mobilize financial resources
5. Formalization of existing oral local conventions
6. Strengthening dialogue and consultation within the community
7. Promoting the participation of all stakeholders by ensuring adequate representation of all groups when developing local conventions
8. Strengthening mechanisms for information sharing to ensure good understanding of the content of local conventions by local stakeholders
9. Ensuring regular reminder of the content of local conventions
10. Establishment of rules consistent with the realities on the ground and changing socio-cultural contexts
11. Provision of technical and financial support

4.3.4. Perception of the respondents on the benefits and limitations of local conventions

The majority of the respondents in Bougouni and Koutiala recognized the benefits of local conventions on natural resources management (Figures 13a and b). Eighty-one percent and 90% of the respondents in Bougouni and Koutiala, respectively strongly agreed that local conventions improved natural resource management in their communities. Seventy-three percent and 93% observed that local conventions led to a reduction of cases of conflict over natural resources. The respondents also reported that local conventions can facilitate a better land use plan thereby strengthening the community's capacity to make decisions on the use of their resources. Although all the respondents appreciated the benefits of local conventions, they also highlighted some limitations faced by existing local conventions (Figure 14a and b). The limitations noted were poor participation of community members in the elaboration and implementation of local conventions, poor dissemination of information to local populations, and poor communication among the different stakeholders. The benefits of local conventions identified in this study are similar to those identified by Djiré (2003) and are in consonance with the objectives of the decentralization of natural resource management (Benjamin, 2004, Onibon et al., 1999; Coulibaly, 2010).

The limitations we found in this study (Figures 14a and b) are also similar to those reported by many other authors including Dicko (2002) in Mali, Innovations Environnement Développement (2009) in Burkina Faso, and Bachir (2007) in Niger. In addition, Djire (2003) observed that local conventions can also be a source of conflicts, instead of being a tool for conflict resolution between the indigenous populations and the non-residents who were not involved in the elaboration and implementation processes but depend on the community resources.

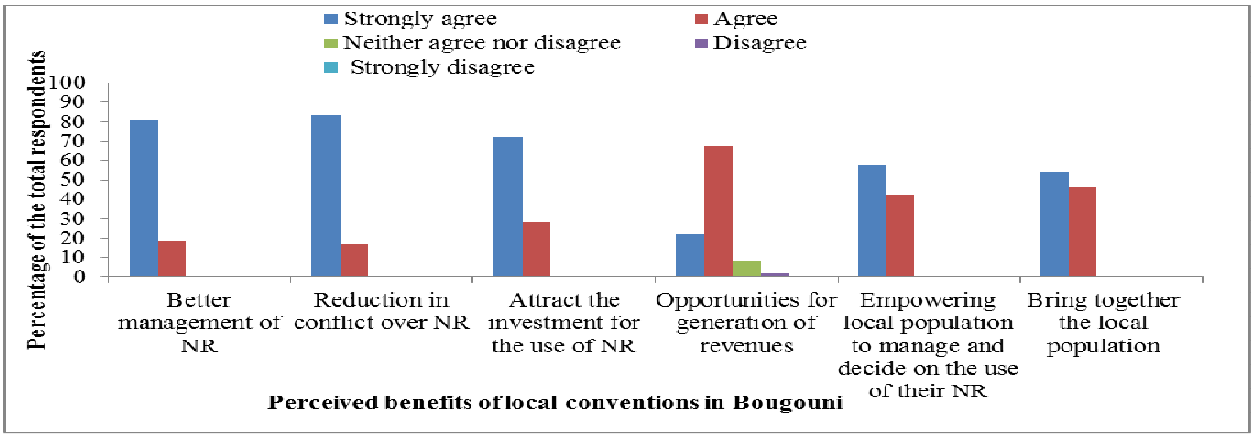

Figure 13a: Perceptions of the respondents on the benefits of local conventions in Bougouni

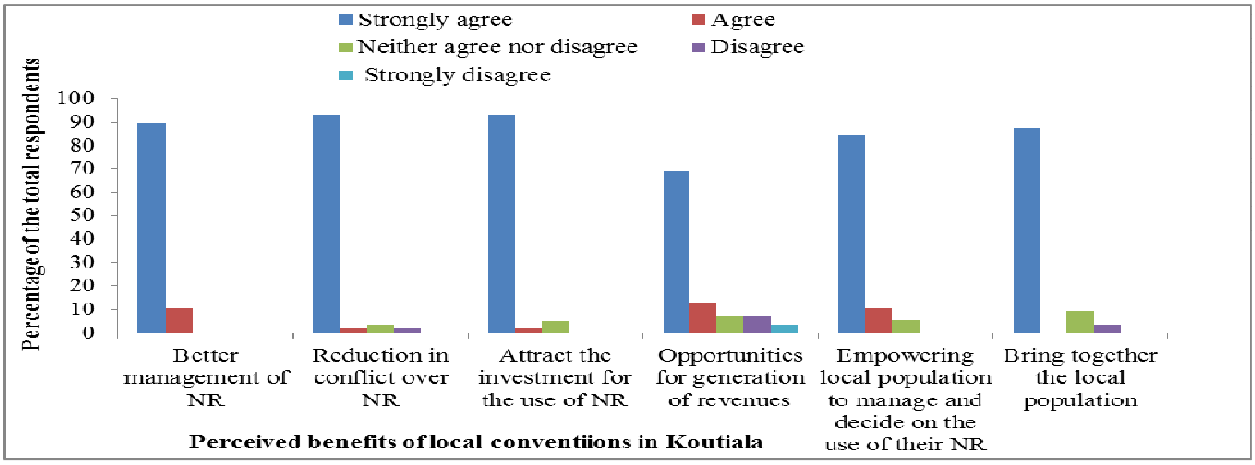

Figure 143b: Perception of the respondents on the benefits[3] of local conventions in Koutiala

[3] ***BetMgt*** *- Better management of natural resources (NR): Local conventions improve management of natural resources in the community, with local conventions, the rights and responsibilities of different actors in the community are clearly defined regarding use and management of natural resources, it is easy to develop long-term plan for the use and management of natural resources with enforcement of local conventions.* ***RedConf -*** *Reduction in conflict over NR: Conflict over natural resource use has reduced in the community as a result of the enforcement of local conventions.* ***Att.Invest*** *- Attract the investment for the use of NR: Local conventions attract external investment in the management of natural resources in the community; it is easy to attract technical and institutional support with established local conventions.* ***ReveGene*** *- Opportunities for generation of revenues: Income generated from the implementation of the local conventions is equitably shared among the community members.* ***EmpLocal*** *-Empowering local population to manage and decide on the use of their NR: All actors in the community accept the rules contained in the local conventions, The local conventions are favorable toward the marginal and vulnerable populations in the community, local conventions sufficiently engage the local people to make decisions on their natural resources, the local authorities including traditional leaders and committees have sufficient power to enforce the local conventions, I am aware of my rights, obligations and benefits in the local*

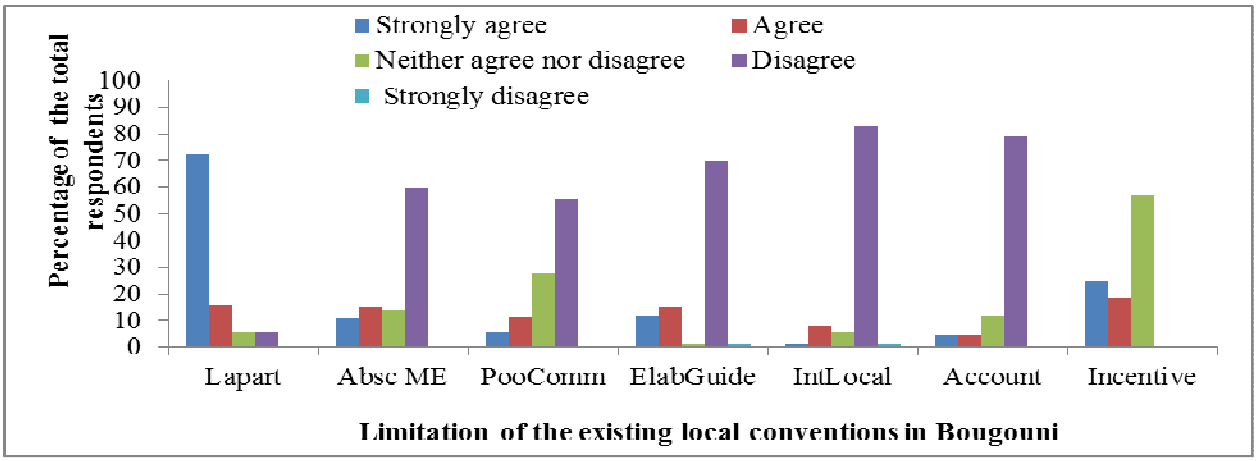

Figure 154a: Perception of respondents on the limitations of local conventions in Bougouni

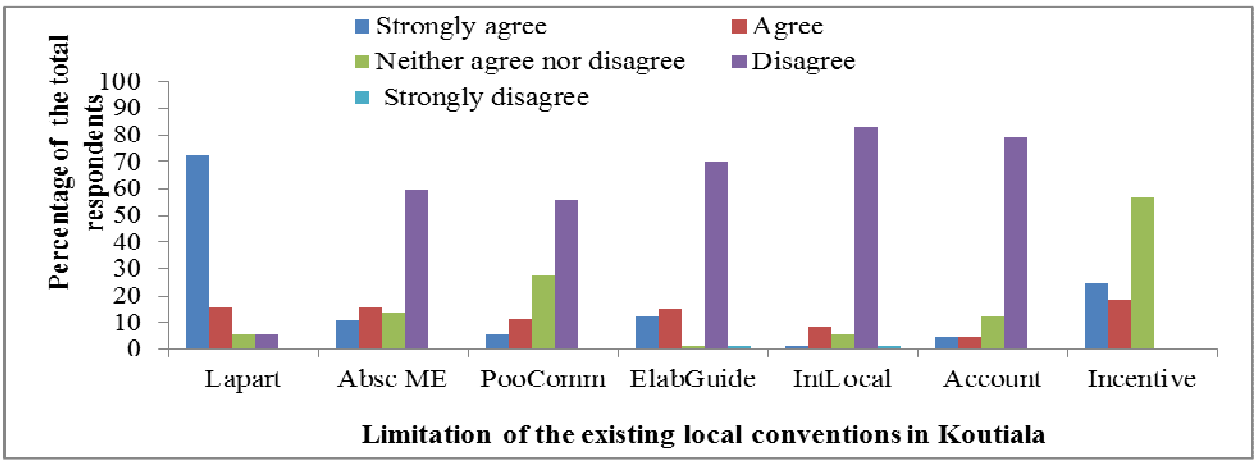

Figure 164b: Perception of the respondents on the limitations of local conventions in Koutiala[4]

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conventions. ***TogPop*** *- Bring together the local population (Foster unit): The local conventions are doing what they are designed to do*

[4] ***LaPart-*** *Lack of adequate participation by community members in elaboration and implementation of local conventions.* ***AbsME*** *- Absence of monitoring and evaluation mechanism.* ***PooComm*** *- Poor dissemination/communication of information to local population :There is no mechanism for information sharing and support to the local actors to ensure good understanding of the content of the local conventions; the committees for the implementation of the local conventions do not communicate regularly with the rest of the communities; the rules of access, use and management of the natural resources contained in the local conventions are not understood by majority of the community members.* ***ElabGuide*** *- Lack of clear guidelines for elaboration processes.* ***IntLocal*** *- Local convention only serve the interest of local administrative and traditional authorities: The implementation committees derive undue advantage from the local conventions as a result of their position.* ***Accountability*** *- Lack of accountability to the local population: The implementation committees are not accountable to the whole community.* ***Incentive*** *- Lack of incentives for implementation of local convention: There are no incentives to respect and comply with the local conventions; compliance with the local conventions is mainly to avoid fines and penalty to be imposed*

The results of the regression analysis of perception of community members on the benefits and limitations of local conventions are presented in Table XIXa & b, and the description of the independent variables used in the regression analysis are presented in Table XVIII. The results of regression analysis on the benefit of local conventions showed three main factors which influence farmer's perception on the benefit of local conventions in Bougouni district. These are secondary level of education, adult education and Fulani ethnic group. The results suggested that farmers were less likely to recognize that local conventions reduce conflict over natural resources. Furthermore, the analysis showed that age, secondary level of education and being Fulani were negatively correlated to the perception of the respondents on the possibility offered by local conventions to better manager natural resources. Farmers 'perception on the limitation of local conventions was negatively influenced by high education level. This could be attributed to their low level of knowledge of local conventions and their lack of involvement.

In Koutiala district, four factors namely age, year of residence, and Mianka and Fulani ethnic influenced farmer's perception on the benefit of local conventions. Older respondents generally had a positive perception of the benefits of local conventions on natural resource management. In Koutiala, old people were more likely to recognize lack of adequate participation of community members in the elaboration and implementation processes, and absence of M&E mechanism as constraints to local conventions. Minianka ethnic group, adult education and illiterate were among other factors that influenced the perception of farmers on the mentioned limit of local conventions.

Table XVIII: Description of independent variables used in the regression analysis of perception of community members on the benefits and limitations of local conventions in the study sites

Independent variable	Description
Age	Age of the respondent (years)
Residence	Years of residence of the respondent in the community
Female	1 if sex is female otherwise 0
Illiterate	1 if illiterate otherwise 0
Secondary	1 if the level of education is secondary otherwise 0
Koranic	1 if the level of education is only koranic otherwise 0
Adult education	1 if it is adult education otherwise 0
Minianka	1 if the ethnic group is Minianka otherwise 0
Fulani	1 if the ethnic group is Fulani otherwise 0

Table XIXa: Results of the regression analysis of perception of community members on the benefits and limitations of local conventions in Bougouni

Independent variable	BetMgt	RedConf	Att.Invest	ReveGene	EmpLocal	TogPop	LaPart	AbsME	PooComm	ElabGuide	IntLocal	Accountability	Incentive
Age	0.002	-0.0006	0.005	0.01	0.01	0.003	0.03**	0.03	0.02	0.003	0.02	0.02	0.02
Residence	-0.0006	-0.0003	-0.004	-0.002	-0.002	0.001	-0.003	-0.005	0.02	0.02	0.01	0.01	-0.01
Female	0.05	0.06	-0.06	-0.02	-0.02	-0.20	-0.21	-0.72*	-0.12	0.03	-0.24	-0.22	-0.28
Illiterate	-0.17	-0.09	-0.21	-0.12	-0.22	-0.14	-0.37	1.32***	-0.55	-0.43	-0.60**	-0.76*	-0.15
Secondary	-0.90**	-0.80**	-1.12***	-0.67	1.26***	-1.12**	-1.41**	-2.71**	-1.49*	-0.98	-3.08***	-4.02***	-2.54***
Koranic	0.13	-0.02	-0.01	0.23	0.06	0.016	-0.99	-0.73	-0.46	-0.17	-0.64	-0.84	0.22
Adult education	0.40**	-0.35**	-0.34*	0.31	-0.44**	-0.47**	-0.36	-0.71	-0.04	0.53	-0.18	-0.14	0.004
Minianka	0.05	0.03	-0.26	0.30	-0.10	-0.04	0.47	0.93	1.21	0.99	0.84	0.79	0.64
Fulani	-0.35***	-0.21*	-0.40***	-0.43	-0.27*	-0.04	0.17	-0.45	-0.27	-0.67	-0.36	-0.67	-0.42
Constant	1.28***	3.5***	1.47***	0.89	1.14***	1.40	0.48	2.95***	2.10***	2.12	2.44***	2.49***	1.83***
R^2	0.25	0.19	0.22	0.09	0.23	0.20***	0.17***	0.20	0.19	0.13	0.32	0.29	0.16

*** Refers to significant at 1%, ** significant at 5%, * significant at 10%

Table XIXb: Results of the regression analysis of perception of community members on the benefits and limitations of local conventions in Koutiala

Independent variable	BetMgt	RedConf	Att.Invest	ReveGene	EmpLocal	TogPop	LaPart	AbsME	PooComm	ElabGuide	IntLocal	Accountability	Incentive
Age	0.02*	0.01	0.02	0.05***	0.04***	0.04***	0.06**	0.07**	0.032	0.03	0.05	0.03	0.047*
Residence	-0.01	-0.01	-0.01	-0.03***	-0.02***	-0.02**	-0.03*	-0.03	-0.003	0.002	-0.02	-0.00007	-0.02
Female	-0.02	-0.14	-0.07	-0.22	-0.19	-0.35	-0.17	0.22	0.61	0.12	-0.23	0.26	-0.23
Illiterate	-0.13	-0.23	-0.17	0.16	-0.15	0.08	-0.35	-0.38	-0.29	-0.57	-0.65	-1.05*	-0.55
Secondary	0.35	0.22	0.28	0.06	0.30	-0.16	0.47	-0.58	0.76	1.36	-0.0004	0.23	0.21
Koranic	0.07	0.03	-0.01	0.40	-0.07	-0.34	1.61	1.88	1.99*	-0.38	1.35	0.53	-0.16
Adult education	-0.25	-0.22	-0.30	-0.04	-0.32	-0.39	-0.77	-1.12	-0.29	0.93	-1.04	-1.23*	-0.49
Minianka	-0.31	-0.27	-0.26	-2.87***	-0.46	-0.09	-0.56	-1.19	-2.74**	-1.54	0.16	-0.58	-1.52
Fulani	-0.07	-0.23	0.14	-2.72***	-0.12	0.72	-0.45	-0.45	-1.86	-1.60	0.56	-0.18	-0.91
Constant	0.59	0.75	0.67	2.58***	0.41	0.10	1.14	1.93	3.11**	2.52*	1.25	1.24	2.35*
R^2	0.13	0.07	0.12	0.33	0.24	0.19	0.16	0.17	0.17	0.10	0.11	0.11	0.11

*** Refers to significant at 1%, ** significant at 5%, * significant at 10%

Conclusion

Results from this study confirm that local conventions governing natural resources management exist in the study sites though mainly informal and the main coverage is limited to the village level. The level of participation in elaboration and implementation processes of local conventions in the study sites is very low and it is influenced by age, year of residence in the community and gender. Participation of the stakeholders in the elaboration and implementation processes of local conventions is often limited to certain groups while some community members are marginalized, particularly women despite the fact that they are major users of natural resources in the communities. The big challenge that faces these institutions governing natural resources is the system of representativeness in the community in the elaboration and implementation processes as community leaders and household heads often dominate which does not encourage active participation. For effective implementation of local conventions, the interest of key natural resource users should be taken into account. It is also important to promote rules and norms that attempt to protect or strengthen women's access to natural resources in the community.

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