

## DYNAMICS OF CONFLICTS BETWEEN CROP FARMERS AND PASTORALISTS OVER AGRO-PASTORAL RESOURCES IN NORTHERN BENIN

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### ABSTRACT

Crop and livestock farming are the main activities for rural populations in sub-Saharan Africa. In Benin, crop and livestock farming occupy 70% of the population, provide between 70 and 80% of export earnings and contribute to 15% of government income. However, crop farmers and pastoralists share the same natural resources for their activities. This study investigated the competition over these natural resources, the dynamics of conflicts that emerge as well as the mechanisms of their resolution, and finally the impacts that have on the relations between crop farmers and pastoralists. For that, 60 crop farmers and 60 pastoralists were interviewed in the Nikki municipality in Northern Benin. Results show that conflicts between crop farmers and pastoralists are over land, access to grazing areas and water points. These conflicts became more and more frequent and violent than in the past and their resolution mechanisms evolved from the recourse to informal institutions such as conciliation and the intervention of wise and notable persons of the community to the recourse to formal institutions such as gendarmerie. These formal conflicts resolution mechanisms also contributed to deteriorate the symbiotic relations between crop farmers and pastoralists that existed for decades. We conclude natural resources subject to conflict between crop farmers and pastoralists could be better managed and conflicts avoided or at least seriously reduced if formal and informal institutions are both considered in their resolution.

**Keywords:** conflict dynamics, conflict resolution mechanisms, crop farmers, pastoralists, Northern Benin

## 1. Introduction

Crop and animal farming are the main activities of rural populations in sub-Saharan Africa. These activities provide society with most of its livelihoods (Biaou, 2010). In Benin, crop and livestock farming occupy 70% of the population, provide between 70 and 80% of export earnings and contribute to 15% of government income (FAO-Benin, 2015). In the practice of their activities, farmers and pastoralists have been collaborating for centuries, sharing the same agro-pastoral resources and exchanging goods and services (Moritz, 2010). Their production methods remain largely extensive and increasingly affect natural resources (land, grazing land, natural water points, etc.). Agricultural activities in Benin are based on the exploitation of natural resources, which are increasingly affected by climate change (Djenontin et al., 2009). Also, the increase in human population and the need to satisfy food and domestic needs that are becoming more and more important lead to the expansion of cultivated lands and the reduction of grazing land (Djibril & Toko Imorou, 2015; Tamou et al., 2017). This continuing reduction of grazing land calls into question intercommunity relations, thus generating conflicts between farmers and pastoralists for access to natural resources (Biaou, 2010). This means that the same cropland for farmers is the one on which pastoralists must find through mobility, forage and water for their livestock. In this situation where two groups with two different lifestyles and objectives live side by side, conflicts arise (Van Driel, 2012). As a result, there is a competition between these two groups over access and use of natural resources (Tamou et al., 2017).

As in all human relations, collaborative relationship between crop farmers and pastoralist has always had its share of conflicts, which unfortunately are more and more frequent and violent (Idrissou *et al.*, 2016). The underlying reasons for conflicts are essentially structural and linked to the fact that the two groups of actors share common resources that are becoming increasingly scarce (Braukämper, 2000). However, crop farmers and pastoralists have lived together for centuries, but conflicts that were peacefully resolved in the past are becoming increasingly violent, leading to the questioning of intercommunity relations (Biaou, 2010; Chukwuma & Atelhe, 2014).

According to the FAO (2015), three (03) factors explain the increasingly intense competing pressures on natural resources. These are:

- Demographic changes (population growth, migration and urbanization);
- Market pressures (increased commercialization, intensification and privatization of local economies, growing integration of national and global economies, economic reforms);
- Environmental changes, such as floods, recurring droughts, alterations in stream flow, changes in wildlife migration that force people to change their livelihood strategies.

In Benin, this competition is reflected in the encroachment of cropland into formerly grazing land (Magrin, 2011). Land clearing therefore seriously compromises access to resources and pastoral mobility. Cash crops such as cotton are leading to drastic reduction of grazing areas (Djenontin et al., 2009; Belki, 2014; Djibril & Toko Imorou, 2015). The shrinking of grazing land materializes in several forms: obstruction of transhumance corridors, creation of "trapping fields" near grazing land (Tamou et al., 2017). These changes in the production and resource management system are not without negative effects on the development of ruminant livestock farming (Belki, 2014) and on the good-neighborly relations that once existed between crop farmers (indigenous) and pastoralists.

In this environment characterized by increasing pressure on natural resources leading to dynamic relationships between farmers and pastoralists, this study was interested in understanding the evolution of conflicts between these actors as well as the dynamics of their management methods. It also investigated the implications of the dynamics of conflicts and their modes of management on the relations between crop farmers and pastoralists in North-East Benin.

## 2. Theoretical approach

Conflicts are generally defined as situations in which two or more entities or parties perceive that they have mutually incompatible goals (Mitchell, 1981). For Gbogbo (2010), conflict is a situation of tension in which two or more parties dependent on each other and aware of their opposition/adversity try by pressure or force to realize their personal interests or action plans apparently or really irreconcilable. Idrissou et al (2016) clarifies by saying that the notion of conflict expresses the fact that one party wants to impose its positions, contrary to the expectations or interests of the other party. This definition reinforces the use of this concept to judge sometimes the strained relations between crop farmers and pastoralists in many parts of the world. Indeed, according to Salihou (2016), most conflicts between farmers and pastoralists are linked to access to natural resources (land, pastures, watering points, etc.). According to the literature, conflicts between crop farmers and pastoralists are quite complex and can be explained by structural and processual reasons (Noorduyn, 2005; Moritz, 2010). These conflicts are manifested by tensions between farmers and pastoralists over access to water points, land, pasture areas and animal resting parks. Some of the conflicts give rise to violence but others are solved with partiality. The reasons for this difference in conflict resolution can be found in analyzing the sequences of interactions (Kriesberg 2007).

Several approaches are used to understand conflicting situations. The structural-functionalist analyses are a more agent-focused analysis of the social and political dimensions of conflict situations (Moritz, 2010). However, the Manchester School for example shifted away from this approach to developed analytical methodologies, like situational analysis and the extended case method, that entailed a detailed examination of one event to see how actors position and reposition themselves in a series of moves (Moritz, 2010). Processual approach was therefore introduced in the 1960s in political anthropology and considered “as the study of the processes involved in determining and implementing public goals and in the differential achievement and use of power by the members of the group concerned with those goals [their emphasis]” (Swartz et al. 1966:7). This analytical approach thus naturally entailed a diachronic study of conflicts in which the focus is on the succession of phases to better understand the underlying causes of the conflict, their degree of violence and their resolution mechanisms. The processual approach is used in this study to investigate the resources under conflict, the evolution of the conflicts in violence and their mechanisms of resolution, and finally the impact these conflict resolution mechanisms have on the relations between crop farmers and pastoralists in the municipality of Nikki.

## 3. Methodology

### 3.1 Field of study

The study was conducted in north-eastern part of Benin in Nikki municipality (9°35' to 10°75' N and 2°45' to 3°30' E), Borgou Department, which is the second largest area of crop and livestock production in Benin (Figure 1). It is subdivided into seven districts (Ouénou, Tasso, Suya, Sérékali, Biro, Gnonkourakali and Nikki) and covers an area of 3171 km<sup>2</sup>, or 2.76% of the total area of Benin.

The relief is favorable to economic activities including crop and livestock farming. Soils are of ferruginous tropical and ferralitic types. Trees encountered very often in fields and fallows are *Daniellia oliveri*, *Parinari curatellifolia* and *Pteleopsis suberosa* (Afrique-Conseil, 2006). The climate is Sudano-Guinean type, characterized by an alternation of a rainy season (May to September) with a long dry season (October to April). The average rainfall is 1100 mm with a favorable temporal distribution for the production of cereals and tubers (Mama Zakari, 2005).

Demographically, the municipality of Nikki has a population of 151 232 inhabitants with a growth rate of 3.83% (INSAE, 2013). The density of the population is 48 hab/Km<sup>2</sup>. The socio-cultural groups encountered in the municipality are mainly Bariba or Baatumbu (45.40%) mostly crop farmers, Fulani or Fulbé (40.40%) mainly pastoralists and Dendi (5.10%) mainly traders. The economic activities practiced are mainly crop and livestock farming, which occupy 72% of the population. Production of food crops (maize, sorghum, millet, soybeans, cassava and yams) is predominant in the municipality compared to cash crops (cotton, soybean, groundnuts and cashew nuts). Livestock production is largely dominated by ruminants, mainly cattle, sheep, goats, etc. (INSAE, 2013). Figure 1 shows the map of Nikki commune and its location in Benin.

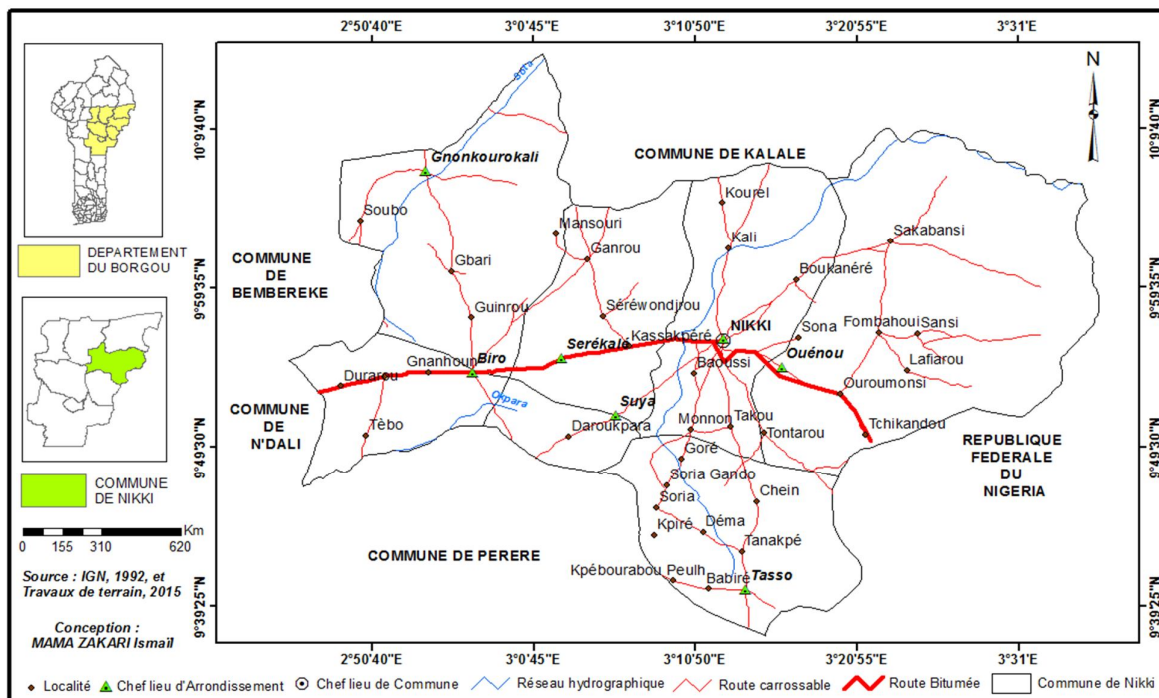
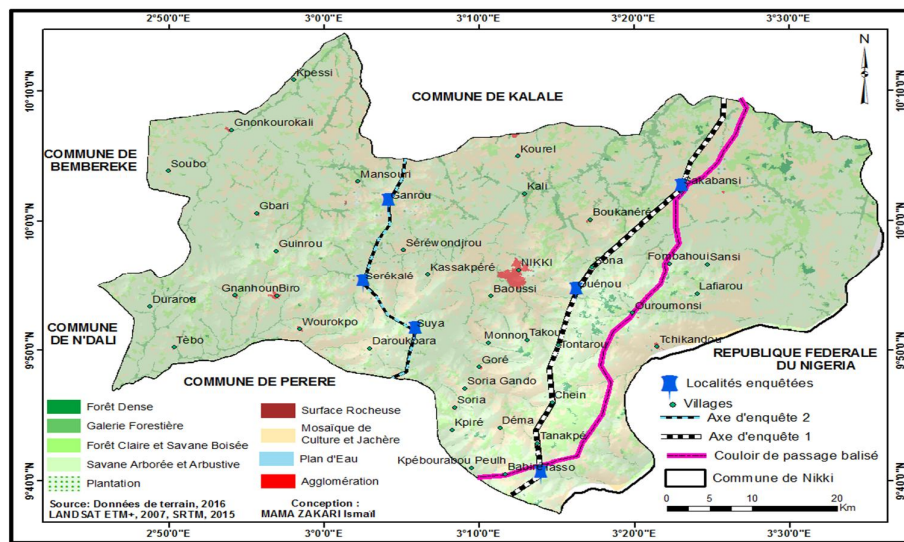


Figure 1: Map of the municipality of Nikki

### 3.2 Study method

Data were collected on a sample of 120 actors including 60 crop farmers and 60 pastoralists selected randomly along two (02) axes (Figure 2), to cover all the districts of the municipality :

- Axis N°1: Sakabansi-Ouénou-Tasso: identified as a border axis; it is located in the east of Nikki municipality, alongside with Nigeria border and has a sub-regional transhumance corridor coming from Niger and crossing several municipalities to reach Togo (ECOWAS corridor). This transhumance corridor is marked on a set of more than 150 km in the municipality of Nikki. The passage of transhumant pastoralists is one of the main causes of escalation of conflicts with farmers in this area.
- Axis N°2: Ganrou-Sérékali-Ouinra-Suya: the Center-West zone of the commune, this axis does not have cross-border corridors of transhumance contrary to the axis N ° 1.



**Figure 2:** The two data collection axes

Along each of the two axes, 30 farmers and 30 pastoralists were randomly selected and interviewed. Data collected were related to the perceptions of crop farmers and pastoralists on the frequency of crop farmer-pastoralist conflicts, the causes of these conflicts, their manifestations and their socio-cultural and economic implications, the conflicting resources, modes of crop farmers access to these resources, land cultivated and fallows of crop farmers and pastoralists, cattle herds for farmers and pastoralists, pre- and post-conflict relations, conflict resolution mechanisms, etc. These data were gathered during semi-structured interviews. The diachronic analysis of relations between crop farmers and pastoralists required the collection of these data over two periods (five years ago and nowadays); this helped to assess the evolution of causes, manifestations, conflict resolution mechanisms, economic, cultural and social consequences and changes over time between the two communities. The information collected were analyzed using discourse analysis and descriptive statistics. The Student's t-test was used to compare at 5% threshold, the average land cultivated and fallowed and cattle herd size for crop farmers and pastoralists.

#### 4. Results

Results for this study focus on the evolution over time of the competing resources between crop farmers and pastoralists, the forms these competitions took over time, the conflicts that emerged from these competitions and the dynamics of their resolution mechanisms and finally the consequences that these conflicts have on the evolution of the relations between crop farmers and pastoralists. These results are diachronically presented in order to see the real changes over time in the different relationships between crop farmers and pastoralists in the study area.

##### 4.1 Socio-economic characteristics of the respondents

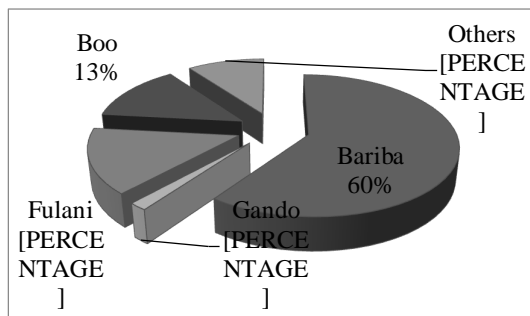
###### 4.1.1 Sex and age of respondents

The sample surveyed is composed of 100% of male pastoralists as this activity is mainly practiced by men and 83.30% of male crop farmers and 16.70% of female crop farmers. This sample reflects the characteristics of the population of the region.

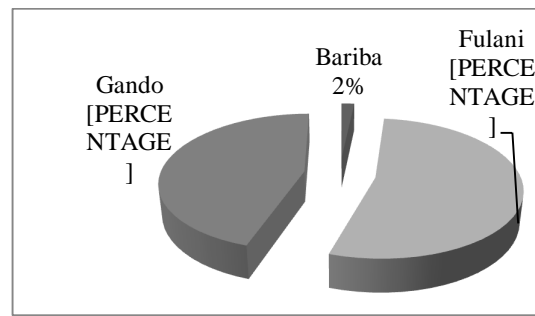
The majority (90%) of crop farmers and pastoralists surveyed are of 21 to 60 years old and the remaining 10% are over 60 years old.

#### 4.1.2 Socio-cultural groups and secondary activities of the respondents

Crop farming is practiced mainly by the Bariba ethnic group (60%) followed by the Fulani and Boo ethnic groups respectively 15% and 13%. As for the Fulani second largest ethnic group in the region, they exclusively practice livestock farming as their main occupation. Figures 3 and 4 show the distribution of ethnic groups according to their main activity.

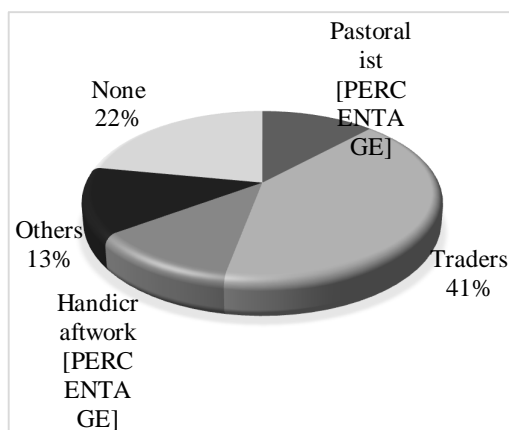


**Figure 3:** Ethnic group practicing agriculture (Field Survey, January 2017)

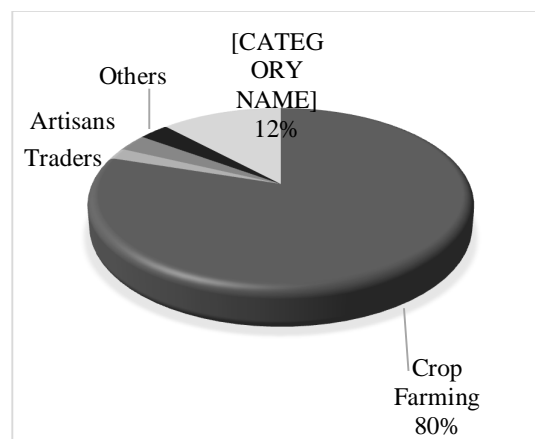


**Figure 4:** Ethnic groups practicing livestock farming (Field Survey, January 2017)

Both crop farmers and livestock farmers (pastoralists) also have a secondary activity. Crop farmers (41%) practice mainly trade as secondary activity but also handicrafts (12%), livestock farming (pastoralism) (12%) and the rest has no secondary activity. As for the pastoralists (80%), they mainly practice crop farming as a secondary activity but also handicrafts and trade. Figures 5 and 6 show the secondary activities carried out by the actors.



**Figure 5:** Secondary activities practiced by crop farmers (Field Survey, January 2017).



**Figure 6:** Secondary activities practiced by pastoralists (Field Survey, January 2017).

#### 4.2 Competition between crop farmers and pastoralists over access to natural resources

Farmers and pastoralists mainly compete over access to three (03) natural resources in Nikki municipality: land, water points and pasture.

##### 4.2.1 Land

Land is used by both crop farmers and pastoralists in Nikki municipality for crop farming. The average land cultivated by crop farmers and pastoralists have increased significantly over the past five years (Table 1). They have increased on average from 7.67 ha to 9.75 ha for crop farmers and from 6.33 ha to 7.33 ha for pastoralists (Table 1). The occupation of land for agricultural practices has significantly increased in recent years for both farmers and pastoralists. The difference in average land cultivated by crop farmers and pastoralists is not significant (Table 1) five years ago and nowadays. So, crop farmers are occupying almost as much land as pastoralists who also in Nikki for their crops, and this shows that some pastoralists (80%) also do crop farming as their secondary activity. However, there is a significant increase in land cultivated both by crop farmers and pastoralists nowadays compared to land occupied for crop farming five years ago. Both farmers and pastoralists expand significantly their crops' land every year. Thus, access to land is an important issue of competition between these two actors in the municipality of Nikki.

**Table 1:** Average land cultivated by crop farmers and pastoralists

| Variables                         | Actors | Mean  | Standard deviation | t Test                                  |
|-----------------------------------|--------|-------|--------------------|---|
| Total area currently cultivated   | Farmer | 9.75  | 5.846              | t=2.181 ;<br>ddl=118 ; p=0.906          |
|                                   | Herder | 7.33  | 6,284              |   |
| Total area cultivated 5 years ago | Farmer | 7.675 | 5.0672             | t =1.221 ; ddl<br>=109.008 ;<br>p=0.168 |
|                                   | Herder | 6.338 | 6.8094             |   |

**Source:** Field Survey Data, January 2017

The increase of land used for crops every year by farmers and pastoralists is contributing to the increase in new land occupation and in the reduction of fallows available for grazing. The average fallow area has therefore dropped from about 2 ha to 0.94 ha per farmer over the past five years, with about 12% of respondents having no fallow (Figure 8). This decline in fallows shows that land is becoming more and more a scarce resource in Nikki, thus reducing land available for grazing.

##### 4.2.2 Grazing

Livestock farming in Nikki municipality is the main activity of Fulani (100%). However, some crop farmers in Nikki (12%) also raise livestock but as a secondary activity. However, the average size of herds of pastoralists is higher than that of crop farmers (Table 2), regardless of livestock species. Grazing is therefore a sought-after resource for both crop farmers and pastoralists. About 58% of the crop farmers surveyed keep their animals at home. The movement of animals to fallows and uncultivated land belonging to farmers for forage is therefore essential for the survival of livestock farmers.

**Table 2:** Average herd size of farmers and pastoralists

| Variables | Actors | Mean  | Standard deviation | t Test                           |
|-----------|--------|-------|--------------------|----------------------------------|
| Cattle    | Farmer | 2.27  | 4.532              | t= - 6.154 ; ddl= 118 ; p=0.000  |
|           | Herder | 72.20 | 87.910             |                                  |
| Goat      | Farmer | 3.80  | 6.092              | t = - 2,798; ddl=118 ; p=0.000   |
|           | Herder | 12.25 | 22.584             |                                  |
| Sheep     | Farmer | 3.15  | 6.876              | t = - 5. 596 ; ddl=118 ; p=0.000 |
|           | Herder | 23.45 | 27.245             |                                  |

**Source:** Field Survey Data, January 2017

Fallow are therefore occupied by both crop farmers and pastoralists. As for crop residues, each crop farmer keeps it jealously for his own animals while they are coveted by the owners of herds surrounding or passing by.

#### 4.2.3 Water points

Water points such as dams, rivers and ponds are sources of water for both off-season crops and for watering animals. The municipality has 22 dams designed for pastoral purposes. In addition to these dams, there are natural watering points such as the Orly and Tasne rivers, the pastoral dams of Biro, Gouré Bata (Sérékali) and Domplawi. Crop farmers stormed the water points and especially their banks in the extension of cultivated areas and especially in the production of off-season crops. The width of 25 m of buffer zone around ponds and river banks set by the law on the environment of 1999 is not respected; this makes it difficult for pastoralists to access the watering points for their animals.

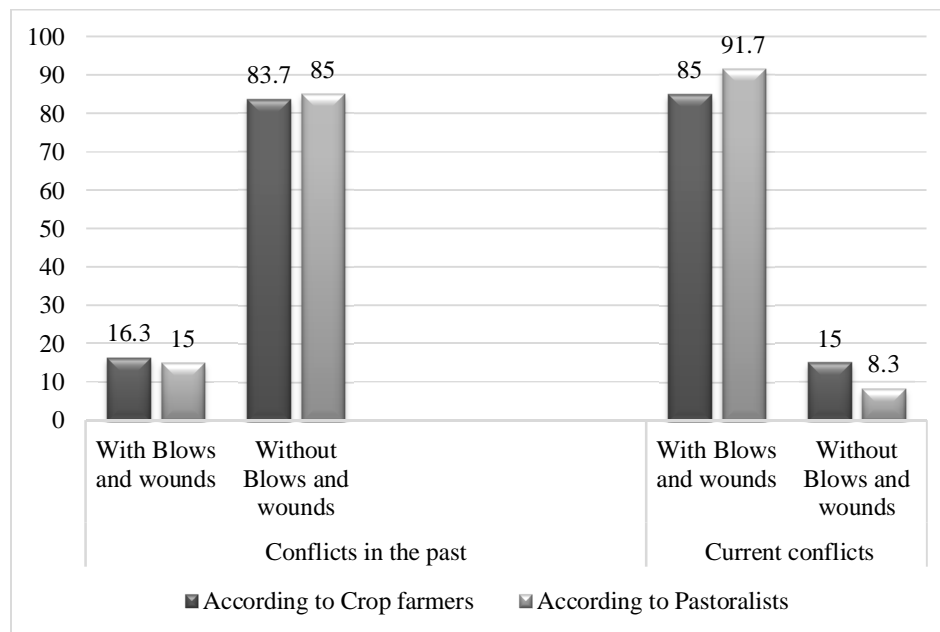
In addition, fishing is practiced at the watering points during the dry season with the use of pesticides and motor pumps to drain water for harvesting the poisoned fishes. These techniques dangerously affect both the permanent availability of water and the health of animals consuming these waters. Thus, pastoralists are marginalized in the exploitation of water points to the detriment of crop farmers and fishermen.

Crop farmers, pastoralists and fishermen share the same resource such as land, grazing areas and watering points for their activities. However, the non-respect of the participatory management principles in the use of these resource make their access difficult for pastoralists. The competition between crop farmers and pastoralists for the access to land, grazing land and watering points for their activities lead to conflicts between crop farmers and pastoralists.

#### 4.3 Conflicts between crop farmers and pastoralists in the municipality of Nikki

The competition over the essential natural resources for crop farmers and pastoralists generate conflicts that manifest in two forms: violent and destructive conflicts (with blows and wounds of the conflicting parties and sometimes resulting in amputations of limbs, death of animal and or people) and non-destructive conflicts characterized by offensive language of the parties to each other. The diachronic analysis of the conflicts between farmers and pastoralists shows that conflicts have evolved into violent and destructive conflicts that became more recurrent over the last five years according to both parties (Figure 7).





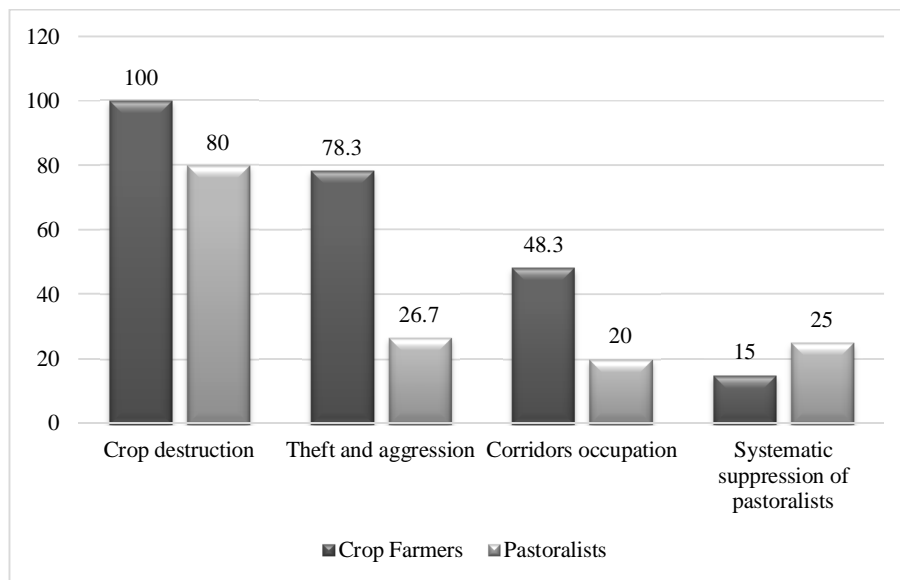
**Figure 7:** Conflict demonstrations (Field Survey, January 2017)

The figure 7 shows that for 85% of pastoralists and 83.7% of crop farmers, conflicts in the past are without blows and wounds while conflicts nowadays are violent with blows and wounds for 91.7% of pastoralists and 85% of farmers. The most recurrent form of conflict in Nikki between crop farmers and pastoralists is therefore the violent form that causes blows and wounds between the two parties.

The "hot spots" of the conflicts in Nikki municipality are the Sakabansi and Tasso localities at the east of the municipality alongside with the Nigeria border (Axis 1) and Biro, Gnonkourakali and Sérékali in the south-west of the municipality (Axis 2) (Figure 2). These localities often record more than 10 conflicts a week during the same periods.

#### 4.4 Causes of conflicts between crop farmers and pastoralists

Conflicts between crop farmers and pastoralists arising from the competition over access to land, water and grazing resources have diverse causes. They are related to crops damages, thefts and aggressions, occupation of corridors and systematic eviction of pastoralists (Figure 8). According to crop farmers and pastoralists, these causes do not have the same importance in Nikki municipality (Figure 8).



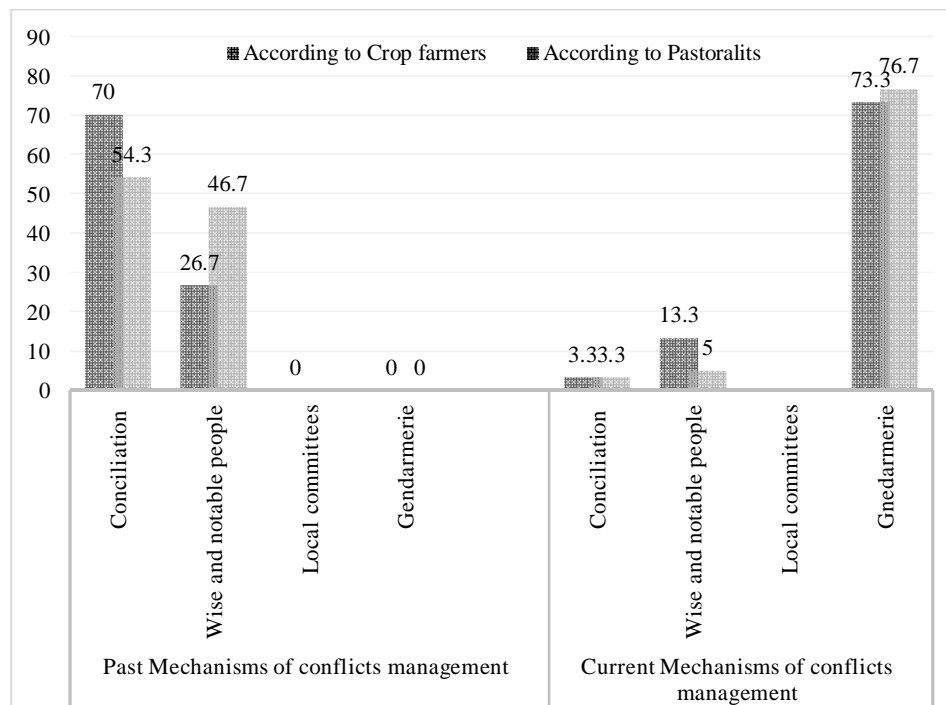
**Figure 8:** Conflicts causes in Nikki municipality (Field Survey, January 2017)

Damage to crops by animals is the prominent cause of conflict in Nikki municipality according to 100% of farmers and 80% of pastoralists interviewed. On the other hand, systematic rejection of pastoralists has caused less conflict between crop farmers and pastoralists in Nikki as it causes fewer negative physical consequences. The damage to crops is a consequence of the absence or insufficiency of corridors for herds movement often occupied by farmers' crops installed without taking into account livestock mobility. Sometimes crops completely surround the watering points so that there is no possibility for animals to access to watering without going into cropped farms. When corridors for animals exist, they are obstructed or occupied by crop farms. Some farmers grow their crops on the livestock corridors under the pretext that the lands are insufficient, or that the lands within these corridors belong to them or that these lands are more fertile.

#### *4.5 Evolution of crop farmers and pastoralists conflicts resolution mechanisms*

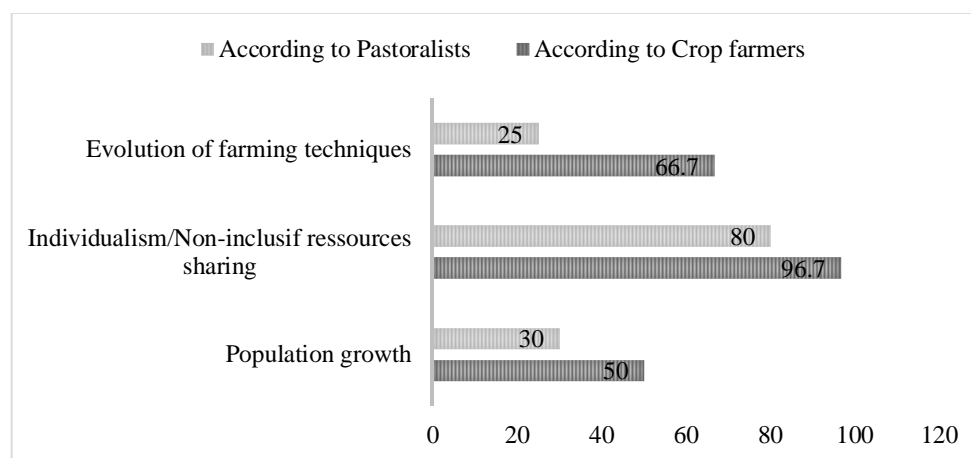
Four ways of resolving crop farmers and pastoralists conflicts are observed in Nikki. It involves conciliation of the actors (friendly settlement), the recourse to the community (settlement by wise persons or notables) or the conflict management committees set up and the recourse to formal institutions responsible for conflict resolution (Police and courts). These modes of resolution have evolved over time.

All the actors interviewed mentioned that in the past, the main modes of conflict resolution between crop farmers and pastoralists was the out-of-court settlement through conciliation and recourse to wise persons and notables. No conflict was sent to court or police. Nowadays, more than 70% of the actors recognized that conflicts are settled with the police and thus by the public institutions. The gradual evolution of the conflicts towards violent conflicts reverses the tendencies of their modes of resolution. Conflict resolution has shifted from friendly settlement between parties to the use of formal dispute resolution processes over the last five years (Figure 9).



**Figure 9:** Conflict Management Mechanisms (Field Survey, January 2017)

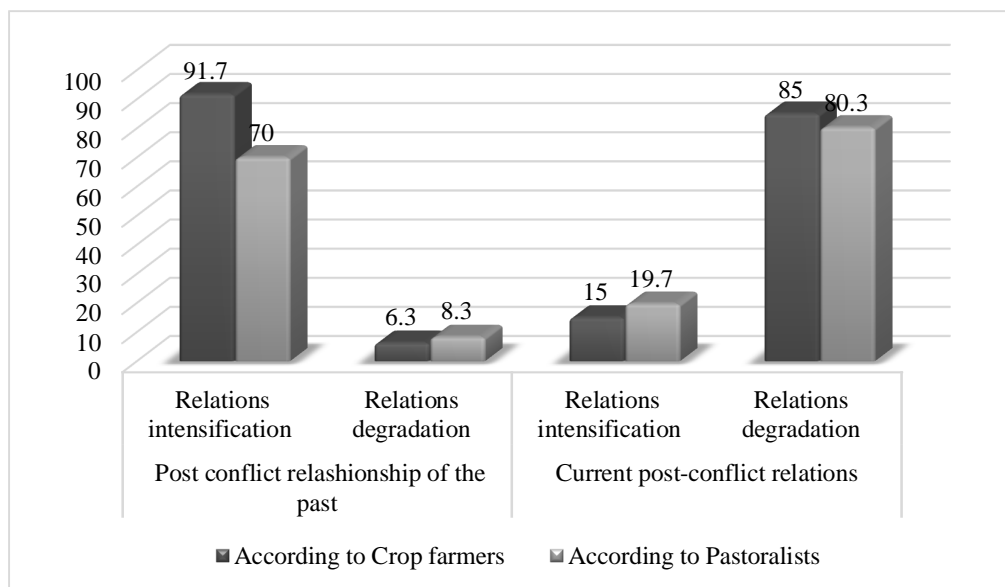
Both crop farmers and pastoralists evoked almost the same reasons for the change in conflict resolution patterns in the region. According to them, the evolution of the modes of conflicts resolution is mainly due to the loss of the community values translated by the excessive individualism of the actors refusing any shared management and any collaboration in the use of the natural resources. This is in addition to the increase in the population that has led to increased competition over access to natural resource and finally the evolution of production techniques favoring the setting up of large crop farms even in lands formerly reserved for grazing (Figure 10).



**Figure 10:** Factors of change in farmer-pastoralist relationships (Field Survey, January 2017)

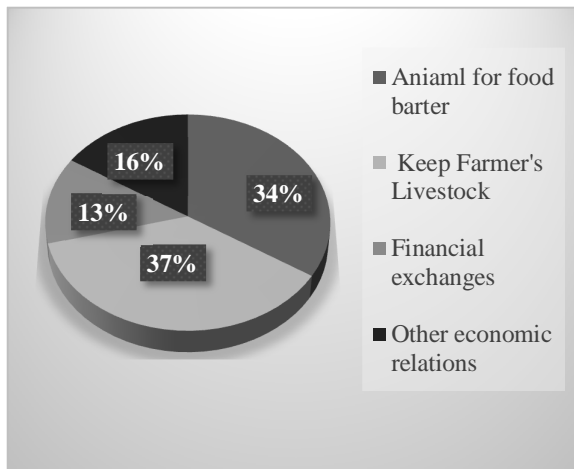
#### 4.6 Implications of crop farmers-pastoralists conflicts resolution methods on their relations

The evolution of conflicts resolution mechanisms affected the relationships between conflicting parties after the conflict. The method of resolution in the past, especially based on conciliation and the recourse to the community institutions generated, according to farmers (91.70%) and pastoralists (70%), good relationships between the actors after the conflicts were solved. On the other hand, the current mechanisms of conflict resolution, which consist in bringing the conflict to the public authorities (police) deteriorate the post-conflict relationships between farmers and pastoralists according to 85% of the farmers and 80,30% of the pastoralists interviewed (Figure 11). Thus, the intervention of police in the resolution of conflicts breaks trust between the conflicting parties, which leads to mistrust and alters the values and historical relationships that existed between crop farmers and pastoralists.

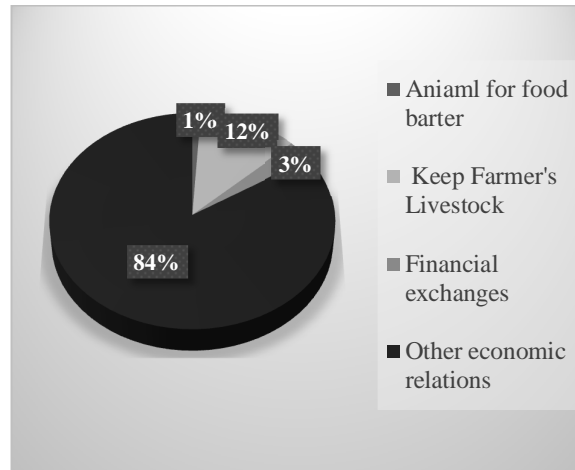


**Figure 11:** Post-conflict relations between farmers and pastoralists (Field survey, January 2017)

The involvement of public law enforcement institutions in resolving crop farmers-pastoralists conflicts is due to changes in crop farmers and pastoralists practices. In the past, crop farmers did not raise animals and pastoralists did not practice crop farming. They have developed a symbiotic relationships that enabled them to support each other in their activities. In economic domain, this dependency was expressed by animal for food barter, pastoralists keeping crop farmers' animals and money lending to pastoralists by crop farmers when needed (Figure 12). These relations between crop farmers and pastoralists has almost totally disappeared and gave way to market based relations, where services to each other are paid (Figure 13).

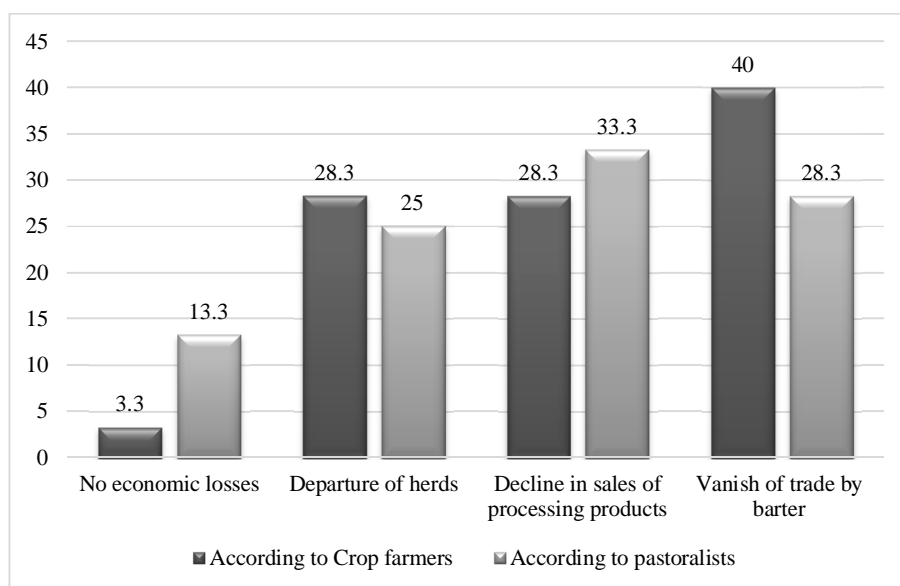


**Figure 12:** Crop Farmers and Pastoralists Economic Relations in the Past (field survey, January 2017)



**Figure 13:** Crop Farmers and Pastoralists Current Economic Relations (field survey, January 2017)

The deterioration of the relations had led not only to social breaking effects between the two communities that were interdependent but also to socio-economic consequences (Figure 14). These socio-economic consequences are mainly the decline in sales of processing products to pastoralists, the vanish of trade by barter between crop farmers and pastoralists and pastoralists leaving the area to other localities leading to losses in taxes collected from pastoralists by the municipality (Figure 14). Thus, both crop farmers and pastoralists loose from the deterioration of the relations between them. The municipality also loose the taxes it collect from the pastoralists reducing its budget.



**Figure 14:** Economic Losses of Changes in Relationships (Field Survey, January 2017)

## 5. Discussion and conclusions

Crop farmers and pastoralists socio-professional characteristics show that in Nikki municipality, some pastoralists practice crop farming and some crop farmers also own animal herds. The stakeholders who participated in the study are therefore agro-pastoralists, as also found in the periphery of the W Biosphere Reserve by Tamou et al. (2017). This means that a significant change has occurred in recent years in the farming system of the region. Indeed, the combination of livestock and crop farming is becoming more common in sub-Saharan Africa, where they have long been considered for different social groups (Landais & Lhoste, 1990; Dugué et al., 2004). Crop farming and pastoralism were linked to the identities of respectively local communities and Fulani. The change of these identities is thus source of conflicts (Idrissou et al., 2016). This change is determined by various socio-political realities. In fact, farmers in Northern Benin to adapt to environmental and institutional changes have increasingly integrated livestock farming into their cropping activities in order to increase their production and to supplement their income; pastoralists have also followed this change by integrating cropping into their pastoral activities to become more and more free from crop farmers (Djenontin et al., 2004; Tamou et al., 2017). Cropping and livestock farming are therefore increasingly practiced by the same socio-professional groups in order to adapt to environmental, social and political realities. These adaptations have the challenge of managing natural resources in a way that reconcile these production systems.

Socio-professional change in crop and livestock farming is a major determinant of the competition for natural resources which generates conflicts whose resolution mechanisms are mainly through public institutions, especially the police instead of the conciliation between actors done by the community intuitions in the past. However, the shift in conflict resolution mechanism also led to the deterioration of the relations between crop farmers and pastoralists. The importance of informal institutions is thus once more pointed out in negotiation as demonstrated in participatory management by Idrissou et al. (2011). Even though formal institutions are set up relations in a collaborative process, the success of the process is guaranteed by the informal relations stakeholders construct together (Idrissou et al., 2011).

The informal conflict resolution methods based on local structures were effective as long as the needs for natural resources including cropland for crop farmers and grazing areas for pastoralists were satisfied. However, it appears from the analysis of land access modes in Nikki municipality that pastoralists do not own land on which they are established; these lands belong to farmers and pastoralists obtained them through "borrowing". Farmers then got back their lands any time they are in need of more land for cropping. Pastoralism is therefore threatened everywhere by the recovery of grazing land for crops (Khari, 2016, Tamou et al., 2017). Land occupied by farm extends every year under the effect of population growth, the persistence of extensive agricultural models, the adoption of new farming technologies that enable to crop more land, the introduction of new cash crops leading to the need for more land and the reactions to climate change consequences (Magrin et al., 2011, Nori et al., 2008; Tamou et al., 2017).

This study on the dynamics of conflicts between crop farmers and pastoralists and its impacts on their relations in the municipality of Nikki enabled us to understand that natural resources, particularly land, water point and grazing land are subject to strong competition between the two stakeholder categories because of their evolution towards similar socio-professional activities (crop and livestock farming). As a result, conflicts are more and more violent and the evolution of their management methods from informal to

formal conflicts resolution mechanisms contributed to the deterioration of the symbiotic relations between crop farmers and pastoralists and led to relations based on economic partnerships. This study also shows that approaches for natural resources and their related conflicts management mechanisms based on traditional institutions were more effective in maintaining the relations between crop farmers and pastoralists but became outdated in view of the growth of the population and the reduction of the availability of these resources. The formal institutions that took over escalated the conflicts that contributed to more deteriorate the relations between the stakeholders. We therefore advice the mix of both formal and informal rules (institutions) in the management of natural resources and the conflicts that emerge to reconcile crop farmers and pastoralists to reduce their competition towards natural resources (Idrissou et al., 2011).

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