Climate Change: A Driver of Crop Farmers - Agro Pastoralists Conflicts in Burkina Faso

Sanfo Abroulaye
Ministry of Animal Husbandry
BP 490 ZINIARE
Burkina Faso

Savadogo Issa
IUCN (International Union for the Conservation of Nature)
Program of Burkina Faso

Kulo E. Abalo
Université de Lomé
Togo

Zampaligre Nouhoun
Institute of' Environment and Agricultural Research (INERA)
Burkina Faso

Abstract

This work focuses on the way climate change and variability in the Sahel of West Africa may lead to the recurrent violent conflicts between crop farmers and agro-pastoralists in Burkina Faso. It identifies and analyses the causes of the violent conflicts between these groups; equally evaluates the impacts of these violent conflicts on communities' welfare. For that, household interviews (100 households were interviewed) and focus group discussions were conducted from 15th may to 30th June 2014 in two administrative regions of the country namely Boudry and Matiacoli. The findings indicated that climate change and variability are impacting negatively land degradation and livestock health in the study area. The frequency and severity of extreme climate events are increasing farmers' insecurity when it comes to the use of natural resources. The study finds that climate change is not a root cause of these conflicts but a factor that exacerbates them. The root causes are socio-economic, political, and land degradation factors such as poverty, population growth and loss in soil fertility. The impacts of the violent conflicts on crop farmers as well agro pastoralists are population and livestock migration, social expulsion, injury and fatality of the population, and the destruction of private properties which can be a vicious cycle.

Keywords: Climate change and variability, Human insecurity, Violent conflicts, Burkina Faso

1. Introduction

Scientific community considered "Climate Change" as one of the world's greatest human development challenges (Barnett and Adger, 2007; Ben Wisner et *al.;* 2007). The world is facing greater weather extreme events such as heat waves, cyclones, tsunamis, droughts and floods (IPCC, 2007; Brooks, 2013). These phenomena affect negatively the environment and people's livelihood, and particularly marginalized groups in the poorest regions, even though they are least responsible for these changes (UNDP, 2009).

Human security occurs on a broader meaning when one considers basic needs for food, water, health, livelihood (UNDP, 1994) and these are the issues addressed in the Millennium Development Goals. Thus, it has been shown that climate change and variability could compromise human security through food, economic, health, environmental, personal, community and political security (UNDP, 1994).

Burkina Faso agricultural sector has been identified by National Adaptation Program of Action (NAPA/PANA) as very vulnerable to climate change (MECV, 2007).

The subsector of livestock is an important contributor to social, economic, food and cultural security. It occupies 80% of the active population, and contributes to 18% to the Gross Domestic Product (GDP) (MRAH, 2012). Agro-pastoral system is the most important livestock system (more than 80% of livestock) based on the use of natural pasture (MRA/IEPC, 2005). Livestock is affected by climate change directly by extreme weather conditions such as heat stress and indirectly through reduction of fodder, water, and the distribution of livestock diseases (vector related diseases and parasites); (IUCN, 2010; Nardone *et al*., 2010; Scholtz *et al*., 2013).

The increase in demand of croplands associated to the increased livestock population without any destocking strategies in the context of climate change and variability may lead to pasture degradation, and the use of marginalized lands (Brook, 2006, Vall *et al.,* 2006; MECV, 2007). Therefore, livestock mobility as livestock feeding practice used by livestock herders become more complicated and sometimes lead to violent conflicts over natural resources use such water and common pasturelands between, especially those between crop farmers and agro-pastoralists (Vall et *al.,* 2006; Ofuoku *et al*., 2010; Olabode *et al*., 2010; Pierre-Yves *et al*., 2010; Rashid, 2011).

Violent conflicts between agro-pastoralists and crop farmers in Burkina-Faso has become very recurrent and represent nowadays more than 65% of the overall natural resources use conflicts (Alkassoum, 2006; MARH, 2011). MRAH (2012) has recorded about 600 conflicts between crop farmers and agro pastoralists occurring each year in Burkina Faso. These conflicts involved most of the time the death of herders, crop farmers or government agricultural extension services agents, the destruction of crops or houses and the injury or killing of animals. For instance, from 2010 to 2012 conflicts between crop farmers and herders has cost more than 100 deaths in Sari, 12 in Tiankoura, 6 in Gaoua, 14 in Perkoua, 7 in Zabre, respectively in the North, Mouhoun, South-West, Sahel and the South Central Regions (MRAH, 2012; Association "TABITAL", 2013).

The causes of these conflicts are natural resources scarcity and their inequitable access, the non-recognition of traditional rights, agricultural encroachments, inappropriate cattle management system, grazing land encroachments, obstructions of pastoral routes, crops damage and in some case corruption (Adebayo *et al*., 2008 ; Ofuoku *et al*., 2010; Olabode *et al*., 2010; Benjaminsen *et al*., 2012). These authors did not make the link with climate change and variability which can jeopardise the natural resources and lead to violent conflicts (Emeka *et al*., 2008; IISD, 2009; Muna, 2009; Odoh *et al*., 2012).

All the studies conducted on conflicts relating to climate change are more theoretical and general (Barnett and Adger, 2007). The empirical study done have addressed the issues of climate change, human security and violent conflict as separate entities. Also, few of them have investigated local conflicts between crop farmers and agro-pastoralists regarding "*Climate Change and Human Security*" framework because the way climate change may lead to violent conflicts is still not clear (Rifkin, 2002; Mochizuki, 2004; Barnett and Adger, 2007; Muna, 2009). If a violent conflict in general is the result of decision and action coming from poor people, in developing countries, it is more local and due mainly to endogenous factors. This is the adequate area to analyse the conflicts related to climate change impacts because they are more likely to be located there (Emeka *et al*., 2008; Odoh *et al*., 2012).

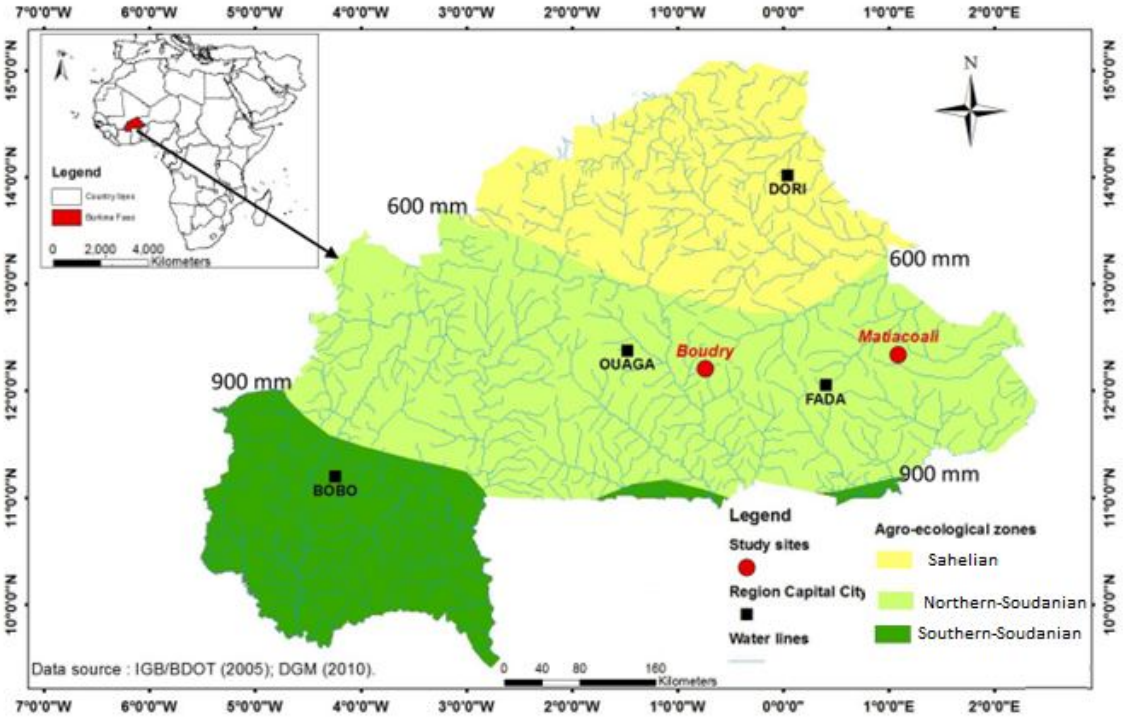
Therefore, it will be interesting through household interviews, focus groups discussion and climate data analysis to investigate the way violent conflicts between agro-pastoralists and crop farmers are going to be exacerbated by climate change and the possible ways of lessening them.

2. Materials and Methods

2.1. Study Site

The study was carried out in two communities namely, Matiacoli (latitudes $12^{o}03'$-$12^{o}24'$N and longitudes $00^{o}55'$- $1^{o}18$ E) and Boudry (latitudes $12^{o}08'$- $12^{o}14'$N and longitudes $00^{o}41'$- $00^{o}80$ W), in eastern and central region of Burkina Faso, respectively. The main criteria of selection of the two study sites are the existence of livestock by taking into account transhumance routes, pastoral zone or pastoral potentialities (reserves, park, forest) in the communities, the frequency and magnitude (number per year) of conflicts between agro-pastoralists and crop farmers. The two sites (Map1) belong to the same agro-ecological zone (Northern Sudanian) with 600–900 mm as annual rainfall, 50 to70 rainy days per season, 150 days as length of rainy season and 28^{o}C as mean annual temperature (MECV, 2007).

The main crops cultivated by farmers in the study area are sorghum (*Sorghum bicolor* (L.) Moench), maize (*Zea mays* L.), rice (*Oryza sativa* L.), and cotton (*Gossypium hirsutum* L.), while, cattle, sheep and goats are the most important livestock species kept by agro-pastoralists and pastoralists.



Map 1: Study Sites Location

2.2. Data Collection

We used the rational method of sampling to identify the two groups (agro-pastoralists and crop farmers). An agro-pastoralist is a farmer who has as main activity animal husbandry (cropping as secondary activity) and using directly natural resources for feeding and watering his livestock on an undetermined or defined space implying the mobility of his livestock. He must take from it his essential income (Ellis and Swift, 1988). He should have also own at least 20 heads of livestock (big or small ruminants) where he is the exclusive or partial owner because cattle herd size has been found as a determinant factor for the practice of transhumance (Zampaligre *et al*., 2013). Whereas a crop farmer is a farmer who has as main activity crop production in which he earns his main source of income. The head of households interviewed were at least 45 years old in order to be able to appreciate changes occurred in the sites. Once these criteria are met, randomly and transect methods, 25 agro-pastoralists and 25 crop farmers' households were interviewed in each site; which amounted to 100 households in the two sites. The interviewed focused on farmers' perception of climate change and impacts by using variables such as drought, flood, migration, pasture scarcity. Concerning the impacts of climate change on human security the household interviews have been done by using variables such as drought, flood, heat stress, migration, pasture scarcity, water scarcity, livestock route, climate change, conflict, economic, health, crop yield, land degradation, soil fertility, animal production and productivity. Whereas, variables such as conflict causes (climatic and no climatic causes), insecurity, conflict trend and management tools were examined to access farmers' perception of conflicts regarding climate-related events (Barnett and Adger, 2007).

Besides, the household interviews using questionnaires, a Semi-Structured Key Informant Interviews (SSKI) with 25 experts in various fields of rural development (rural development projects workers, NGOs, associations, livestock and crop extension services agents involved in natural resources management) was also done at local and regional levels.

Focus groups discussion was done including adults males and females household members based on their willingness to participate in the study. The tools such as "resources mapping", "historical timeline", "and seasonal calendar" was used (ENDA, 2013).

To show the change in climate parameters, rainfall and temperature data (annually data) from nearness synoptic stations (Ouagadougou for Boudry and Fada for Matiacoali) were collected for the period 1970-2010. This period was considered because it includes the major climatic hazards such as drought and flood (CRED/EM-DA, 2013), and which are supposed to be the impacts of major changes in the climate (IPCC, 2001).

All the data packages collections are based on the theoretical and conceptual framework (figure 1).

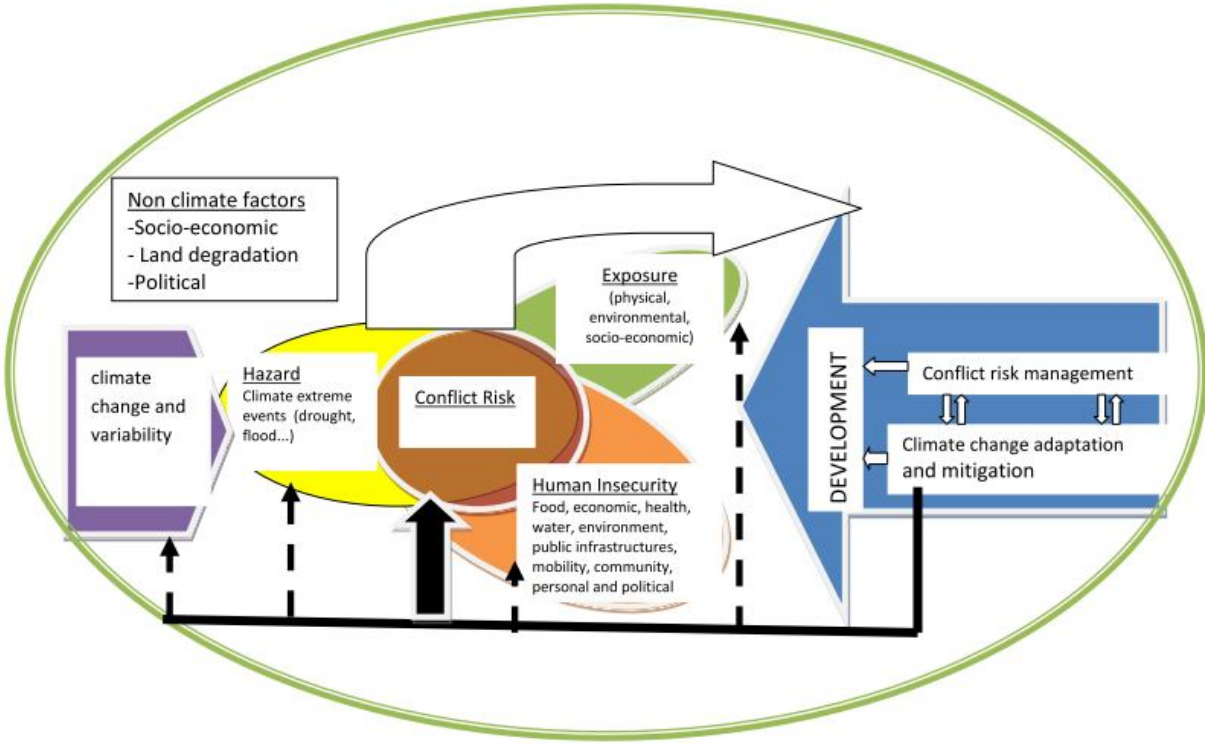


Figure 1: Conceptual Framework: Conflict Risk Assessment and Climate Change Adaptation Framework (Source: Adapted from IPCC/SREX, 2012)

2.3. Data Analysis

The annual patterns of the rainfall, temperature, livestock health and price were examined for the two sites. The qualitative data were codified in quantitative form in the software EpiData 3.1 which was used for the data entry. We used Excel (2013) for figures drawing, while, SPSS 20 and SYSTAT 12 were used to perform both descriptive and analytical statistics. Chi-Square and Mann-Kendall Tests with a conventional significance level of $p < 0.05$ were considered in the groups' analysis.

3. Results

3.1. Factors of Farmers' Vulnerability

Farmers have identified land, water, and livestock health issues as their factors of vulnerability and thereby their factors of insecurity (Table 1). Indeed, rainfall variability and its decrease leading to water resources scarcity (92% of all the respondents) entail croplands extension and the use of the shallows by crop farmers. Crop farmers affirmed that because of the demographic growth, climate aridity and soil infertility, they tend to compensate their yield decrease by an increase in cultivated areas. For them, the yield decrease is mainly due to the decrease in soil fertility (100% of respondents), hence, the diminution of arable lands availability (98% of respondents). In addition, agro-pastoralists pointed out the creation of new reserves making pastoral mobility difficult. They think that the competition with other natural resources users has the direct consequence of pastoral resources scarcity.

Agro-pastoralists (94% of respondents) identified pasturelands reduction and the obstruction of transhumance routes as caused by crop farming pressure. For them, this reduce pastoral mobility and may increase their vulnerability (insecurity) for the use of natural resources. In addition, herders have mentioned the reduction of palatable plants diversity with the disappearance of some species such as *Afzelia africana, Pterocarpus erinaceus, Andropogon gayanus, and Andropogon pseudapricus* the most preferred plants by grazing livestock.

For agro-pastoralists (82% of respondents), the reduction of pasturelands leading to forage deficit could be the root cause of the outbreak of some livestock diseases. They think that food and nutritional deficits facilitate the occurrence of other pathologies due to the weakening of the immune system. Also for them, transhumance into sub humid zones also, increases livestock exposure to trypanosomiasis and ticks. That is why they were saying that "the current cause of livestock illnesses is livestock hunger ". Thus for them, the only reasonable and efficient solution for them is livestock mobility, including national and trans-boundary transhumance where some farmers keep part of their herd in the host countries. However, in Boudry agro-pastoralists do not see animal health issue (64% of respondents) as a big deal compared to those in Matiacoali (82%) because they think that this issue is manageable by applying sanitary prophylaxis and keeping to veterinaries advice. (Table 1).

Table 1: Farmers' Perception of Their Factors of Insecurity

		Communes		**Crosstabs analysis**
Observed parameters	**Results**	**Boudry**	**Matiacoali**	**Chi-Square Tests**
Factors of insecurity: Agro-pastoralists and Pastoralists	Pasture scarcity	96%	98%	0.312
	Water scarcity	84%	92%	0.037
	Availability of mobility/transhumance routes	92%	96%	0.149
	Worsening of Animal Health	64%	82%	0.001
	Decrease of Animal Productivity	68%	96%	0.01
	Decrease of crop yield	96%	100%	0.174
Factors of insecurity: Agro-pastoralists and Pastoralists	Water scarcity	85%	100%	0.05
	Availability of crop land	96%	100%	0.341
	Decrease in soil fertility	100%	100%	Constant

N= 100 P<0.05

3.2. Farmers' Vulnerability to Climate Change Impacts

For crop farmers and agro-pastoralists (90% of all the respondents), climate change is a factor which aggravates their vulnerability (table 2). They think that changes in climate patterns such as significant rainfall variability or the increase of temperatures leave them with less water, less pasture, crop failure, failure in livestock's productivity, and health issues leading to an increase of their vulnerability. The more they will become vulnerable to climate change, the more their exposure to food, economic, health and environmental insecurity will increase. 58% of respondents say that the level of their insecurity will influence the occurrence of conflicts, but not climate change itself.

However, the main causes of conflicts mentioned by the two groups of farmers are natural resource scarcity and competition, socio-economic factor such ethnic group marginalisation, demographic and livestock growth, and political implications (table 2).

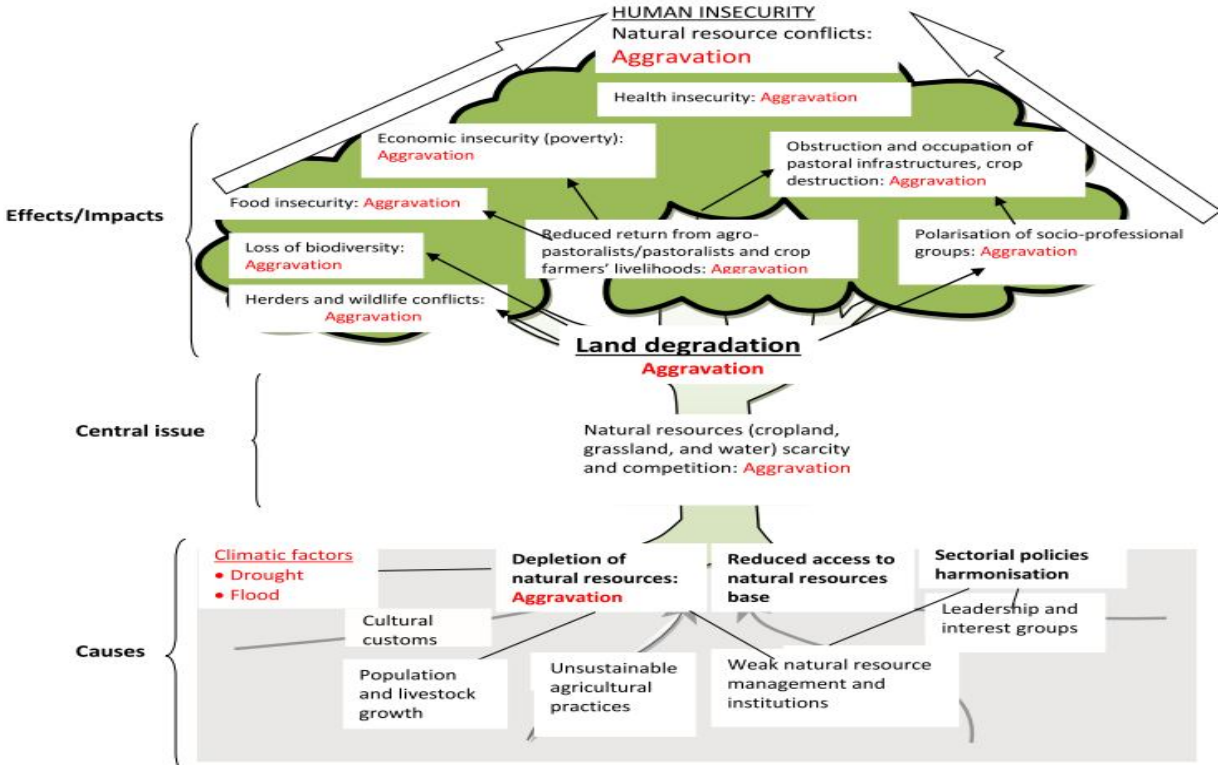
Table 2: Farmers' Perception of the Relationship between Climate Change, Insecurity and Conflicts Causes

		Communes		Crosstabs analysis
Observed parameters	**Results**	**Boudry**	**Matiacoali**	**Chi-Square Tests**
Agro-pastoralists/Pastoralists				
Climate Change as aggravator factor of farmers' insecurity	approved	89%	91%	0.079
Impact of farmers' insecurity	Conflicts exacerbation	46%	38%	0.062
	Cause of conflict	54	62	0.064
Cause of conflicts	Socio-economic	92%	80%	0.222
	Politic	64%	58%	0.056
	Land degradation	96%	100%	0.312
Crop farmers				
Climate Change as an aggravator factor of farmers' insecurity	Approved	91%	90%	0.279
Impact of farmers' insecurity	Conflicts exacerbation	47%	44%	0.211
	Cause of conflict	53	56	0.621
Cause of conflicts	Socio-economic	89%	96%	0.357
	Political	54%	53%	0.094
	Land degradation	92%	100%	0.212

N= 100 P<0.05

The root causes of natural resources scarcity are: natural resource depletion, limited access to natural resources, and the lack of sectorial policy harmonization with limited enforcement of laws (figure 2).

Figure 2: Natural Resource Scarcity and Competition Conflict Tree



- **Natural Resources Depletion**

Natural resource depletion can be due to climatic factors that allow the classification of land as arid or semi-arid. Then, the unpredictable variation of rainfall and magnitude of drought determine the availability and distribution of pasture and water resources. Members of both communities have identified the decline in rainfall in the study area leaded to less water, pasture, and crop yield. Also, they have perceived an increase in heat events in terms of intensity and duration, and drought as major climate-related disasters affecting their livelihood.

However, drought is not the sole climatic driver of conflict exacerbation. During the focus group discussions, it was mentioned that high rainfall, floods wash up the pasture and destroy watering systems. This leads to a lot of negative impacts such as famine and food insecurity, economic and health insecurity, migration, and transhumance leading to the higher probability of conflicts occurrence over the remaining pasture and water.
In addition to climatic factors, cultural practices (bush fire), population and livestock growth, unsustainable agricultural practices (shifting cultivation, large herds keeping), and weak natural resources management (overgrazing and tree cutting) may also lead to pasture depletion and thereby exacerbate natural resource conflicts.

- **Limited Access to Natural Resource base**

In Burkina-Faso, the presence and capacity of extended public institutions are limited on the ground. Supervision at the district level for example is poor because of lack of human and economic resources. For instance, at the community level, we have only one or two technicians in livestock sector in charge of the training and supervision of all the community members. As a consequence, pastoral zones have been created but limited effort is done to secure them and control the pasture dynamics in order to avoid overgrazing.

- **Lack of Sectorial Policy Harmonization and laws enforcement**

Natural resources management is shared by many ministries (Animal husbandry, Environment, Agriculture, Water, and Energy). This leads to many laws with no internal harmonization. For instance, the Ministry of Animal Husbandry is in charge of pastoral zones creation, their management and monitoring. For instance with photo 1, you will see that on the pastoral zone of Matiacoali which was created 20 years ago by the Ministry of Animal Husbandry, the Ministry of Environment has proceeded to its designing which reduces pastoral activities. In addition, means laws exist but their enforcements is limited.

Photo 1: Matiacoali Pastoral Zone Designed by the Ministry of Environment

Natural resource scarcity and competition (due to their depletion, policies harmonization and limited access) are factors that lead to land degradation. Once the land is degraded, it will reduce the return from farmers' livelihoods with some consequences such as food, economic, health insecurity and ethnic groups' polarisation. This context of human insecurity is the cause of violent conflicts.

Climate change may exacerbate farmers' vulnerability to natural resources availability. It is a factor that aggravates farmers' insecurity and leads to conflicts exacerbation. Climate change has also become a factor that exacerbates natural resources competition and generates conflicts (figure 2). Those climatic factors, associated with the current socio-economic conditions, may explain the increase trend of conflicts (figure 3), without any significant difference at 5% between the two study areas.

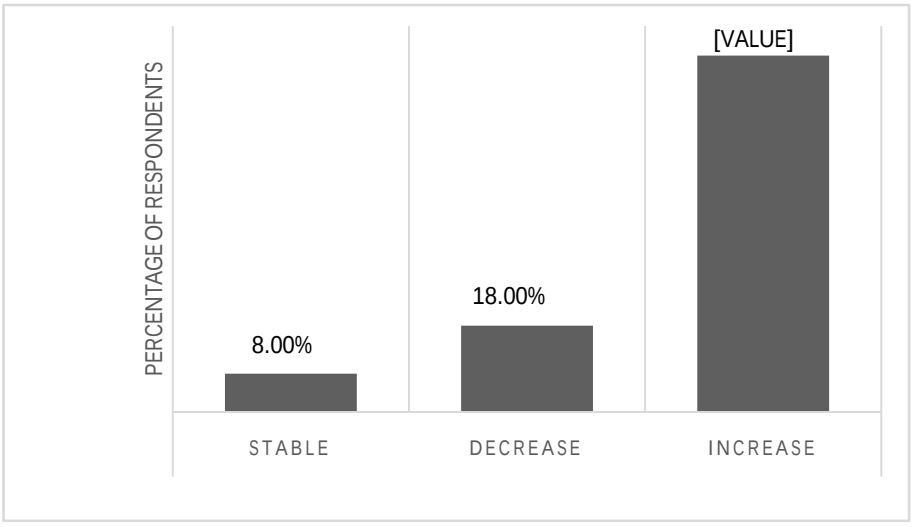


Figure 3: Farmers' Perception of Conflicts Trend

Our investigation showed that the conflicts outbreak occurs during two critical periods: the sowing and harvest periods, that is, during May-June and October-December (table 3).

Table 3: Agricultural Calendar of Crop Farmers

			Communes	
Activities	**Type of conflicts**	**Results**	**Boudry (n=50)**	**Matiacoali (n=50)**
Beginning of sowing date	Sowing period conflicts	May	4%	17%
		June	96%	75%
End of harvesting Date	Post harvesting conflicts	October	19%	30%
		November	59%	25%
		December	22%	46%

3.3. The Impacts of Violent Conflicts on the Communities' Welfare

More than 80% of respondents (table 4) in Boudry reported that the impacts of violent conflicts are peoples' injury and death, infrastructures destruction, livestock killing, the loss of goods, expulsion of people from the village, and migration, while, in Matiacoali those impacts were mentioned by less than 10% of respondents. An analysis of the impacts in Chi-Square Tests showed a highly significant difference existing between these two communities.

Table 4: Agro-Pastoralists' Perception of the Impact of Communal Conflicts

		Communes		Crosstabs analysis
Observed parameters	**Results**	**Boudry**	**Matiacoali**	**Chi-Square Tests**
Impacts of Conflicts	Death, trauma and injured	80%	12%	0.0007
	Destruction of infrastructures	84%	8%	0.0003
	Killing of livestock	92%	8%	0.0002
	Loss of goods	96%	8%	0.0001
	Expulsion	84%	8%	0.0003
Conflict Management	Amicably	64%	100%	0.001

N= 100 P<0.05

Matiacoali has a low impact of conflicts because the community has put in place an amicable conflict prevention and management tool named "espace de dialogue". This tool limits the impacts of conflicts. Also in Matiacoali, Fulani people are not the only ethnical group doing pastoral mobility. The Gourmantche (who are native of the land) are well involved in pastoral livestock system and that contribute to facilitate livestock mobility.

Table 5: Crop Farmers' Perception of the Impact of Communal Conflicts

		Communes		Crosstabs analysis
Observed parameters	**Results**	**Boudry**	**Matiacoali**	**Chi-Square Tests**
Impacts of Conflicts	Death, trauma and injured	81%	13%	0.0005
	Destruction of infrastructures	83%	8%	0.001
	Killing of livestock	68%	8%	0.001
	Loss of goods	95	8%	0.001
	Expulsion	64%	8%	0.008
Conflict Management	Amicably	62%	99%	0.002

N= 100 P<0.05

The two communities have conflict prevention and management tools, and when a conflict occurs, it is managed amicably (82% of all respondents) with local councilors and traditional chiefs (95% of all respondents). The amicable conflicts management is highly used in Matiacoali than it is in Boudry.

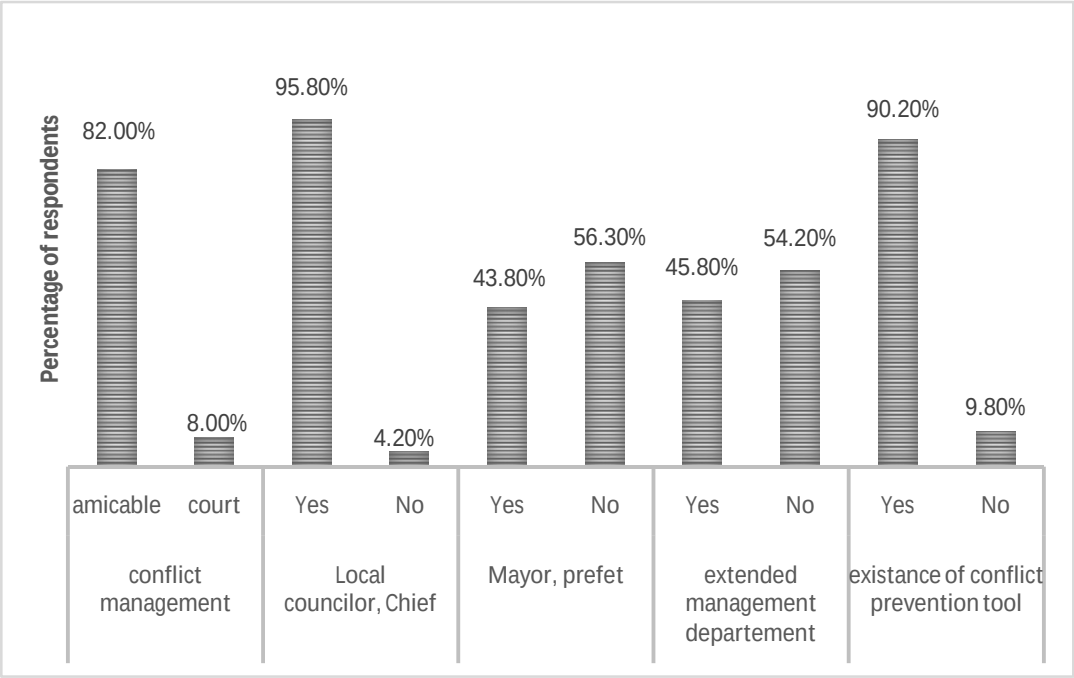


Figure 4: Conflict Management and Prevention Analysis

Discussion

The frequency and severity of extreme climate events (floods, droughts) and the rainfall variability are threatening farmers' adaptive capacity (Kandji *et al.*, 2006). As they have low adaptive capacity to climate change impacts for their resilience building, agro-pastoralists become more and more vulnerable. This could be explained by the fact that they depend only on natural resources use and thereby more insecure in this uncertain climatic conditions. In fact, changes in climate patterns such as significant rainfall variability or the increase in temperatures lead to less water, less pasture, crop failure, failure in livestock's productivity, and health issue an therefore, increase in crop famers, pastoralists and agro pastoralists vulnerabilities. The more they become vulnerable to climate change impacts, the more their exposure to food, economic, health and environmental insecurity will increase and thereby the increase also in their insecurity. The magnitude of their insecurity will determine the risk of conflict. This is in coherence with our conceptual framework where climate change hazards could exacerbate natural resources conflict risk by increasing communities' exposure and their insecurity level to climate change impacts. The decreasing availability of clean water, suitable land for cropping, pasture and livestock's routes could create a condition of "simple scarcity", and "deprivation" in the area, and that may provoke violent conflicts (Emeka, 2008; Odoh and Chilaka, 2012; Rashid, 2012).

Climate change can impact the natural resources that herders and crop farmers are competing for and thereby increase their insecurity, leading to conflict (Alkassoum, 2006; Barnett and Adger, 2007; Muna, 2009). Climate change is not, therefore, a root or a direct cause of natural resource conflicts but a factor that exacerbates these conflicts by increasing farmers' insecurity through the depletion of those natural resources.

However, this point of view is not shared by some authors (Turner *et al*., 2011; Hellendorff, 2012; Cullen and Idean; 2012). For them, it is difficult to make the link between climate change as a factor of pastoral resource depletion and the agro - pastoral conflicts because they think that conflicts occur where we have the abundance of resources. That is why they have concluded that the conflicts are caused by social and political factors due to the dysfunctions of the institutions and norms which regulate the communities' interactions.

All are nevertheless unanimous that the environmental factors can contribute to the occurrence of conflicts while drought or flood may create water, land or pasture scarcity. The fact that the frequent conflicts appear where we have the abundance of resource could be explained by the relativity of this abundance and the mobility implication which creates population convergence toward these areas. This type of movement can have an environmental cause (drought and flood). In addition, climatic parameters can induce pasture, land and water depletion, leading to an increase in competition. Then, when the population increases more rapidly than these natural resources and when this is associated with others social and political factors (such as household's fragmentation, the decline of pastoralist and crop farmers' reciprocity and their inter-dependence due to their activities diversification, the market farming and land management policies), the risk of violent conflicts could be higher. Conflict causes are complex and we cannot isolate only one element as focus.

Climate-related conflicts are caused by numerous factors. Therefore, it is often hard to highlight and single individual causes out. Climate change is a conflict aggravator and may extend the scope of current conflicts, or provoke underlying and latent conflicts to break out. That is why the approach to conflict analysis must be holistic. It must take into account all factors that can have a link with the issue because it is very difficult to gauge the contribution of each factors (climatic and non-climatic) in the natural resources conflicts analysis. But, if our aim is to reduce the frequency and magnitude of these conflicts, it will be necessary to take into account all these factors in the approach because they are linked.

Conflict is a part and parcel of human society; it can make better social changes. Conflicts do not necessary have negative impacts. But they become harmful when they escalate into violence with negative impacts on human security such as breakdown of local livelihoods, displacement, natural resource degradation and economic loss (Mikkel *et al*., 2012).

In our case, the impacts of the violent conflicts between crop farmers and agro-pastoralists are more social and economic. We have migration, expulsion, injuries and death of the population, and the destruction of property which compromise all effort of local development and social group integration. In addition to that, we have psychological injuries. After the conflicts, the social peace is in trouble. Some families are traumatized and will bear irreparable aftermaths. Most of the time, the departures are recorded during and after the conflicts toward neighbouring countries with a lot of flock. Many authors (Abba *et al*., 2008; Ofuoku *et al*., 2010; Rashid, 2011) found similar impacts of natural resources conflicts. They have showed that these conflicts can lead to personal, community and political insecurity, food, economic, socio-psychological insecurity. If in Matiacoali, the impacts are not significant compared to Boudry ($p < 0.05$), it is due to the conflicts management tools put in place there with the help of RECOPA (*Reseau de Communication sur le Pastoralisme*) and IUCN (International Union for the conservation of nature) based on local conflicts management approach. In fact, farmers encourage the intervention of chiefs and local councilors in conflict management because they think having satisfaction from their local processes of natural resources conflicts management is rewarding. They affirm that the advantage of this type of conflict management is that rarely do we have some aftermaths, while the intervention of local authorities or court very often revives the conflicts. They go rarely to prefects (district commissioners), mayors and agricultural technicians because they think that they overuse some rules and are often involved in corruption. That is why Alkassoum (2006) and Ofuoku *et al*., (2010) said that local tools are very suitable for natural resource conflicts management and resolution. In addition, Sawadogo (1993) has underlined the importance of landlords in conflicts resolution.These conflicts will become a vicious cycle if they are not well managed and resolved (in order to avoid revenge). It is, therefore, important to have an integrated climate change adaptation and conflicts risk management strategy mainstreamed in our development policies.

Conclusion

The frequency and severity of extreme climate events (floods, droughts) and the rainfall variability are threatening farmers' adaptive capacity, leading to an increase of their vulnerabilities. The worsening of farmers' vulnerability thereby their higher insecurity leads to natural resource conflicts exacerbation where climate change is an aggravating factor through the depletion of these natural resources. Climate change is not therefore, a root cause of natural resources conflicts but an underlying cause by reducing people's access to natural resources that are important to sustain their livelihoods. The root causes are more socio-economic, political and environmental.

The impacts of the violent conflicts between crop farmers and agro-pastoralists are peoples' injury and death, infrastructures destruction, loss of goods, livestock killing, expulsion, and migration. If they are not properly managed and resolved, these conflicts could be a vicious cycle through their undermining human security in the current day and in the future. However, in Matiacoali, people have found some strategies for their conflicts prevention and management based on their local institutions. For a better approach, we may have an integrated climate change adaptation and conflicts risk management strategy which should be mainstreamed in our development policies.

The authorities should give to customary institutions an opportunity to deal with some of the causes of conflict because the traditional mechanisms for conflict management and resolution continue to work. Finally, climate change adaptation and disaster (conflict has to be considered also as a disaster) risk reduction should be mainstreamed into land plans and strategies at national, local and sectorial levels such as livestock development and water management.

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