

DESERTIFICATION AND ENVIRONMENTAL SECURITY. THE CASE OF CONFLICTS BETWEEN FARMERS AND HERDERS IN THE ARID ENVIRONMENTS OF THE SAHEL

Sergio Tirado Herrero

Department of Economic Theory and Economic History. Faculty of Economics and Management. University of Alcalá. 28802 Alcalá de Henares, Madrid. Spain.
stiradoherrero@gmail.com www.conflicts-environment.info

ABSTRACT

Traditional production systems in the Sahel are based on the integration of activities sharing and competing for renewable resources (water and soil fertility) under threat of desertification. A framework of relationships ranking from conflict to collaboration between human groups devoted to agriculture and pastoralism has been developed throughout history and has proven to be successful in sustaining the livelihood of the region's population. Changes in the economic, social and political structure of the Sahel related to the process of colonization and de-colonization substantially altered the way in which resource scarcity was dealt previously. In a context of widespread social tension and political instability, this is thought to have increased the likelihood of farmers-herders conflicts. In this paper, we explore the worsening security conditions of the rural Sahel in the light of the new environmental security theories, which help to widen the focus of conflict analysis bringing in social, political, economical and environmental issues that were formerly disregarded.

Keywords: desertification, environmental security, conflict and collaboration, farmers and herders, scarcity, Sahel.

VIOLENT CONFLICTS AS MULTI-DIMENSIONAL PROCESSES WITH ENVIRONMENTAL IMPLICATIONS

The concept of security is evolving and enlarging in order to include a range of factors that make it fit better with its complex and dynamic nature. Because of this, it is moving from the narrowly militaristic understandings of threat, vulnerability and response towards a multi-dimensional, holistic approach (Dabelko *et al.*, 1999). Among the wide range of layers that the new conception of security displays, the environmental, but especially the social and economic issues, have arisen as most significant (see Table 1 for a list of factors contributing to violent conflict). These ideas are embodied, for instance, in prevention tools like the *index of human insecurity* (IHI), which estimates the likelihood of violent conflict through considering four different environmental parameters (net energy imports, soil degradation, safe water and arable land) along with other economic, social and institutional factors (Loneragan *et al.*, 2000), not unlike the UN *index of human development* (see epigraph 2.3).

Scarcity is a key concept when linking natural resource and security issues. Rees (1991) proposes 4 different types of scarcity related to fight for resources: i) *physical scarcity*, related to resources only available in a finite amount (broad definition), ii) *geopolitical scarcity*, meaning that (mainly non-renewable) resources are often distributed unequally on the surface of the Earth in such a way that some countries depend on deliveries from others, iii) *socio-economic scarcity*, concerning the unequal distribution between or within societies of purchasing power and of property rights to natural resources, and iv) *environmental scarcity*, in the sense that resources that have traditionally been regarded as plentiful are becoming scarce now because of the failure of human beings to adopt sustainable methods of management (mainly renewable resources such as water or fertile soil, as it is the case of land desertification). Scholars now agree that environmentally-induced conflict from renewable resource scarcity (thus, *environmental scarcity*) will become increasingly frequent because, unlike non-renewable resources, technological innovation and the market have only achieved limited success in developing substitutes for renewable resources (Dabelko *et al.*, 1999). This might be consistent with some economic empirical evidence: the evolution of prices of non-renewable resources between 1870 and 1989 (Nordhaus, 1992) and the changes in the expected life of selected resources between 1970 and 1994 (Pearce, 2000)

shows that most non-renewable natural resources, including fossil fuels such as oil, coal and gas, are becoming economically less scarce thanks to developments in the extraction techniques.

There are several ways humans may increase environmental scarcity over renewable resources (Homer-Dixon, 1991): i) decreased quality and quantity of renewable resources through exploitation/degradation at rates higher than the natural renovation of stocks (*supply-induced* scarcity); ii) increased population growth or per capita consumption (*demand-induced* scarcity); and iii) unequal resource access (*structural* scarcity). These sources can act singly or in combination when generating environmental scarcity and their interaction produces two particularly common phenomena that Homer-Dixon (1994) has named *resource capture* and *ecological marginalization*. Both are key concepts and will be properly presented when analyzing the farmers-herders conflict and its relationship with desertification (see epigraph 4.2).

This paper aims to analyze the farmers-herders conflict in a region vulnerable to desertification (the Sahel) under the framework of the renewable resources' (water and fertile soil) environmental scarcity concept. However, in order to gain a broader picture of the subject the scope of the analysis has been enlarged and includes social, economical and historical dimensions along with environmental factors (focusing on desertification). Table 1 shows how environmental factors are less relevant compared to social, political and economic when trying to understand why conflict initiates because, as Libiszewski (1992, p. 8) points, "the environmental variables do not directly cause the conflict per se but instead make more salient the variables that can precipitate conflict". Accordingly, it intends to understand to what extent the desertification process influences the farmers-herders conflict in comparison with the rest of contributing factors, following the holistic approach of conflict analysis.

Table 1. Factors contributing to violent conflict under the *holistic* paradigm

Contributing factor	Link to intrastate violent conflict	Link to interstate violent conflict	Strength of relationship
Political system	Probability of violence varies inversely with the degree of democratization.	Stable democracies are unlikely to experience violent conflict with one another.	<i>Strong</i>
Geographical contiguity		Neighboring states are more likely to experience conflict than non-neighboring states.	<i>Weak</i>
Ethnic fragmentation	Probability of violence increases with the degree of ethnic fragmentation	Ethnic linkages across borders increase the probability of conflict diffusion.	<i>Strong</i>
Population density	Probability of violence increases with population density.		<i>Strong</i>
Power status		If there is a substantial difference in power status, the probability of violence increases.	<i>Medium</i>
Previous conflict	Violent conflict in the previous two years increases the probability of violence.		<i>Strong</i>
Level of economic or human development	Prob. of violence varies inversely with the level of development.		<i>Strong</i>
Resource scarcity	Probability of violence increases with increased levels of resource scarcity.		<i>Weak</i>

Source: Dabelko *et al.*, 1999.

FACTORS SHOWING INFLUENCE ON THE CONFLICT BETWEEN FARMERS AND HERDERS

Ecology of the Sahel and the farmers-herders relationship

The term *Sahel*, in spite of its variety of meanings in different fields, is widely acknowledged as the relatively narrow band South of the Sahara desert between the 150 and 600 mm isohyets covered by semi-desert grassland, thorn shrub and wooded grassland dominated by *Acacia* spp. (Wezel and Rath, 2002; Wickens, 1997). It can be considered as an *ecotone* because it puts into contact the desert ecosystem of the Sahara and the Northern edge

of the African dry tropical environments, thus sharing features of both. Although biogeographically it connects the Atlantic coast of Senegal and The Gambia with the Red Sea in Eritrea, for the purposes of this paper we will refer of the Sahel as the Western half of that band (see Figure 1 for a sketch of the position and extension of the Sahel and Tables 3, 4 and 5 for a list of the countries hereby considered as the Sahel).



Source: own elaboration after the map of Africa from the UN Cartographic Section.

Figure 1. The Sahel in North Africa

Biophysical variables in the Sahel, mainly rainfall, are extremely irregular, which has led some authors to suggest that there are not “normal” rainfall levels (US Congress of Technology Assessment, 1986). This challenges the equilibrium ecological theory, unable to capture uncertainty and variability of arid environments, and makes concepts such as *carrying capacity* and *stocking rate* ineffective in predicting ecosystem productivity at least at local scales (Niamir Fuller, 2000). The region’s non-linearity climatic patterns, along with other factors like the abundance of biological vectors of a variety of human and livestock diseases, create a uniquely dynamic but dangerous environment (Goldsmith *et al.*, 2002) as the hundreds of thousands of deaths related to the droughts of the 1960s and 1970s prove (IPCC, 2001). Because of this, primary production in the Sahel is sometimes only possible thanks to mobile pastoralism, an opportunistic form of land use that has proven to be highly adapted to the changing conditions of this environment. Agriculture barely exists below the about 400 mm isohyet (Blench and Marriage, 1999). This means that, at least in a

substantial fraction of the Sahel, agricultural and pastoral production areas overlap. Consequently, they compete for scarce resources under threat of desertification (water and soil fertility), which is the base for the farmers-herders conflict presented here. But they also show a complex and well-developed collaborative behaviour based on the exchange milk, blood, leather, meat and manure for stove for agricultural products (local cereals like millets and sorghums), labour or grazing rights (Blench and Marriage, 1999; Blench, 2001b). In fact, we might consider that conflict and collaboration are the two sides of a wider framework of relationships between pastoral and agricultural groups, which historically developed as a way of coping with environmental variability.

Historical factors

Ethnic and religious diversity

History conditions, though not determines, the relationship between pastoral and agricultural people. Historical factors are relevant since the Sahel has been populated since the early stages of human evolution, as it is proven, for instance, by the fact that the world's oldest know stone tools, dating between 2.6 and 1.5 million years ago, have been found in Gona, Ethiopia (Semaw, 2000), on the Eastern side of the Sudano-Sahelian band.

Such an old history of human population in Africa, along with other factors like the diversity of environments, generated a high degree of ethnic, linguistic and religious *fractionalization*. Measures of ethnic diversity based on the ELF (*ethno-linguistic fractionalization*) index ranking from 0 to 100 show that Africa (especially the Sub-Saharan countries) is the most culturally diverse region of the world, accounting for a comparatively higher ELF than regions like Europe and the Americas (see Table 2).

Table 2. Ethno-linguistic diversity of Africa and other regions of the world (1960)

Country	Europe & North America	Asia (South & East)	Latin American & Caribbean	Middle East & North Africa	Sub-Saharan Africa
<i>ELF value</i>	15.5	47	17.5	18	72

Notes: ethno-linguistic diversity measured through the ethno-linguistic fractionalization index (ELF) ranging from 0 (minimum value) to 100 (maximum value) based on data from 1960.

Source: Elbadawi and Sambanis, 2000.

Table 3. Ethno-linguistic diversity of the main countries in the Sahel

Country	ELF value
<i>Senegal</i>	72
<i>Gambia</i>	73
<i>Mauritania</i>	33
<i>Mali</i>	78
<i>Niger</i>	73
<i>Nigeria</i>	87
<i>Burkina-Faso</i>	68
<i>Chad</i>	83
Average	71

Notes: ethno-linguistic diversity measured through the ethno-linguistic fractionalization index (ELF) ranging from 0 (minimum value) to 100 (maximum value) based on data from 1960. Source: Posner (2003).

These are all relevant facts because, according to Table 1, a strong correlation is supposed to exist between the factor “ethnic fragmentation” and the probability of violent conflict. Having in mind the subject of this paper, another fact to take into account is that many of the neighboring ethnic groups in the Sahelian region have been engaged traditionally in different land-use strategies, namely agriculture and pastoralism. This would be the case of many ethnic groups in the Sahel, as it happens in Senegal between the Wolof cultivators and pastoral Peule or Fulbe people (Warren and Khogali, 1992). Furthermore, the Sahelian band puts into contact the Muslim, Northern African people with the Sub-Saharan people whose original indigenous beliefs such as animism coexist with different Christian churches imported from Europe. As can be extracted from Table 4, the population of most of the Sahelian countries is divided between these two religious groups and it is believed that pastoral people in the Sahel are mainly Muslim (Blench, 1996). The idea behind these estimates is that different ethnic groups practicing different religions and devoted to different land uses can be more easily engaged in conflicts related to scarce resources competition.

Table 4. Religious diversity of the main countries in the Sahelian band

Country	Cults
<i>Senegal</i>	Muslim 94%; indigenous beliefs 1%; other 5% (mostly Roman Catholic)
<i>Gambia</i>	Muslim 90%; Christian 9%; indigenous beliefs 1%
<i>Mauritania</i>	Muslim 100%
<i>Mali</i>	Muslim 90%; indigenous beliefs 9%; Christians 1%
<i>Niger</i>	Muslim 80%; remainder indigenous beliefs and Christians
<i>Nigeria</i>	Muslim 50%; Christians 40%; indigenous beliefs 10%
<i>Burkina-Faso</i>	Muslim 50%; indigenous beliefs 40%; Christian (mostly Roman Catholic) 10%
<i>Chad</i>	Muslim 51%; Christian 35%; animist 7%; other 7%

Source: CIA World Data Factbook 2002.

However, it is still under discussion the influence of ethnic diversity on the likelihood of occurrence of conflicts. There is evidence based on statistical multi-variable analysis showing that, for a data set on civil wars throughout the world between 1816 and 1992, highly fractionalized societies have no greater risk of experiencing a civil war than more homogenous ones (Collier and Hoeffler, 1998), although it seems that ethnic diversity becomes problematic when it borders *polarization* and one of the ethnic groups accounts for 60-40% of the population and can dominate the others (Collier and Hoeffler, 2001). Similar quantitative analysis for the whole Africa suggest that ethnic diversity might have a deterrent effect on violent conflict (Elbadawi and Sambani, 2000). Whether this is also valid for more detail scales, particularly in the Sahelian region, is still to be proven, but it might be that the influence of ethnic diversity in violent conflict depended strongly on the local conditions. This would demand a rather case-by-case approach. Thus, in any case, attention must be paid to the ethnical and religious factors contributing to violent confrontation over natural resources.

Farmers and herders. An ancient conflict

It is likely that the origin of competition for scarce resources, namely water and soil fertility, between agricultural and pastoral activities goes back as far as the Neolithic. The myth of Cain and Abel (*Genesis* 4), recorded in the Bible but probably existing much earlier in the form of an oral tradition, can be interpreted as a sublimation of the recurrent confrontation that might be happening in areas where farming and herding overlapped in Middle East in ancient times. Analogously, some traces of the

conflict are thought to be found in the traditional Indian epic poem *Maharabata*, which is understood nowadays by modern ecologists as a recorded proof of the war between the sedentary farmers of the Hindu valley and the incoming, riding nomads from the steppes of Central Asia who finally subdued them by 1500 BC (Gadgil and Thapar, 1990).

Within the old tradition of competition for resources, pastoral people have taken in many cases the role of aggressors, whereas agricultural people have been subject to recurrent raiding and stealing of their crops by the former. This has to do with the way farmers and pastoralists organize themselves and the territory they occupy. Nomadic pastoralists usually locate on marginal, desert environments and their way of life is based on moving across long distances and reaching the peaks of primary production they have identified in the many years of adaptation to this environment. Thus, their agricultural activities were minimal and relied on settled farmers for the agricultural supplies, as the idea of *complementarity* between agriculture and cattle-raising shows (Blench, 1996). As Harris (1990) and Harris (1996) suggest, pastoralists then felt very often tempted to improve their negotiating position attacking the villages of farmers, and did so thanks to the stronger military capacity and mobility that riding horses or camels gave them. If successes in raids became recurrent, the farmer population would have then considered them as their lords and the pastoralists would have improved their position becoming taking the political and military leadership. Nevertheless, the most common output of this process is thought to be the sedentarization of the nomadic conquerors, who would have then adopted the agricultural way of living in order to feed all the population under their rule (*ibid*). In the Sahel, such a behaviour has been recorded, at least, for the Tuareg herders in Northern Burkina Faso (Banzhaf *et al.*, 2000).

Examples drawn from the history of Eurasia, Africa and America support this idea (Blench, 2001a). Probably the best known expanding pastoral people have been the Arabs and the Mongols who, in spite of their low number, rapidly spread across vast distances, and settled, ruled over and mixed with the local population of invaded areas (Harris, 1990). In West Africa, the nomadic Fulbe launched a *jihad* in the early 19th century which transformed the political map of the Sahelian region (Blench, 2001b). The idea behind these evidences is that complex systems, such as environmental and cultural, show *inertias* in their long-term behaviour, thus making historical factors to be considered when analyzing the farmers-herders relationship.

Underdevelopment and social changes

Between the multiplicity of causes behind the sort of conflict presented here, the social, economic and political factors probably arise as the most influencing (see Table 1). This is relevant since Africa is known for its economic weakness and political instability: most of the African countries and the whole of the Sahelian states belong to the so-called *third world*. This has to do, on the one hand, with the way African people organize themselves (that can be exemplified with the deeply rooted *clan* loyalty) and, on the other hand, with the colonization and decolonization of the continent (de Temmerman, 2000). To a certain extent colonization forced Africa to become a source of natural resources and labour force (in the form of slavery) for the colonizing powers, which deeply influenced the traditional political organisation of the colonized countries and started a period of profound changes whose consequences are still felt nowadays.

These changes haven been very intense in the Sahel in the second half of the last century and have reshaped the demographic features of the region. After World War II, Sahelian population, who used to have very low growth rates (also because of the depopulating effect of slavery) and used to be predominantly rural, started to grow very fast, especially in the cities, where population growth rates have been substantially higher than the average (Pieri, 1992; UNDP, 2003 – see Table 5 for figures on total and urban population growth rates). The urbanisation of the Sahelian population has to do partially with the rural-urban migration happened as a response of rural societies to the droughts and famine in the 1970s (Brockerhoff, 1994). In fact, it is thought that migration is an important demographic response to poverty and environmental stress in Africa (Krofkors, 1995), and the Sahel would not be an exception, rather a good example, for this. Rural urban-migration in this context points out the difficult conditions that Sahelian people are facing to ensure their livelihood. They might be suffering from the loss of what Sen (1981) called the *entitlement of food* (resources that can be used to produce food or to obtain through exchange), showing the large extent of poverty and deprivation in which the region is immersed.

Sub-Saharan Africa is one of the poorest regions of the world. The average living standards of its people are presently as low as they used to be 30 years ago and their income is substantially lower than other typically underdeveloped regions such as Latin America or China (Kim, 2003). These world regions are immersed in what has been called a *growth tragedy* (Cohen, 1998) that prevents them to achieve the GDP growth rates needed

for economic and social development. In fact, the average value of 46 Sub-Saharan countries' growth rates for the 1990s reached 0.105%, which means that most of these countries witnessed negative growth until recent years (Kim, 2002). Similarly to what was presented in epigraph 2.2.1, it has also been argued that ethno-linguistic fractionalization might be a major factor hindering the development of the region (Easterly and Levin, 1997). However, multiple-variable analyses have rejected this hypothesis (Kim and Kim, 2003), suggesting that it is not ethnic diversity but lack of democracy in a context of diversity what leads to the growth tragedy (Collier, 1999).

Table 5. Development indicators of the main Sahelian countries

Country	Total population 1975-2001 ⁽¹⁾	Urban population 1975-2001 ⁽²⁾	GDP per capita ⁽³⁾	Life expectancy at birth ⁽⁴⁾	Adult literacy rate ⁽⁵⁾	HDI rank ⁽⁶⁾
<i>Senegal</i>	4.8 – 9.6	34.2 – 48.1	1,500	52.3	38.3	156
<i>Gambia</i>	0.6 – 1.4	17.0 – 31.2	2,050	53.7	37.8	151
<i>Mauritania</i>	1.4 – 2.7	20.3 – 59.0	1,990	51.9	40.7	154
<i>Mali</i>	6.3 – 12.3	16.2 – 30.8	810	48.4	26.4	172
<i>Niger</i>	4.8 – 11.1	10.6 – 21.0	890	45.6	16.5	174
<i>Nigeria</i>	54.9 – 117.8	23.4 – 44.8	850	51.8	65.4	152
<i>Burkina-Faso</i>	6.1 – 12.3	6.3 – 16.9	1,120	45.8	24.8	173
<i>Chad</i>	4.1 – 8.1	15.6 – 24.2	1,070	44.6	44.2	165

Notes: (1) total population in million people; (2) urban population as % of total; (3) GDP per capita in PPP (*Purchase Power Parity*) US\$; (4) life expectancy at birth in years; (5) adult literacy rate as % of population age 15 and above; (6) HDI rank as position in the list of 175 countries. Source: UNDP, 2003.

The picture drawn above applies for describing the situation in the West Africa Sahel, if it is not too optimistic. Most of the countries in this region rank very low in the UN Human Development Index list and three of them (Mali, Niger and Burkina-Faso) are among the five least developed countries in the world according to this criterion (UNDP, 2003 – see Table 5).

A number of internal and external factors have been suggested to explain this development trap (Kim and Kim, 2003): low population density, a difficult environment (tropical climate, low soil quality, etc), low size of countries (a legacy of the colonial era), high volatility of prices in their export products, failure to coordinate policies, lack of state governance and democracy in decision-making systems, inefficient and corrupt bureaucracies, etc. Some of these explanations point that the way politics are performed in Africa is one of the constraints the development of the

Sahel. In fact, political regimes in the Sahelian countries, as in many other African countries, rank between *presidential authoritarian regimes* and *military dictatorships* (Nyong'o, 2002).

Besides, the progressive globalisation of the Sahelian economy started by colonialism in the 19th century has forced the local consumption and, above all, production patterns to adjust to the fluctuations of international markets. For instance, peanuts were promoted by colonial powers as an export crop in Senegal and The Gambia since the 1830s, which made local farmers shift from subsistence agriculture and expand their agricultural land to marginal areas and provoked sometimes the disruption of the migratory patterns of pastoralists (US Congress of Technology Assessment, 1986). Then, after the 1960s the price of this export crop dropped and since then remained low, making the rural income of Senegal more than halve in the period 1960-1977. This forced Senegal to become a net importer of food and did not help the falling of purchase power of the rural population (Sokona *et al.*, 2003). Globalisation also affected traditional common-resource management regimes, which had negative consequences on the long-term availability of scarce resource such as fertile land and water. In Northern Burkina Faso, the decision of weakening the formerly ruling Tuareg people was done by corralling groups into separate designated areas and restricting the movement of herds. Although attempted to be reversed afterwards, it finally led, along with other factors such as population growth, to the abandonment of the traditional, communal management of resources based on complementarity between agricultural and livestock production, which has been substituted by much more anarchic and selfish attitudes towards shared natural capital (Banzhaf *et al.*, 2000).

Sahelian countries are immersed in a development trap characterized by low income levels and literacy rate, growing population density, rural-urban migration, lack of democracy and political rights, slow or negative economic growth, inequality and social tensions. These are all factors significantly increasing the probability of conflict (Dabelko *et al.*, 1999; Collier and Hoeffler, 2001) and it is not by chance that the all of them rank low in the *human security index*⁴⁵ (see epigraph 1) (Loneragan *et al.*, 2000). Although fight for resources between farmers and herders is quite a

⁴⁵ All Sahelian countries show values of IHI (*Index of Human Insecurity*) above 5 and some of them (Nigeria, Chad, Senegal and Guinea Bissau), above 6. In contrast, OECD countries are featured by IHI values in the range 1-4. The index is scaled from 0 to 10 (Loneragan *et al.*, 2000).

specific type of conflict, it is clear that it will happen more easily in a context of widespread social and political instability, as it is the case.

CASE STUDIES

Niger

Desertification and environmental change are thought to be connected with violent conflict between agricultural and pastoral people in Nigeria. Fulani herders have clashed in recent years with neighboring agricultural ethnic groups, such as the Zarma (also known as Djerma), in Niger. Furber (1997) reports that, in May 1997, in the village of Falmaye some 90 kilometers Southeast from Niamey, seven people were killed and 43 wounded when Zarma villagers attacked a Fulani camp as a reaction to the death of a Zarma in a fight with Fulani herders earlier in the day. These two ethnic groups also clashed in the region of Téra, 160 kilometers Northwest from the capital. Though no deaths were reported, 35 people were wounded.

The Fulani are a true pan-African ethnic group, primarily Muslim, whose herds extend from Senegambia to the Red Sea along the whole Sudano-Sahelian band to which they have adapted their resource use patterns. This includes transhumance, which moves them northwards in the rainy season and brings them South in the dry season. Given that they are scattered over a long distance, they frequently mix with other ethnic groups practicing agriculture, with whom they exchange goods and services. For instance, their camps are welcome in the Southern, agricultural region of the Sahel, since cattle dung is the best manure in the area (Matsushita, 1999). In Niger southwards the Sahara desert, where the conditions allow agriculture on the most fertile areas, they often share their land with other agricultural people such as the Zarma. These live primarily in Western Niger, but also in Burkina Faso and Nigeria, where they grow millet, sorghum, rice, corn and tobacco, and cash crops such as cotton and peanuts. They also own livestock because they like complementing their diet with dairy products (Warren *et al.*, 2001). In the Southwestern region of Niger, where the Zarma arrived by the 19th century, the Fulani are minority, though the original inhabitants (Batterbury, 2003). There are evidences of rapid soil erosion, whose short-term effects are felt by both Zarma and Fulani (Warren *et al.*, 2002), and of environmental change (biodiversity loss and reduction of wooded areas) following land intensification and migration (Batterbury, 2001). This might

be indicating that social and historical conditions (a minority of pastoral people feeling threatened by incoming farmers, who become the dominant ethnic group) added to environmental factors including desertification processes (intensification of primary production, soil erosion, loss of plant cover, etc) might lead to violent conflict between farming and herding communities.

Nigeria

Blench, (2001a, p.15) tells how the colonial government favoured the Muslim Hasa-Fulani herders in Nigeria, who got to control the local juridical system. During this period, court cases between farmers and herders tended very often to be decided in favour of the latter. Independence came and farmers began gradually to take control of local authorities, and their appointees started making decisions in courts. The result was a reversal of the previous bias, meaning that farmers were compensated for their historical mistreatment by local justice. In such a way, part of the historical basis of the conflict was set. Afterwards, religious, socio-economic and environmental factors helped to increased tension between competing communities, which led to an open conflict in recent years as it is shown below.

The confrontation between Muslim Hasa-Fulani herders and mainly Christian neighbouring agricultural communities has already reached the level of armed confrontation and produced numerous casualties in the past few years. The UN Integrated Regional Information Networks, the UK Home Office and the British Broadcasting Corporation (BBC)⁴⁶ have reported on continuous, widespread violence in the Northern and central states of Nigeria throughout 2002 and 2003:

- January 8, 2002: dozens of people died and hundreds were displaced in clashes between local farming communities and nomadic Fulani herders in Mambilla plateau, Northeastern Nigeria. The fight broke out in Tonga Maina village following a dispute over grazing land.
- February 22, 2002: at least 23,000 Fulani herders fled Nigeria's Eastern Taraba State to Cameroon to escape clashes which broke out between several communities in Mambilla Plateau.

⁴⁶ Metasource: European Country of Origin Information Network
(URL: <http://www.ecoi.net/doc/en/NG/content/7/1051-1109>)

- May 30, 2002: at least 10 people died in clashes between nomadic Fulani herdsmen and local people in parts of central Nigeria's Plateau State. These fights were part of an emerging pattern since a major upheaval in 2001 in the state capital, Jos, in which more than 500 people died.
- June 20, 2002: at least 30 people were killed in clashes between farmers and herders in Barkin Ladi local council area of Nigeria's central region Plateau State. The clashes were sparked by a dispute over grazing land in the village of Kassa.
- July 15, 2002: at least 12 people were killed in an outbreak of ethnic and religious violence between Fulani herders and agricultural people in the Plateau State, central Nigeria. Farmers blame some of the attacks on Fulani herdsmen who, would have been seeking to avenge the death of one of their chiefs in the September 2001 Jos conflict. The herdsmen in turn accused the indigenes of giving them ultimatums to leave land which, for decades, had been their traditional grazing areas.
- March 4, 2003: more than 100 people were killed in clashes between ethnic groups living side-by-side and competing for limited resources in the Northeastern state of Adamawa.

Reporters from the information agencies found connections between these conflicts and the environmental changes happened in the arid lands of Nigeria, though no formal explanation was offered by institutions. However, some facts worth to take into consideration might illustrate the proposed influence of desertification on violence.

The 38% of Nigeria's surface, accounting for 32% of the Nigerian population, is under desertification threat or in desert-like condition (Odumosu, 2002). There is general consensus that desertification is the primary environmental concern in the drylands, the most affected area. In the Northern states closer to the Sahara desert, between the 50% and 75% of the territory is being affected by desertification forcing people and their cattle to migrate southwards. Incoming population and livestock are absorbed mainly by buffer states in the center of the country, also under threat of desertification in the 10%-15% of their land (Federal Ministry of the Environment of Nigeria, 2001). One of them is the Plateau state where the conflicts aforementioned were reported in 2002. The consequences of this process of environmental degradation are challenging the livelihood of many pastoral nomads because almost 90% of the cattle in the country is located mainly in the Northern states. Besides, herds from neighbouring countries, especially from Chad, Niger and Cameroon, are attracted to these

zones because of the abundant supply of fodder around the patches of the Lake Chad wetland and beyond (*ibid.*). Worsening environmental conditions are most probably caused by socio-economic pressures, basically population growth (between 1975 and 2001, the country's population doubled, rising from 54.9 million to 117.8 million people) and low level of human development (Nigeria ranks 152 in the Human Development Index list) (UNDP, 2003). Given these circumstances, it is possible to understand why desertification is playing a certain role in sparking off conflicts for increasingly scarcer land and water resources between settled farmers and incoming herders.

CONCLUSIONS

Featuring conflict between farmers and herders in the Sahel

Conflicts between farmers and herders are a specific facet of the spectrum of social, economic and political tensions that are taking place in the Sahel in the recent past. Although it is difficult to establish comparisons between different violent events, some common properties that may help to understand this typology of conflicts have been identified:

- Conflict between farmers and herders is to be understood in terms of competition for scarce renewable resources under threat of desertification, namely *water* and *soil fertility*. In the past, resource availability in the Sahel was determined by annual rainfall and confrontation was part of a wider framework of relationships developed throughout history based on cooperation and exchange of goods and services in periods of abundance and on violent competition in periods of scarcity. Recently, this traditional way of dealing with environmental variability has been deeply modified and resource availability, although still dependant on biophysical variables, has to do also with a number of demographical, social and economical reasons (see epigraph 2.3). Besides, it is also clear that it is linked to the notions of *conflict* and *crisis* that is usually connected to mobile pastoralism (McGinnis, 1999; Blench, 1996).
- Although not in all cases, it is very likely that conflict usually happens as a violent reaction of pastoralists whose traditional grazing areas or transhumance pathways are invaded by incoming farmers. Transhumant pastoralism in the Sahel, as in many other parts of the world, is a

declining activity (Blench, 2001a; 2001b). At the same time, population growth and economic changes have favored other forms of less mobile of livestock production, as well as agriculture (Wezel and Rath, 2002; Blench and Marriage, 1999). This change in the production strategy of the Sahel has occurred along with unexpected variations in rainfall during the second half of 20th century. As Puigdefábregas (1995, p. 65) suggests as follows, the recent *ecological history* of the Sahel also helps to explain encroachment onto the grazing land of pastoralists: “between 1940 and 1960, rainfall in the sub-Saharan band was clearly over the average. As a reaction of this, many farmers and herders headed North and established in drier lands where, formerly, only nomadic pastoralism existed. In the middle 1970s, drought trapped these people in a *cul-de-sac* because further North only desert could be found and the South, from where they were coming, had been already occupied by increasing agricultural populations “. In this way, the overall region resource-use intensity increased and, thus did the likelihood of conflicts between long ago settled pastoral people and incoming farming and herding migrants (Wezel and Rath, 2002).

- They are taking place in a region prone to violent confrontation (Lonergan *et al.*, 2000; ICG, 2004) between political, economic or even *ecological* rival factions. Sahel is undoubtedly one of the poorest and most underdeveloped regions in the world, where political and social instability is widespread and weak states are unable to control and/or supply with basic services large fractions of their territory (see epigraph 2.3). There, former social order previous to colonization has to a given extent disappeared but not substituted after the withdrawal of colonizing nations, as Banzhaf *et al.* (2000) recorded in Burkina Faso. This has made the region vulnerable to violent conflict and provides a proper context to find non-peaceful means of dealing with resource scarcity between pastoral and agricultural groups.
- Conflicts for resources between farmers and herders have implications in terms of ethnic and religious diversity. The Sahel is an *ecotone* (see epigraph 2.1) but also a borderline between two different cultural universes: the Muslim, Arab-related Northern Africa and the black, Sub-Saharan Africa where traditional beliefs such as animism cohabit with various interpretations of the Christian faith (see epigraph 2.2.1). Although evidence points that ethno-linguistic diversity is not enhancing the probability of conflicts in Africa as a whole, this issue might be important when analyzing this kind of conflicts in the Sahel. There, differences between farming and herding communities are

not only in terms of resource-use systems (Warren and Khogali, 1992), but also from an ethnic and religious standpoint (Blench, 1996), which might be influencing negatively the existing tensions between them.

- These are mainly intra-state, low-intensity, long-lasting and recurrent conflicts, as many other environmentally-induced conflicts, which are “sub-national, diffuse and persistent in character” (Homer-Dixon, 1994, p. 1) As it can be extracted from both cases studies (see epigraphs 3.1 and 3.2), conflicts between farmers and herders, although serious and involving hundreds of deaths, are not as violent as those happening in many other countries in Africa (ICG, 2004).
- The intensity of the violence reached in the clash is dependant on the level of technical development of warfare available for confronting parties. This is especially relevant because there is mounting evidence showing that small arms are becoming increasingly more available in the Sahel (van der Graff, 1999) and the whole Africa (Lumpe, 1999).

Linking desertification and environmental security in the Sahel

The notion of desertification seems to be directly connected with the Sahel since this term was coined after the severe droughts that razed the region in the late 1960s and early 1970s (Puigdefábregas, 1995). Following the concept of *environmental security*, it is widely recognized that this process of resource degradation must be taken into account for understanding and preventing conflicts in arid environments. The UN Convention to Combat Desertification (2003) points out this relationship explicitly: “desertification exacerbates poverty and political instability. It contributes significantly to water scarcity, famine, the internal displacement of people, migration, and social breakdown. This is a recipe for political instability, for tensions between neighboring countries, and even for armed conflict. Evidence is mounting that there is often a strong correlation between civil strife and conflict on the one hand and environmental factors such as desertification on the other”. Other institutions such as IUCN and OECD (Dabelko *et al.*, 1999), refer to this issue in similar terms. In the same direction, Eswaran *et al.* (2001) found that large fractions of the Sahel are *global desertification tension zones* comprised within the 11.9 million km² (containing as many as 1.4 billion inhabitants) of very high-risk class areas where major conflicts related to the reduced ability of the land to support people in agriculture-based communities are expected to happen.

The process leading to an increased probability of conflict between agricultural and pastoral people in the Sahel are consistent with the phenomena of *ecological marginalization* and *resource capture* proposed by Homer-Dixon (1991; 1994) presented in epigraph 1. On the one hand, resource capture happens when a decrease in the quantity or quality of renewable resources coinciding with population growth encourages “powerful groups within a society to shift resource distribution in their favour. This can produce dire environmental scarcity for poorer and weaker groups whose claims to resources are opposed by these powerful elites” (*ibid.*, p. 10). Although it is not strictly possible to speak of *elites* in this case, there is evidence, as it was shown in epigraph 4.1, showing that farmers are occupying the traditional grazing lands and transhumant pathways of Sahelian nomadic pastoralists, forcing them to move to ecologically marginal areas (Puigdefábregas, 1995; Wezel and Rath, 2002). However, the situation in the rural areas of the Sahel is better described through the notion of *absolute scarcity* (meaning that resource scarcity is suffered by all members of society) than through *relative scarcity* (which also is to be found here, since not all members of the society are equally poor and enjoy the same access to resources). On the other hand, ecological marginalization occurs when population growth and unequal resource access combine to produce four social effects particularly relevant for violent conflict: i) decreased agricultural production; ii) decreased economic productivity; iii) population displacement; and iv) disrupted institutions and social relations (Homer-Dixon, 1991). All these effects are in some extent present in the recent past of the region. As epigraph 2.3 pointed, Sahelian and other Sub-Saharan countries have experienced negative economic growth along the 1990s (Kim, 2002), which might be related to declining soil fertility that has already been registered in Mali and Niger (World Resources Institute, 1998). This has been cause, among other factors, of extensive rural-urban migration and has drastically increased the share of urban population of Sahelian countries (UNDP, 2003 – see Table 5). Besides, the Sahel (and other African regions) suffered from authoritarian regimes and widespread political instability (Nyong’o, 2002) after the disruption occasioned by the process of colonization and de-colonization. Again, the multiplicity of causes and factors linked to violent conflict is visible.

However, it must not be forgotten that environmental degradation is only a factor, probably not the most significant, related to violent conflict. The Sahel is a region of widespread *food insecurity* whose inhabitants have to face extremely difficult conditions to ensure their livelihood. This is

source of a complex net of social tensions and political instability which, although cannot be isolated from environmental conditions, are the main reason for understanding conflict. Similarly, the type of conflict discussed here is only one of the forms environmental degradation links to human insecurity in rural areas, but other effects are to be found. For instance, it is recognized that human insecurity in urban areas related to environmentally-induced rural-urban migration is expected to increase in underdeveloped countries (Gizewski y Homer-Dixon, 1995), as it is the case of the Sahel.

Things are still rapidly changing in the region. Population will be growing fast at least during the first part of the current century and consequently pressure on resources will increase as well (Pieri, 1992). Other important changes are expected to happen in the medium and long-term because of *global warming*, which will set the scenarios determining the evolution of the farmers-herders relationship in the Sahel. There is no agreement on whether climatic conditions, measured as water availability, will worsen or improve along the 21st century but it seems that by the 2100 the Sahel could be better irrigated than in the last forty years (IPCC, 2001, p. 495). The way in which people, mainly in rural areas, will adapt to climate change displaying coping behaviours and increasing preparedness based on the experience of the 1960s and 1970s droughts will probably determine the long-term effect of climate change in Sahelian societies (Dietz *et al*, 2004). Blench (1996, p. 3) argues for the recent past that it is “likely that resource conflict is more prevalent than earlier in the [20th] century and that this is not merely an illusion generated by more research. There are more people competing for fewer resources and there are more perceived resource arenas.” This could be also the case for this beginning century. Many factors evolving simultaneously will decide whether the probability of conflicts between farmers and herders will enlarge or decrease in the future. However, it is very probably that the surest way to encourage Sahelian agricultural and pastoral communities to deal more peacefully with resource scarcity is improving the overall living conditions of the Sahelian rural population.

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