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## Research area: ecology, history, culture and economy

### Introduction

The objective of this chapter is to present the research area and to discuss the ecological and the human contexts in which the pastoralists carry out their activities. Since the study area runs across administrative boundaries and relief regions, from the highlands to the floodplain, an understanding of its non-equilibrium characteristics is vital for an adequate appreciation of human activities therein and the evolution of pastoralism in particular. This account will elaborate on the climatic variability, relief, soils, hydrology, and vegetation, and provide a brief history of the people and their cultural diversity, including some economic activities like crop farming, fishing, and animal husbandry carried out within the region. The physical conditions of the region, in terms of its climate, relief, soils, and drainage have a close relationship with the rhythm of pasture and water availability, whose fluctuations influence the mobility of cattle and the people that depend on them. The modern and traditional pastoralists operate within these physical and human contexts, which determine in a major way how pastoralism evolves.

The delimitation of the research area was determined at the beginning of this research when I carried out a general assessment of the migratory patterns of the pastoralists, the problems they encountered, and the different techniques they employ in herding. A comparative analysis between traditional and modern pastoralism within the social, economic, technological, and ecological purview was seen to be most feasible in this area because it has a diverse history of human installation, a melting pot of culture, and witnessed the most significant shifts in pastoral development. In Mindif, the *Yaéré*, Moulvoudaye, Maroua, and Bogo are found important periodic cattle markets, grazing grounds, and transhumance corridors, where contact with the sedentary farming communities is ever-present. Furthermore, in the transhumance floodplain the presence of fishers and their fishing canals, coupled with rice irrigation farming, lead to intensive interactions between people and their activities. The economic activities of the people are largely primary in nature, a state of affairs in which extensive farming competes with pastoralism for space.

## Research Area

This research covers part of the Far North Region of Cameroon, which is delimited to the west by the Nigerian border, running across the margins of the Mandara Mountains; to the east by the Chadian border, running along the river Logone; to the north by Lake Chad; and to the south by the North Region (Map 2.1). The latitudinal location of the region is between 10° and 13° north, within the Sudano-Sahelian zone of Africa. In general, the Far North Region of Cameroon is triangular in shape and extends for over 352 km from the southern border with Chad to Lake Chad at the northern border. The aerial size of the region is estimated at 34,263 km<sup>2</sup>, comprising about 7.4 per cent of the total land surface of Cameroon. Population-wise, this region is inhabited by about 3,480,414 people (2010 projections from TRGPH of 2005, the second-highest population in the country after the Centre Region). Culturally, the Far North of Cameroon is diverse and is inhabited by about 42 ethnic groups (Boulet, 1984; Meur and Felix, 2001) and has one of the highest population densities in the country, with an average of about 90.8 persons<sup>1</sup> per km<sup>2</sup>, comprising about 17.9 per cent of the national population (TRGPH, 2005). Extremes occur in the spreadout of the population. While certain areas such as the Mandara Mountains have population densities of between 130 and 250 inhabitants per km<sup>2</sup>, others like the Logone and Chari Division harbour only about a quarter of this, 30 inhabitants per km<sup>2</sup> (MINEPAT, 2009; Noorduyn, 2005). Areas including the Waza National Park (170,000 ha), the Kalamaloue National Park (4,500 ha), and the Mozoko-Gokoro National Park (1,400 ha), all created in 1968, are void of human population.

The spatial delimitation of the study area was performed with consideration of the following:

- the zones of dry-season transhumance (Waza Logone floodplain) and wet-season camps (Mindif, Moulvoudaye, Pétté, Dogba) exploited by the traditional pastoralists, permitting us to observe the constraints and opportunities that trigger traditional pastoralists to drift towards the modernization of their pastoral activities;
- the zones where large-scale sedentarization has taken place (Maroua, Petté, Mindif, Bogo, and Moulvoudaye), permitting us to determine factors favouring pastoral modernization and how it is carried out;
- the zones of interaction between pastoralists and wildlife sanctuaries (east, south, and southwest of the Waza National Park)—that is, Niwadji, Badadaye, Andirni, Amkodje, Tchède, and Lougouma—and the zones of interaction between pastoralists and farmers, fishers, and the rice project, SEMRY (*Société d'Expansion et de Modernisation de la Riziculture de Yagoua*)—that is, around the Maga, Pouss, and floodplain areas.

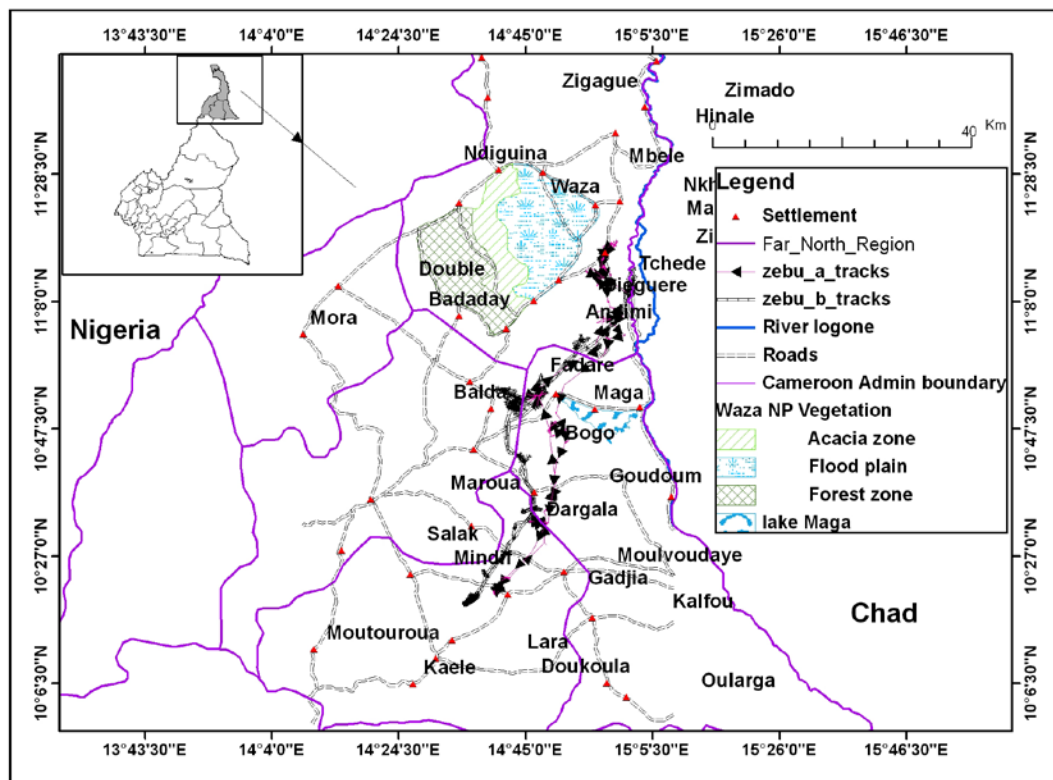
The study zone has an aerial coverage of 1,250,000 ha or 12,500 km<sup>2</sup> (a third of the Far North Region's surface area of 34,263 km<sup>2</sup>) and transcends administrative boundaries, since the herders carry out their activities across these boundaries. The study area cuts across four Divisions of the Far North Region, namely; Logone-et-Chari, Diamaré, Mayo Kani, and Mayo Danai. It also stretches to about 5 km into the western border

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<sup>1</sup> Troisième Recensement Général de population et de l'Habitat (TRGPH) estimated the 2005 population of the Far North Région at 3,111,792.

with Chad, close to Kazire, as collared Zebu B grazed in this area in 2006–07 and were still met there in the dry seasons of 2008 and 2009.

Map 2.1 Research area in the Far North Region of Cameroon



This area contains the highest number of sedentary and nomadic pastoralists. The pastoralists constitute about 15 per cent (522,000) of the total population of the Far North Region, estimated to be over 3.4 million today (3,480,414: TRGPH 2010 projections) and 280,000 pastoralists for the area under study. The traditional nomadic pastoralists comprise about 3.3 per cent (9,240)<sup>2</sup> of the pastoral population, and this number can fluctuate upwards to the approximately 30 per cent, depending on the political situation in neighbouring Chad. Out of a total of about 800,000 cattle,<sup>3</sup> the traditional nomadic pastoralists possess close to 300,000 cattle<sup>4</sup> and the sedentary, modern agro-pastoralists over 500,000. However, the nomadic pastoralists possess a greater number of cattle per head compared with the sedentary pastoralists.

### Sahelian droughts and pastoralism

The success of traditional pastoralism is tied to the availability of water and pasture at the right time, place, and quality. Shortages in pasture and water are therefore major limitations to viable traditional pastoralism, which depends entirely on the natural

<sup>2</sup> Estimates have been done through the use of partial data available in the Sub Divisional offices of MINEPIA, personal head count through the use of nomadic community leaders and the baseline data of the socio-economic surveys of 1998 carried out by the defunct Waza Logone project.

<sup>3</sup> Ministry of Livestock, Fisheries and Animal Industry (MINEPIA) estimates 774,451 cattle for year 2005, and 817,243 for year 2008. The figures fluctuate regularly because of cross border herding and difficulty in data collection since the herders do not disclose their cattle numbers to evade taxes.

<sup>4</sup> Data is from MINEPIA cattle vaccination statistics, 2006-2007.

provision of these elements (Stenning, 1971; Fricke, 1979; Khazanov, 1984; Von Kaufman, 1986; Sullivan & Homewood, 2003). The climate of the Sahel is characterized by scarce absolute rainfall, which falls unreliably and within short rainy seasons, and which is often of limited availability for human use. High temperatures during rainy seasons ensure that much of the rainfall is lost in evaporation, and intense downpours result in surface-water runoffs and floods (Anderson et al., 2008). The link between rainfall, water availability, and livestock production has been abundantly referenced in the literature on pastoralism (Mathewman, 1991; Bongfilioli, 1993). Geographers and meteorologists have observed the impact of climatic elements in directly influencing the quality, quantity, and distribution of livestock in West Africa (Mortimore, 1989; Mortimore, 1998). The rhythm of pastoral mobility and the latitudinal oscillation of pastoralists correspond to the changes in moisture and forage conditions. The seasonal climatic shift, spottiness of rains, high temperatures, and unpredictable micro-climatic changes necessitate movement (Brokensha et al., 1977; Adhola-Migot et al., 1980; Salzman, 1980; Grayzel, 1986). The spatial mobility of tropical pastoralists had been recognized as a manifestation of the concrete functioning of the ecological system (Balm, 1988) with respect to the interdependence between and among peoples, animals, and the physical and biological environment. Pastoral mobility within this global system provides nutritional needs for livestock survival. Nomadic communities depend strongly on finding grazing niches which can be exploited through mobility. Water and forage are the most important resources for pastoralism, and changes in their availability greatly influence pastoralists' livelihood security. Livestock is the most important asset for pastoralists, and livestock productivity is directly dependent on access to forage and water resources. Access to forage and water resources tends to decrease during a large-scale drought, with the result that pastoralists lose assets. The value of pastoralist's disposable assets determines pastoralists' power to purchase goods. If the value drops to the extent that they can no longer purchase the food they need to sustain themselves, then pastoralists lose their food entitlement and drought turns into famine (Hussein et al., 1993).

The meteorological drought periods of the early 1970s and 1980s, with their associated climatic desiccation, caused the deaths of thousands of people and millions of animals (Glantz, 1976, 1996). Following the definition of Pratt et al. (1997), a drought occurs when rainfall in a year is below half the long-term average or when rainfall in two or more successive years falls 25 per cent below the long-term average. Nine major droughts have occurred on the African continent in the last five decades: 1965/66, 1972/74, 1981/84, 1986/87, 1991/92, 1994/95, 1999/2001 and 2005/6. The drought of 1981/84 was the worst ever recorded in Sub-Saharan Africa. In 2009, drought hit Kenya, and most parts of East Africa were affected, killing many livestock. In 2010, Niger was hit by drought and famine, and in 2011 it was Somalia that suffered the most. Prolonged dry seasons resulting in shortage of water and pastures compel pastoralists to change their production strategies, and the emergence of new semi-intensive forms of pastoralism is just one of these. Pastoralists have experienced debilitating and recurring meteorological droughts (Dahl et al. 1976; Frantz, 1978; Salzman, 1980; Shanmugaratman et al., 1992; Bonfiglioli, 1993). Incessant droughts lead to crop failures and water scarcities (Perrings, 1993). Periodic droughts take heavy tolls on animals, owing to thirst, hunger, and exhaustion (Stenning, 1959; Vengroff, 1980; Niamir, 1990). Drought causes social and economic ruin, hunger, poverty, disease, and destitution and leaves the pastoralists dependent on the sedentary society

(Konczacki, 1978; Jacobs, 1980). In his article 'Mechanism to enhance effective popular participation', Catterson (1990) says that drought displaces people and reduces them to beggars, beggars who become overly dependent on international relief hand-outs. Drought makes rain-fed farmers expand their farms into cultivable sylvo-pastoral land (Catterson, 1990), thus displacing the pastoralists and forcing them to move southwards (Van Dijk, 1996). In some areas, drought also helped to trigger conflict—for example, in the case of the Second Tuareg Rebellion in Mali in 1990 (Keita, 1998). As droughts and farmers sweep away pasture-lands, pastoralists abandon herding and switch to farming or full-time wage labour (Cisse, 1980; Dahl, 1980). Pastoralists who are unable to cope with the effects of localized catastrophes 'bottom out' to become urban migrants fit for poor wage occupations (Brokensha et al., 1977; Swindler, 1980). The droughts of the 1970s and 1980s were particularly responsible for the breakdown of the symbiotic relationships between the Fulbe pastoralists and the Mossi farmers of the central plateau of Burkina Faso (Delgado, 1989; Breusers et al., 1998; De Haan et al., 1997; Oksen, 2000). The increasing frequency of drought in the past few decades in Sahelian Africa has been linked to climate change (Thornton et al., 2006), and this current phenomenon has brought migrating herds of traditional pastoralists into competition with semi-sedentary livestock keepers as well as with farmers. Climate-change models predict an increased risk of drought events for Sahelian African pastoral areas, due not only to increased variability of rainfall but also to higher temperatures, even if mean rainfall is expected to rise. The recent droughts in Niger (2007 and 2009) and that in East Africa that affected Kenya and Ethiopia in 2009 are said to have impoverished pastoralists and compelled them to settle and adopt a new livelihood (Nassef et al., 2009). A shift from mobility to sedentism and the marginalization of nomadic peoples have done much to exacerbate vulnerability in the Sahel, where flexibility, in the face of a high degree of spatial and temporal variability in climatic and ecological conditions, is the norm (Glantz, 1996).

The damaging impact of drought on pastoralists is exacerbated by the natural reaction of livestock markets (Smith et al., 2001). Analyses of price movements show that the livestock/grain terms of trade rapidly turn against livestock during drought (Toulmin, 1995; Dietz, 1993). The price movements are due to two independent processes that aggravate each other. As the production of staples decreases in a period of drought, their price rises dramatically, and pastoralists are thus forced to sell more animals than in normal years to satisfy their need for cereals (Dietz, 1993). This process in turn causes the price of livestock to dwindle. Additionally, during severe droughts livestock mortality increases dramatically, and herders tend to sell their animals preemptively before they become shrunken and exhausted. In such situations, the price of livestock declines unprecedentedly. For example, the 2005 famine in Niger was preceded by a rise in prices for millet and sorghum by 75 to 80 per cent above the average of the previous five years, while the prices for livestock decreased by more than 50 per cent (Rass, 2006). In contrast to poorer livestock keepers, wealthier herders and urban entrepreneurs are able to take advantage of the market situation during drought to buy livestock at low prices (De Bruijn & Van Dijk, 1992) as an investment, as they are able to keep the stock alive through purchase of feed. After the drought they often entrust the animals to impoverished pastoralists to manage them (Basset, 1994). As a consequence, many herders are gradually transformed from herder-owners to hired herders. Estimates of the proportion of livestock now belonging to absentee herd owners are as high as 80 per cent in some areas, such as Mopti (Shanmugaratnam et al., 1992).

Various coping strategies are employed by pastoralists to minimize ecological constraints. Coping strategies refer to the shorter-term survival mechanisms put in place to resist post-climate-shock impact (Anderson et al. 2008). This can lead to adaptation for groups able to protect and increase assets but can be a vicious spiral towards poverty for the poorer, through scattered efforts in low-skilled, low-income, broad-spectrum casual employment (Homewood, 2008; Little et al., 2001). Hjort (1981) explains that pastoralists have used different responses to drought-associated stresses, including culling, selling, sharing, lending, borrowing, diversifying, gifting, and herd splitting. To counter natural and artificial disasters, the pastoralists engage in frequent movement, resource circulation, social co-operation, and pre-post-drought herd enlargement when vegetation conditions are excellent (Brokensha et al., 1977; Dahl, 1980; Sandford, 1982; Cousins, 1983; Swinton, 1987).

## The ecology of the Far North Region of Cameroon

### *Climate*

The climate of the Far North Region of Cameroon has been identified by climatologists as a semi-arid, tropical type with three principal seasons that can be observed within one calendar year. Firstly, there is the rainy season (referred to locally as *duumol*), which occurs from June to October; this is followed by the cold dry season (*dabbunde*), from November to January; and finally there is the hot dry season (*tchedu*), from February to May (Beauvilain, 1995; Reiss et al., 1997). During these seasons, marked variations in temperatures, rainfall, humidity, and winds occur. As regards temperature variations and according to the data I analyzed from the Maroua Salak meteorological station, provided by the *services de la meteorologie* of Maroua (Figure 2.1), temperatures vary from between 20 °C (January mean minimum) to 37 °C (April mean maximum). The variations in temperature are caused by variation in seasons, altitude, and latitude. In the rainy season, temperatures are lower because cloud-cover reduces the incidence of solar radiation. In the cold, dry season, the dry, foggy, and dusty harmattan winds absorb most of the solar radiation, leading to cold conditions. Latitudinally, the temperature, solar radiation, and evapo-transpiration increase northwards, while altitudinally, temperatures show an insignificant decline from the floodplain towards the Mandara Mountains. In fact, the floodplain has more biting cold nights in the cold, dry season than elsewhere in the region.

A study of the rainfall figures in the Far North Region of Cameroon also showed great disparities over the years. Annual rainfall averages diminish through the latitudes from the south towards the north. The mean annual rainfall was observed to range from 500 mm in the northern borders with Chad to 1,100 mm in the southern borders with the North Region. Remarkable fluctuations can also occur during drought years: up to approximately 50 per cent (Beauvillian, 1995). The variation of the seasons is caused by the reversal in the direction of trade winds. In the dry season, November–April, the cold, dry northeast trade wind or harmattan blowing from the Sahara Desert desiccates the region. In the rainy season, June–October, the moisture-laden southwest monsoon winds blowing from the Gulf of Guinea bring clouds and rain in the region. The quantity and distribution of rainfall over the months and years vary enormously, and recurrent drought cycles are not uncommon (Beauvilain, 1995). Analyses of rainfall data show that precipitation between 1974 and 2008 saw dramatic fluctuations particularly during the Sahelian droughts of the early 1970s and 1980s, which killed

thousands of people and millions of animals (Gore, 1979; Beauvillain, 1995; L'Hôte, 2000). The annual rainfall shown in Figure 2.2 is said to have declined steadily since the 1970s, and this has endangered the ripening of crops, a situation that has pushed farmers to abandon long-cycle crops (Njomaha, 2004).

Figure 2.1 Mean monthly temperatures, Maroua Salak, 2008 figures

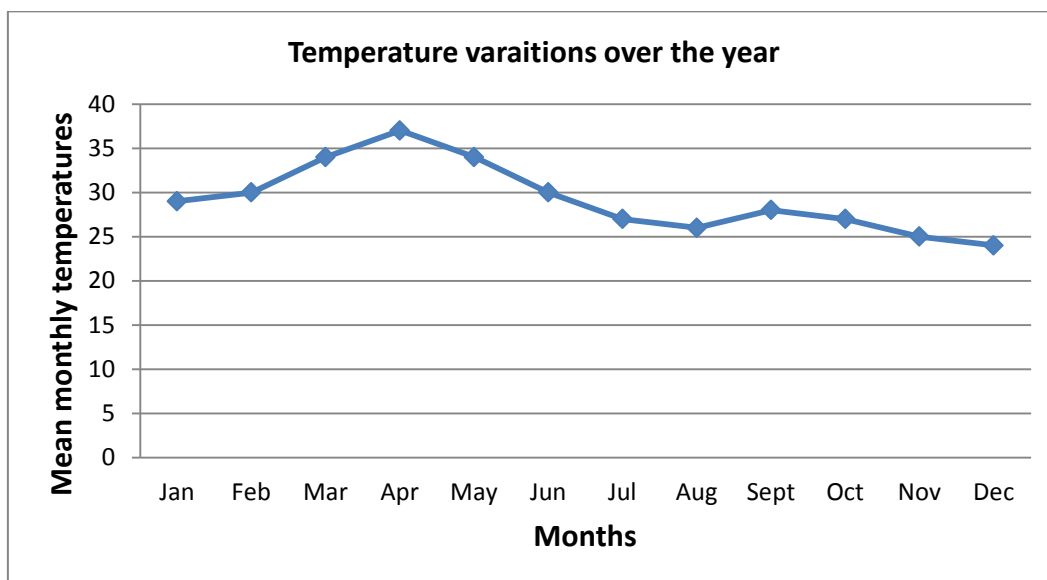
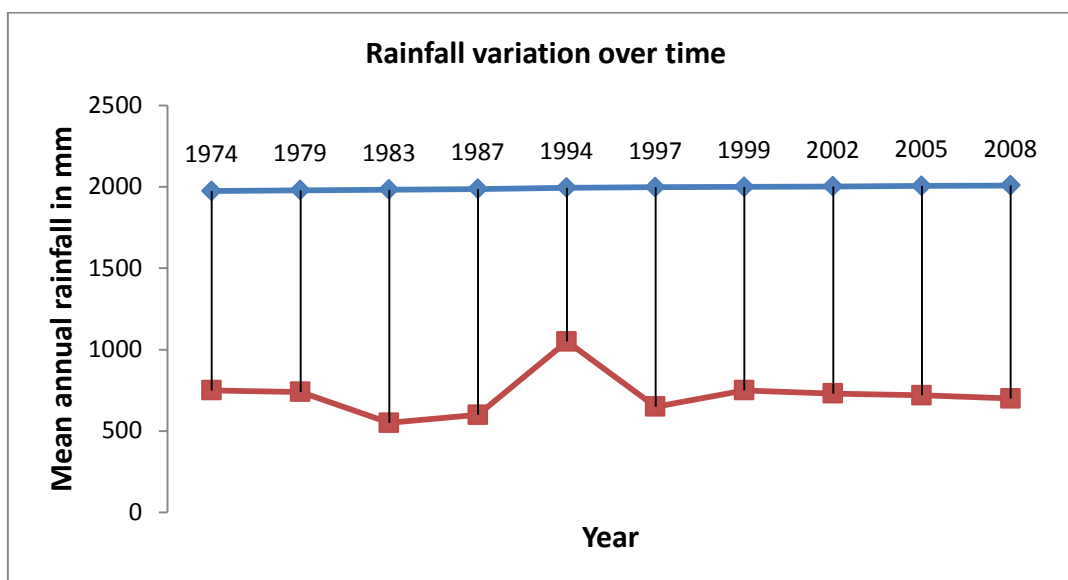


Figure 2.2 Rainfall variation in the Far North Region of Cameroon



Source: Rainfall data (in mm) from the Maroua Regional Delegation of the Ministry of Transport (*Service de la Météorologie*)

The mobility of the nomads has also witnessed an increase, especially in regards to distances covered over the seasons. Rainfall variations are also noticeable when the altitudinal or topographic context is taken into consideration. Mokolo and Mora in the

Mandara Mountains show slight variations of rainfall compared with Maroua, which is the meeting point of the mountains and the vast plains. The seasonal fluctuations in rainfall are shown in Table 2.1. Rainfall is generally heaviest in August, with July being next and then September. At times, May has more rainfall than June, a situation which reflects early arrival of rainfall but without the rainy season actually starting. June often seems to be a dry month, which in real terms and at least once every five years results in the failure of early sown crops and the wilting of new grass shoots for cattle. Nomadic pastoralists make forward and backward movements (results of Zebu collar data) to adjust to these conditions on their way back to wet season settlements.

*Table 2.1* Annual rainfall distribution in the Sahel zone of Far North Cameroon in mm, 2007

Location	Days of rain	J	F	M	A	M	J	J	A	S	O	N	D	Total
Maroua	68	0	0	0	15	64	102	151	248	104	67	0	0	<b>751</b>
Yagoua	57	0	0	0	25	57	216	253	296	126	14	0	0	<b>987</b>
Kousseri	52	0	0	0	4	82	55	207	132	71	0	0	0	<b>551</b>
Bogo	66	0	0	0	21	98	106	125	243	127	47	0	0	<b>767</b>
Mokolo	?	0	0	0	6	14	93	300	274	75	39	0	0	<b>801</b>
Mora	69	0	0	0	13	47	39	356	130	91	15	0	0	<b>691</b>

Source: Field data, Far North Regional Meteorological Centre (MINTRANS).

During the fieldwork conducted in 2006–09, I observed that the single and most reliable indicator of a non-equilibrium grazing system is climatic instability, which manifests in low and variable annual rainfall. The climate of the Far North, being a Soudano-Sahelian type, is typical of the non-equilibrium state and dictates the movement of traditional pastoralists as a consequence of natural availability or absence of water and pastures over space and time. Wet and dry periods in the Far North of Cameroon have major economic consequences and important effects on human activities. The differences observed in the distribution of rainfall are the principal influence on the migration of people and animals, whether this is spontaneous or organized. Climate is thus one of the major factors that dictate the rhythm of human activities in this dry land region and is the main trigger of the change from traditional to modern pastoralism.

#### *Climate variability*

Climate variability has had an impact on the distribution of rainfall, temperature, and evaporation rates in the Far North Region. The analysis of the variations of temperature, rainfall, and atmospheric humidity figures from 1961 to 2007 reveals a general tendency of increasing temperatures, decreasing rainfall, and decreasing atmospheric humidity, which means drier conditions for the region over time, creating greater difficulties for cattle. The mean monthly rainfall, temperature, and humidity data for the 46-year period analyzed were calculated, and deviations from the mean for each month recorded. The average of the deviations constituted the tendency for each of the elements observed.

The simplified formula<sup>5</sup> outlined below was used for the analyses:

$$\frac{\sum M_{mx}}{N} = AM_{mx} \qquad \frac{AM_{mx} - M_{mx}N_{1---N46}}{12}$$

#### *Temperature increases*

According to the analysis, the only month that has not witnessed an increase in mean temperature over the years is January. The 2.3 per cent fall in temperature in January is essentially linked to the effects of the dry, cold, dusty wind—the harmattan—which blows across the region during this period. July registered the lowest increase in mean monthly temperature, 0.4 per cent, as a result of the heavy rainfall caused by moisture-laden southwest monsoon winds. Meanwhile, June and October experienced the highest increases in temperatures, 3.1 per cent and 2.6 per cent respectively, as shown in Table 2.2. This phenomenon explains the tendency of shortening rainy period, indicating climate change effects likely to occur in dry Sahel regions. A mean temperature increase of 0.34 °C over the last 46 years (1961–2007) has been observed, and this is an indication of climate change, with the Sahel becoming warmer.

*Table 2.2* Increase in mean monthly temperature of Maroua in °C from 1961 to 2007

J	F	M	A	M	J	J	A	S	O	N	D	AV
-0,58	0,44	0,46	0,55	0,09	0,86	0,10	0,51	0,36	0,65	0,40	0,27	0,34

*Table 2.3* Relative variation of mean monthly temperature in Maroua in % from 1961 to 2007

J	F	M	A	M	J	J	A	S	O	N	D	AV
-02,3	01,6	01,5	01,7	0,2	03,1	00,4	02,0	01,4	02,6	01,5	01,1	1,2

Source: Analyses Maroua Salak airport meteorological station data (MINTRANS).

#### *Rainfall tendencies*

A general decline in mean precipitation is noticeable over the years, 17.06 per cent from 1961 to 2007. The fall in mean annual precipitation and a rise in temperature of 0.34 °C correlates with a drier period in the future, and this has been predicted in the Regional Circulation Models (RegCM). July and August are the wettest months that have not shown great variations. However, during the months of October, September, and May, a high absolute and relative decline in rainfall has been observed, 44.54 mm (75.61 per cent), 25.74 mm (19.59 per cent), and 25.02 mm (39.96 per cent) respectively, as shown in Tables 2.4 and 2.5.

*Table 2.4* Absolute variation of mean monthly rainfall in Maroua in mm from 1961 to 2007

J	F	M	A	M	J	J	A	S	O	N	D	AV
0	0	-1,07	-5,03	-25,02	18,97	-24,76	-30,87	-25,74	-44,54	-0,02	0	-11,5

*Table 2.5* Relative variation of mean monthly rainfall in Maroua in % from 1961 to 2007

J	F	M	A	M	J	J	A	S	O	N	D	AV
0	0	-83,12	-27,10	-39,96	18,46	-12,54	-13,12	-19,59	-73,61	-1	0	-13,2

Source: Analyses of Maroua Salak airport meteorological station data (MINTRANS).

<sup>5</sup>  $\sum M_{mx}$  = Sum total of the monthly means for x; x= element to be measured; N = Number of months for the same month within the study period;  $AM_{mx}$  = Average monthly mean for x;  $N_{1---N46}$  = Month 1 to Month 46 of the same month; 12 = Average for all the 12 months.

### Humidity variations

Atmospheric moisture has registered a general annual decline of 20.34 per cent in absolute value and 15.69 per cent in relative value. This means that the atmosphere of the region is becoming increasingly drier. During the months of December, January, and February, the humidity of the air rises mainly as a result of evapo-transpiration emanating from vegetation and the soil. These are the months when most of the rivers dry out and when cattle begin suffering from water scarcity (Tables 2.6 and 2.7).

Table 2.6 Absolute variation of mean monthly humidity in Maroua from 1961 to 2007

J	F	M	A	M	J	J	A	S	O	N	D	AV
0,67	2,73	4,23	-0,87	-5,43	-3,33	-4,13	-3,1	-	-6,27	-1,87	0,9	-
								3,87				1,72

Table 2.7 Relative variation of mean monthly humidity in Maroua in % from 1961 to 2007

J	F	M	A	M	J	J	A	S	O	N	D	AV
02,31	2,73	17,45	-	-	-	-	-	-	-	-	02,93	1,98
			02,32	10,53	05,24	05,67	04,02	05,27	10,82	05,41		

Source: Analyses of Maroua Salak airport meteorological station data (MINTRANS).

### Relief and soils

The topography of the Far North Region is largely the reflection of the Lake Chad basin. This region is occupied by vast floodplains, pedi-plains, and some interruptions of rising peaks and highlands to the west. Two major relief regions can be identified: the floodplain of the Logone and Chari to the northeast, and the elevated southwest region rising towards the Mandara Mountains (the source of many rivers). These two relief regions are separated by a pronounced beach-like, elongated sandy dune, which runs in a northwest direction (Drijver and Marchand, 1985; Obale-Ebanga, 2001). Geologists associate the origins of the elongated, beach-like sandy dune to the ancient limit of Lake Chad, when the region was wetter than today and when the lake was very extensive. The retreat owing to a systematic shrinkage of Lake Chad must have left the dune behind as its southernmost limit. The region to the northeast of the ridge is a vast plain composed of sandy-clayey alluvial deposits. Meanwhile, the region to the southwest of the ridge consists of small, isolated, rising granitic inselbergs (*Dent de Mindif*) and the high plateau to the west of Guider that culminates in the volcanic Mandara Mountains (1,312 m). The Mandara Mountains are a landscape that consists of high plateaux of steep slopes interrupted by granitic inselbergs of approximately 250–350 m altitude. Mount Oupay is the highest peak, with approximately 1,494 m altitude, within the Mandara Mountains (Morin, 2000). This topography generally defines the hydrographic network of the region. The highlands and plateaux are used for wet season grazing when the (*yaérés*) floodplains become too swampy.

The Waza Logone floodplain (*yaéré*), where dry season transhumance is carried out, stretches from Yagoua to the south through Maga, to Logone Birni to the north, and lies to the west of the Logone River downstream. The origin of the floodplain is tied to the presence of the fluvio-lacustrine formations of the Quaternary period, which has given rise to the hydromorphic clayey soils and vertisols on the badly drained and very flat topography. It is watered firstly by direct rainfall and then by river flooding. The aerial size of the floodplain of Far North Cameroon is estimated at 17,500 km<sup>2</sup>, and the portion known as the Waza Logone is just half of this (8000 km<sup>2</sup>), (Scholte *et al.* 1996; 6000 km<sup>2</sup>, Loth *et al.* 2004), while the flooded surface is continuously shrinking.

The pedology of the region is diverse, ranging from granitic rocks in the high plateau to sedimentary rocks in the floodplain. The Waza Logone floodplain is generally composed of sedimentary rocks of multiple sources, including lacustrine deposits uncovered during the retreat of Lake Chad. The sedimentary deposits contain coarse and fine feldspatic sands, derived from the Logone and Chari rivers, and sandy-clayey alluvium (Obale-Ebanga, 2001, Noorduyn, 2005), derived from the intermittent rivers that descend the Mandara Mountains towards the Logone valley. The River Logone floodplain encompasses poorly developed, hydromorphic vertisols comprising mainly clayey materials (Oijen and Kemdo, 1986) waterlogged for about five months of the year. As regards the Mandara Mountains region, it comprises mostly gneiss and granite, with soils constituting lithosols of volcanic derivation that hardly retain water after rainfall, a situation which explains the lack of permanent rivers. The volcanic nature of the mountains has provided pockets of fertile soils that have been ameliorated over the centuries by terracing (Ndoum, 2001). The soils of the southern plateau region have a shallow profile and a low clay content that underlies their infertility and unsuitability for agricultural production (Boutrais, 1984). The Diamare plains are also covered with tropical ferruginous sandy soils of leached planisols, luvisols, and cambisols—all poor soils for agriculture. However, pockets of fertile vertisols with sandy-clay contents can be found on most parts of the plain, and they are agriculturally productive (Obale-Ebanga, 2001).

The nature of the soil determines its fertility as well as moisture balance. The study of the factors affecting soil moisture balance in a dry land region is pertinent, as the moisture<sup>6</sup> deficits mentioned earlier impose limits to forage and water availability. To illustrate the intervening factors affecting soil moisture balance, the vicinity of Maroua (an upland plateau), comprising well-drained feldspatic sands, has been used as shown in Table 2.8. Here, the average monthly rainfall, evapo-transpiration, and mean monthly temperatures are presented using the approach of Thornwate, 1948.

*Table 2.8 Relationships between rainfall, temperature, evaporation, and soil moisture, 2007*

Month	J	F	M	A	M	J	J	A	S	O	N	D
Rainfall mm	0	0	0	15	64	102	151	248	104	91	0	0
ETP-Piche	194	214	262	256	148	99	70	52	52	91	168	176
Soil Moisture mm	49	32	19	10	08	27	135	230	260	176	118	67
Mean Temperature°C	29	31	33	34	32	30	29	27	27	29	27	24

Source: Field measurements and Maroua Salak airport meteorological station data (MINTRANS)

Field measurements I carried out showed that temperature and evaporation rate largely determine soil moisture balances<sup>7</sup>, which in turn influence water availability in rivers and wells. Data from the meteorological station was used to determine the evaporation rate by applying the method of Piche (1872), available in the Maroua Salak meteorological station. Results obtained show that evaporation rates are high, and large

<sup>6</sup> Where soil samples were collected, weighed, heated in an oven to evaporate moisture, and then weighed again, to obtain the difference in weight before and after the operation. This helps to determine the moisture that was available in the soil sample.

<sup>7</sup> Soil moisture is the result of the interplay of inputs and withdrawals: inputs (precipitation and irrigation), withdrawals (evapo-transpiration, which in itself is determined by temperature, withdrawals from wells, and ground-water seepage).  $P = ETP + I + L + D + \Delta\theta$ , where P=Precipitation, I=Canopy Interception, ETP=Evapo-transpiration, L= Net Lateral water flow, D=Deep drainage, and  $\Delta\theta$  =Changes in soil water storage due to seepages.

water deficits occur in the soil. The water retention capacities of soils vary from one soil type to another, ranging from between 30 mm per meter depth for sandy soils to 120–200 mm for clayey soils (similar to the average of L'Hôte, 2000). River flow in this region through ground water seepage is most likely when the soil contains at least 120 mm of water (L'Hôte, 2000) per cm<sup>3</sup> of soil. According to the soil moisture data presented in Table 2.8, only four months of the year (July, August, September, and October) exceed this minimum level. It should not be surprising, therefore, to find dry, sandy river beds immediately after the rains cease in October.

The fluctuations of soil moisture over the year clearly indicate the period when soil moisture is highest and when deficits occur. For about 115 days, from July through October, the available moisture in the soil exceeds ETP (evapo-transpiration), meaning that the growth of pastures and river flow are assured. For soils that retain less than the maximum available moisture for plant growth and stream flow (about 260 mm in Maroua in September), this period is shorter because excess water drains through the soil and high temperatures result in high evapo-transpiration. The water available in the aquifers and rivers depends on this evaporation rate and the ability of the soil to absorb and retain moisture. This is particularly important in dry lands, as soil moisture determines at any point in time the availability and quality of pasture and water, factors that determine pastoral activities.

Faced with these soil and climate characteristics, the possibilities for the reconstitution of water reserves in the soil and the availability of water to plants and animals are limited. In general terms, the annual water balance presents large deficits. Soil moisture reserves are constituted during the wet season (June to September), when evapo-transpiration is less than the rainfall amounts. The reserves close to the surface are, however, depleted by evaporation during the long, hot, dry season, leading to the drying out of rivers and pastures. While in the field, I observed that as the rivers dry out, the traditional pastoralists drift to the floodplain, and the modern pastoralists resort to alternative sources of water (well digging and water-pump machines).

### *Vegetation*

The vegetation types of the Far North Region are strongly influenced by the climatic conditions, soils, and relief variations. The low-lying seasonally flooded plains are covered by large expanses of grassy fields, while the slopes and highlands are covered by tree and shrub savannahs. As a result of a long history of human occupation of the region and the high population density, the entire natural vegetation has roughly been turned into the secondary stage (Brabant & Gavaud, 1985; Wassouni, 2006). The secondary vegetation is referred to as degraded (Fotius, 2000), as a result of human activities in the form of agriculture, livestock rearing, and firewood harvesting. However, some zones of the Far North Region are void of human habitation and are occupied by national parks such as the Waza and the Kalamaloue parks. These wildlife sanctuaries harbour diverse vegetation types, the most important being the Acacia Seyal forest (subject to intrusions into the park for Arabic-gum harvesting), covering about one third of Waza National Park.

The vegetation of the floodplain (*yaéré*) is grassy, a zone highly valued by nomadic and transhumant pastoralists. It serves as the last resort for water and pasture when the surrounding plateau has been scorched by bush fires and rivers have completely dried out. Both annual and perennial grasses such as *Hyperrhenia bagirmica* serve as food for cattle. Without the *yaéré*, the livelihood of several pastoralists would be lost and the

regional cattle economy would also be devastated. The main perennial grass is *Hyparrhenia rufa*, which after the water has retreated in January is of little nutritional value to livestock. It is thus burnt to obtain more nutritious new shoots that have low productivity (approximately 350–450 kg DM/ha), which is offset by its high quality, especially at this period when protein supplies elsewhere are most scarce. The lowest areas of the *yaéré* are occupied by *Bourgou* or *Echinochlea stagnina*, which provides excellent grazing. The carrying capacity during the dry season is 3 TLU/ha. This rate explains the extraordinary attraction of the area to livestock owners who are confronted in the high plateau areas by total a lack of natural forage and free surface water. The edges of the *yaéré* particularly close to water bodies also have a favourable moisture regime. The field layer supports mainly annual grasses, including *Pennisetum pedicellatum* and *Schoenefeldia gracilis*, which produce about 1,250 kg DM/ha and have a carrying capacity of 4 TLU/ha (Gaston et al., 1976; Gaston, 1996).

Based on the classifications of Brabant and Gavaud (1985), the vegetation of the Maroua plateau area comprises principally woody savannah of the Medio-Sudan altitude type, with the *Isobertia doka* being mainly the significant tree species. Moving northwards, we find the *Anogeissus leiocarpus* and *Acacia albida*, which constitute a dominant part of the tree species. At the base of the plateau escarpments is found abundant woody savannah that comprise *Anogeissus/Faidherbia*, enriched by *Boswellia daziellii* and *Combretum spp.* The rocky sub-soil of the Diamare plain is predominantly covered by *Anogeissus leiocarpus* and *Sclerocarya birrea*. Meanwhile the sandy-clayey areas are covered by *Acacia Seyal* and *Balanites aegyptica*. The vegetation cover to the southeast is composed of *Amblygonocarpus andongensis* and *Detarium microcarpum*, in combination with *Guiera senegalensis* (Fotius, 2000; Seignobos, 2000). In the high plateau the pasture type comprises *Aristida kerstingii* and *Loudetia togoensis*. The productivity of the vegetation is about 2000 kg DM/ha (Gaston et al. 1976; Gaston, 1996), but these are coarse grasses inedible during the dry season, and this results in the migration of herds towards the floodplain (*yaéré*). During the rainy season, the carrying capacity is estimated at 3 TLU<sup>8</sup>/ha (Gaston, 1996).

### Hydrology

The Far North is a region of great ecological contrast comprising important river basins such as the Logone and Chari. These river basins and the floodplain (*yaéré*) of the Lake Chad basin are vital for dry season transhumance, where water and pasture availability are assured. However, due to the relatively low-lying nature of the area and the nature of the soils, which do not favour the presence and interception of water tables at the surface, most of the rivers of the Far North Region are intermittent and remain dry for a greater part of the long, dry season. The absence of permanent rivers has a great impact on agro-pastoral activities. The only permanent and important fishing river that traverses the region is the River Logone. This river is characterized by a main flow in the wet season and a low flow the rest of the year. Another river, Mayo Louti, which is not part of the Logone River system that lasts long into the dry season, issues at the southern edge of the Mandara Mountains and flows into the Benue basin.

The flow of the permanent rivers is largely influenced by precipitation amounts, the geology, and the catchment from which the river originates. On the left bank of the Logone, the river Guerleou is intercepted by the Maga Lake. The Lake Maga waters

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<sup>8</sup> Tropical Livestock Unit (TLU), estimated at 1.4 head of cattle per hectare (Gaston, 1996)

enter the floodplain through Logomatia. The Logomatia, a tributary to the Logone, usually keeps flowing when the Maga dyke is opened. Logomatia serves double purposes: as an overflow of the Logone in the wet season, and as a drain of the floodplain at flood recessions. The general flow of water follows the northeast and the northward inclination of the topography, from the Mandara through the Diamare to Lake Chad (Detay, 2000). There are also two large artificial lakes, Lake Maga and Mokolo, which were constructed to serve as irrigation reservoirs for, respectively, rice cultivation and potable water supply. The construction of the Maga Dam resulted in many downstream social and ecological problems (Oijen & Kemdo, 1986), depriving cattle of a large part of the floodplain. However, Lake Chad, Lake Fianga, and River Logone are important providers of fish to the local inhabitants. The floodplain inhabitants, notably the Kotokos and Mousgoums, earn their living through fishing and rice cultivation. To the fishers, the *yaéré* and its rivers are not only a source of livelihood but a home for all their aspirations.

The Waza Logone the transhumance floodplain (*yaéré*) receives its first waters as rain in June and from the ephemeral rivers, or *maje*, flowing from the Mandara Mountains, the main rivers being *mayo* Boula and *mayo* Sanaga. Water from the Logone is transferred mainly by the Guerleou downstream from Bongor and the Logomatia, the latter being filled from both ends when the flow of the Logone at Bongor exceeds 400 m<sup>3</sup>/sec. The Logomatia then discharges into the *yaéré* via a drain from the west of Ivrie in a bend from the northwest side. Complete flooding of the *yaéré* corresponds to about 4 km<sup>3</sup> of water volume from the Logone, with a depth of about 0.7–1.0 m and a surface area of about 8,000 km<sup>2</sup> (Loth et al., 2004). An earth dam 27 km long was built in 1979 in the *yaéré* area of Pouss and Maga. The Maga Lake that developed behind the dam has a capacity of 400,000,000 m<sup>3</sup>, with a maximum surface area of 400 km<sup>2</sup> (390 km<sup>2</sup> (Naah, 1989)). This lake is fed by the *mayo* Sanaga and the *mayo* Boura from the Logone. Excess water is emptied through a tail work<sup>9</sup> at Vrik, which drains the paddy rice and the floodplain. The 21 km-long Tékélé containment dyke runs from the Logone to Pouss to downstream of Gamsel and since 1979 has closed the Arainaba gap. The floods of the Logone have been diminishing over the years as a result of the construction of the Maga dam upstream, water losses owing to irrigation and evaporation from the Logone as it spreads on the floodplain, the dynamic reduction of water in the river channel during the dry season, and the irregular inundations of the floodplain since 1972 owing to recurrent droughts (Detay, 2000). The diminishing flood-water levels have had a significant impact on pastoral activities in the region.

### The human context

The Far North of Cameroon had a history of invading peoples, which has resulted in a mix of cultures. The region is thus very culturally diverse, wherein Muslims, Christians, and Animists live together. Economically, the inhabitants engage in crop farming, animal husbandry, fishing, and trade. Various project interventions (Maga dam construction, the Mindif-Moulvoudaye agro-pastoral project, SEMRY, and SODECOTON) greatly influenced the rural economy and natural resource management.

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<sup>9</sup> The dyke of Maga Dam has outlets used to regulate water flow from the lake into the floodplain. During the dry season, water is released through these outlets into the floodplain to irrigate the SEMRY rice fields.

Natural resource exploitation and management are usually influenced by the political and economic relations of the people inhabiting the area. The organization and interest of the various communities also provide the stage for conflict management. It is within the economic and the cultural diversity framework of the region that intercommunity and interethnic relations of the people have been analyzed in later chapters of this book.

*The history of the people*<sup>10</sup>

The Lake Chad basin region, of which the Far North Region of Cameroon is a part, is often referred to as the crossroads of Africa. This is because numerous ethnic groups migrated into and mixed with local tribal peoples from the Logone floodplain in the east to the Mandara Mountains in the west. Archeological findings show that the Sao were the first inhabitants of Far North Cameroon, and they dominated life here until the tenth century. The Sao civilization, the oldest documented civilization in the area, developed in the eastern parts of the Far North Region. The civilization expanded in the early centuries after Christ and saw its downfall in about 1000 AD when the region was subjugated by Kanem fighters. The incoming Kanem warriors swept across the country and almost entirely assimilated the local inhabitants into their cultural and political systems (Martin, 1981). The Kanem Empire is said to have grown in size and strength and became most powerful in the eleventh century, when it was transformed into an Islamic empire. In its pursuit of regional dominance, the Kanem Empire acquired horses, weapons, and Islamic legitimacy to subdue their neighbouring regions. By the fifteenth century the empire had declined and was defeated by the Bulala, who formed the Bornou Empire stretching to the south of Lake Chad, in the present Logone Birni area, where they established their capital. The Bornou Empire expanded its realm to the Adamawa in the south and into the Hausalands of Nigeria (Njeumaha, 1989). The kings established strong relations with the Islamic world of Egypt and the Ottoman Empire. Borno became a centre for learning and scholarship and gained wealth through war, plunder, trade, and the sale of slaves across the Sahara. The slave trade drastically drained Bornou of its active population, and this led to food shortages and natural resource scarcities, which caused a decline of the empire in the sixteenth century. The decline of the Bornou Empire in the east saw the rise of a more voracious Baguirmi Empire in the west. The Baguirmi chased the Bahr Erguig from their Banre indigenous homeland flanked by the Logone and the Chari rivers. Many displaced groups wandered through the Diamare plains as far west as the Mandara region. Other more organized groups came back to the southern Diamare plains to found the Zoumaya Kingdom.

The plateau areas south of the Mandara Mountains were occupied by the Kapsiki and Bana tribes, who are the descendants of the Mafa and the Mofou. Other tribes that later settled in the Mandara region include the Fali, Kola, Hina, Goude, and Djimi. The Mandara and Bana tribes established themselves in 1400 in the central part of the plateau and later on extended their territory to the Mora and Diamare plains. The Mandara are supposed to have migrated from the Bagirmi, setting up their first capital in Kerawa and later Doulo. They expanded their territory through conquest by attacking the Mafa in the west, the Kotoko in the north, and the Guiziga and the Zoumaya in the south. The Mandara easily subdued the Bornouan and the Gamergou coming from Nigeria into their territory. Concerning the nomadic Arab Shoa pastoralists to the north, coming from the Sudan in the 1600s, their assimilation by the Mandara was not possible

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<sup>10</sup> Extracted from Mohammadou (1988), Njeuma (1989), and Seignobos *et al.* (2000).

as they were yet to establish permanent settlements. By the seventeenth century, the Mousgoum people coming from the Baguirmi established themselves in Kossa and Guirvidig. They arrived here as Muslims having got their faith while in Baguirmi from a Sokoto Fulani. The Mofou came from Goudour and settled in the Diamare as from 1600. They lost battles against the Guiziga, who arrived in 1700, and were displaced to the mountainous areas of Douroum and Douvangar. The Guiziga established themselves in Maroua and Moutourwa. The Mundang settled in Midjivin, Lara, Kaele, etc.; the Guidar settled in Guider; and the Zoumaya settled in Mindif and Meskine. The Guiziga, Mundang, Guidar, and Zoumaya are thought to belong to the same group, the Mbana, who originated from the Chadian side of Mayo Kebi.

In the late seventeenth century, some nomadic Fulbe pastoralists arrived in the Zoumaya Empire. The Fulbe pastoralists initially cohabited peacefully with the existing populations, paying tribute to the local chiefs. In spite of this, minor feuds occurred between the pastoralists and agriculturalists over crop damages, cattle theft, and payment of tributes to Zoumaya chiefs (Pontie, 1979). The first major wave of Fulbe nomadic pastoralists (*perol*) migrated from West Africa to Far North Cameroon in the eighteenth century (Mohammadou, 1988; Seignobos et al., 2000), and this happened in stages, through migratory drifts (transhumance) and sudden migrations in response to intolerable ecological and socio-political situations (Stenning, 1960; Abubakar, 1977; Mohammadou, 1988). However, the Fulbe pastoralists were relative late-comers, who moved into Far North Cameroon in the eighteenth century in search of pastures for their cattle and also to escape from taxes from the Bornou princes. The Fulbe are now spread throughout West and Central Africa, from the Sene-Gambia in the west to the Sudan in the east and number about 20 million people (Adebayo, 1991; Boutrais, 1994). They lived peacefully with the local tribes to whom they paid tribute. The early nineteenth century saw the birth of a Fulbe jihadist movement, led by Sheik Uthman dan Fodio, whose principal aim was to expand Islam through conquest. Greater numbers of Fulbe pastoralists fled into Far North Cameroon during and after the Islamization wars (jihad) begun in Sokoto by Sheik Uthman dan Fodio in 1804 (Azarya, 1978; Njeuma, 1989 and 2000). By the 1820s most parts of the Lake Chad basin, including the Far North Region of Cameroon, had been conquered, subjugated, and placed under the rule of the Adamawa Emirate, a vassal state of the Sokoto Sultanate (Njeuma, 1989; Seignobos et al., 2000). The Adamawa Emirate provided the Fulbe pastoralists safe and secure pasture for their cattle.

As the Fulbe jihadists swept across northern Cameroon they defeated the Zoumaya Empire and subdued the Diamare tribes, capturing and enslaving some. The defeated communities were converted to Islam, incorporated under the Adamawa Emirate (ruled by Modibo Adama and itself ruled by the Sokoto Sultanate), and over generations were completely amalgamated. Other tribes who resisted conquest, such as the Mandara, Guiziga, and Tupuri, maintained their animist beliefs and are derogatorily referred to as Kirdis or pagans (Njeuma, 2000).

The Fulbe who entered the Far North of Cameroon came in from Bornou (Nigeria) and belong to three major clans: the Yillaga'en, great warriors responsible for most of the conquest in the region; the Ferrobe, mostly from the ruling class, skilful in leadership; and the Wollarbe Islamic scholars. The arrival of the Germans in the early 1890s saw the end of Fulbe hegemony. The Fulbe initially resisted German penetration, but by 1901 the Germans began conquering Fulbe chiefdoms, eliminating the resisting ones and instituting puppet leaders. The Germans armed the Fulbe chiefs (Lamiibe) to

conquer the last resisting Kirdis (Van Beek, 1989). However, by 1913 the Germans began transferring power to some of the Kirdi chiefs, but unfortunately for them the arrival of the First World War provided the Lamiibe greater excuses to conquer the last groups of resisting Kirdis. This situation continued for some time under French rule after the war, and the Fulbe chiefs were still empowered to rule over most of the Kirdis. By the 1920s some smaller villages were separated and given greater autonomy to avoid the abuse of some Fulbe Lamiibe. Many pagan chiefs were consequently recognized by the French in the system of indirect rule (Beauvillain, 1989). The French wanted the chiefs to comply with their administrative system, while overlooking the fact that most of the animist chiefs had only a moral-traditional role. The importance of the Lamiibe and chiefs continued after independence, as they were allocated some secondary administrative functions either as first-, second-, or third-class traditional rulers.

The collapse and eventual fragmentation of the Sokoto Sultanate under colonial rule led to the creation of *Lamidats*, ruled by the Lamiibe. Eight Fulbe *Lamidats* were founded in the Far North and they include Mindif, Maroua, Bogo, Gazawa, Binder, Miskine, Kalfou and Pétté. The colonial government gave the Lamiibe powers through the system of indirect rule (Mohammadou, 1988; Njeuma, 2000). The Lamiibe were assisted in their duties by secondary (the Lawanes) and tertiary chiefs (the Djaoros and Ardos). The creation and consolidation of the *Lamidats* begun under the influence of the Sokoto Caliphate triggered the sedentarization of many Fulbe pastoralists (*Fulbe wuro*), who later became agro-pastoralists, businessmen, civil servants, and absentee herders. The 'Fulbe *wuro*', known in the Anglophone literature as town Fulani, are people who have settled and who have partly mixed with the local population through intermarriages. In contrast, the cattle Fulani/Fulbe *ladde* are the nomadic pastoralists, who roam on rangelands with their cattle. The differences between Fulbe *wuro* (*Hua'en*) and Fulbe *ladde* (*Mbororo'en*) can be assessed from the level of integration into the larger society, in the evolution of cattle herding techniques, and in changes in livelihood and lifestyle. Other important nomadic pastoralists in this region are the Shoa Arabs, who move in conjunction with the Fulbe nomads.

Although the jihads succeeded in subjugating the indigenous inhabitants of the Far North Region, most of them still remained animists and others later became Christians. There exist large and powerful chiefdoms of Christians and animists—namely, the Tupuri, Musgum, Guiziga, Mundang, Masa, and Mofu. The Fulbe are only a minority and constitute about 14.2 per cent of the total population (Seignobos, 2000). Other powerful non-Fulbe sultanates, such as the Kanuri and the Kotoko, control large surface areas on which Fulbe pastoralists depend. The pastoralists have to regularly negotiate their way through the *Lamidats*, chiefdoms, and sultanates for access to pastures, and sometimes relations between pastoralists and resident populations are strained (Boutrais, 1984; Moritz et al., 1996).

The existence of ethnic and religious diversity in a region of periodic resource scarcities is likely to witness competition over resource access and use. Compounded with this diversity is the high population density and growth, unprecedented in the Sahelian region of West Africa. Over the last few decades, the population of the Far North Region has grown from 1,395,231 inhabitants in 1976, to 2,467,000 in 1995 (Seignobos et al. 2000), to 3,111,792 in 2005, to 3,480,414 (TRGPH 2010 projections). The Far North Region also suffers from great poverty, with a general poverty prevalence of 55.2 per cent as against the nationwide poverty prevalence of 38.0 per cent (Vision 2035 of MINEPAT, 2010). This high poverty level is connected with over-

dependence of the inhabitants on the primary sector, and the low agricultural productivity due to frequent crop failures. Given these circumstances, I think that there is a delicate balance between extensive arable farming and extensive pastoral activities in a region where poverty and population density is high. The strained relations that exist between pastoralist, farmers, and fishers in this region are therefore the result of the scramble for these scarce resources (see Chapter 5).

### *The cultural diversity*

The Far North Region is inhabited by several ethnic groups, with different cultural backgrounds. The region is usually referred to as the cultural melting pot of Africa, the meeting point of multiple ethnic groups generally related to each other through mutual ancestors. As earlier discussed in the history of the people, the empires (Kanem, Bornou, Zoumaya, etc.) that were founded in this region with different capitals, after subjugating the indigenous inhabitants left them in peace and permitted them to practice their culture. The arrival of the Fulbe in the early nineteenth century brought in a combination of Islamic religious values and the hierarchical political organization related to Islam. The Fulbe and Shoa Arabs, who comprise about 85 per cent of the pastoralists, have been Muslims for centuries. The Fulbe under Uthman dan Fodio led the Islamization mission (jihad) of the seventeenth century that swept all over West Africa. However, other Muslim groups, such as the Kanuri and the Kotoko, formed their own states even before their Islamization and were not subdued by the Fulbe (Boutrais, 1984; Njeuma, 2000). The Kotoko and the Shoa Arabs also did not identify themselves with the Fulbe because they had had been long Islamized and had relatively little to learn from the Fulbe. However, during the past three decades, Far North Cameroon has been witnessing an Islamic renewal (Seignobos et al., 2000; Moritz, 2003), in which scholarly teaching and preaching are systematically being inculcated in the inhabitants of the major settlements of the region.

Culturally, two essential elements characterize a Pullo, which are *pulaaku*<sup>11</sup> and Islam. Within Fulbe society, behaving like a Pullo is as important as being a good Muslim (De Bruijn & Van Dijk, 1995), although in the long run Islamic values tend to override, particularly for the sedentary population. Unlike being a true Muslim, to behave like a Pullo for the Fulbe is not a problem. Being a true Muslim requires much effort and can only be attained by intensively studying the Qur'an for at least two years and by strictly adhering to the Islamic code. The Fulbe under the Adamawa Emirate managed to unite the north in a non-Muslim, non-Fulbe identity and developed the identity feelings of belonging to the region.

The arrival of the colonial state reinforced the divide between the Muslim rulers and other traditional religious leaders. The French colonial government favoured the 'civilizing' mission of Islam by encouraging the Muslims to subdue other ethnic groups (Njeuma, 2000). However, Christian evangelists heralded the Kirdi (animists who resisted conversion to Islam) and turned the word Kirdi into an admirable appellation (Schilder, 1994). Thus, the existence of multiple tribal groups, Muslims and non-Muslims, side by side in a regional framework forms the basis of the cultural diversity<sup>12</sup>

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<sup>11</sup> *Pulaaku*: concept defined in Chapter 1.

<sup>12</sup> Cultural diversity is a source of conflict, and this will be discussed in Chapter 6. The economic

within this study area. Political manipulations have also contributed to the fragmentation of the ethnic and tribal settings. Appointments and elections to political posts follow a delicate attempt to balance power between the Muslims and the non-Muslims. Adherence to political parties is more a case of ethnic and religious leanings, which rarely follow party ideology.

#### *History of project interventions*

Multiple interventions by projects of varied dimensions have influenced and some are still influencing the trend of pastoral development in Far North Cameroon. Most of the projects highlighted in this section have in general affected the agro-pastoral arena particularly by introducing new pastoral techniques, although not without hitches, in a progressive modernization process. Both the opportunities offered to traditional pastoralism and the constraints created by these projects are considered as stimulating factors towards pastoral modernization. While projects like the Mindif-Moulvoudaye pilot agro-pastoral project, SODECOTON producer of cotton-seed cakes consumed by cattle, the agro-pastoral project of Sirlawe, and the Waza-Logone project had direct implications on pastoralism, other projects such as the SEMRY irrigation rice project and the related Maga Dam construction have had varied indirect consequences for pastoralism in the region.

The Mindif-Moulvoudaye pilot agro-pastoral project was financed by USAID in the 1980s and introduced a rotating pasture management system that benefited the sedentary pastoralists (Dabire, 1995). The project was developed in response to the droughts of the early 1970s, during which a loss of more than 50,000 cattle was reported in Far North Cameroon (Seignobos & Iyebi-Mandjek, 2000). The project divided the Mindif-Moulvoudaye region into rotational grazing blocks designed for pasture improvement. These measures, although welcomed by the sedentary pastoralists, were detested by the nomadic pastoralists because they were excluded from the programme. By 1985, when the necessary infrastructure was in place, the project had collapsed.

The Maga dam project resulted in the construction of the Zilim dyke, which had both positive and negative effects on the pastoralists. The best traditional pastures were lost through inundation by Lake Maga (400 km<sup>2</sup>) and occupation by the 1,500 ha rice fields of SEMRY (*Société d'Expansion et de Modernization de la Riziculture de Yagoua*) (Loth et al., 2004). The hydrological regime of the river basin was also modified both upstream and downstream, while the floodplain shrank on average from 3,500 km<sup>2</sup> to 1,800 km<sup>2</sup> (Drijver & Marchand, 1985; Loth et al., 2004). The project reduced the aerial surface of fish reproduction and created a zone of dry season pasture of 1,500 ha, which attracts from between 3,000 to 4,000 cattle yearly in the south of Lake Maga (Oijen & Kemdo, 1986; Schrader, 1986). Although hydrologists are not unanimous on the impact of the dam (Grijzen & Wit 1983; SOGREA, 1980, 1981, 1992), the effects were disadvantageous to downstream vegetation, consequent on human and animal use.

The villages downstream were forced to dig more wells to obtain water (Schrader, 1986), and the salinization of the soils owing to insufficient drainage was feared (Oijen & Kemdo, 1986). Large-scale irrigation projects like Maga impact on pastoralists

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activities of the people are ethnically dominated (Mousgom are fishers, Fulbe herders, Guiziga farmers, etc.), and each group lays claim to resources even if it is against the interests of another group. Weaker ethnic groups such as the nomadic herders are usually edged out in zones where their presence is unwelcome. Conflicts over leadership and territory are very common owing to diverse interest.

differently because the affected floodplains are zones of intense exploitation by pastoralists, fishermen, and garden-vegetable cultivators. The man-induced modifications of the hydrological regimes affected the composition of plant species, fish populations, and the time of entry and stay of pastoralists in the floodplain/*Yaéré* (Oijen & Haberland, 1991). The downstream conditions were became very poor, leading to the drying out of the wildlife drinking holes (*mares*). Trucks with water tanks were used to refill wildlife drinking holes, especially in the Waza National Park. Over-grazing, bush fires, and cattle trampling reduced the vegetation of the *Yaéré* to a bare surface (Grijzen & Wit, 1983; Meyvogel & Ekobo, 1986; Schrader, 1986). The negative effects of the Maga dam led to the initiation of the Waza-Logone re-flooding scheme (Loth et al., 2004). The question is: how did the pastoralists respond to the negative impact of the Maga dam? Did this include pastoral modernization? Scholte et al. (1996) have adequately discussed pastoralists' response to the re-flooding scheme, but to my knowledge no literature exists on the readjustment strategies of pastoralists resulting from the negative impact of the Maga dam.

The Waza-Logone Project was a floodplain re-flooding scheme started in 1994 to solve water-shortage problems caused by the building of the Zilim dyke. Historically, the Logone floodplain, which covers ca. 8000 km<sup>2</sup>, has been a key resource area for pastoralists of the Lake Chad basin (Beauvilain, 1985; Scholte & Brouwer, 2005). When rangelands in the surrounding plains and mountains dry up and the sources of surface water disappear, pastoralists trek to the Logone floodplain to find forage and easily accessible surface water for their animals (Scholte, 2005). Each year, thousands of pastoralists from Cameroon, Chad, and Nigeria enter the floodplain with over 200,000 cattle (Beauvilain, 1981; Loth et al., 2004) for a period of about seven to nine months. The mobile pastoralists that use the floodplain are said to belong to two ethnic groups, namely, the Arab Shoa and the Fulbe (Azarya et al., 1999).

The responses of these pastoralists' groups to the re-flooding scheme were diverse because they had suffered from previous governmental and project interventions (Scholte *et al.*, 1996; Moritz *et al.*, 2002). The annual monitoring of pastoralists' responses to the re-flooding scheme showed that the number of pastoral camps increased dramatically from 1995 to 1997. Grazing intensities also increased because pastoral campsites lasted for more days than before the re-flooding scheme. The increase in grazing intensity within the re-flooded area for the six months' dry season period saw a steady rise in cattle density from between 27 cattle per km<sup>2</sup> in 1993 to 69 cattle per km<sup>2</sup> in 1999 (Scholte, 2005).

The Waza-Logone Project also assisted nomads in resolving conflicts with fishers and agriculturalists (Kouokam *et al.*, 2004). These conflicts concerned the blocking of transhumance routes into and within the Logone floodplain by agricultural fields and fishing canals (Moritz *et al.* 2002). The resolution of these conflicts was made possible through the demarcation of livestock corridors into the floodplain and the establishment of conflict resolution mechanisms (Kari & Scholte, 2001). The abrupt end of the Waza-Logone Project in 1998 was a blow to the nomadic and transhumant pastoralists, as conflicts with fishermen and farmers took an upward trend. The pastoralists I discussed matters with claim that in the end the project created more difficulties for them, as they were abandoned on a no-return journey without having made headway. The farmers now cultivate parts of the cattle corridors (*burti*) and even uproot demarcation pillars without major consequences. Did the problems resulting from the abrupt halt of the Waza-Logone project push the pastoralists to modernize their cattle-herding activities?

This research study aims to provide answers to this question, in order to fill the existing knowledge vacuum on recent pastoral developments in the region.

SODECOTON and SEMRY are the principal agro-industries in this region. SODECOTON (*Société de Développement du Coton du Cameroun*) was created in 1974 as a joint venture between the Cameroonian State (30 per cent shares) and the *French Compagnie Française pour le Développement des Fibres Textiles* (70 per cent shares). The primary activities of SODECOTON have been to promote cotton cultivation through peasant farmers and the processing and selling of cotton and its by-products (oil, cotton-seed cakes, and hulls). SODECOTON could be considered the principal agent of agricultural transformation in this region, owing to the technical and institutional support to the farmers. It introduced the plough, fertilizer, and pest control in the guise of promoting peasant cotton production. Cotton cultivation is a major source of income for peasant farmers (Ali, 1994), and this has encouraged them to expand cultivated surfaces at the expense of pastoral lands (see Chapter 5 for current figures). Within the pastoral sector, the sale of cotton-seed cakes and hulls as supplementary feed for cattle and veterinary products triggered pastoral modernization (see Chapter 7).

As for the SEMRY (*Société d'Expansion et de Modernisation de la Riziculture de Yagoua*) project, it was created in Yagoua in 1971 with the main objectives of increasing rice production along the Logone floodplain, increasing farmers' incomes, and reducing rural-urban migration (Njomaha & Pirot, 2004). In 1976, SEMRY recorded a remarkable agronomic performance, with an annual production of 23,391 tons of paddy rice, about 50 per cent more than the projected output. This success encouraged the government to further expand the project from Yagoua (SEMRY I) to Maga (SEMRY II) and Kousseri (SEMRY III). By 1986, the three SEMRY units were producing a total of 102,680 tons of paddy rice on 13,000 hectares of land in collaboration with 22,000 farmers (Harre *et al.*, 1992). Current production of SEMRY (see Chapter 5 for 2009 figures) has dropped to 66,080 tons,<sup>13</sup> and the surface area under cultivation has decreased to 6,589 hectares (for SEMRY I and II only) owing to inadequate financing. However, individual peasant paddy rice cultivation in the floodplain has gained ground, as rice cultivation techniques have largely been adopted. Paddy rice cultivation has become a major occupation of the floodplain inhabitants.

## The economy

Within the Sahel region of Africa in general and the Far North Region of Cameroon in particular, different ethnic groups have different occupations. In spite of the fact that most people rely on the mixture of agriculture, pastoralism, and fishery, most groups are clearly specialized in one of these activities, which often forms part of their ethnic and cultural identity. While the nomadic Fulbe are purely pastoralists, the majority of the Mousgoum and the Kotoko settled around the River Logone valley have been and still are fishermen for the last two centuries. Meanwhile, on the cultural landscape, peasant subsistence farming and cash cropping dominate. However, pockets of off-farm activities, particularly trading and tertiary employment, provide the basis of a livelihood for many people who are drifting towards the urban sector.

### *Pastoral economy in the Sahel*

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<sup>13</sup> Ibrahim Boukar, SEMRY delegate of Maga area, interview 2009.

During the past few decades, it has been observed that pastoralism is in continuous decline because of threats posed by human population growth, increasing crop cultivation, and other human activities that shift extensive livestock production to areas of primary productivity that are increasingly marginal. Other research findings in the Sahel region of Africa have also shown that government policies, especially land-use policies over recent decades, have not been in favour of pastoralists (Swallow, 1991; Homewood *et al.* 2004). Studies have also concluded that the livelihoods of pastoral communities are linked to the possibilities of adaptation of their activities to the ecological variability of the region, to the flexibility they must engage in to ensure access to resources, to the nature of conflicts and co-operation between ethnic groups, to the inconsistent role of the state in assisting pastoral livelihoods, and to the negative discourse surrounding pastoralism that still circulates in some government and development policy circles (Thébaud & Batterbury, 2001). Many governments consider pastoralism as intrinsically detrimental to the environment as well as being economically irrational, and they continue to pursue policies of sedentarization and renovation, which are often erroneously associated with intensification. Pastoralism in most parts of Africa had been sidelined by land-tenure policies designed to support sedentarization by encouraging a privatization process, which by implication encouraged crop production and livestock intensification (Ault *et al.* 1979). Previous development interventions had considered pastoralism as backward and environmentally degrading (Scoones, 1994; Sullivan & Homewood, 2003). Pastoralism was to be modernized by development planners through the introduction of state ranches, fattening centers, and forced organization of pastoralists into strictly supervised pastoral associations (Sinclair & Fryxell, 1984; Grainger, 1992). Most of these policies and interventions have proved, over the decades, to be inappropriate, as they underestimated the production potential of traditional systems and misconceived the production rationale of traditional pastoralists (De Bruijn & Van Dijk, 1995).

In much more recent times, however, it has been realized that pastoralism plays a vital role in the economies of the countries of Sahelian Africa. The diverse contributions of pastoralism to the subsistence and economic development of Sahelian countries has gained recognition, and discussions on the importance of livestock are abundant in the literature (Jahnke, 1982; McIntire *et al.* 1992; Winrock International, 1992; Birner 1996). It has been realized that agriculture, which dominates most of the economies in the region, relies heavily on the livestock sub-sector for its contribution to the Gross Domestic Product (GDP), estimated at 32 per cent in recent decades for the Sahelian region as a whole (Winrock International, 1992). The region's growing population also relies heavily on livestock products for their daily dietary requirements. The provision of draught power and manure equally contributes a great deal toward improving the stability and sustainability of cultivation in existing agro-pastoral systems.

Additionally, the agro-ecological conditions of the Sahel have strongly influenced the development of the various livestock production systems. Livestock production here is thus dominated by sedentary agro-pastoralism and nomadic pastoralism. These are pastoral systems that evolved in response to the regions diverse agricultural environment; arid, semi-arid, sub-humid, and highland zones with varying temperatures, altitudes, soil types, and natural vegetation (Jahnke, 1982). These diverse agro-climates, coupled with divergence in cultural preference and economic incentives, influence the distribution of animals throughout Sahelian Africa. The agro-ecological conditions have made it possible for pastoralism to be practised in areas not suitable for cultivation.

Pastoralism in the region, in general, is characterized by the daily, seasonal, or yearly movement of animals in response to the region's fluctuating weather conditions and to reduce the risks associated with the use of variable rangelands.

Furthermore, as a result of the ecological conditions resulting in the natural aridity of the environment, the erratic rainfall, and the risk of droughts and bush fires, the pastoral systems operate in a disequilibrium context (Behnke *et al.* 1993). Disequilibrium ecology makes pastoral mobility remain a vital strategy that promotes optimal utilization of sparse resource availability, which may not take into account existing stocking rates (Behnke, 1994). Opportunistic grazing movements enable pastoralists to have access to heterogeneous and unpredictable pasture resources, rather than relying on the hypothetical stability or uniformity of those resources (Mace, 1991; Lane & Morehead, 1994; Mortimore, 1998). During the rainy season, annual grasses have a high nutritional value, and surface water allows herds to roam freely throughout the rangelands. During the dry season, however, pastures have a low nutritional value, and the biomass available for the dry season covers the basic nutritional requirements of the herds until the next rainy season (Thébaud *et al.*, 2001). With the exception of the rainy season, when pastures are abundant, herds usually provide low milk yield during other periods, a situation that pushes the pastoralists to sell animals at local markets in order to purchase cereals. It has been shown that the mistaken government intervention has, in most cases—particularly in the Sahel—not only failed but interrupted the fragile ecology, economy, and food security of the pastoralists (Hogg, 1990). Reasons associated with this failure include the total neglect of the knowledge of the pastoralists, top-bottom conception and implementation with no due consideration of the objectives and needs of the herders, the inability to use indigenous social organizations (Hogg, 1990), the conversion of pastoral lands to non-pastoral use (Waters Bayer & Waters Bayer, 1998), the neglect of existing traditional forage systems and experiences of the pastoralists (Scoones, 1995), and, worse still, the introduction of an equilibrium solution (the ranch model) to a non-equilibrium environment (Benke & Scoones, 1993; Scoones, 1995).

The pastoralists themselves have become increasingly aware of the competition for land as well as the impact of unfavourable terms of trade which pushes them to diversify their income and revitalize the management rules of their collective resources. The Sahelian pastoralists have been made particularly fragile by the last two great droughts (1973 and 1984), which have deeply modified their strategies for recomposing their stocks. The impact of the droughts was noticed over the years on the level of their income, their cereal needs, and the amplitude of their movements during transhumance and migrations (Toulmin, 1986). The great droughts have equally affected their destocking strategies, because it is during periods of drought that pastoralists tend to sell off their animals at cheap prices to avoid high mortality rates and especially to buy most needed cereals (Dietz, 1993). On the other hand, these tragedies have contributed to reinforcing Sahelian pastoralists' capacities for adaptation.

#### *Pastoral economy in Far North Cameroon*

Since the arrival of the Fulbe pastoralists with abundant cattle wealth in the early nineteenth century in the Far North Region, the cattle economy has grown extensively within this extended and almost cattle-parasite-free bush land (Noorduyn, 2005). After the conquest of the region by the Fulbe jihadists, various nomadic groups migrated into the region over time, steadily increasing livestock numbers. Although during the

droughts of the 1970s, the total number of livestock in the Sahelian zone decreased, cattle numbers, however, did not drastically decline in the Far North of Cameroon because many cattle sought refuge in the water- and pasture-rich floodplains of the region. The subsequent droughts of the 1980s and the construction of the Maga dam depleted the floodplain water in this cattle refuge area, resulting in a decrease in the livestock numbers to about 30 per cent (Beauvillain, 1989). The transhumance areas were particularly severely hit. The Logone floodplain notably witnessed a drop in cattle numbers from 228,000 in 1980 to 122,000 in 1990 (Beauvillain, 1989). In the Mindif region, a decrease of about 30 per cent was recorded in the livestock sector. By 1985, the herds that had sought refuge in the Chadian part of the floodplain in the 1960s and 1970s returned because of the civil war there (Boutrais, 1984; Beauvillain, 1989; Seignobos, 2000). Cattle numbers began to experience an increase from 1995 and at the start of the re-flooding scheme, although some areas are still subject to a decline. Estimates of cattle numbers<sup>14</sup> from 1986 to 2008 show a steady decline (Table 2.9) from year 2000, probably owing to ecological constraints and the development of new approaches to pastoralism. The return of peace in nearby Chad after the civil wars of the 1980s and turmoil of the 1990s must have equally contributed to the decline in cattle numbers. Also, in this region most animals are constantly on the move with the herders, not only during the seasons and the year but also during a single season. Cattle herders always seek the best places to graze their herds, whether this is across the borders or within the country. It is therefore difficult to determine the real number of cattle in this region. During interviews I realized that the cattle owners are themselves reticent to give the exact number of cattle they own out of fear of taxes and jealousy from others.

*Table 2.9* Population changes of cattle, sheep and goats in Far North Cameroon, 1986–2008 (in thousands)<sup>15</sup>

Species/year	1986	1987	1994	1995	1996	1998	2000	2003	2004	2005	2008
<b>Cattle</b>	784	750	689	585	987	1147	1180	956	851	774	768
<b>Sheep</b>	433	720	751	593	622	686	731	837	895	958	1036
<b>Goats</b>	623	920	938	785	824	989	1052	1205	1290	1380	1461

Source: 2008 MINEPIA Regional Delegation data, and estimates from personal waterhole counting. Reference has also been made to the data of Beauvillain, 1989; Boutrais *et al.* 1994; Seignobos, 2000; Njonwe, 2001 and Njomaha, 2004.

Goats are by far the most important domesticated animal in terms of absolute numbers owned. There are seemingly more goats than other animals in this region, and the numbers are growing exponentially, as can be seen in Table 2.9, since the goats are more adapted to the dry environment. Goats can be owned by anybody wishing to keep from a few to many goats within his/her homestead. Goats feed on almost all the grass and shrub at their disposal. However, cattle are the most important in terms of the households who own them, the economic contributions they make to the household and local economy, and the social networks that they create. The next most culturally important animal reared in this region and by the people who could be termed pastoralists is the sheep. The sheep is highly valued for its mutton, and the hides are used in the artisanal sector. The region is also predominantly inhabited by Muslims,

<sup>14</sup> Cattle counting is performed by the government through the department of livestock, during vaccination campaigns and tax assessment drives. These records are not exact and fluctuate regularly owing to the cross-border movements of cattle.

<sup>15</sup> Figures have been rounded up to the nearest thousands.

who, owing to religious prescriptions, sacrifice at least one ram per family each year during the feast of the ram. Other animals reared by these pastoralists in order of importance include donkeys and horses.

The dependence of pastoralism on ecological variables means that any unfavourable climatic condition like prolonged drought influences the behaviour of the herders, and their actions in most cases are determined by the state of their immediate environment. The threat of drought and diseases has always been of profound concern to the pastoralists. During droughts, farmers may be involved in a short-term change from multi-cropping to mono-cropping of the most drought-resistant crop (usually millet). However, the pastoralists I studied have resorted to long-term changes of their rearing strategies by replacing drought-sensitive animals like cattle with heat-resistant and drought-tolerant animals like goats, and this accounts for the increasing number of goats in Far North Cameroon. In the study of the ecological influences on pastoralism, it seems that adaptation to the environment is evident, and the availability of water and pastures is critical (Chapter 4). This adaptation process has made it possible to utilize lands unsuitable for most agriculture and to provide surplus animal products for the sedentary populations.

The development of the livestock sub-sector in Cameroon has been assured since 1974 by the Ministry of Livestock, Fisheries and Animal Industry (MINEPIA). MINEPIA is responsible for the overall protection of livestock in Cameroon against epizootics such as bovine pleuroneumonia and bovine trypanosomiasis. The beef programme developed by MINEPIA and the World Bank resulted in the creation of SODEPA (*la Société de Développement et d'Exploitation des Productions Animales*), FONADER (*le Fonds National pour le Développement Rural*), and MSEG (*la Mission Spéciale d'Eradication des Glossines*). It is from this moment that government policies were oriented towards pasture improvements, development of rural pastoral hydraulics (water points for cattle), and the eradication of trypanosomiasis. The livestock sub-sector contributes about 165 billion Francs CFA to the Gross Domestic Product (GDP) and employs about 35 per cent of the rural population (OECD and AfDB, 2003) in Cameroon. Additionally, the traditional system of cattle herding is giving way to a new form of cattle herding that has brought into play young entrepreneurs, civil servants, and businessmen who have benefited from subsidized micro-credit schemes<sup>16</sup> to invest in cattle rearing. This form of investment ends up building them a sure financial capital in land and cattle.

### *Crop farming*

The Far North Region is characterized by diverse food and cash-crop production systems. These production systems include the subsistence farming of rice, millet, sorghum, and maize, cultivation of cash crops such as groundnuts, cultivation of industrial cash crops such as cotton, and fodder production. The hand-held hoe (*ndaba*) is the most commonly used agricultural tool in this region. The use of draught power and tractors is also gaining grounds in the areas of rice, groundnuts', and cotton cultivation.

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<sup>16</sup> Subsidized micro-credit schemes, cited in Chapter 1. See FONADER (*Fond Nationale de Développement Rurale*).

### *Subsistence farming*

Land is cultivated in most of the fertile plains of the Far North Region. The most important subsistence crops here are sorghum/millet, maize, rice, peanuts, beans, onions, cowpeas, and okra. Millet (*Pinnesetum typhoides*) is the main food of the inhabitants and is of several varieties. The choice of what the rural populations identify as red, white, or yellow sorghum (*Sorghum tricolor*) is based on the vicinity and traditions of the agricultural community. The most important sorghum type especially preferred by the Fulbe population is the *mousskouari*, which is transplanted sorghum, cultivated at the end of the rainy season on heavy clay soils that retain much water derived from the wet season. The crop is sown in nurseries during the rainy season and transplanted at the beginning of the dry season. In some areas, particularly in the neighbourhood of the floodplain, dykes are used to conserve water in the soil to enable the crop to ripen before harvest in February. The rain-fed sorghum locally called *mil-rouge* and preferred by the Kirdis is usually fermented for the production of local beer called *bil-bil*. The culture of *bil-bil* production, in which local staples (millet especially) are converted into alcohol, results in food scarcity during periods of poor harvest.

The cultivation of maize (*Zea mays*) and rice (*Oryza sativa*) is increasing in importance since these crops have become part of the preferred food of the people. The early-ripening maize variety is preferred because the rainy season is short. The most important menace to maize cultivation is that it necessitates much water and high soil fertility and is prone to weeds and weevil attack. Maize is often grown near the homestead for easy administration of household refuse to ameliorate soil fertility. Most of the peasant farmers practice mixed cropping where many crop types are cultivated on the same farm. Other important crops cultivated here include cowpeas (*Vigna unguiculata*), local beans (*Phaseolus vulgaris*), and Bambara groundnuts (*Vigna subterranean /voacudzoli*), all of which are good sources of protein. These crops are also leguminous (with nitrogen-fixing nodules), which helps to improve the fertility of the soil. Peanuts and onions are highly commercialized and fetch a lot of cash income for the inhabitants.

### *Peasant cash cropping*

Peasant cash cropping is carried out in the form of cotton, peanuts, onions, carrots, tomatoes, and rice cultivation. Vegetable cash-cropping is mostly designed for local consumption in the nearby urban centres. Onions, peanuts, and tomatoes are transported and sold in large quantities to the southern towns of Yaoundé, Douala, and Bafoussam. Cotton is exported to European countries. Large-scale rice cultivation was introduced by the SEMRY rice project. The Maga dam was purposely created for the irrigation of rice farms. The irrigation project originally received a lot of support in the Logone valley. Parcels of irrigated fields were prepared and rented to peasant farmers for the cultivation of rice. The SEMRY rice project did not succeed in satisfying the needs of the inhabitants because rice still remains an expensive commodity and much rice is still being imported from Asia. However, about three-quarters of the rice produced is sold to Nigerian businessmen and this provides the people with some income.

Cotton cultivation became more and more important as a cash crop especially after the creation of the cotton industry, SODECOTON, in 1974 (Zuiderwijk, 1998). SODECOTON does not grow the cotton itself but supports peasant farmers with fertilizers and fixed prices to grow cotton for the factory in Maroua. The expansion of cotton fields has led to increased land scarcity and land competition (Van den Berg,

1997). Cotton production is the most important source of monetary revenue for the crop-farming population. It has led to the modernization of the local economy through micro-credits, external inputs, seeds, machinery, draught animals, and new technologies (Zuiderwijk, 1998). The production of cotton-seed cakes has also enhanced the possibilities of pastoral modernization and the introduction of new technologies in the pastoral sector.

### *Fishing*

Fishing is an important occupation for many of the inhabitants who live along the Logone valley and at the borders of Lake Chad. Some ethnic groups such as the Kotoko and the Mousgoum have taken up fishing as a way of life. While the women catch fish for household consumption, the men catch fish for sale. Fishing in the floodplain is mainly done through fishing canals, estimated to number over 2,500 (Prins & Mahamat, 2003; Loth *et al.*, 2004), inundated during floods. The floodplain (*yaéré*) receives water directly from rain and from the overflow of the river Logone. The tributaries of the Logone, the Guerleou and Logomatia, also bring in a lot of water to the floodplain. Stream flow in the *yaéré* is much diffused, particularly among many twisting and intertwined channels. The artificial fishing canals are connected to the main rivers and drain both water and fish from the plain towards the rivers. As water and fish return to the river channel through the fishing canals, all the fish are trapped and extracted from the canal, including the very young ones. Fishing is prominent in the fishing canals, pools, and in the main rivers. Common fish species such as the *Alestes nurse*, *Hyperopisus bebe*, *Tilapia zillic*, *Marcuerrius cyprinoide*, *Clarias spp*, *Synodontisnigrita*, and *Brienomgrus niger* are found in the floodplain (Blanche *et al.*, 1962; Harkes, 1993). Annual fish production in the *yaéré*/floodplain varies between 1,500 and 2,300 tonnes (Sagua, 1987, 1993; Leveque, 1997) within the floodplain only. Prins and Mahamat (2003) estimated a total fish catch of about 12,000 tonnes per year within the floodplain and Lake Maga, most of which are sold in the Far North Region and to Nigerian merchants.

### *Other income-generating activities*

Most of the off-farm activities have close links with the secondary and tertiary activities of the urban centres. Within the urban settlements, various opportunities and tertiary services are offered, including amongst others, restaurants, shops, motor-bike transport, health, and education. The advent of the mobile telephone networks has led to an increase in individually operated roadside telephone posts. Some rural areas attract many tourists, leading to employment opportunities in hotels, restaurants, and as guides. Handicraft and other artistic works are sold to tourists to earn some income. Also, the presence of an appreciable number of civil servants, coming from all parts of the country but resident in the towns of the region, and the workers of national and international NGOs and religious organizations have changed the economic landscape of the rural areas towards market-oriented activities. The emergence of many local and international traders is linked to the presence of diverse people of varied occupations. The traders usually import or export manufactured and agricultural goods of diverse sources. The trade in fuel wood, extracted from the surrounding rural areas for the urban market, generates income for individuals and middlemen (Njomaha, 2004).

## Conclusion

The analyses presented in this chapter reflect the stated hypothesis, which was to show how the ecology, history, culture, and economy of the Far North Region provides the base of the diversity and disparity of man and his activities. The climate and climate variability, the vegetation, soils, relief, and hydrology of the region were discussed. It was observed that the climate acted as the most limiting factor to livestock and crop production. Rainfall in the region is very unpredictable, erratic, and diminishing over the years. The low and unreliable rainfall, which averages approximately 700 mm a year, largely determines the availability of pastures and water in *mares* and streams. The variations between years and locations are so great that crop failures and cattle losses are common phenomena. While increasing temperatures (more evaporation of *mare* water) and declining rainfall further aggravate water availability, the porosity of the sandy clays empties river channels of their water, leading to dry, sandy river beds. However, the presence of clayey soils and a shallow water table in some areas has favoured well-digging to access water for cattle and irrigation. In terms of vegetation types, the Diamaré is covered with tree and shrub savannahs, while the Logone floodplain is covered by expanses of grass fields on sandy clays.

The human environment involves a range of economic activities, such as fishing, farming, and trade. Within the socio-cultural arena, the presence of the Fulbe pastoralists, with a long history of cattle herding, and the dynamism of other local communities in incorporating cattle herding as a livelihood venture have enhanced the diversity of pastoralism in the region. The diversification of human activities involving trade, crop farming, fishing, and animal rearing is a clear indication of man's struggle to ensure a livelihood and improve his living conditions where possible. In cases where the activities of man are ethnically dominant, as for instance the Mousgoums and Kotokos in fishing, the Fulbe in cattle herding, and the Guiziga for extensive millet cultivation, land utilization becomes an issue of open competition that disfavors the less dominant groups like the nomadic pastoralists.

After presenting the physical and human milieu of the study area generally, we shall now look in Chapter 3 at who specifically the pastoralists are. Chapter 3 will focus on the comparison of the socio-economic and livelihood characteristics of the traditional nomadic pastoralists with those of the modern sedentary agro-pastoralists. This comparison is very important, as in subsequent chapters it will be used as the basis of differentiation—in terms of economic, social, and technological aspects—manifest between these herder communities.