Bushland in Mindif Region, Cameroon : functions, decline, context and prospects

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BUSHLAND IN MINDIF REGION, CAMEROON

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Functions, Decline, Context and Prospects

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Leiden, 2006

Cover photo frontside: Aerial view of Mindif region, with the 'Pic de Mindif' in the background. Photo Jean-Yves Jamin, in: Prasac, 2002, CD-ROM 'Mille et une photos des savanes d'Afrique centrale'.

Cover photo backside: Typical bushland scene, with clearance of new field in the foreground. Photo André Teyssier, in: Prasac, 2002, CD-ROM 'Mille et une photos des savanes d'Afrique centrale'.

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Contents

1 Introduction: first overview and problem perspective

Over the past few decades, the environment has become a subject of great interest world wide. The present research project is related to the growing global concern about the fact that natural resources are being degraded or depleted, while the world population is increasing. In Africa, this phenomenon seems to be more disquieting as the majority of the population still depends heavily on natural resources for subsistence. The situation is the result of combined effects of natural and human factors leading to progressive resource scarcity which in turn may lead to social conflicts (Homer-Dixon, 1994).

Like other African countries, Cameroon is facing environmental problems, especially in the Far North province which has a fragile Sudan-savannah ecology and high population density. The Mindif region is located in this part of the country and is undergoing a process of deforestation and soil and pasture degradation. The bush vegetation cover which plays a very important role in rural ecology and livelihood activities is progressively being cleared for cropland expansion. If this would continue, then this vital resource base would ultimately disappear. A major question is: what will happen then?

The aim of this research is to analyse the problem of bush reduction and degradation in the Mindif region, to explain this problem by connecting it to its social driving forces, and to look for solutions for future in the region.

1.1 The study area

The country of Cameroon is composed of some 237 different ethnic groups spread over its ten provinces. The Far North is the most northern and the most populated province (with more than 2 millions largely rural inhabitants); it comprises more than twenty different ethnic groups. The province counts six divisions: Logone et Chari, Mayo Sava, Mayo Tsanaga, Mayo Danay, Diamare and Mayo Kani. The research area, which lies in the Mayo Kani division but borders the Diamare and Mayo Danay divisions, is shared by four main ethnic groups: Fulbe, Mundang, Tupuri and Giziga.

The research area is usually loosely referred to as the Mindif area. It is the ecological zone limited In the North by Djapay-Matfay – Mogom, in the south by Lara, Boboyo, in the east by Gay Gay-Kodoki-Kolara and in the west by the road from Moutouroua to Mouda. Administratively the study area falls in four different sub-divisions: Mindif, Moulvoudaye, Kaélé and Moutouroua,

all of them administrative units of the Mayo Kani division. The research region is also part of five cantons or lamidates: Mindif, Lara, Boboyo, Midjiving, and Moutouroua (see Figures 1.1 and 1.2).

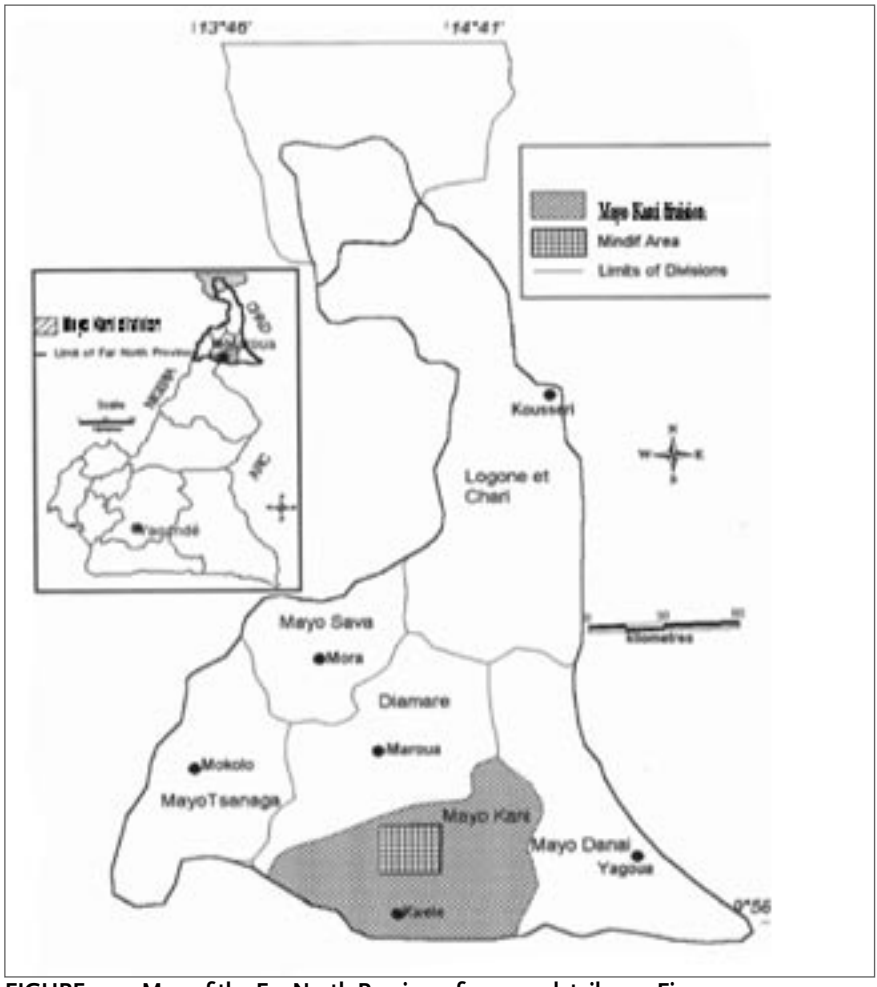

FIGURE 1.1 – Map of the Far North Province, for more details see Fig 3.1

Geographically, the region is situated between the latitudes 14'16 and 14'47 N and the longitudes 10'16 and 10'43 E. The Mindif sub-division covers a total surface area of 943 km² and has a total population of 40,000 inhabitants with a population density of 42 inhabit./km². In addition to the sub-divisional area the study area is extended to some villages belonging to the same ecological domain but which belong to the neighbouring administrative units. There are 4 villages from Moutourwa sub-division, 3 villages from Moulvoudaye sub-division and 14 villages from Kaélé sub-division which makes a total of 21 villages added to the 16 localities of the Mindif sub-division. The study area's total surface is around 30 km x 40 km = 1200 km², shared between Giziga vil-

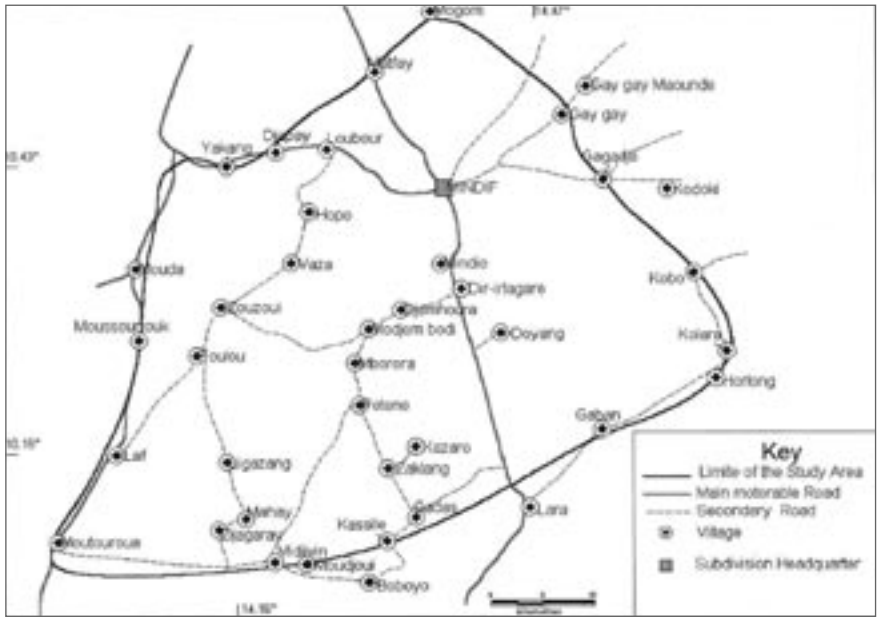

FIGURE 1.2 – villages of the study area

lages with 510 km², Mundang villages with 300 km², Tupuri villages with 130 km², Fulbe villages with 200 km², and Mindif agglomeration with 60 km².

Located in the semi-arid geographical zone, the Mindif region is on the boundary between the Sudanian zone to the South and the Sahelian zone to the North. It is characterised by a short rainy season (June-September) and a long dry season (October-May). The annual rainfall is erratic, ranging from 600 to 900 mm per year. The dry season starts with a cold period but from February onwards it is hot, with temperatures ranging from 20 to 40 degrees C (Brabant and Gavaud, 1985).

The natural vegetation cover is that of a savannah landscape with grasses, shrubs and trees. This vegetation is supported by different types of soil including fertile clay soils, sandy soils, ferric soils, (granite) soils, hard stony soils, very wet soils (Seiny Boukar et al., 1997).

The general topography of the area is flat with small hills and a number of inselbergs (Tobias and Vanpraet, 1981). Coming from Mandara Mountains, many seasonal rivers called 'mayo' flow through the region. The largest ones, mayo Boula and mayo Louga, cross the region before flowing into the Maga lake and the Logone river. The ground water flowing beneath the sandy river beds is usually not far beneath surface (Boutrais et al., 1984: 517). This partly explains why most of the settlements are located near water courses.

1.2 Historical background

The Mindif region was largely empty land until the 18th century, except for the Mindif urban centre. There is controversy concerning the settlement of the first inhabitants of Mindif urban centre. Very little is known about the matter due to lack of reliable data and many sources are contradictory (Van den Berg, 1997:35). Some sources state that before the Fulbe came, the Zumaya, whose ethnic origin is still undetermined, were living at the foot of the Mindif peak around the 16th century. It was only early 19th century that these Zumaya farmers were subjected by the Fulbe chiefdom (Van den Berg, 1997: 27).

Outside Mindif urban centre, the Tupuri were the first to settle early in the 18th century, occupying the South-East of the area (Boutrais, 1984: 127-142). A decade later came the Giziga group that settled in the North and the West of the region (Beauvilain, 1989:20; Vincent, 1992:486). They were followed by Mundang and sedentary Fulbe groups who came in almost at the same period. The Mundang group settled in the South while the Fulbe created their Lamidate (chiefdom) at the Mindif peak foothill thus taking control of the Centre and North-East of the area. Other Fulbe groups, pastoralists also called the Mbororo with a nomadic life, created routes of transhumance throughout the 'no man's lands' separating the four other groups. These spatial positions of the five groups remain basically the same up to this day, even though they have become mixed in villages.

From the beginning and during the colonial period, the contacts between the various groups were characterised by reciprocal repulsion. Due to this permanent hostility between them, the settlements were separated by large bands of empty bush serving as no man's lands between the territories. In a general tendency of expansion of the territorial areas, however, migration to the territorial borders and beyond was greatly facilitated after the colonisation, which after 1960 ruled out all significant inter-ethnic violence. At the beginning of state formation following independence, the Ahidjo regime realised that it needed the political support of the entire North of Cameroon, in order to be accepted by the rest of the Cameroon people (Schilder, 1994: 162). For this reason, social peace became a premium and sensitisation actions were conducted in order to release the tensions between the main ethnic groups, so as to present the North as one political and cultural entity.

The land settlement systems of the Mindif region may be grouped into two categories: the Tupuri system on one hand and the Fulbe, Mundang and Giziga system on the other. While the three latter groups have in common that settlements are agglomerated around the centre and are surrounded by zones of fields and bush, the Tupuri habitat is scattered over the land with each household located in the family fields. The two systems have different

consequences on land use dynamics. Compounds in the Tupuri system are more space consuming than that of the three other groups. When there is space around the compound, the natural tendency is to enlarge the domestic area and this is what happens in the Tupuri areas. The demographics of the four ethnic groups also display a significant difference between the Tupuri and the others. Of the entire Northern region, the Fulbe have the lowest (even stagnant) growth rate with a population densely agglomerated around the Lamido's residence and in village centres (Boutrais, 1984: 131). The Giziga and Mundang groups have average growth rates and population densities (Lembezat, 1961: 133; General Population Census, 1976, 1987). Compared to the three other groups, the Tupuri have the highest growth rate and population density of the Mindif region.

The main activities of the Tupuri, Giziga and Mundang groups were farming and small livestock-raising, while the Mbororo were involved in and large livestock-raising without farming (Podlewski, 1966). The sedentary Fulbe had small farms with large herds of cattle and were more involved in trade (Boutrais et al., 1984). The most common farming system was shifting cultivation, combined with permanent home fields close to the houses, that keep up their fertility by being manured. The livestock-raising system was natural grazing. The land tenure was quite simple. One just had to clear a piece of bushland to create his farms and report to the local chief to get rights over these portions. These land rights will remain also during the period of fallow as long as the owner will stay in the village (Le Roy, 1991). The other bush activities such as hunting, firewood collecting, grazing, gathering (wild fruits, legumes) were completely without collective control.

The combination and interactions between the natural elements, the population dynamics and the human activities resulted in progressive reduction of bushland. In addition, the economic crisis started in 1987. Decreasing employment in the cities generated a wave of migrants from towns, creating a sudden increase in local demand for cropland, thus increasing clearance of bushland for cultivating. The expansion of cropland, in turn, resulted in a further reduction of pastures, putting farmers and herders sometimes in harsh conflicts. These issues will all be elaborated in the present dissertation.

1.3 Government and project activities

As will be demonstrated more fully in section 4.4, the bush is the basis for the sustainability of the farming systems prevailing in the Mindif and most other areas in North Cameroon. It is largely through the bush that cropland soils maintain their fertility. Cropland soil fertility has been subject of great concern for quite a time in the entire Northern region. Some attempts to solve these problems have been made by the state, the para-statal cotton com-

pany (SODECOTON) and some development projects such as the Mindif – Moulvoudaye Project,[1] and DPGT[2] (Developpement Paysannal et Gestion des Terroirs). Improved bushland management has often been part of these projects.

In order to improve the agricultural and pastoral production, the government decided in 1970 to join the CBLT (Commission du Bassin du Lac Tchad), a multi-purpose international institution geared towards the improvement of livestock – raising conditions in the Logone et Chari and the Mindif region (Roupsard, 1987: 202). After several studies, a pilot project was initiated in 1978 called 'Projet-Pilote-Mindif-Moulvoudaye' (PMM), co-financed by the Government of Cameroonian and the American funding agency USAID. The project was placed under the supervision of the CPLCS[3] (Comité Provincial de Lutte Contre la Sécheresse). The main objectives of the PMM were to improve land management and intensify agropastoral activities in the pilot zone in order to better integrate cultivating with stock-raising. The fieldwork consisted of reorganising land use by separating pastures from land under cultivation and protecting the pastures against new farmers. The integration of crop and livestock was developed separately within the agricultural zones, far away from the routes of transhumance and grazing areas.

Animal traction had been introduced in the region during the colonial period in 1954 by a French cotton company located in Kaélé, the CFDT[4] (Compagnie Française de Développement des Fibres Textiles). The aim was to increase cotton production, hoping for positive side effects on the food crops as well. For this purpose, the cotton firm created an extension service which progressively included the food crops. Later on a livestock extension service was also created to help cotton farmers in the process of crop/livestock integration. To reach that aim, the extension service decided to organise villagers in groups called 'GVPs' (Groupements Villageois Pré-coopératifs). The duties of these local organisations were to take care of the cotton trade and help the villagers getting access to credit and collective purchase of small farming tools, such as animal-drawn equipment from the cotton company (De Steenhuijsen Piters, 1995: 57). But like the other techniques, ploughing has its risks. The use of plough should be supported by the use of organic manure in order to sustain soil fertility. Since these conditions were not fulfilled, after decades the use of ploughing lead to progressive soil degradation. Without a long period

1 'Projet-Mindif-Moulvoudaye' is a development project designed in 1975 to promote economic development through the crop and livestock integration in the Mindif region.
2 'Développement Paysannal par l'approche Gestion des Terroirs' is a development project directed towards rural areas which helps peasants in organising themselves for a better management of local resources.
3 'Comité Provincial de Lutte Contre la Sécheresse' was a provincial committee in charge of desertification problems for the entire former Northern region.
4 C.F.D.T. was a cotton company; later on it became SODECOTON.

of fallow or regular organic manure, ploughed soils get exhausted (Roupsard, 1985: 352). So people continued to clear the bushland to create new fields, which led to the continuation of the bush destruction process.

During the 1970s, the government also tried tree planting through 'Opération Sahel Vert'. The aim of this action was to abate the perceived desertification process, with the hope to improve ecological conditions which could generate positive effects on cultivating and animal production. This tree planting programme was placed under the supervision of 'Projet Centre-Nord' a state organism in charge of agricultural development in the North Province. After ten years of tree planting the results were minimal: very few planted areas still have their tree cover today.

The problem of bush decline rose in official awareness during the last decade, coinciding with the growing importance of environmental issues. Like others, the Mindif region is confronted with environmental problems such as soil and pastures degradation processes, and deforestation leading to bushland decrease (Kaag and Vermeulen, 1992). The extension of livelihood activities by the local people under the demographic pressure on land is contributing to the progressive disappearance of the free bush areas used as pastures by local and nomadic pastoralists. On top of the ensuing soil degradation, competition between bush related activities is becoming more and more pronounced, leading to a growing number of conflicts opposing the various users such as farmers, herders, tree cutters, nomads, hunters.

1.4 Recent evolution

The introduction of cash crops and the recent rise of the price of food crops have introduced the rural areas into the market economy. The main new religions including Islam and Christianism and urbanised individuals have great influence on people's behaviour. Besides these, developmental projects, NGOs and the new evolution of the socio-political context in the country have brought a lot of changes in the general emotional and organisational framework of agricultural production as well as in the rural life as a whole. As a consequence of the combined effect of all these, some negative changes also occurred. First of all, the strict discipline in food production of the past has considerably eroded. Worse, on-farm crop thefts which used to be shameful and destruction of crops by cattle which used to be seen as disrespect towards the victim are now increasingly common subjects of conflicts in the villages. The religious and symbolic perceptions of food of the past are getting lost as well. Food crops, as well as cattle, or bush resources, have become profane items, since fields can be sold or leased, and agricultural work is often remunerated with cash, in contrast to what was observed in the past.

The former perception of land as a collective good to be used with care is vanishing bit by bit. Land is no longer allowed to someone according to his food needs and the size of his family as it used to, but the surface of allocated piece of land depends more and more on the purchasing power of the applicants. The new situation which is increasingly influenced by the monetary economy, permits land accumulation and the use of money in land transactions and agricultural work. The individuals who regularly have access to cash are in a position to increase their wealth, acting as entrepreneurs and traders, with the necessary approval of the local administrative authorities. Land is progressively being put on the market even though slowly and through a complex procedure.

The present picture of the social context seems quite grim as many of the mechanisms which allowed solidarity and discipline are disappearing without being replaced by new and well-accepted rules. The ethnic groups are undergoing a kind of transitory period between traditional and modern or western systems of rules. The local exercise of power, which is very much marked by Muslim influence for historical and political reasons, takes advantage of the situation for the benefit of a local political and administrative elite occupying power positions.

The decision-makers, at both local and national levels, have missed the opportunity of taking advantage of the positive role played by some traditional institutions. The *chef de terre*, for instance, was a true agricultural leader whose advice was often useful to farmers, and the former technical and religious organisation of food production has proven to be salutary to villagers as well. The confusion of responsibilities held around land use rules and rights has degenerated into a complicated situation where it becomes really difficult to have a clear overview of the power structure and the functioning pattern of decision-making in the country and in the region.

1.5 Locally perceived problems of the region

The Mindif region is experiencing a number of problems, among which the bush- related ones are seen as the most basic by environmentalists (De Groot and Den Heijer, 2000). When questioned about their main problems, local people first talk of poverty. Later in my discussions with local people, the 'poverty' issue was broken down into many different concerns: lack of drinkable water, lack of good roads, lack of schools, lack of health centres, elephants causing damages to their fields, bush fires, pasture reduction and agropastoral conflicts around the use of the bush. The intensity of these problems of course varies in time and space and from one ethnic group to the other. Some of them are specific to certain villages, but common in the entire region are

problems with drinkable water, roads, soil fertility, productivity of croplands and pastures and school teachers and health centres.

As an indicator of the locally perceived importance of each problem, the frequency with which tey were spontaneously raised during individual interviews and group discussions could be measured in each of the 37 villages of the research area. Table 1.1 presents these frequencies organised by ethnic origin of the villages, a division that will be further explained in chapter 3.

TABLE 1.1 – Distribution of locally perceived problems according to ethnic areas. The numbers denote the number of times a problem was brought up spontaneously in the group discussions in the 37 villages.

Types of problem	Giziga	Mundang	Tupuri	Fulbe	Mindif	Number of villages
Potable water	13	-	1	3	1	18
No good road	4	1	1	3	1	10
Lack of teachers	1	-	-	1	-	2
No health centres	1	1	-	-	-	2
Lack of primary school	1	-	-	-	-	1
Elephant damages	8	8	1	2	1	20
Bush fires	1	1	-	-	-	2
Reducing pastures	1	1	-	-	1	3
Agro-pastoral conflicts	2	1	3	-	1	7

As the Table shows, the lack of government services (water, road, school etc.) comes first in this type of settings. On the other hand, people do show awareness that bush-related problems exist as well, on a level felt as less acute. (see Table 1.1).

1.6 Integrating the problem perspectives

The lack of direct government inputs (roads, teachers, drinkable water, elephant damage compensation etc.) will receive no further attention in this study. All the other problems may be seen as elements of a single complex: scarcity of land needed for the traditional land use system.

As said, this land use system uses two types of cropland: out-lying fields that have a fallow cycle, and 'home fields' that are manured. During the fallow period, the fields become bush, and bush also provides the fertile soils to open up new land. The manure for the 'home fields' is provided by cattle, and

the grazing for the cattle is provided by the bush. Thus, the bush provides a lot for soil fertility, and its disappearance signifies the disappearance of the entire traditional system. In the Mindif area, the bush is not only decreasing in terms of surface area, but is also degrading in quality due to heavy grazing, bushfires and the extraction of firewood, often by outsiders who supply firewood to the towns. The problem is compounded by cyclic droughts (Keletigui, 1996). It cannot be excluded that in the Mindif area, there may be still just enough bushland around for soil degradation to not prevalent yet, especially since people also avail of some chemical fertilizer through the cotton production. Overall however, crop production per capita of the extreme North province is on a downward trend (Njomaha, 2004).

A powerful social factor leading to land shortage is human fertility (Mortimore, 1998: 98-99). As the marginal utility of the additional child remains high in the rural areas, people have many children and they will continue to do so until an unexpected situation or event strongly motivates them for family planning. The second social factor may be the policy making about land and bush uses which may not ensure the future availability of these natural resources. The third social but also economic factor may be the entry of the market economy in rural areas which motivates people to produce more, not for subsistence, but for money, thus adding supplementary demands leading to more resource exploitation.

Living under environmental constraints such as rainfall variability and increasing soil degradation, smallholders have developed many strategies to cope with the uncertainty of their rural life conditions. To meet the increasing demand for food, cropland is expanded to the empty bush. Some farmers keep livestock, the size of which depends on the financial capacity of household, with the aim to prevent hard times. Diversification of income generating activities is another strategy observed in many households, and varying with the periods of the year. During hard times, meaning bad years due to lack of rains, people develop additional survival strategies including paid labour, gathering and selling uncultivated bush products, borrowing money or goods from relatives or friends and selling personal belongings (Mortimore, 1998: 116-117).

Three groups present different perspectives for the future: the rich, the middle group and the poor. While the rich are trying to increase their wealth through the exploitation of natural resources and the middle people are struggling to meet their needs, the third group is always threatened by the poverty trap which has already become a reality for some households today. Although the process is reversible, with people entering the poverty trap for a moment and then exit out through personal efforts or external help, the general process is characterised by the decreasing possibilities of poor households. Since there is some bush still standing and the access for cultivating remains, peo-

ple may tend not to see the necessity yet to invest more on permanent fields. More on all this is in chapters 4, 5 and 7.

1.7 Theoretical framework: transition theory

The theoretical basis on which this research is grounded include transition perspectives such as the Malthusian, Boserupian and Thünian theories and De Groot's (1992) Problem–in- Context (PiC) framework. Though partially, transition theories are referred to for trends and prospective analysis in order to help check the position of the research area with regard to the transitional process. Theories provide insights for historical and incidental understanding in the light of detailed description of the situations observed in the area, whereas environmental science methodology through the PiC framework helps to structurize the problem analysis and explanation.

The PiC framework recommends an actor-based approach for studying the social causes of environmental problems. The Action-in-Context method (part of PiC) connects local actors to wider-scale contexts including the international actors. The purpose of connecting the proximate actors and factors to the higher level and contextual actors and factors is to help identify options for local, regional, national and global policy making with regard to environmental problems.

As has been summarized by Njomaha, (2004: 20-22), three main transition theories present three different aspects or typologies of the evolution of social and economic situations in general. Malthusian pessimistic theory states that population naturally grows faster than the production of means of subsistence and if nothing is done so that the food production catches up with population growth, the situation will end up with people migrating to other places to avoid starvation or famine. In other words, the end of the bush will mean ever higher population pressure on arable land, ever higher levels of land degradation and finally the abandonment of the villages for new places where the process will resume till there will be no place left to go. According to Malthusians, it is of great necessity to maintain a balance between food production and population growth. On the contrary, the Boserupian optimistic view is opposite to Malthusian theory and takes advantage of demographic increase. For Boserup, rising population density is an enabling condition to agricultural intensification as explained by Kates et al. (1993) cited by Njomaha (2004: 20). According to Boserupian theory, when the population-land ratio increases, farmers are forced to employ more labour and become motivated for improving technological inputs. Rising population densities then facilitate innovation and diffusion of improved technology because of higher rates of interactions between people and lower transaction cost, and the com-

bined effects of these generates subsequent changes in terms of improvements in agricultural practices and yields.

Thünian theory basically refers to the existence of a central market which determines farmers' responses depending on variable economic gains pertaining to the production of marketable goods or the exploitation of natural resources. As Njomaha, (2004: 22), referring to Lambin (1994), puts it, the space-related Von Thünen theory states that the land and resources nearest to the market are first exploited because of the relatively high economic rent and low transportation cost. Therefore, the land use or landscape is made of rings of decreasing agricultural intensities as one move outwards from the market. Thünian theory is relevant to explain land use changes in savannah regions with regard to urban-driven frontiers of deforestation due to firewood exploitation which constitutes one of the main concerns in this research. Thünian theory also helps explain why successful agricultural transition often takes place at short distances from major cities such as Kano in Nigeria (Mortimore, 1998) or Nairobi (Tiffen et al., 1994).

In the Mindif area today, the bush occupies a central position in the farming systems. The areas of good bush are disappearing rapidly, however, as will be shown later in this dissertation. This, together with continuing population growth, necessitates agricultural transition to more intensive systems. The problem then is that by the time that motivations for change have become high enough, incomes from crops and cattle may have already declined so much that the capacities to invest in these systems may have become too small. This Malthusian poverty trap has been the fate of the poorer households even in a region such as Machakos district in Kenya that became famous for its rapid and massive transition to sustainable and intensive agriculture (Murton, 1999). The question then is: will the region of Mindif and North Cameroon in general find motivations for transition before the poverty trap closes even on the less poor farmers?

No miracle such as in Machakos (Tiffen et al., 1994) can be expected. Machakos enjoyed large capital influx from Nairobi, much attention from government and NGOs and the good fortune of a booming world market crop (coffee) that in this region requires terracing. No such circumstances present themselves in Mindif. Some signs of sustainable intensification are visible at the provincial level, such as investments (for and sometimes by urban people) in onions and orchards (Njomaha, 2004; Zuiderwijk, 1998; Timmermans, 1998), but these remain isolated on the very few spots with good soils and high groundwater tables. At the household level in the Mindif region, De Groot and Den Heijer (2000) describe a tendency of farmers to experiment with soil and water conservation but without massive or consistent implementation due to lack of urgent motivations.

In terms of lack of urban markets, soils, climate and crops, Mindif and North Cameroon in general look more like eastern Burkina Faso as described by Mazzacuto and Niemeijer (2000) than like Machakos. Farmers in eastern Burkina Faso do invest considerably in land conservation, however, in terms of both physical measures and institutional adaptations. This would suggest that farmers in North Cameroon could still make headway, but a comparative study on what really makes the difference is as yet lacking. For North Cameroon, there do not appear empirical grounds yet to either enter into the Boserupian narratives that have become almost sacrosanct in the social sciences (e.g. Jones and Carswell, 2004) or follow the Malthusian perspective that still prevails in environmental policy and management circles (e.g. Mitchell, 2002: 11, 14).

This dissertation focuses on the bushland rather than the land use system in general, describing, inter alia, the present-day functions of the bush and the connected intitutions. What could be the role of the bush for the region in the future? First of all, sustainable management of the bush is important for the future if only because no one can entirely predict and control hazards (Croll and Parkin, 1992: 18) meaning that some bush cover needs to be left standing for biodiversity and the future generations. Second, irrespective of whether Malthusian or Boserupian perspectives prevail in researcher visions or field realities, protection of good bushland will anyway help to bring transition about earlier. It will raise motivations for agricultural transition at a time when impoverishment is less prevalent. This issue will be returned to in Chapter 7.

1.8 Dissertation structure

This book consists of seven chapters. The first one is an introductory part which presents the historical background of the study region till this day. It also presents the current perceived problems in relation to land and bush use. Chapter 2 deals with the research questions, the main concepts, and the methodological approach. Chapter 3 presents the general physical and social features of the study area, linking up land use dynamics with the bush problem. It provides insights on linkages between geographic context, population, institutions and land dynamics, which result in social conflicts due to growing competition around bush products. Chapter 4 discusses the ways people use the bushland, the importance of the bush in soil and biodiversity conservation, and the role of the bush in extensive agriculture. Cultural and economic dimensions of the bush are also presented, as well as the different types of bush vegetation cover. Chapter 5 focuses on the actions, the actors, and their motivational factors in their social context. It discusses the determinant factors within the social environment which bring people to take actions the way they do. Chapter 6 is the continuation of what was discussed

in the preceding chapter, but with special focus on institutional aspects pertaining to decision-making at the different levels. This chapter assesses the successes and failures of bush use regulation, emphasising the gaps between the principles and the practices of the laws originating from both traditional and modern institutions. Chapter 7 examines the transition trends, makes projections for the future living conditions in the study area. It also deals with bush problem solving discussions and looks for possible exit options concerning policy-making for the study area and examines the required conditions for their feasibility within the specific social context of the region.

2 Concepts, Questions and Methods

2.1 Defining the 'bush' concept

2.1.1 General bush concept

As a general definition from dictionaries, the word 'bush' denotes the wild, uncultivated land. The bush is part of the savannah landscape which is made up of several categories. According to the National Centre for Forestry Development (CENADEFOR, 1985), the savannah of the Far North of Cameroon displays seven different types of vegetation cover: (1) deciduous open forest; (2) low thorny shrubland and discontinuous thorny semi-steppe; (3) dense thorny shrubland; (4) grassland, pastures, subsistence and industrial plantations; (5) steppe woodlands; (6) mosaïc of farms and steppe woodlands; (7) periodically inundated zone around lake Chad. From among these seven classes, the land cover of the Mindif area displays only three. These are deciduous open forest, steppe woodlands and mosaïc of farms and steppe woodlands. Within these, we have the following categories of land cover: fields, fallows, open forests, closed forests, grasslands, shrublands, bare lands (or 'hardé' in Fulbe language). Of these, only the fields are cultivated and the other categories, following Password's definition, are 'bush'. This definition will be used throughout the present dissertation. The detailed definition of these bush components are given in the nomenclature of section 2.1.3.

2.1.2 Local people's bush concept

The local people's definition of 'bush' differs from the definition stated above. For the local populations the 'bush' or 'brousse' is defined as 'all land outside the village, whether cultivated or not' (Van den Berg, 1997: 63; Den Heijer, 1998: 23). For instance, when someone goes to his fields outside the village, he says he is going to the bush. But he would not say the same thing when going to the fields just around the village. Hence there are two types of fields: 'bush fields' or 'champs de brousse' and 'home fields' or 'champs de case'. Sometimes, there is a continuum of fields from home to the bush area. Then it becomes difficult to say which of the fields are parts of the village and which ones are part of the bush. In the Tupuri areas for instance, the difference is hardly noticeable between these two types of field due to the scattered nature of the villages. The clear difference is made between the virgin bush and the inhabited area. The bush here is a place where people gather products such as fuelwood, wild food or meat, timber etc. and where people seldom have arable fields.

The attribute 'bush' or 'house' given to fields will depend on the relative position or distance of the fields from the village and they connote the closeness to 'bush area' in the local conceptualization. 'Bush fields' are sometimes also called 'forest fields' indicating fields far from the village, in the forest. In their turn, the house fields are also called fields of 'the back of the house', meaning fields surrounding the village and fields that are closer to the village. Anyway, the connotation of distance from the village appears to be the defining factor in the bush conception of the local people. Roughly, the bush is all land outside the circle of intensely farmed fields directly around, and visible from the village.

2.1.3 Nomenclature

In the present study, the term 'bush' will refer to a land cover category, not a distance-to-village category. This implies that, when discussing the bush problem with local people, the French term 'brousse' has been used only insofar it was clear to everybody that the uncultivated land was meant.

The bush then, is defined as everything not field or village, hence including fallows, bare lands or 'hardé', grasslands, shrublands, open forests, and closed forests. Fallow here refers to young regrowth of the vegetation cover after being used as field. Bare land or 'hardé' means space predominantly bare with no tree or few trees. Grassland means vegetation cover dominated by grasses with no tree or few trees. Shrubland means vegetation cover dominated by shrubs with no tree or few trees. Open forest means space where tree cover is more than a few trees but less than 50% of the vegetation cover. Closed forest means space where tree cover takes up more than 50% of the vegetation cover.

Furthermore, clarifications are needed about the key words 'land cover' and 'land use'. The land cover refers to the village field and bush categories mentioned above. The fields are land cultivated in the current year, with or without trees (agro-forestry). The term land use refers to human activities on the lands, comprising housing (village), cultivating, firewood gathering, hunting, grazing, tree cutting for timber, wild fruits collecting etc. From the land use one derives the functions of the land, also for bush areas. There are internal or local and external or supra-local functions (De Groot, 1992). A more detailed discussion of bush functions is presented in chapter 4.

2.2 Conceptualizing the 'bush problem'

2.2.1 Problematic actions

The starting point of this research is that natural resources of the Diamaré and Kaélé divisions are progressively disappearing. This is backed up by the following observations:

1 The bush is disappearing and being degraded through the increase of open areas, disappearance of trees, cropland expansion, tree cutting (Minef, 1993; Madi & Huub, 1997) ;
2 The local population is growing fast (1987 population census: growth rate of 2.9 %);
3 Soil fertility is decreasing (Levrat, 1990; Njomaha, 2004);
4 Crops yields are decreasing (Njomaha, 2004);
5 Conflicts are arising around the use of bush resources, (reducing natural resources, good arable lands, pastures leading to conflicts between bushland resources users);
6 Environmental functions of the bush are getting lost (climate change, reducing Regulation and Processing Functions);
7 No effective action is undertaken to stop these processes (lack of efficient actions from state, local people or any other entity to mitigate or solve the problems and facts mentioned above);
8 Local people do not seem to be aware enough or may feel powerless (no concrete actions from local people to solve or reduce the problems, indolent attitude).

These problems stand out as consequences of problematic actions developed primarily by local populations, such as cropland expansion, tree cutting intensification, high population growth rate, and overexploitation of bush resources or products.

2.2.2 Methodological approach

The methodological basis underlying this research is a combination of two elements: the socio-anthropological skills for fieldwork (Bernard, 1994) on the one hand, and the Problem-in-Context (PiC) framework developed by De Groot (1992) on the other. According to De Groot (1992), environmental problems arise from the actions of a set of actors. These actors are motivated by a set of factors lying within their social context. There are also hidden secondary, tertiary actors and factors that influence the proximate primary actors and bring them to act in one way or the other. And, of course, these social driving forces vary from one context to another.

Following the PiC framework and considering the problematic actions mentioned above, the bushland decline appears to be the result of a set of actions coming from some actors operating within the specific environmental context of the study region. The bushland is decreasing primarily due to problematic actions of the local people. But these people are acting under the pressure of socio-economic reasons and motivational factors which, sometimes, are beyond their control (economic context, local authorities, and hierarchy in local context they cannot influence). In most cases, they have little economic margins which allow them alternative options to the actions needed to attain their objectives or aspirations. Considering all these facts, interviewing the

primary actors only is insufficient for a clear understanding of all the driving forces behind the bush decline problem. One needs to go deeper in the analysis of the social context if the best solution to the problem is to be found.

There are different types of variables one should distinguish in the analysis and explanation of the bush problem.

- The final variables or impact variables, referring to the bush-dependent elements in livelihood, well-being, biodiversity and sustainability.
- The function variables referring to all linkages between the state of the bush and the final variables i.e. linkages between the bush and the living conditions of the local populations, the ecological state of the environment, the well-being of the people and the sustainable availability of the bush of the study region. This is the subject of chapter 4.
- The environmental variables referring to the linkages between functions of the bush and the state of the bush. This is one of the subjects in chapter 3.
- The activity variables referring to the linkages between state of the bush and the human activities that directly affect the bush. This is especially treated in chapter 5.

In PiC, all these variables have an empirical ('as is') and a normative ('as should be') version. Livelihoods are what they are and what they should be, bush quality is what it is and what it should be, and human activities are what they are and what they should be ('carrying capacity'). In the present study, virtually all emphasis is on the empirical side. In other words, it has been taken as so self-evident in the Mindif bush problem that incomes should be maintained, functions should be fulfilled, agriculture intensified etc. that I have declined to justify and quantify these assumptions.

The PiC categories of variables are key elements for the environmental problem analysis which is the basis for problem explanation. To look for the deeper motives of the actors and get the basic causes of their actions, one needs to go deeper into the social context e.g. through the social analysis of PiC, also called Action in Context (AiC). Here, the analysis starts from the primary activities i.e. all actions happening directly to the bush. From these actions one goes to the primary actors like, for instance, firewood cutters, cattle producers, crop growers, tree fellers. After that, one moves to the options of the actors i.e. everything the actor can do, like for instance gathering firewood or not, felling trees or not, grazing cattle or not, growing crops or not. Then one looks for the motivational factors. These are factors that are important for the decision-making, such as short-term cost and benefits, long-term benefits of sustainability; desire to be a good member of the community, respect of nature, and care for the future. From the options and motivations of the primary actors one can look for the secondary or tertiary actors that influence these options and/or motivations, thus getting into what is called the actors'

field of AiC, where power linkages between the primary and the secondary actors are identified. In my research, it is the way the actors are influenced by each other in their decision-making concerning the use of the bush or its products. These aspects are treated in chapter 5.

2.2.3 Research questions

The research problem can now be broken into several questions corresponding to steps of the bush problem analysis and explanation. These guiding questions include:

1 What is the basic social structure of the local populations? The aim here is to have a general overview of the local people, especially their social organisation, socio-economic categories, demographic trends and some other social dynamics.
2 What are the types of bush in the area? A distinction may be made here between general typology and the people's own typology of bush. What are the different ways people use the bush resources, how much and how often?
3 What are the functions of the bush? This question includes general functions and specific functions the bush performs for the local people. The latter may partially be measured in order to assess how much these local functions weigh in the households' livelihoods.
4 What are the actors and the factors driving the use of the bush? The emphasis is put on the harmful actors and factors at the base of bush degradation and bush resources depletion. The aim here is to find out why the actors take the harmful actions.
5 What are the factors and the enabling conditions playing in favour of the harmful actions of the actors? The accent may be put on the legal and institutional ground of the current bushland use in the area. Of particular interest here are the land tenure system, land use laws, and land use regulation rules and practices.
6 What is the future of the bush in the area? This is a prospective look into the future considering the current trends of bushland use situation, with the aim to have an idea of what would happen to the bush if things just continue the way they do, and what could be the direct social consequences. The prospective analysis of the future may also help assess the sustainable potentials of the area without bush.
7 What needs to be done in the Mindif region for a sustainable bushland use system that is inducive to further development of the area?

2.3 Methods used to study the bush problem

2.3.1 Reconnaissance visit and pre-testing

Although a native of the region, I did not have a clear knowledge of the status of the bush in all the villages of the study area. Therefore, I first visited the study region in March 1997 to examine the landscapes, who are living there, what is being done there, and assess the state of the bush in the zone. On the way through I noted down everything I found interesting for the research topic, for the functions, and the state of the bush areas. I also paid short visits to the division officer, to sub-division officers and to the traditional authorities such as the chiefs, the Djaoros and Lawans for the first contact with them and their people. 37 villages were visited during this reconnaissance trip during which administrative and traditional authorities were informed about the first step of the research fieldwork: pre-testing.

The pre-testing phase of the research was done in April 1997 to appraise people's reaction to the interview and survey situation. It was to see whether they understood the questions or needed explanations before getting the points raised in the questions. The pre-testing also checked whether the people perceived the bush problem and possible solutions. It was also meant to get their primary explanations about the bush degradation and/or reduction i.e. who or what do they see as responsible for the damage caused to the bush areas and what can be done at first sight? This helped me to select the topics or aspects on which to put more emphasis and reformulate some of the research questions for the final interview guide. The primary knowledge and general overview of the local context and people, and as well as terms locally used was necessary for the elaboration of the final questionnaire (Maliki, 1993: 7).

For all these reasons, we formulated 10 pre-test questions and submitted them to 182 persons scattered all over the 37 villages. Respondents were randomly selected within the various ethnic areas. The large number of people for the pre-testing was to extract meaningful responses from ordinary people and to separate collective from individual perceptions. This provided some insights from which I started to build up the final questionnaire guide and chose the methods and tools to be used for the fieldwork. For all fieldwork, I worked with one field assistant who was supported by four other assistants. Three of the assistants were women who were selected to interview women. The people we met were sensitised on the objectives and importance of our field interviews. These explanations motivated the respondents to participate actively to the preliminary interview sessions. We decided to use female assistants for women and male assistants for men, in order to generate a relaxed atmosphere between the interviewer and the respondent, thus facilitating open discussions.

2.3.2 Household census

To get a correct sample basis or population and to gather basic statistics, we decided to count all the households' heads of the region. This part of the fieldwork took place from May to June 1997. With a checklist we went throughout the villages to ask for the activities and social characteristics of the households. These included cultivated acreages, cultivated crops, types of domestic animals raised and their respective numbers. I had to go through all this because the administrative statistics were neither well done nor well kept. Furthermore, the study region is extended to four different sub-divisions where basic information on rural activities are not always stocked nor well kept if collected.

For this two month census operation, I was assisted by my main field assistant and some temporary assistants. In each village, we looked for the Djaoro or Lawan, explained the reasons of our visit and asked him to inform his people. After that we went through the village to meet the households' heads. If we failed to meet someone at home, we would visit his place the following day before going to another village. For more certainty, we had a resource person in each village that checked whether the information given to us was correct or not. This was because some people don't want to tell the truth about the exact number of their cattle, for instance.

2.3.3 Sample and sampling procedure

After the census operation we came out with a total of 6257 households' heads from which we decided to draw a sample of 200 respondents, 50 respondents' wives, 30 respondents' children and 20 special cases for a total of 300 people to meet. To come to these results we selected two criteria (cultivated area and number of cows) to classify the households into 9 categories. These two elements were chosen because of their direct relation with the two largest bush consuming activities which are cultivating and animal raising. For each criteria we had three levels of wealth: large, middle and smallholders. For the cultivated surface, the boundaries were < 1ha (Ps), and 1 3 ha (Ms), and > 3ha (Rs). For the number of cattle, the boundaries were 0 cow (Pc), 1-10 cows (Mc), and >10 cows (Rc). The matrix of three by three gives nine classes (Table 2.1) which we reduced to five classes (Table 2.2) for the interviews by combining 2+3+6, 8+9 and 4+5. This is because I noticed that the four other categories were not important in number and could logically be combined into five classes.

After this classification I decided to draw a random sample of 40 persons from each of the groups which make 40 x 5 = 200 respondents. This decision was motivated by some facts from the questionnaire pre-testing during which we remarked that people of the same ethnic area or category have almost similar responses to questions. This was not a surprise for at least two reasons: first of all, it is of common knowledge that rural areas are characterized by a high

level of social homogeneity in terms of ways of thinking or behaving; secondly, I already know owing to a precedent study and to my own experience as a native of the area that, in general, daily behaviour of adult rural people of the research area is determined to a high degree[5] by local traditions and cultural rules. Therefore, there was no need to draw proportional sample according to category or ethnic area and we decided to take equal number of interviewees from all the household categories. In addition to this, I decided to go deeper in the interviews and multiply sources of information to reinforce formal interview data. In this line, some specific case studies have been carried out pertaining to firewood exploitation and to agro-pastoral conflicts for instance. I also compensated the herder category through in depth analysis of relevant aspects from students' fieldworks.

TABLE 2.1 – Distribution of households'socio-economic categories. In parenthesis is the number of households in the category.

surface X cows	Small	Middle	Large
Small	1. PsPc (686)	2. PsMc (68)	3. PsRc (40)
Middle	4. MsPc (2364)	5. MsMc (1028)	6. MsRc (166)
Large	7. RsPc (1406)	8. RsMc (360)	9. RsRc (139)

Legend: s = cultivated surface; c = number of cows; P = poor, lower class; M = average, middle class; R = rich, upper class

TABLE 2.2 – Household categories used as sampling basis

Household groups	Number of households
Rich (= 8 + 9)	499
Poor (= 1)	686
Middle or Mixed (= 4 + 5)	3 392
Big herder (= 2 + 3 + 6)	274
Big cultivator (= 7)	1 406
Total	6 257

To draw the random samples we attributed a number to each person of the subgroup and put them in a box from which we picked one number and wrote down the corresponding name before putting it in the box again for another draw. We continued like this till we had 40 persons from the concerned subgroup and then passed on to another. After the overall selection of 40 household heads per category, it was then possible to have the distribution of the sampled households per village, per ethnic area and per ethnic group.

5 The researcher has conducted a 3e cycle doctoral study (1995) on the Far North province focusing on social determinants of northern people's behaviour in native rural area and in town taking the case of Youndé and Douala cities.

The ethnic area is the native space for a given ethnic group. Other ethnic groups living with them are considered as immigrants or strangers. The two categories are sampled in each ethnic area.

TABLE 2.3 – Distribution of sampled households per category, by ethnic area

Ethnic area	Rich	Middle	Poor	Big cropper	Big herder	Total
Giziga	17	14	15	20	14	80
Mundang	10	9	12	10	7	48
Tupuri	7	6	2	2	4	21
Fulbe	3	4	4	2	7	20
Mindif centre	3	7	7	6	8	31
Total	40	40	40	40	40	200

In spite of all the precautions taken during the census operation in order to avoid misinformation about the household categories, after the first round interviews and the detailed calculation of the cultivated surfaces and number of cattle, some of the sampled households appeared to be different from the characterisation made during the households census. The most striking case was that of the purely herder household heads, many of whom turned out to also cultivate at least 1ha of crop, especially among the Giziga, Mundang and Tupuri ethnic areas, thus putting them either in the rich or middle classes instead of large herder category as they were sampled. Due these reasons, the middle class were increased significantly while the other classes were reduced, especially the herder class which has decreased to 22 instead of the 40 household heads previously sampled. This is why the final configuration of the interviewed household heads looks different from the drawn sample, namely as in Table 2.4.

TABLE 2.4 – Distribution of the interviewed households according to socio-economic categories, by ethnic area

Ethnic area	Rich	Middle	Poor	Big cropper	Big herder	Total
Giziga	15	32	16	15	2	80
Mundang	10	13	12	10	3	48
Tupuri	7	8	2	2	2	21
Fulbe	3	4	4	2	7	20
Mindif	3	9	7	4	8	31
Total	38	66	41	33	22	200

Since sample size per category is not proportional to the size of the category in the population, data are mostly presented for the sample itself based on within-category representativeness. Extrapolation to all households requires more data transformation (i.e. wighted averages), which we avoided except in a few cases since the objective was to analyse each of these important catego-

ries equally intensively. Some data for the entire population are drawn from the household census instead.

2.3.4 First round household interviews

We presented the list of persons selected from the sampling to traditional authorities, who chose local guides. These local guides accompanied us to the homes of the selected persons. When the person was at home we arranged a rendezvous or started to work if possible. Most of the time, we just started and made an appointment for another day. This was necessary because the questionnaire was too long for one single session. Before starting the interview, we first explained again to the respondent how he had been chosen from among other villagers and why we did the interviews. Due to these precautions, the first round interviews have taken 6 months, going from July 1997 to January 1998.

The interviews were conducted in local language and sometimes in French through an interpreter. When some respondents insisted to sit together and talk with us, we stated clearly to each respondent not to follow or contradict what his neighbour was saying but to express freely his own opinion. Due to the use of local language in interview sessions, and to gender issues in the region, interviewers were men and women of the same ethnic groups as the respondent; female field assistants conducted interviews with women while the men took charge of the men.

2.3.5 Secondary data

From February to March 1998, we conducted some semi-structured interviews to get information about official statistics on the acreage, the cattle, the number of children going to school, etc. A checklist had been conceived for each type of data to be collected. The purpose here was to compare these official data to what we got from the census operation and appreciate the relative difference between them. For this purpose, we met the heads of Agriculture and Animal production services of the Mayo Kani division and Mindif subdivision, and all the headmasters of existing schools in the study area. Developmental structures present in the villages were also listed to help assess the degree of dependence of the respondents on bushland and bush products. An inventory of NGOs, and Research Projects operating in the villages were made in order to have a general overview of the external organisations intervening in the villages. This shows the degree of exposure of the localities to exogenous influence and was used for the analysis of innovation and transitional processes.

The semi-structured interviews consisted of meeting some persons to talk about several topics of importance pertaining to the bush use problems. Sessions were held with officials of institutions such as the Délégation provinciale de l'environnement et des forêts (DPEF) in Maroua, Délégation dépar-

tementale de l'environnement et des forêts (DDEF) in Kaélé, Poste forestier (PF) in Mindif (Ministry of environment and forest), Service provincial des domaines (SPD) in Maroua, Service départemental des domaines (SDD) in Kaélé (Ministry of Urbanism and Town Planning), as well as with all traditional authorities (Lawanes and Djaoros) of the region. The issues were discussed.

2.3.6 Group discussions

Group discussions consisted of organising meetings with people in each of the 37 villages of the study region. This part of the research was completed from May to August 1998. During the sessions the issues were discussed through the use of participatory tools such as storytelling for participatory learning (Van Est and De Wit 1996), participatory mapping, historical matrix of bush related products and historical profile of bush products in relation with the quality of life in the village (Schoonmaker Freudenberger, 1994). We always had two groups i.e. a group of men and a group of women. In each group we tried to have sub-adults, adults and elderly persons. The men's groups worked with male assistants, the women's with female assistants. This was necessary to make communication easier between the assistants and the local populations and to avoid reluctance from Muslims who hardly allow their wives to talk with unknown men.

2.3.7 Second round household interviews

The main purpose of this second phase of household interviews was to deepen certain aspects of responses with some of the same respondents of the first round. The specific deeper investigations were related to the degree of dependence on bush elements, the signs of innovation and transition in farming systems, land tenure and bushland use regulations. Due to their special position, the nomads who were not sufficiently represented in the sample were interviewed during this last phase of fieldwork. Their problems regarding bush use and bush reduction as well as their relationships with the land authorities were discussed during the sessions. This part of the fieldwork was done with the help of the main field assistant and the active participation of a student, Jan van der Ploeg, completing his fieldwork under the supervision of the researcher.

2.3.8 Transects and maps

Transect walks in the bush areas were necessary to see the extent of the forested bushland, its typology and components. In addition to the visual observation, we wanted to know more about the evolution and rough limits in the past of areas of great importance, for instance healthy bush or a totally degraded area. Therefore, people of over 40 years old were selected to be field guides during transect operations for they can tell the story of land use and vegetation dynamics in their surroundings. We called this 'commented transects'.

Due to seasonal variations in vegetation cover, the transect walks were conducted in two phases: one during the dry season (May-June 1997) for trees and shrubs and the other part in the rainy season (June-August 1998) for grasses. The transect operation itself was conducted by the researcher assisted by four field assistants. It consisted of walking from one village to another crossing the bush between them. Along the transect line, 'observation units' were processed every 1km when there was a steady natural vegetation cover. The 'observation unit' consisted of a surface area of 100m x 100m = 1 ha in parts of natural vegetation, thus excluding fallow and field plots. Inside the observation unit, types of tree and shrubs or grass, depending on the season, were counted and their respective percentages of soil cover were visually evaluated. This evaluation was made by the five persons of the group separately in the field and at the end of transect, a general mean was calculated out of the different sources.

Field observations starting from reconnaissance visit, interviews tours, transect walks and personal visits to the study area provided enough data to feed our perception and help to draw some topical maps of the Mindif region. The general presentation map of the Mindif region was fed with geographical coordinates collected using a GPS. In addition to the empirical knowledge the researcher had of the study area, information about limits of villages had been completed and validated during group discussion sessions when necessary. It was then possible to map the bush areas per village, as an overlay on the map of the study area.

2.3.9 Direct and participant observation

Observation has been the most permanent activity during the fieldwork period. Observations were made during the pre-testing, all along the interviews rounds, group discussions and transects. The aim was to see exactly who is doing what, where, when and why, for how long or how much time, with which frequency, and so on. The observed facts usually provide more clues for the explanation of people's behaviour or actions in a given context (Chauchat, 1985: 95).

2.3.10 Data organisation and analysis

Reuchlin (1991: 35) thinks that, even though one is not practically capable of eliminating or avoiding all the sources of systematic bias in research, it is good to postulate that it is possible, at least theoretically. The data validity emphasised here depends heavily on the efficiency of the methods and tools used in the field. Sharing this idea, I assume that the methods used for the study of the bush problem have been effective at generating valid data.

The various data obtained during the fieldwork were tabulated according to the dissertation writing plan. Concretely, the various information sources were put into digestible forms, regrouped under different themes. After that

they were codified and fed in Excel and Statgraphics software for statistical analysis and interpretation. The general feature is that the data from the 37 research villages was organised under 5 items representing the four main ethnic groups and Mindif centre as shown in Table 2.3. The currency used for the valuation of bush function was the FCFA. At the period of the interviews (1997), 1 French Franc represented 100 Francs CFA and 1 US Dollar was around 700 FCFA.

2.3.11 Student research

In the course of this research we received a number of students from different universities who were completing their field work in the Mindif region. Their various orientations have been very helpful for some specific details needed in our research. The most important thing to be mentioned here is that they provided me with the 'outsider's viewpoint' to complement my analysis of local perception of land use and bush functions, as all except one were not from the North of Cameroon. They included 2 students from Dschang University (Peyani and Nkapnang), 2 students from Ngaoundéré University (Isseri and Aminatou), 2 students from Leiden University (Den Heijer and Van der Ploeg) and 1 student from Utrecht University (Van Ommeren).

The first student, Peyani Tambo, did research in 1995 on the use and management of fodder trees by the local herders for domestic livestock. He focused on the bush biomass production and its perception and utilisation by local herders. His work provided me with insights in many ways. The next students were Debby den Heijer and Lilian van Ommeren (1997) from Holland. Den Heijer did research on the role played by bush products in the livelihood of the rural households, putting more emphasis on the local perception of bush functions. She extended the analysis to the economic incidence of bush products in local development trends. Van Ommeren worked on the local perception of bush functions as well, but focusing more specifically on the cultural dimensions, comparing the various ethnic groups. Data from Den Heijer and Van Ommeren have been used especially for chapter 4. Isseri Guy (1997) researched on land use tenure and bushland dynamics. His aim was to assess the rhythm of bushland reduction and find out the driving social causes. As he was a geography student, he helped drawing the maps of the bush zones and of the study region, using GPS coordinates. His data have been used in chapter 3. Aminatou (1998) has been the only student being a native of North province, who did research on institutional aspects of bush use and management, looking more closely at land use regulation in collaboration between local chiefs and the administrative authorities. She provided interesting insights for chapter 6. Nkapnang (1999) did research on gender and bush use with the aim to distinguish bush actors and assess the relative impacts of their actions on bush reduction or degradation. The part on competition between bush-related activities supplied us with important information about the role played by the various components of the local

populations in bushland dynamics for chapter 5. Jan van der Ploeg (1998) worked on social and ecological transformations at the base of land use conflicts registered in the Mindif region. The results of his research have served a lot for chapter 6.

In general, I used the information from student research for specific aspects on which they worked so as to refine my own analysis of the same phenomenon. There has been no systematic use of the students' field data because the differentiation of their specialities and domains of interest did not allow that. Moreover, being a native of the research area, I already knew many things and only wanted external viewpoints to either refine or supplement my own understanding and analysis of the researched aspects of the bush problem in the Mindif region.

3 The Research Area

This chapter describes bush-related aspects of society in accordance with which local people develop production strategies to meet their needs. In general terms, the bush problem facing these people is its progressive degradation and disappearance while at the same time the population continues to grow leading gradually to an increasing land scarcity in the region.

3.1 Social structure

3.1.1 Population composition

As stated above, the natives of the study area are Fulbe, Mundang, Guiziga and Tupuri groups. There are 19 Giziga villages, 9 Mundang villages, 5 Fulbe villages and 3 Tupuri villages in the study region. Villages are inhabited in majority by their natives (generally ¾) and more recent immigrants (generally ¼). These immigrants may be of the dominant ethnic group of the village, of one of the three other native ethnic groups, or of a different ethnic origin. Six of these non-native ethnic groups are represented in the area, in small numbers.

The social structure of the study region displays the general characteristics of the entire North region of Cameroon. Among the 6257 household heads, 5950 are men (95%) and 307 women (5%). Of the 5950 male heads, 5517 are married (88%), 131 bachelors (2%), 195 widowers (3%), 107 divorced (2%). Among the 5517 married households' heads, 4173 are monogamous (76% of the male heads) and 1344 are polygamous (24% of the male heads). Average family size in the study region is 6 persons; husband and wife with four children.

As Table 3.1 shows, the various ethnic groups do not live alone in the villages they dominate. Each of them hosts immigrants from other groups. Due to this exchange of migrants, villages of the research area have an increasingly multi-ethnic composition. Migration therefore, is an important issue which should deserve attention. For the purpose in this study, a village is allocated to a group when this group is native or dominant in number. Usually, this is also the group that established the village originally. Concerning the latter, the Tupuri villages are the exception. Their area is part of the former Mindif kingdom, hence ruled by Fulbe traditional authorities appointed by the chief of Mindif. The first generation of the Tupuri is made of immigrants from their neighbouring ethnic area, while people of the second generation are

natives of the present area. Due to their dominant number and the intensity of their involvement in bush related activities, we preferred to attribute these three villages to Tupuri instead of Fulbe.

TABLE 3.1 – Number of heads of households of villages according to ethnic groups[6]

Ethnic area	Giziga	Mundang	Tupuri	Fulbe	Other	Total
Giziga villages	69	2	1	7	1	80
Mundang villages	4	38	-	6	-	48
Tupuri villages	1	2	12	5	1	21
Fulbe villages	3	-	2	14	1	20
Mindif centre	10	2	-	18	1	31
Total	87	44	15	50	4	200

Of the four groups, the Fulbe are originally the most spread out over the region, followed, respectively by the Giziga, the Mundang and finally the Tupuri. The Tupuri, whose population used to grow fastest, also migrated much more than the four other groups. Among these four the Giziga, Mundang and Fulbe all had a migration balance of 25% while the Mindif urban centre came last with only 5% of migration balance (Podlewski, 1966; Boutrais et al., 1984: 309). Nowadays, the Fulbe are found in all the other groups' social space and so are the Giziga.

Mindif centre has a mosaic population, which is common for all the urbanized agglomerations in Cameroon. It is the administrative capital of the subdivision of the same name where all the state services are located. The traditional canton chief (Lamido), all the administrative staff, and the political elite are living side by side in this small locality. The Mindif centre is ethnically and socially heterogeneous and is considered a Fulbe stronghold community. Approximately 50% of its inhabitants are Fulbe, 35% Giziga, and the other groups share the remaining 15% of the population (Van den Berg, 1997: 4).

Tupuri geographic mobility is increasing nowadays compared to the decade before 1984 (Boutrais et al., 1984: 131), with a migration rate[7] of 24%, following the Fulbe group with 25%, whereas the Mundang group sends out 21%

6 Table 3.1 lists the number of household heads according to ethnic groups in the interview sample (n=200). It was not possible to table figures from the survey or household census simply because no question was asked about the ethnic group of the household heads. There was no need to do so at the moment because the census aimed at having the number of cows and the total cultivated surface which were to be used as criteria for the households classification as described in the research methodology. The detailed socio-economic information about the household heads was to be obtained later through the interviews.

7 Migration rate is defined as the annual percentage representing the number of people leaving their initial place of settlement definitely or for a long period of time, hence excluding seasonal migrations which occur during a short period of the year.

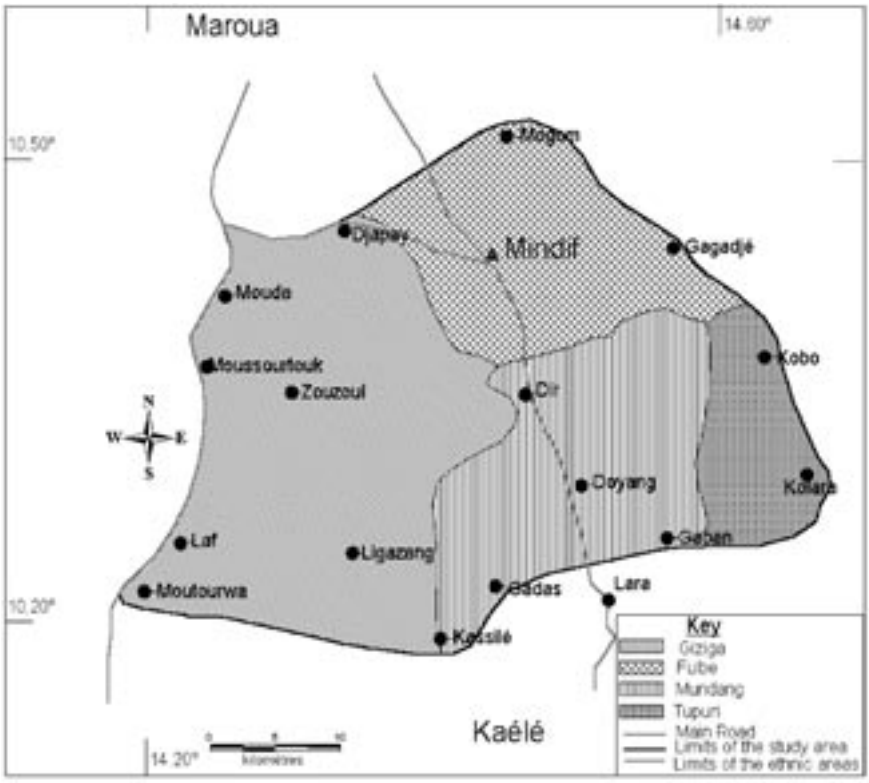

FIGURE 3.1 – Location of the ethnic groups in the Mindif region

of its members and the Giziga group members present a migration rate of 13%. The Tupuri migration is predominantly short distance movement to the neighbouring Fulbe areas. Due to their pastoral past, the Fulbe who are less familiar with manual work often hire labour furnished by the neighbouring Tupuri group. After some years of work for the Fulbe, the Tupuri employee often asks for a plot of land to crop and finally settles in the surroundings of the Fulbe master's land (Boutrais et al., 1984: 323). This is how, slowly, the Tupuri took over part of the Fulbe territory of the Mindif region. The Mundang and Giziga villages created on the Fulbe-dominated areas were based on a different process. In most of the cases, villages were created by a group of persons who decided to leave their former ethnic settlement and in search of opportunities in the empty bush. Once they found it, they settled, called on Fulbe chief commanding the territory and surrendered to him. Later on, family members joined them in the new settlements and the villages gradually gained size.

The Mindif region is undergoing a kind of transitory period of social change which consists of a complex recombination of social relationships between the ethnic groups. The factors underlying this social process are the creation

of roads, the inter-ethnic marriages, commercial exchanges, political groupings, and the increasing importance of the monetary economy in rural areas.

3.1.2 Political structure

The Mindif region is under the political authority of two kinds of power: the State structures and the ethnic social institutions. The modern administration has to take into consideration the local traditional structures through a very tight collaboration and vice-versa for a better management and control of the populations. The cultural and traditional arena is under the control of the canton chiefs (Lamidos) assisted by their own subdivision heads (Lawans) and village heads (Djaoros).

Modern administration

Cameroon is divided into provinces, divisions, subdivisions and districts. Provinces are headed by Governors, Divisions by Prefects, Subdivisions by Sub-Prefects, and Districts by District Officers. All the technical departments of the government also have representatives at each of these levels; each Ministry has its subdivision representative. The State services operating in the rural areas of the Mindif region are those of the Ministry of Agriculture, the Ministry of Forest and Environment, the Ministry of Fisheries and Animal Breeding, the Ministry of Urbanism and Towns Planning, and the Ministry of Territorial Administration. There are 'delegates' or 'chefs de poste' of each Ministry working with households heads under the supervision of 'sub-divisional delegates' who are under the command of 'divisional delegates'. At each of the levels, the various delegates are supposed to work in tight collaboration for the local population's good. Co-ordination of these State services at the divisional level is presided over by the Prefect.

Modern politics

After the monolithic regime which ended in 1990, the region under study became dominated by three main political parties (Schilder, 1994: 224). These include the ruling party, CPDM (Cameroon People Democratic Movement) and the opposition parties NUDP (National Union for Democracy and Progress) and MDR (Movement for the Defence of the Republic). A smaller opposition party is the NADP (National Alliance for Democracy and Progress). The MDR and NADP joined in a coalition with the CPDM, therefore the NUDP is currently the only real opposition party. However, the NUDP also collaborates more and more with the ruling party. Political parties are the power basis for the local and external elites. They are the vehicles of patronage which also serve as channels for ideological campaigns. Challenging each other in their struggle to gain the population's support for the elections, the parties have contributed to a lot of confusion in the mind of the rural masses. Instead of explaining the political framework and networking to the common people, they rather distinguished themselves by a striking contrast in their declarations and methods.

While some beg for people's votes, some visit them at night to buy votes, and others organise feasts with hundreds of cows and goats offered to the populations in order to get their support. Only little attention is paid by some of them to the explanation of the basic principles of political activity and its goals and procedures. For the rural population, politics is like trading, meaning making profit out of the people's support considered as a commercialised good. According to popular perception, the elites who compete to become deputies, local council members etc., have to spend money as an investment to get to the top positions and earn the money back on the basis of that position. Therefore, there is no way one comes to them for electoral matters with empty hands. This political culture arose as a result of the common practice of the ruling party leaders who used large amounts of money taken out of the state accounts to bribe voters and organise large festivities in the villages during all the electoral campaigns since the beginning of the multiparty system.

From the viewpoint of the competing elites, most of whom are based in Yaounde, the party politics provides the opportunity to rise up to higher positions in the state administration or in the general political leadership either locally, in the region or nation-wide. The higher position one occupies in a political party the higher the probability to be appointed to a high political or administrative function, including a significant amelioration of standards of living, prestige and so on. This appointment is only possible if the party obtains good results through the mobilisation of the rural masses who are targeted by all the competing elites. As the candidates do not have the same popularity among the local populations, the methods to obtain votes vary. Some will use money and state power, some will rely on their creativity and imagination to find good words and ways to convince people. The result of the elections determines the rise in the political and administrative domain to a large degree. However, this is not systematic, because appointments sometimes do not follow this channel. Many other criteria are taken into consideration for the promotion of the individuals. In the Cameroonian context characterised by a constant change and fluidity of the institutions, one should avoid systemic conclusions about the functioning of societal affairs (De Garine, 1988: 211).

Traditional administration

Like the Chadian case described by Maliki (1993: 14), the Cameroonian administrative organisation integrates modern and traditional structures. Traditionally, the Mindif region is subdivided into five 'cantons' or chiefdoms locally designated by the terms 'Lamidate' referring to dominant Fulbe administrative organisation. The notion of canton implies the existence of a territory ruled by a canton chief or 'Lamido' in Fulbe language, or first degree chief in modern administrative term. The five cantons of the region are Mindif for Fulbe; Lara and Boboyo for the Mundang; Midjiving and Moutourwa for Giziga ethnic groups.

The traditional administrative structure is similar throughout the study area, despite differences in designations of the various personalities according to ethnic language and differences in enforcement of traditional regulations between specific traditions. The cantons are subdivided into villages placed under the responsibility of village second degree chiefs or 'Lawans' who are appointed by the canton chief. Villages in turn are broken into quarters ruled by third degree chiefs or 'Djaoros' also put in place by the canton chief. Usually, the Lawans are chosen among the royal family members while the Djaoros are chosen from the local families which may belong to the canton chief's family or not. The Djaoros have under their command the households' heads belonging to their quarter. The village territory covers the entire terroir i.e. all of arable land cultivated by the people of the settlement under consideration, and the other lands over which the local people exercise de facto rights of ownership (Maliki, 1993: 15).

Traditional politics

Traditionally, power positions were obtained through inheritance or the influence of wealth. The canton chiefs were chosen among the princes by the previous chiefs before death. Usually, the old chief calls some friends and notables, either days before or on the very day his death, and tells them the name of his successor. These people will then pronounce the name during the funeral ceremonies and will calm down the other sons of the deceased chief in order to make peace between them. This worked till the last two decades, when some unlucky princes started to contest the choice of their father. Some cases required the intervention of the modern administration authorities, which created a tremendous tension among the royal family members. The repetition of the complains progressively led to more intervention of the state administration in the succession issues; the state decided to organise limited elections among the candidates to the succession of a deceased chief. The candidates are recruited among the previous chief's sons and brothers only, and the voters comprise the royal family members extended to traditional authorities i.e. the Lawans and Djaoros. The elections are presided over by the modern administrative officer, either the Sub-Prefect or the Prefect. Succession through inheritance has become a specific case, whereas elections are becoming more and more common practice. Furthermore, the state decided to reinforce this process through the allocation of a kind of salary to traditional chiefs. However, they need to have an official recognition from the state administration to get that money. This enabled manipulation of the succession elections, rather increasing the confusion than simplifying it.

Today, the traditional chiefs look more like appointed administrative staff than the symbols of local traditions. Furthermore, the succession process has become an open matter where politics play an important role. The nature of the former ethnic-religious boundary between Islamic rulers and pagan ruled has changed considerably during the two last decades. This can partly

be attributed to the introduction of cotton as a cash crop available to everyone, and the increasing influence of the Christian missions which brought in the modern schools (Schilder, 1994: 5).

The succession of Lamido Amadou Lame observed in Midjiving during our field work illustrates the tendency described above. The son of the deceased chief, Moussa, who was living with his kin in Midjiving, was challenged by his uncle, a retired gendarme living in Kaélé town. The latter used money to buy the votes and managed to get the support of the state administration representatives. The competition was placed in the political domain, presenting the two candidates as belonging to two different political parties. Moussa was seen as NUDP representative, because his sister, Ada Marie has a high position at the divisional section of that opposition party, while the challenger, Sinata, was affiliated to the ruling CPDM and a member of ANDP. The administrative support for Sinata therefore was automatically granted, and Moussa then had to struggle hard with the help of the populations and the friends of his deceased father. The elections took place within a high level of social tension and ended with the victory of Moussa Lame, beating his uncle with a difference of three points. Later on, the newly elected Lamido Moussa had to implicate himself with CPDM political activities to obtain his official recognition in a reasonable period of time.

A similar evolution took place in the attribution of positions of notable, Lawan or Djaoro. From inheritance, it has shifted to monetarised power, with money in either a direct or an indirect role. This means that one can become Lawan or Djaoro by using money either to be appointed by the canton chief or to buy the votes if elections are organised. The case of Zacklang observed during our field work period was instructive on the issue. The present Lawan, Watchoing, who is the son of the previous Lawan, had to fight hard against the brother of his deceased father, Malloum who was more wealthy and managed to get the support of the modern administrative authorities of Kaélé. The victory of Watchoing over his uncle is certainly due to his popularity among the local populations who strongly supported him because he has been always living with them in the village and is well known. In contrast, his uncle is a Muslim living in Maroua town who seldom visits the village. People prefer someone who is sharing their daily life and is willing to perpetuate their traditions.
Money can be used to become a notable as well.

Integration of modern and traditional power
State functionaries and traditional authorities representing two forms of social organisation have dynamic relationships depending on the context. Sometimes they have perfect collaboration and sometimes they contradict each other, e.g. due to diverging interests (Van den Berg, 1997: 209). De-

pending on the importance of the matter, traditional leaders and modern administrative staff can get in open conflict when consensus cannot be found.

Traditional chiefs, bearers of local traditions, used to be followed by their populations. The state administration relied on them to have a hold on the population during the one-party state period from independence till the 1990s. With the coming of a multiparty system in the course of the last decade, the ruling party managed to get the support of the traditional chiefs with the aim to maintain or obtain new support of the populations. Some of the chiefs accepted to collaborate and some did not. The latter were then threatened of being thrown off their chiefdom by the administration. Many of such chiefs maintained their position owing to the strong support of their populations who, in some cases, decided to come out with weapons, considering the situation an attempt at colonial deportation as reported from the past. Settlement of these cases required serious negotiations, conducted by an independent board accepted by the local populations and the representatives of the administration. Although less dramatic, the case of the former chief of Boboyo, Gong Maina, the father of the current chief, Gong Kazi corresponds to this situation. He openly refused to cooperate with the ruling party members, after which he had many problems with the administration representatives in Kaélé town. In contrast to this case, many of those chiefs who accepted to collaborate with the administration have gradually lost their influence and control over the populations. They were seen as betrayers of the traditions and motivated by money for their own use. In such situations, people prefer to forget about traditional ways and try modern administrative procedures to look for solutions to their problems. For instance, disputes about cropland limits which used to be treated at the level of the canton chief, are now brought before the justice court, as is currently observed in the canton of Lara. This happens much more in villages where people no longer trust their traditional leaders due to their affiliation to politics or modern administration. A third situation is that where the local canton chief collaborates a bit with administrative authorities while remaining on the hand of the population. These cases are treated by the administration as opponents. This has been the case with the Lamido of Doumourou, a small village south of Kaélé town.

Social hierarchy

Within the socio-political context described above, the farmers see themselves as the poorest social stratum of the society. This is linked to the manual and physical characteristics of the work they are doing. To them, social ascension begins with the shift from manual and physical to non manual and less physical activities such as trading and administration jobs. When asked about their social position, the most common answer of the local farmers is 'I belong to the group of poor people', meaning farming including all rural ac-

tivities. This negative perception of themselves is the heritage of the colonial period perpetuated by the national authorities after colonisation.

All the pride local farmers used to have of carrying out their favourite activities of cultivating, hunting, or gathering has progressively vanished, giving way to disillusion and social frustration. The more civil servants a family or a village has, the more they rise in social hierarchy. The ways up is either improving one's wealth through trade or doing well in the new school system to get a job. From the point of view of the farmers, the established social hierarchy is quite clear, putting the graduate civil servants at the first place, followed by the ordinary civil servants, the rich Fulbe traders, the wealthy rural families with large herds of cattle, and finally the group of poor people to which they themselves belong.

In the Mindif region like in the entire province, people are struggling to earn their living in the context of socio-political inequalities and insecurity which has a great influence on their daily lives (Van den Berg, 1997: 4). Consequently, the social status and the power position determine, at least to a certain extent, the access to land and natural resources, since the conditions are neither clearly defined nor correctly implemented by the relevant local authorities. And farmers are fully aware of this situation.

A slight difference can be noticed between ethnic groups. Modern or western way of life is the classification criteria commonly used to rank the ethnic groups. Following this reasoning, the Fulbe come first in the social hierarchy, favoured by their Islamic culture inherited from Arab civilization. This is recognised by all the groups. The Fulbe identity and lifestyle are associated with high status, political power and more refined Islamic way of life (Azarya, 1996: 46). Therefore, to become a Muslim means to act like a Fulbe, to speak the Fulbe language, to send one's children to Koranic schools. As Santerre (1969:158) in Azarya (1996: 46) puts it, these were all ways to achieve greater respectability, higher culture, more refined living and hence upward social mobility. Strongly stimulated under the Ahidjo regime, Islamization led to Fulbeization and played a determinant role for the use of Fulfulde as the general language of public transactions (Bah, 1993: 84-85).

After the Fulbe, each of the three other groups claims to be second. From the observations of colonial times, Missionaries and anthropologists, it appears that the Mundang could be ranked second, followed by the Giziga with the Tupuri coming last (Lembezat, 1961: 148; Steenhuijssen Peters, 1995: 50-52; Schilder, 1994: 36-38). This social hierarchy is well expressed through inter-ethnic marriages. For instance, the Fulbe easily exchange wives with the Mundang and a little with the Giziga, but not at all with the Tupuri. It is easier for Mundang males to take Tupuri women than the reverse case (Schilder, 1994: 56-57). Marriage between the Giziga and Tupuri is very rare.

This expresses the social perception of each ethnic group by the others, displaying the so called 'social distance'. If the Fulbe top position is enhanced by their Arabic Islamic tradition, the Mundang own their second position to the level of modern education and the flexibility of their culture which permits and facilitates the process of incorporation in Western culture. The Giziga follow due to their location in-between the Fulbe and the Mundang neighbouring groups. The Tupuri who happen to be more attached to their traditions, are being penalized by their late involvement in modern schooling and the rejection of Islam. The Fulbe, Mundang, and Giziga are either fully or partly engaged in Islam, whereas the Tupuri are completely negative about that religion, thus undermining their social integration with the others. In a village where all the groups are represented, most of the time, they are living in separate quarters. Sometimes, Fulbe are mixed with Mundang or Giziga, but never with Tupuri. The latter in turn tend to have their own quarter without mixing with others, when it is possible, because of the cultural incompatibility.

3.1.3 Civil society organisations

There are several forms of organisations working in the rural areas. These aim at socio-economic development of the localities and originate from both inside and outside. The emergence and increasing number of endogenous associations indicates transitional trends from the transformation of the rural society, because these forms of organisation used to be found only in urban areas. The introduction of externally based structures such as NGOs, internationally financed development projects, shows that the rural area is being progressively opened up to external influences.

Developmental structures

Developmental structures refer to basic infrastructures such as hospitals, schools, water points, wells, roads, mosques, churches, and State services. In the research area, there are 12 different types of social infrastructures: 25 villages have a church, 33 villages a school, 16 villages a mosque, 25 villages a water point, 32 villages have market places, 13 a health centre, 34 a State office of agriculture, 33 a State office of animal production, 1 village has a pharmacy, 3 villages a State office of social affairs, and 2 villages a State office of forests and environment. All these play different and important roles in the localities' development process.

Table 3.1 shows that Mosques are found in all the villages of the Fulbe who are Muslims, followed by the Tupuri villages which are located in the Fulbe territory as stated above. On the contrary and following the same principle, churches are found much more in Giziga and Mundang villages who are in majority Christians. Nevertheless, an extension of the two institutions into the opposite areas can be noticed, implying that the Mindif area is developing

a kind of religious syncretism inherent to the social integration. Some may call it religious democratisation process.

TABLE 3.2 – Distribution of the number of villages having developmental infrastructures according to ethnic group areas

Types of structure	Giziga villages 19	Mundang villages 9	Tupuri villages 3	Fulbe villages 5	Mindif centre 1	Total number of villages 37
Church	14	6	1	3	1	25
School	16	9	3	4	1	33
Mosque	7	1	2	5	1	16
Water point	15	5	2	2	1	25
Market	17	8	2	4	1	32
Health centre	5	3	2	2	1	13
Agr. Serv.	16	9	3	5	1	34
Ani. Serv.	16	8	3	5	1	33
Soc. Affair	1	1	-	-	1	3
For. Serv.	1	-	-	-	-	1
Pharmacy	1	-	-	-	-	1

Projects and NGOs

Many other organisations such as research and extension programmes, development projects, and NGOs operate in the research area. The Mindif region effectively hosted SODECOTON operating in 35 villages, DPGT present in 34 villages, CAFOR in 7 localities, PMM in 5 villages, INADES formation in 8 localities, VERGNET (forage) in 2 villages, FRACO (forage) in 1 village, AFEEP in 2 villages, CEFAR in 2 localities, FIMAC in 2 villages and CODASK in 1 village; a total number of 14 organisations operating in the region. This shows that the Mindif region has been open to external influences for quite a long time, thus having access to much information about many different activities or fields of interest.

Two of these institutions have had important impacts on the study area: Sodecoton and the Mindif-Moulvoudaye Project. Of the two, only Sodecoton is still operating in the region, certainly due to its adaptive way to manage its cotton business for profit. Since its introduction in the Mindif area, cotton has always been the main cash crop for farmers. As a regular and certain income source, cotton production has been till todays the steering factor of rural development in the Mindif area like in many other parts of the Far North province. With the creation of DPGT project (*Développement Paysannal et Gestion des Terroirs*) in 1997, the cotton company has succeeded in organising cotton growers into well functioning associations such as *Association Villageoise Pré-coopérative* (AVP), *Association Villageoise Auto-gérée* (AVA) and (*Cercle de Caution Solidaire* (CCS) (Zuiderwijk, 1998: 167-174). These associations help the cotton company for the monitoring of field tasks, the distribution of cotton inputs given on credit (seeds, plough, fertilizer, pesticide), the

collection of cotton during selling period, the compliance of producers with Sodecoton's policy and for the recovery of credit from the cotton growers after selling period. In doing this, the cotton company has introduced new ideas in the rural areas, bringing people to experiment some innovations in agricultural practice and to experience new forms of social responsibility. The Mindif-Moulvoudaye Project, as any project with a fixed duration, ceased activities. In order to maintain these associations functional, Sodecoton has developed a system of incentive in the form of reward to better achievements.

The PMM was designed to improve livestock-raising and realise crop-livestock integration. The project began without a good understanding of the different ethnic groups, political and socio-economic and environmental situation in the Mindif area (Van den Berg and Van Est, 1991: 15). The project was supposed to base its actions on local organisations, which had to be reinforced in order to continue the activities after the project would have closed down. Instead of this, the project staff went out to organise people by themselves and implement the activities through the dominant socio-political organisation of the Fulbe. Working with local leaders instead of traditional authorities would mean empowering the former, and the latter would not have liked that. Furthermore, from the initial objectives of crop and livestock integration, the project became sectoral, laying much more emphasis on animal husbandry than on agriculture. The project and its objectives had to be reorganised in order to avoid the heavy administrative structure of the project, and the top-down, hierarchical and centralistic decision-making. For instance, the water points created by the project were abandoned without care as soon as the project ended. For the populations, these water points were the project properties, not theirs, and therefore, nobody had thought of maintaining them in good state of functioning, even though cattle herds continue to be watered there till this day. This does not mean that top-down approaches never work. The case of Sodecoton argues to the contrary. Although top-down, the Sodecoton approach has always been flexible enough to be adapted to changes within the social context and in the general or global economic conditions surrounding cotton production. The key of success for any approach lies in the close follow-up of actors and actions through iterative and flexible adaptations to new conditions.

Missionary actions

Catholic missionaries installed in Lara have played an important role in the field of land use and management for the rural people of the research area. The Catholic Church of Lara has a dispensary offering its services at a low price to the rural population. As many cases of illness caused by undernourishment were registered in the health centre, the missionaries decided to help people by enabling them to produce more and dietary balanced food. There was an agricultural engineer among the priests, and the Mission decided to train some villagers who could spread the skills among their village people.

At the same time, some newly married women were trained by the Sisters in household's accountancy and management, family health care, and housewife's duties. Slowly, they extended their activities to all the Mundang villages around Lara centre, including villages from other cantons like Boboyo, Mindif and Kaélé. These Missionaries were also among the first to create a primary school in the entire Mayo Kani Division during the late 1940s. The installation of the cotton company in Kaélé and its first extension office in Lara can be linked to these facts. The first extension agents of C.F.D.T. (now Sodecoton) were people from a small village of Lara called Makebi, where the extension office was located. The missionaries took advantage of this proximity to the CFDT extension service to expand their social activities into the agricultural domain, in order to gain more converts while helping them to improve their health.

The Islamic institutions played a different role, especially for the Fulbe. The practice of Islam which is driven by Arab education has affected their health education. For instance, child mortality among the Fulbe has always been lower than among other ethnic groups and this is partly due to their better child care. As Islamic rules recommend that women should not do hard works, Fulbe Muslim women less frequently go and work on bush fields like Giziga, Mundang and Tupuri women do. Therefore, Fulbe Muslim women usually have more time than others to take care of their children. Furthermore, the knowledge of Arab language has helped the Fulbe Muslim traders to develop important commercial exchanges with Arab world which enable them have more income to tackle with their daily needs. Unfortunately, knowing how to read and write in Arab language has played against the attraction of modern schooling for the Fulbe Muslims. The consequence has been their only limited involvement in new forms of organisation driven by western values.

Village associations

In addition to the above organisations, a great number of the villages have locally organised associations such as 'comité de développement' (CD, 26 villages), 'Groupe d'Initiatives Communes' (GIC, 23 villages, 'Association villageoise des Producteurs' or 'Association villageoise Auto-gérée' (AVP/AVA, 19 villages). Overlapping these associations, there are other organisations (tontine, solidarity group) in 7 villages of the Mundang and Giziga areas, mostly run by women. The main objectives of these rural associations are to mobilise local people and organise them in groups in order to realise collective economic actions which will have good returns for the entire of the village population. The idea behind this is that, the more you come together the stronger you become and the more you get the chance to succeed in collective goals achievement with benefits going to every member of the community. The emergence of these organisations are the direct consequences of the combined influences of NGOs and projects actions. Although not really a new phenomenon in rural areas, these new forms of group organizations

are externally defined and financially supported. Being a representative of the outside world, Sodecoton is the power that gives shape and strength to these village associations. What this means is that, the outside world is gaining more and more ground in the rural areas throughout intermediaries such as Sodecoton and these associations.

Generally, Giziga, Mundang and Tupuri are more involved in these peasant organisations than Fulbe including inhabitants of Mindif centre. This appears to be linked to the different levels of education of the groups. Leading staff of organisations need to be educated because they occasionally have to make reports and discuss with external agencies. The follow up of the staff actions by the other members requires a minimal level of education. The non-Muslim groups have always been more attracted by modern education than the Fulbe who preferred Arab education until recently (Boutrais et al., 1984: 467; Nkili, 1977: 345-46; Mbaisso, 1990: 111).

3.1.4 General overview of social and economic dynamics

As Maliki (1993: 9) puts it, in the village, the differences between the households are not visible at first glance, because all inhabitants live, work and feed themselves in the same manner. But still some differences can be observed originating from the capacity of certain family heads to have complementary activities enabling them to increase their capital. Generally, these differences are based on unequal access to resources, a different land status, the size of domestic herds and the mass of available family work force.

Traditionally, ethnic groups usually have no care for the neighbouring group's situation. The same applies at a broader scale and at the provincial and national levels: very little is undertaken to use the complementary situation between various areas of the country to cope with food problems and unpredictable events such as drought. This is mainly linked with each group's ethnic pride and autonomy. But, as time passed by, the four traditional societies living side by side slowly and gradually learned from each other. For example, the three groups composed of Giziga, Mundang and Tupuri borrowed a lot from the Fulbe life style. The Giziga, the Mundang, and the Tupuri, practising a mixed food production system, including agriculture, animal husbandry, and to a lesser extent, hunting and food gathering, are now getting into off-farm and off-bush activities which used to be Fulbe monopoly. The Fulbe in turn learnt some agricultural skills from those three groups who are traditionally agriculturists. Fulbe are getting involved in agricultural activities, although this is mainly in the form of investments in hired labour. Thus each of these groups values and carries out rural activities in slightly different ways and with varying results.

This social integration has been made possible by some similarities in the customary rules in relation to outsiders or strangers. Although they have

developed different ways of dealing with outsiders, each ethnic social organization provided room for immigration and incorporation possibility. For instance, social rules in each group recommend the acceptance and welcoming of strangers who come in peace. Immigrations have taken place in all directions, enhancing inter-ethnic exchanges and social relationships. These increasing inter-ethnic social exchanges led to inter-ethnic marriages and the integration of the various social values. This social integration process which started some decades ago, gained momentum rapidly due to favourable conditions brought about by the reducing harsh political atmosphere in the region and the country. The social integration has evolved to the extent that it has become really difficult to distinguish the specific cultural features of the different ethnic groups from first sight. Inter-ethnic marriages have increased confusion even about physical traits. The wearing style, dietary habits, social values, etc., are now mixed, integrating cultural and social elements of the various ethnic groups (Bah, 1993: 62).

From the social integration at work, the new factors of differentiation are the economic prosperity and standard of living, the social relationships, rather than ethnicity and traditional hierarchy or prestige as it used to be. Mutual respect and collaboration are on the rise, replacing the former solidarity or charity marking the social framework of production and coping activities. Progressively and apart from few cases of personal conflicts, most of the people are taking each other on the same ground and with equal chances to emerge depending on their specific aptitudes and capacities to discover the most promising socio-economic channels. The confusion on vertical and horizontal relationships provided good conditions for emergence of a new form of coping relationship. The new type of relationship is problem-solving oriented because it is destined to help actors solve their problems in the new and changing world. The coping relationships are on the rise due to the upsurge of the complex brought about by the combined effects of the state inability to handle its agents and to get rid of the perverse consequences of the economic crisis. In the context of generalized corruption people feel the necessity to invest time and energy in making friends from the powerful circles in order to help in case of hard times or specific problems. This type of relationship is not related to kinship or family, even though it can also include these categories.

However, slight differences in the domain of social compatibility still appear nowadays. All the harsh oppositions and conflicts of the past are not yet totally forgotten, and they still influence the attitude of some people today. In addition to the historical background, one should also notice that the ethnic self-esteem is still present and does determine the attitude of some individuals in their social relationships (Schilder, 1994: 43) and in the choice of their life style and livelihood activities.

A tendency towards integration of agriculture and animal husbandry is clear; purely cultivator or herder households are disappearing with people getting more involved in both. Most of the large cultivators buy cattle to help them improve their crop production and cattle also serves as saving for the future problems. Apart from the Mbororo nomads who keep to their traditional pastoralism without cultivating, the sedentary herders who are mainly Fulbe are getting more and more involved in cultivating activities.

3.1.5 Livelihood in the Mindif region

There is a kind of fluidity in livelihood activities in the research area. The Mindif households are characterised by a continuous change in their ways to cope with the livelihood problems inherent to their environment. Although showing different attitudes towards innovations, the households progressively adapt themselves to the new life conditions generated through the combined effects of social and natural factors. Each of the households is well aware of the fact that he has to produce in a short period of time all the needed goods for the family in a year. They are also very much aware of the existence of a shortage period ('soudure') likely to occur in July and August. They usually name most of the months according to the main rituals to be performed and to the technical operations to be accomplished. Above food requirements, there are other basic needs such as school fees, health care, leisure, clothing, gifts, etc, to be financed through the family income. Thus sustaining livelihood means making provision for these items from different sources, depending on means and factors of production at the disposal of the household.

Food production

Dryland cultivation offers the potential for high overall output if large areas are cultivated with varieties of millet and sorghum. With the use of a plough, households are able to plant large areas with relatively little labour. The use of a plough reduces the need for human labour for intensive hoe cultivation as it used to. Food crops benefit from fertiliser used in previous years if planted in rotation with cotton. This side effect of cotton cultivation can only last, however, if a rotation over at least three to four years is maintained, which is not always the case nowadays.

All the groups try hard to be self-sufficient as far as food is concerned, and all their production strategies are directed at that. The dryland cultivation pitfalls such as the variability in season quality often lead to dramatic fluctuation of crop output levels. Food security thus has to be ensured by storage of crops, as well as continuing the practice of dry season activities. The risks to agricultural production in a dryland environment are mediated by a range of networks, institutions and organisations. Individuals are not alone in pursuit of a livelihood, but they are part of the social fabric making up the rural soci-

ety. Due to incorporation process and to some accidental events, the bundle of strategies is getting highly complex and always changing.

In these societies as it is in the others of the Far North Cameroon, food means cereals, although meat, milk, fish and other items play a noticeable part in the diet. For a human being, to eat and to live is said: 'to eat the sorghum porridge'. As already stated above, cattle play only a small part in the daily diet. Being one of the main bride-wealth and prestige assets, cattle are very seldom killed for nutritional reasons even during food shortage. In case of emergency, cattle can be sold to buy cereals. The sheep, goats, and chickens are more readily used, although mostly on religious or social occasions. Anyway, their sale allows the farmer to get a small amount of money when he needs it. They constitute, to a certain extent, a buffer resource allowing cereals to be bought when necessary. Needless to say, as most farmers undergo the same fluctuation in cereal stocks, they all offer sheep and goats at the same time, thus enabling the traders to buy at the lowest possible price In the case of food shortage, people hardly kill their domestic animals to eat. They will only accept the killing of cattle just to consume its meat as a last resort. The Tupuri often reserve cattle milk to feed small animals and for people practising the ritual fattening cures called 'Gurna', while Mbororo mostly sell it to earn money for food purchase. The other groups use cattle milk both for home consumption and sale (De Garine, 1988: 231).

Hunting and gathering represent supplementary activities which help households cope with the uncertainty inherent to their rural livelihood. Most of the sedentary groups have a definite policy in relation to the use of food stores. In every compound, all women who have borne children possess at least one granary to store the produce of the field she has cultivated with her offspring. The head of the family is in charge of the main granary, in which the produce of the main field and secondary field, cultivated by all the members of the compound, is stored. The cereals contained in the women's granaries will be used for daily purposes and should last until the rains. Attempts will also be made to buy cereals outside at low cost to economize the family stock. The main granary remains untouched as long as possible. Its opening involves ritual performances (gurna, initiation, circumcision). The cereals contained in the main granary should be used in case of important ritual obligations (new year feast, funeral ritual, etc.). The discipline in using the granaries was quite stern until recently. The need of currency due to monetarization of the economy pushes many of the housewives to deplete their cereal reserves to brew local beer for cash. In general, the groups are very much aware of the need to save enough food for the hard labour period. When the time for field preparation comes, the rain (or main) granary will contribute and stores will diminish progressively until the first crop harvest at the end of September or August.

The food-store policy is backed by an adapted food technology. For instance, fresh vegetables and greens which are available for only about six months are dried up in the sun to be consumed the rest of the time, even though they lose much of their vitamin content through the process. According to the climate, fish, and sometimes meat, can be dried and kept for about three months, sometimes more.

Cropping activities
Within former traditional societies, relationships between households also included the sharing of labour for herding or agricultural activities, such as weeding or harvesting. Pooled herding systems were common, as were work parties. These cooperative activities within lineage clusters continue today, though reducing. They persist particularly in villages where large families live in close proximity and ties remain strong. In other instances, sharing occurs as a form of charity when someone who is old or handicapped is helped out by the other members of the family or lineage.

Besides the technical and organisational ways of dealing with uncertainty in food, some non-material answers, devised by traditional societies in coping with a situation perceived as highly dramatic, still continue to be applied. Ritual offerings consisting of the slaughter of a chicken or small stock to please mother earth and the ancestors in order to obtain good crop yields are still being practised by a few members of the groups, but this is increasingly rare.

Apart from food production, hunting and gathering, the households look for supplementary income sources to improve the level of their welfare. Many of the households earn money from other income sources such as firewood selling, food trade, rural employment, etc. Trading is another way to cope with uncertainty in food supply, income purchase, and many of the rural families trade weekly in the local market. The interest in cereal trade has gradually increased: it is very profitable to grow them and take advantage of the seasonal price increases by selling them to those farmers who still cultivate more cotton than food crops. The sedentary Fulbe of Diamare and Garoua region have understood this perfectly. They monopolise the production and trade in sorghum and millet, which they sell, sometimes, to the very workers they had employed to grow these crops. Many Mundang and Giziga have joined the Fulbe in carrying out this food trading business, with only few Tupuri following them. The women primarily trade the ingredients for the stew that accompany the staple food, namely dried fish, salt, fried groundnuts, and beverages. Most of the women's income comes from making sorghum beer and alcohol which generate a benefit of about 100 % of the investment.

Seasonal migration is another way of dealing with food and income problems. Till this day, temporary migrations often take place between July and

December from the Massa and the Tupuri country to the Fulbe and Mundang agricultural areas. About 25% of the young men go there to take part in the agricultural tasks related to the dry season sorghum and cotton.

Goods and income management
Abundance of food and money coexist from October to January. The money from the cash crop is mainly used for drinking and buying prestigious manufactured items. Less is used to buy and increase the food stocks in preparation of the hard crop growing period during which food shortages usually occur. Money is considered too scarce to be spent on such trivial items as food. People give a very low priority to food, except, to a certain extent, the sedentary Fulbe. Food appears to be something which should be produced at family level, even if this is just an aspiration or ideal. Food ranks much lower in priority than the complex prestige circuits of bride-wealth (Tupuri, Massa), prestige fattening cures (gurna: Tupuri, Massa), cattle lending (Tupuri, Massa), and possession of modern items (clothes, bicycles, motorcycles, radios, etc.: Mundang, Fulbe, Giziga, Tupuri).

Purchase of prestige goods, social expenses, and taxes ('impôt forfaitaire' or capitation taxes) very soon dry up the money resources of the peasants who may even sell at low prices some of their crop and small cattle to local merchants. Progressively, the cereal resources dwindle and market price of cereals increases steadily and generates an active trade from February to July. The increase in cereal prices during the rains allows profitable commercial transactions which are detrimental to local farmers and weigh heavily on their budget. Furthermore, at that period money becomes much more rare than usual. The structure of rural incomes is immensely varied. Moreover, the composition of rural incomes is not static. Incomes come irregularly and unpredictably. Securing the household money supply and fulfilling investment plans are both dominated by uncertainty. Savings in the rural economy tend to be in the form of physical assets, such as livestock. But monetary savings mechanisms do exist through institutions such as tontines and other forms of village associations.

Due to inconsistency of these savings systems, coping with income insecurity means having a comprehensive portfolio of income sources, derived from both agricultural and non-farm activities. Households with a greater diversity of income-earning activities tend to be more income – secure than others. Sources of income include crop sales, livestock sales, remittances received, off-farm activity, bush products exploitation in the form of food and construction items, sometimes even for sale. Building a portfolio requires assets, both material and human. Households are not homogeneous income-earning units: men, women and children within a household may have independent and separate income sources which may or may not be pooled, depending on the situation and the need. Portfolio of income-earning potentials is not

only reliant on individuals within a household, but may also depend on others. Although agricultural activity today is often individualistic, with farming households increasingly doing it alone, in case of hard times, such as droughts, when draught power is scarce and labour is critical to ensure a good harvest, social networks are re-established and co-operative behaviour becomes evident. Social networks play the role of social security, as means of offsetting extreme hardship. Investing in social relationships thus has its place in the coping strategies of the rural households.

3.2 Physical structure

3.2.1 Habitat structure

The general landscape in the Mindif area is characterised by bushland intermitted with farms, usually grouped in villages. Except for the dispersed Tupuri settlements, these rural settlements usually occupy a central position and are grouped around the village chief's compound. Most villages are located on upper parts of unproductive soils called 'harde'. The surroundings going from the last house of the village to the deepest parts of bushland are left to field plots expanding outwards, thus gradually consuming bush areas. The commonly observed bush-consuming process is that an increase in the population leads to the construction of new houses which in turn pushes fields outwards which in turn pushes the bush away. Construction materials mostly come from the bush, especially for the walls and roofs.

The general outlook of the habitat is almost homogeneous with a range of 85 to 93% of the houses constructed out of natural elements, implying a great dependence of rural households on bush products. The few modern elements concern some roofs made up of sheet metal (15%) and some rare walls constructed using cement. Modern houses completely constructed out of non- natural materials are really scarce except in the Mindif urban centre.

3.2.2 Land

The land can be grouped into two categories: the areas under cultivation and the bush, including pastures. As cultivated areas, there are home fields and bush fields. Home fields are small plots in- between the compounds and just around the village settlement, cultivated with red millet combined with vegetables and mostly farmed by women and old men (Van den Berg, 1997: 63). The bush fields are a bit far, up to about 3-6 km away from the village. They are farmed by both men and women depending on the type of crop. These larger fields are cultivated with a variety of crops, including cotton, peanuts, beans, yellow sorghum, sesame, pumpkins, Bambara nuts and vegetables. The allocation of crop varieties to plots depends on the plot's soil quality.

The fertility and the types of soil vary greatly depending on ecological and geographical factors. The empty bush where new fields are created when needed serves as reserve for fields and pastures to villagers, depending on the soil quality and composition (Van den Berg, 1997: 65). The combination of the soil typology and arable land availability determines the periodicity of shifting cultivation and consequently of fallow. The extent of fields varies depending on the village territory, the growth rate of its population, and the possibilities to transform unsuitable soils into cultivable areas. Table 3.2 presents current surface areas of the various types of land use.

TABLE 3.2 – Distribution of land use types following the local people's indications and according to ethnic areas (hectare)

Land use	Giziga	Mundang	Tupuri	Fulbe	Mindif	Region
Fields	16 789	10 356	5 863	4 727	1 629	39 364
Bush:						
• Fallow	24 125	9 540	4 750	3 850	1 310	43 575
• Pasture	4 375	1 000	1 300	2 000	750	9 425
• Empty bush	6 650	952	800	2 500	750	11 652
Land	51 939	21 848	12 713	13 077	4 439	104 016

Source: Field survey, transect walks, group discussions and measurements in the villages. Surfaces are estimations.

The difference between the total of 104,016 ha shown in table 3.2 and the regional surface area of 120,000 ha includes measurement error and the space occupied by the houses, market places etc. of the village agglomerations. The spatial organisation is not always simple and sometimes categories overlap. Fields are plots cultivated during the current year, but some are grazed after harvest. Fallows are plots taken up in the regular fields fallow cycle e.g. uncultivated from one to five years, but are grazed while fallow. Fallows from six years and above are gradually classified as pastures or empty bush. Pastures refer to place where animals graze, excluding the fields and fallows. Furthermore, villagers make a difference between 'home pastures' and 'outside pastures'. The first category of pastures is located at the borders of the home fields where the small stock graze. These are 'hardé' spots close to the village settlement where animals are lead by younger children. The second type called 'outside pasture' is situated far from the village, depending on the availability. Only older children or adults lead the animals to these pastures for grazing and watering. The unused bush is the rest of land used for the creation of new fields when needed. It also includes long fallows and extensively used 'outside pastures'.

Like the arable land, the availability of pasture varies depending on the village territory, the demographic pressure on cropland and as well as the animal population pressure on grazing areas. For instance, the Giziga, Mundang

and Mindif centre areas have a higher availability of pastures per head because they have relatively low number of animals on aggregate. On the contrary, the Tupuri and Fulbe areas which have at the same time large surface of bush and large herds of cattle, are facing grazing problems. This grazing land scarcity has been exacerbated, as I will show later, by the Tupuri cropper immigrants who are enlarging their field plots every year thus reducing grassland availability in the area. That is why some Fulbe peasants send part of their cattle herds away for transhumance under the care of a 'Gainako' or hired cattle keeper (usually a relative or a friend).

3.2.3 Crops and farming systems

Amongst the 6257 households in the census heads, 6098 (97.5%) declared to be farmers. These farmers work on a total cultivated area of 39,364 ha, with the dry-season sorghum (also called yellow sorghum or muskuari) in first row (23,525 ha), followed by, in decreasing order, red millet or rainy-season sorghum (8,501 ha), cotton (5,982 ha), peanuts (444 ha), beans (418 ha), corn (373 ha), cassava (82 ha), potato (23 ha), onion (9 ha), sesame (5 ha), and voandzou (2 ha). The most important crops are in decreasing order the yellow sorghum produced by 31% of the sampled households, closely followed by red millet cultivated by 30% of the households, cotton produced by 28% and peanuts by 11% of households. The other crops are of secondary importance. The relative importance attached to each crop as assessed by our interviews follows the same order as above, i.e. yellow sorghum (number 1 for 56.5% of respondents), red millet (23.6%), and cotton (8%). This shows clearly that these three crops are playing the most important role in economy of rural areas of the Mindif region.

The Giziga area seems to be more specialised in yellow sorghum cultivation with 68% of the cultivated surface, while Mundang, Tupuri and Fulbe seem to be more involved in the cassava production with 3.8%, 2.1%, and 3.5% of the total surface allocated to this crop, respectively. The Mindif centre population is the most involved in potatoes production with 3% of its total cultivated surface, while the neighbouring Fulbe are the most dealing with cassava cultivation which takes up 3.5% of their total cultivated surface. The general feature of cultivating activities shows that the Giziga and Mundang have more diversification than the three other groups. They cultivate all the varieties of crops while the other ethnic groups make a selection

Cassava was not mentioned in the interviews but it is not a new crop in the area. It is just that cassava was slowly coming up from its original low prevalence. In the past cassava was not considered as a basic food crop. It was cultivated on a very small scale and was used as a relish crop for dessert and sometimes it helped during the 'soudure' period of the rainy season (July-August). As time passed and with population growth, the space allocated to cassava has been gradually occupied by the basic crops (cotton, millet and

muskuari) because of the growing land scarcity. Nowadays, cassava is coming back and is even on the way to become a basic food crop, at least in the Fulbe area. This situation is the result of combined effects of extension activities, of the soil degradation, and the advantageous conditions of cassava cultivation compared to other crops. Cassava has a high-yield potential on marginal soils, is less labour demanding, well adapted to prevailing dry conditions, and thus is an appropriate answer to famine risk due to increasing human population under land degradation and bushland reduction processes (Sikana and Mwambazi, 1996: 112-113). The come-back of cassava production can also be considered as local adaptation to changes in the environment.

TABLE 3.3 – Total cultivated surface of the various crops for the sampled households in 1997, per ethnic area

Crop	Giziga	Mundang	Tupuri	Fulbe	Mindif	Total
Yellow sorghum	258	78	30	27	62	455
Red millet	91	50	26	21	32	220
Cotton	85	50	32	21	20	208
Beans	12	11	7	2	1	33
Corn	3	3	1	1	10	18
Peanuts	7	7	-	1	1	16
Sesame	2	3	-	-	-	5
Bambara nuts	1	0.5	-	0.5	-	2
others	1	4	-	4	1	10

Source: interview sample

TABLE 3.4 – Distribution of the households according to total cultivated area (ha) per household and ethnic area.

Ethnic area	0.1-0.99	1-2	3-4	5-6	7-8	9-10	11-20	Total
Giziga	3	11	24	17	14	6	5	80
Mundang	3	13	23	3	2	1	3	48
Tupuri	3	1	9	5	1	2	-	21
Fulbe	2	6	8	3	1	-	-	20
Mindif	-	14	9	6	-	1	1	31
Total	11	45	73	34	18	10	9	200

Source: interview sample

As shown in Table 3.4, the distribution of total acreage of the households varies a bit with the ethnic groups. The mean acreage of the Giziga people is 5.42 ha, the mean acreage of the Mundang is 4.31 ha, the mean acreage of the Tupuri is 4.24 ha, the mean acreage of the Fulbe is 3.35 ha, and the mean acreage of Mindif urban population is 3.90 ha.

The cultivation techniques commonly used are:

- ploughing is done by 70.5% of the farmers;
- ploughing combined with the use of fertiliser is practised by 19% of the household heads;
- ploughing combined with the use of manure is done by 21% of the farmers;
- many households also make use of herbicides (53%), chemical treatment for cotton fields (87%), and sometimes for beans plots (43%);
- a few household heads also try to make terraces which consist of making walls around bare land or 'hardés' on muskuari fields in order to stop rain water from flowing away and help it infiltrate in the soil (1.5%);
- manuring without ploughing is sometimes done but very rare.

The cultivation system depends on the access and control over the production factors, the most important of which are work force and land (Maliki, 1993: 30). The more common farming system in the Mindif region is shifting cultivation with fallow periods and the use of manure in home fields (64%). The fallow periods are reducing, however, forcing farmers to modify their techniques. Cases of households without fallow possibility for all their crops already exist and are even increasing, taking up 30% of the families. Some of such households, representing 6% of the farmers, have moved to a kind of intensification system which consists of relay cultivation of different crops on the same plot in a year. This multi-cropping is done on a small scale with red millet or corn and yellow sorghum. This means planting millet or corn during the rainy season, going from June to September, and the yellow sorghum transplanting takes place after the harvest of the previous crop. After one year of multi-cropping, the farmer may leave the plot for one or two years fallow if possible and shifts to another field plot to avoid soil exhaustion. This practice goes with a little use of some modern inputs if possible, or manure.

One of the most important features of agricultural transition is diversification of crops i.e. growing a variety of crops either during the same period or at different periods of the year. The Fulbe and Mundang groups are already entering this phase of crops diversification as they represent 80% of such cases observed in the region. Mixed cultivation i.e. crops association in a field, is more common in the Mundang area where it is done by 46% of households, followed by the Giziga with 27.5%, the Tupuri with 24% and Fulbe 20% of their farmers; in total, this is 26.5% of the area's households. The number of the households heads engaged in the first stage of intensification, practising mixed and diversified cultivating represents 26.5%, according to the households census. A more detailed analysis of intensification is presented in Chapter 7.

Animal husbandry is the second main activity in the study region even though only 49 persons declared themselves herders during the census. These are large cattle owners who are mainly from the Fulbe group. According to our census, 27% of the households in Mindif area own cattle or sheep (1,688 and 1,697 respectively), 58% own goats (3,623), 19% own donkeys (1,218), and 3% own horses (187). There are 23,769 goats, 10,468 sheep, 14,658 cows, 2,194 donkeys, and 221 horses. In addition, there are pigs and poultry. Of the three locally known stock-raising systems, only two are practised: extensive and mixed systems. The extensive system which is practised by 26% of the households, consists of grazing the cattle during the day and enclose them in the compound for the night. The mixed system, used by 38% of farmers, consists of grazing the animals during the day and supplying extra food upon their return to the enclosures. Depending on the type of animals, the supplementary food is salt, cotton residue (cotton cake), stalks of yellow sorghum, and/or household leftovers including the residue of local beer ('bil-bil') production (Den Heijer, 1998: 32). The third system, that was not practised, is the intensive system, i.e. permanent enclosure and fodder supply ('cut and carry').

A different picture arises from the interview data. These data show that, among the sedentary groups, the Fulbe have the highest cattle ownership rate (78%), closely followed by the Tupuri (76% of the households) and then the Mindif centre (65%), Mundang (58%) and Giziga (42%). About 51% of the respondents own between 1 and 9 cows, 18% between 10 and 19 cows, 11% between 30 and 39 cows, 8% between 40 and 59 cows, and 7% between 20 and 29 cows. If one looks at the average size of owned cattle, goats and sheep, the Fulbe group comes first followed by Tupuri, Mundang, with the Giziga coming last, as shown in Table 3.5a.

TABLE 3.5a – Mean size of family, size of individual fields, size of total household fields, cattle herd, sheep herd, and goat herd per household according to ethnic area.

Ethnic area	Family size	Field size (ha)	Fields total surface (ha)	Number of cattle	Number of sheep	Number of goats
Giziga	6	0.93	5.42	7	9	7
Mundang	6	0.84	4.31	13	5	7
Tupuri	6	0.51	4.24	16	5	10
Fulbe	5	0.60	3.35	16	3	6
Mindif	5	0.62	3.90	27	4	7
Overall	6	0.78	4.59	13	6	7

Source: research interview sample (N= 200)

TABLE 3.5b – Sum of extrapolations of livestock to all households within categories

Ethnic area	Proportion of total households	Number of cattle	Number of sheep	Number of goats
Giziga	42.5%	1815	23933	1815
Mundang	25%	20335	7821	10950
Tupuri	11%	11012	3441	6883
Fulbe	16.5%	16218	3097	6194
Mindif	5%	8447	1251	2190
Total	100% (n=6257)	74,928	39,544	44,831

As indicated in section 2.3.3, figures from the sample cannot simply be extrapolated to the entire population. However, the census result of 1,688 is totally unsatisfactory; anyone travelling through the area can see at a glance that there must be many thousands of heads of cattle. Therefore, we will use the sum of extrapolations within categories. Table 3.5b shows this in detail, with total livestock numbers approximately 75,000 non-nomadic cattle, 40,000 sheep and 45,000 goats. These figure appear much more realistic and trustworthy than the 1,688 of the census, as observed on transects and by participant observation and also checked by field assistants by counting in the villages. Therefore, these are the numbers I will continue to use.

The methodological problem is the fact that people mostly do not give full details about their assets. To get correct cattle ownership figures, for example, we had to count the animals ourselves during the first round of interviews. This was not practicable for field surface areas on a large scale. But relying only on the surfaces declared by the people without specifying the types of field yields unsatisfactory results: respondents tend to mention the surface allocated to their main crops only, thus excluding secondary crops. During the census operation, people's responses included only crops like millet, cotton, peanut, sorghum. This is why the average farm size from census data was by far lower than that from the interviews. In our case, we tried to match the declarations of the respondents with what we observed during the transect walks. By so doing, we succeeded in reducing discrepancies, not in eliminating them. That is why census data were only used for general overviews whereas the interview data were used for the refined analysis of the cultivated surfaces.

As mentioned earlier, 70% of the farmers use a plough. Ploughing increases yields and makes weeding easier; therefore more and more farmers adopted it. The animals used to pull the plough include cows and bulls, donkeys, and horses. The former traditional moral interdiction to use female animals for ploughing has disappeared today.

Soil fertility risk is mainly due to harmful agricultural practices, mainly the use of a plough without manure, the shortening or absence of a fallow period and the lack of agroforestry. The use of a plough requires compensatory actions such as the application of manure and/or fallow. Without these, the field plots become quickly exhausted, especially when there is a total clearance of trees on the field plots. With faster soil exhaustion, the rotation between fields also accelerates, leading to shorter fallow periods, thus leading to a complete vicious circle. Harmful agricultural practices are displayed in Table 3.6.

TABLE 3.6 – Cases of harmful agricultural practices according to ethnic areas in the sample (N = 200). 'Short fallow' means less than 5 years.

Ethnic area	Plough but no manure	Short fallow	No trees on farm	No fallow practice
	n %	n %	n %	n %
Giziga	31 39	23 29	45 56	19 24
Mundang	6 12	22 46	14 29	11 23
Tupuri	5 24	6 28	2 9	13 62
Fulbe	9 45	8 40	2 10	5 25
Mindif	10 32	15 48	18 58	12 39
Total	61 31	74 37	81 41	60 30

Table 3.6 shows that most of the observed cases of ploughing without manure are found with the Giziga, which is certainly due to their lower cattle ownership compared to the other groups. The short fallow period is mostly found in Mindif centre which is due to growing cropland scarcity. The total clearance of trees on field plots is again mainly observed with the Giziga, which can be attributed to their heavy involvement in firewood trade. The absence of fallow periods is predominantly found in the Tupuri area, which is due to high competition around land use between cultivators and nomadic herders. For similar reasons, the Mindif centre and the Mundang are progressively getting into the same situation. Our interviews included investigation of awareness of the negative impact on the soil of harmful practices. The specific question here was: 'According to you, what can be the consequence of the production system using ploughing without manuring on the soil?' Table 3.6 shows that many respondents were aware of the negative effects of such agricultural practice, especially in the Giziga and Mundang areas.

Farmers who do not apply manure on their ploughed field do not do so out of ignorance or unwillingness, but inability. There are three ways to acquire manure: owning cattle, paying cattle owners to bring their herds to the plots, or buying organic matter from cattle owners. Since many farmers do not own cattle, do not have enough money to buy manure and do not have good contacts with cattle owners, they simply have to do without it.

TABLE 3.7 – Respondents aware of possible negative consequences of harmful practices in the sample (N = 200)

Ethnic area	Soil exhaustion	Soil dries up	Soil erosion
	N %	n %	n %
Giziga	28 35	2 2	37 46
Mundang	32 67	2 4	4 8
Tupuri	11 52	– 0	9 43
Fulbe	1 5	2 10	0 0
Mindif	5 16	13 42	0 0
Total	77 39	19 10	50 25

3.2.4 Bush-related activities

Most households practise two or more of the four main bush-related activities (farming, animal husbandry, wood exploitation and hunting). All the farmers use firewood for cooking and so do the herders and hunters, which makes them all firewood collectors. In the research area, 98% of the households carry out bush related activities; almost the respondents take something from the bush, but in varying quantities.

As shown in Table 3.8, there are many types of bush products consumed by the local population. These are wild fruits, honey, insects, timber and medicinal plants which are collected by 83% of the households, green leafy vegetables and wild meat consumed in 84% of the families, grass used in 78% of the households, firewood cut by 90.5% of the respondents, and ropes collected by 39.5% of the family heads. Table 3.4 shows that the Mundang and Giziga are interested in all the items but one and the three other groups make several choices. Less Mundang and Giziga use ropes (31% and 21%) while less Tupuri, Fulbe and Mindif centre use fruits, vegetables, meat, honey, insects. The products

TABLE 3.8 – Distribution of the use of bush products, given as percentage of the number of households in the area, by ethnic area

Bush products	Giziga (N=80)	Mundang (N=48)	Tupuri (N = 21)	Fulbe (N=20)	Mindif (N=31)	Total (N=200)
Fruits	92.5	71	24	10	11	59.5
Vegetables	95	71	33	10	12	61
Meat (hunting)	95	71	33	10	10	60.5
Honey	95	71	29	10	10	60
Insects	95	71	24	10	11	60
Timber	79	83	86	10	84	74.5
Fodder, grass	61	87.5	95	95	84	78
Firewood	86	90	100	95	93.5	90.5
Ropes	21	31	100	50	51.5	39.5
Medicinal plants	95	71	29	100	100	83.5

Source: research interview sample

intensively used by almost all the groups are timber (except Fulbe), fodder or grass, firewood, and medicinal plants (except Tupuri). The low representation of the settled Fulbe for timber is due to the fact that many among them have houses built out of modern construction materials, while the low representation of the Tupuri for medicinal plants is probably due to their lesser knowledge of the useful species. What this means is that the products of gathering in the bush still play a determinant role in self-sufficiency of the rural households of the Mindif region. With the growing scarcity of these uncultivated goods due to the degradation of natural resources and the growth of the towns, gathering has become a source of cash income through the commercialisation of its products. Chapter 4 gives more information.

3.2.5 Off-farm and off-bush activities

There are 109 censused households (1.74% of the census) doing off-farm and off-bush activities. Within this category of actors, a distinction is made between civil servants and local council employees (36%), traditional authorities (23%), independent workers such as craftsmen, carpenters, house builders, needle workers etc.(16%), traders (5%), religious leaders (6%), and employees (9%). Household heads involved in these activities are more concentrated in Mindif urban centre (37.1%), followed by the Giziga area (18.5%). The other three groups share the same proportion (14.8%). It is noteworthy that the Mundang seem to be more involved in such activities except trade with 49% of such occupations, followed by the Giziga group with 36%, the Fulbe with 8% and mainly in trade, the Mindif centre with 5% and mainly in administration, and finally the Tupuri with 2%.

3.3 Bush areas of the study region

The reconnaissance tour offered the opportunity to locate the thickly vegetated and unoccupied bush areas of the region, far from human settlements sometimes serving as boundaries between villages. Some of the villages have established limits using natural elements such as river beds, hills or mountains, many of the villages did not have these natural opportunities. Where those elements are not available, territorial limits are unclear and villages simply managed to avoid conflicts through common use of the bush resources and land. This was possible because most of the neighbouring villages usually had social links through ethnicity or marriage.

3.3.1 Tree and shrub varieties

The general vegetation cover of the study region is bushland which displays a rich biodiversity including over 40 woody species and over 50 species of herbaceous vegetation. The dominant tree species are *Acacia nilotica, (19% of all trees over 3 m high), Acacia ataxacantha (15%), Anogeissus leiocarpus (11%), Acacia seyal (10%), Balanites aegyptiaca (9%), Combretum collinum (4%), Gui-*

era senegalensis (3%), Piliostigma reticulatum (3%), Commiphora pedonculata (3%), Zizihpus mauritania (2%), Dichrostachys cinera (2%), Cadaba farinosa (2%), Bauhinia rufiscens (2%), Combretum glutinosum (1%), Sclerocarya birrea (1%), Dalbergia melanoxylon (1%), Ximenia americana (1%), Tamarindus indica (0.6%), Butyrospermum parkii (0.5%), Diospyros mespiliformis (0.3%). These are only the species found almost everywhere all over the study region. In addition to these, there are undetermined species which represent 7% of the total number of trees found in the study area during the transect walks.
Grass species

The grass species comprise mostly *Aristida adscensionis* (34% of all grass cover), *Setaria pallide-fusca* (16%), *Rootboellia exaltata* (11%), *Zornia glochidiata* (9%), *Axonopus compressus* (6%), *Eragrostis aspera* (4%), *Pennisetum pedicellatum* (3%), *Cassia obtusifolia* (2%), *Pennisetum polystachyon* (1%), *Ipomea erioscarpa* (0.8%), *Cyperus rotondus* (0.6%), *Brachiaria lata* (0.5%), *Kyllinga squamulata* (0.5%), *Cassia mimosoidus* (0.4%), *Sida stipulata* (0.3%). As with the trees, there are also many undetermined grass species which represent 3% of all total number of grass types identified all over the study area.

3.3.2 Location of bush zones

As stated above, bush areas surround the village settlements. After the transect walks, five bush zones were identified, drawn in Figure 3.2. Each zone is used

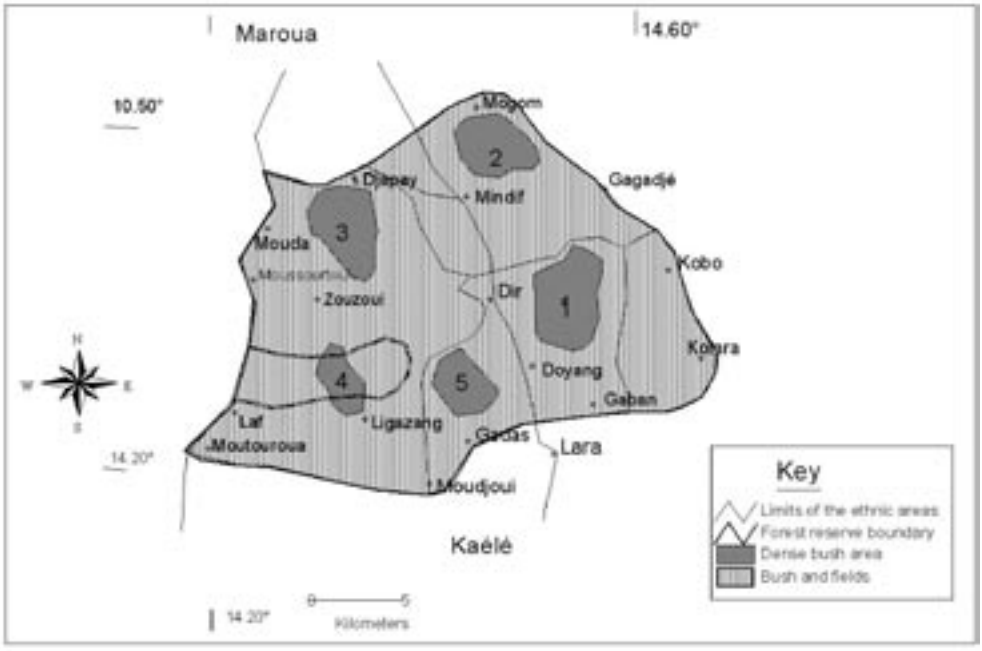

FIGURE 3.2 – Bush zones in the research area

by one or more ethnic groups including Mindif agglomeration. Zone 1 is shared by Mundang, Tupuri, Mindif centre, and Fulbe villages; zone 2 is mainly under the use of Fulbe and some Mundang villages; zone 3 serves for Giziga, Fulbe, Mindif, and several Mundang villages; zone 4 is mainly for Giziga and several Mundang villages; zone 5 is for the activities of Giziga and Mundang villages.

TABLE 3.9 – Distribution of ethnic villages involved in the bush zones

Zones	Ethnic villages	Transects walked	Observation units
Zone 1	4 Mundang, 1 Tupuri, Mindif centre	5	33
Zone 2	1 Mundang, 3 Fulbe	3	11
Zone 3	7 Giziga, 1 Fulbe, 1 Mundang, Mindif centre	6	25
Zone 4	7 Giziga, 1 Mundang	6	23
Zone 5	5 Giziga, 3 Mundang	5	24
Total	–	–	116

Considering the fact that each observation unit is a surface 100m x 100m, the 116 units represent a total surface of 116 ha observed during the transect walks. Sampling intensity per zone is presented in Table 3.7 These bush zones do not show substantial differences, even though some slight variations exist as shown in Table 3.6.

TABLE 3.10 – Average density of trees and shrubs per hectare in the dense bush zones, by bush zone (trees above 3 meters, shrubs above 1 meter)

Bush zone	Trees density	Shrubs density
Zone 1	136	141
Zone 2	156	30
Zone 3	146	12
Zone 4	134	17
Zone 5	148	18
General	144	44

3.3.3 Typology of the bush vegetation

The bush types vary; a distinction is made between fallows, open forest, shrubland, bare land or 'hardé' spots, grassland, pastures, and a rest category.

FIGURE 3.3 – Fallow (photo: Wassouni)

Fallowed fields (Figure 3.3) are defined as part of the bush. Fallows occupy a major part of the arable lands of the villages in the study area. They also look like bare lands after harvest. The fields in fallow can be mistaken with shrublands, grasslands and hardé spots depending on the duration of the fallow.

FIGURE 3.4 – Open forest (photo: Wassouni)

The open forest (Figure 3.4) refers to land where tree cover is higher compared to shrubs, grasses, bare lands or rocks. This represents the bush spots with large trees (Moritz, 1994: 31). It is not very common to find land cover made of trees only. In most cases, there are combinations of several types of

vegetation cover including at least two or three components, such as trees and grass or trees, grass and shrubs.

FIGURE 3.5 – Shrubland (photo: Wassouni)

The shrublands (Figure 3.5) concern areas with shrubs dominating over the other vegetation items. Most of the time shrubs are combined with grasses and trees, but they are hardly found in combination with bare land spots.

FIGURE 3.6 – Bare land or 'hardé' (photo: Wassouni)

The bare lands, also called 'hardé' (Figure 3.6), are areas with predominantly none or very sparse vegetation cover. The soil is hardly covered by a very low herbaceous or grass species with sometimes some shrubs and trees. The hardé spots bears mostly annual grasses with predominantly *Schoenefeldia*

gracilis or *Ludetia togoensis* less than ten centimetres tall (Seghieri and Floret, 1993:57; Moritz, 1994: 31). Hardé can often be worked and be transformed into muskuari (dry season sorghum) productive soil (Seignobos, 1993: 11). Fertile vertisols can also evolve towards hardé throughout the degradation process. The other main characteristic of the hardé is that it does not let water infiltrate in the soil and all the rain waters run away, causing soil erosion. That is why harde is perceived by Fulbe pastoralists as ' a pasture where no grass grows or water infiltrates' (Moritz, 1994: 30-34). It should be borne in mind, however, that water and soil runoff from hardés may end up at the hardé boundary, where they may help the vegetation growing there.

FIGURE 3.7 – Grassland (photo: Wassouni)

The grasslands (Figure 3.7) are areas dominated by grass vegetation cover with only few trees, shrubs, or bare surfaces. The height of the vegetation ranges from ten centimetres to two meters. A healthy grassland is made up of thick and compact vegetation. Such vegetation is often found on fallowed fields or areas flooded during the rainy season. Often, the biomass of such 'best' grassland is not available to cattle, however, because it is flooded when the grass is green and only accessible after drying out completely.

The bush areas also bear miscellaneous space categories such as rocks, mountains, water courses or streams (Figure 3.8). They deserve some attention because sometimes they also play a role which has a great influence on the bushland dynamics. Stones and rocks, for instance, may create small areas just around them where water and organic matter accumulate.

3.3.4 – Distribution of bush types

Table 3.11 indicates the relative importance of each vegetation cover item. The average cover percentage represents the proportion of bush surface covered by the elements in question. The coverage percentage of trees, for instance,

FIGURE 3.8 – Muskwary field at the border of a water course (photo: Wassouni)

takes into consideration their branches and leaves. The coverage percentage shows the importance of the items in terms of soil occupation in the bush zone, and the general average indicates the relative importance of these bush components in the study area as a entire.

TABLE 3.11 – Average cover percentage of the different bush types, by bush zone. Fallows are included in the four types

Bush zone	Open forest	Shrub	Grass	Hardé	Others	Total
Zone 1	22	23	48	5	2	100
Zone 2	27	12	58	2	1	100
Zone 3	25	5	69	1	0	100
Zone 4	20	7	66	2	5	100
Zone 5	26	7	65	1	1	100
Total	24	11	61	2	2	100

Source: Observation units of the transect walks

Overall, the vegetation cover of the Mindif region bushland is predominantly grassland (61%), open forest (24%) and shrubland (11%). These estimations are based on the transect fieldwork and should be considered as an estimate of coverage by the different types of vegetation. The exact total surfaces of these various bush types could not be assessed.

During the group discussions in the villages people were asked to estimate the forested bush surface left in the village territory. The perceived bush surface left for each village was estimated as a fraction of the village's total surface area.

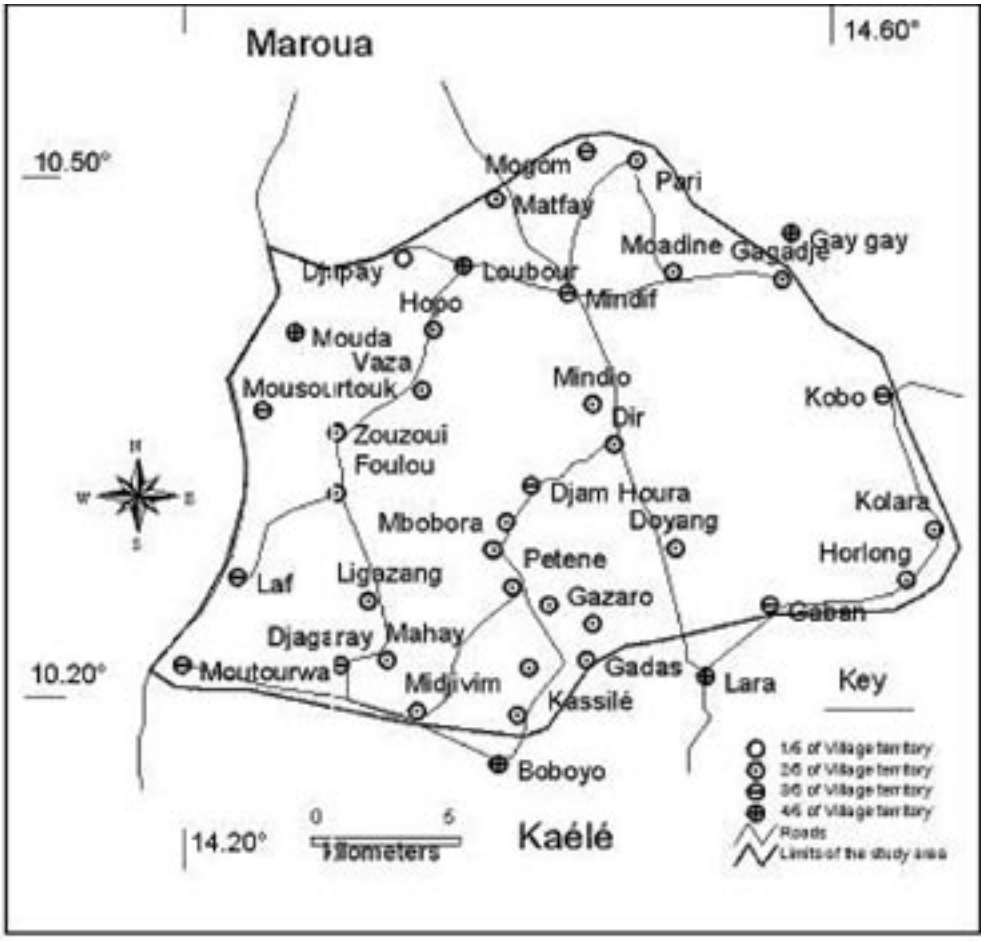

FIGURE 3.9 – Perceived forested bush surface left in the villages.
Source: group interviews

As can be seen in Figure 3.9, only two villages (Mouda and Loubour) think that they still have a lot of bushland. This is probably a perception biased by the existence of good patches of bush near the two localities: Mouda is close to an IRAD trial tree plantation and Loubour is a small village located close to a thick forest gallery linking Mindif urban centre to Matfay. Actually, the extent of bush vegetation is not very different from other cases where the bush is perceived to take up from 2/5 to 3/5 of the village territory.

3.4 Institutions connected to land tenure and land use

Land tenure refers to a range of aspects of access to, and control of land (Van den Berg, 1997:173). It concerns the rules and practices of land allocation including various actors of different categories acting under the supervision of institutions and authorities. Land tenure is a dynamic matter which varies with time and space.

Land tenure usually involves different types of actors in relation to different types of land. This implies varying rules and practices, which makes it difficult to grasp the complexity of land tenure at first sight. In order to facilitate the understanding of this complicated matter, Bruce (1988) developed a model which distinguishes different dimensions of land tenure, including vertical, horizontal, historical, and personal aspects. In the model of Bruce, the vertical aspect refers to social hierarchy while the horizontal dimension deals with forms of land use; and the historical dimension presents changes in time within the same context, and finally the personal dimension refers to the perception the actors have of the land tenure rules and facts. To these dimensions of the model, I have to add other 'special actors' who can be situated at the intersection of the vertical and horizontal aspects. Such actors are found in both traditional and modern formal structures.

3.4.1 State law and agencies

According to constitutional laws, the State is the owner of all the lands in Cameroon and people only have the right of use. The State is involved in land tenure through some of its departments to ensure the rational and equitable use of the land under the supervision of its representatives at the various levels of administrative hierarchy. Fully concerned with land tenure are the Ministry of Territorial Administration (MINAT), the Ministry of Urbanism and Town Planning (MINUH), the Ministry of Environment and Forests (MINEF), and the Ministry of Agriculture (MINAGRI).

According to State laws, there are three types of land: the national domain, public land, and private land. The national domain is the area not titled and not occupied either by State buildings or other goods of public interest, it is nominally owned by the state. This includes villages settlements with their cropfields, pastures and the surrounding bush areas. The public land category refers to areas where buildings for public services are found including sea ports, water courses, market places, museums, schools and so on. The private land refers to areas appropriated by private individuals, by the State, a community, or legal personality through a land title delivered to the owner by the State department in charge of land titling (MINUH). This Ministry has the duty to ensure the enforcement of State laws pertaining to land tenure attached to the three types of land and to assure a good functioning of the land titling procedures. It represents the State in making sure that the lands

are being used by the right owners and in the right way. The MINEF has the same duty for forest zones including savannah bush areas. The actions of other institutions such as MINAGRI, SODECOTON, and IRAD, are more oriented towards land uses instead of land tenure and land rights.

Management of the national domain displays all the four dimensions mentioned by Bruce (1988). The vertical line concerns the administrative hierarchy going from the National Assembly, the Presidency, the Ministries and their respective sub-hierarchies as presented in section 3.2.2. The horizontal line is composed of special actors including formal and traditional actors. The formal other actors includes the semi and non-governmental institutions, the traditional other actors are categories of people who play special roles in the society such as the 'chefs des terres', the traditional healers, the religious leaders and other influential people not included in the other categories. The historical aspect concerns the modification of rules depending on the changing aims and due to specific or particular events or conditions (colonial administration, then State formation after independence, then social context with ideological changes, etc.). And finally the personal aspect which concerns the actors' perception of land use and tenure that influences their actions in the field, e.g. their own interpretation of the laws and rules which in turn determines their attitude in the field of implementation or application.

3.4.2 Traditional structures

Everywhere in Africa, traditional land tenure shaped local power organisation. Like other rural areas, the Mindif region has a power structure organised in vertical, horizontal, historical and personal aspects, and all ruled over by the canton chief (Lamido) with the support of his subordinates. In these traditional societies, land tenure usually has two aspects: appropriation for private use and collective right of use. The land cannot be a private property but is always a collective good destined to provide resources for a community (Le Roy, 1991). Following this principle, the traditional heads, meaning canton chiefs, lawans, djaoros, and family heads, have the duty to organise and regulate land use and land tenure within the space or territory under their respective control. Access to land is also given to outsiders from neighbouring villages, lineages, or ethnic groups. Where there is enough empty bush, access to land cannot be denied to somebody whether he is a native or an outsider. This explains why immigrants easily settle on non-occupied lands where-ever they are. Since the notion of private property about land is unknown in the rural areas, the utilisation rights are given to everybody who is in need and who applies for a piece of land to crop (Castellanet, 1992: 27).

In the traditional organisation of land tenure, the roles were clearly defined between the central authorities and the horizontal actors in the Mindif region. The traditional power has the final decision anyway, while the others

could use their special position or influences to obtain some favour for themselves or for a third person under their protection. All the horizontal actors comprising the various social groups such as 'chefs des terres' (land masters who are among the first families to settle at the village), the religious leaders, the notables and royal family members, the various clans if any, and the traditional healers were equally eligible for the special favour from the central authorities, provided they maintain a good level of relationships with the concerned personalities. The enforcement of the rules attached to land tenure were always tempered by these multiple social status thus access to and control over land resources depend on the nature of relationships between the applicant and the land authorities. Any case of conflicting decision was negotiated over through the intervention of 'common friends' of the two sides.

Since the study region lies within three chiefdoms with four different ethnic groups, one could expect a variation in the land tenure according to these socio-cultural elements. But actually there is just a slight variation between Fulbe tenure and that of the three other groups; Mundang, Giziga and Tupuri land tenure systems are the same. The small difference between them and the Fulbe system lies within the exploitation of the bush products. All these four groups exclude women from the rights to land but in addition to this, the Fulbe also exclude women from the exploitation of bush products except for firewood (Nkapnang, 1999: 22). Ideally, Fulbe women do not need to work the land or gather bush products because men have the duty to provide everything for the family.

In the Mindif region, land for cultivating is generally acquired by inheritance or by clearance of a piece of empty bush. Natives are free to clear bush for cultivating while immigrants need to ask permission from the traditional authorities. This situation is still the same in many villages of the region while in some others the rules have changed a bit due to the reduction of empty bush. In such villages, there are new rules for bushland management. Depending on some criteria, both natives and immigrants have to ask permission to create farms in empty bush. In addition to this, other forms of transaction occur in land management. There is flexibility in land tenure depending on the degree of land scarcity. The more the empty bush disappears, the more the access to empty bush become restricted (Timmermans, 1998: 49). This situation offers new opportunities to traditional authorities to make a profit from land transactions. For instance, when an outsider comes to ask for a piece of land he first has to visit the canton chief, which costs some money since 'the lamido is not visited bare hands for private matters'. After that, he will have to negotiate the size of the land with the local sub-chief, who of course will take his part, before the two call to the lamido again for confirmation of land use rights. For this last visit, the applicant will give an 'official' amount of money in the form of 'official application fee'. A small part of this money will be given to the sub-chief as his responsibility remuneration. This appli-

cant should regularly visit the lamido under the same conditions as the first visit to preserve his land rights. The lamido therefore is making money in an illegal way, since land cannot be legally sold. In doing this, he is reducing the resource base of the community which, in the long run, will increase the number of social conflicts generated by land scarcity problems. This means more and more money for the canton chiefs as there will be more and more land conflicts to solve, implying the paying of money by the actors involved for the trial fees and sometimes for bribery.

3.5 Land use and tenure regulation practices

From the field survey data, it appears that the village level regulation of bushland use varies according to the specific situation of each village depending on its demographics and social composition.

Question 82 of the interview guide asking about procedure of getting land for cultivating in the village distinguished natives' from outsiders' procedure thus having two modalities: 1 = ask the Djaoro, Lawan or Lamido before clearing a piece of bush; 2 = don't ask anybody and clear a piece of bush. The combination of these two modalities gave way to five classes: 1 = 'no control' i.e. total open access for anybody. This stage of no regulation and no control refers to the former 'no man's lands' of the very far past mentioned by Boutrais et al.(1984: 264) which were 'buffer zones' between hostile ethnic groups. Completely uninhabited, these empty zones belonged to no particular group or population. These areas were found between Mindif centre or Fulbe and Mundang, Tupuri (south-east), and Giziga (south west) settlements. These buffer zones have disappeared with time; 2 = 'little control' i.e. no asking for natives but asking the sub-chief for outsiders. The category 2 is the case where outsiders can clear a part of the bush to create new farm by asking the Djaoro or Lawan who are locally competent to allocate land to people without calling to the Lamido, while the natives do not need any permission. This means also that there is enough free bush left and the applicant can clear at will. At this stage there is no fear for the future; 3 = 'more control for outsiders' i.e. no asking for natives but outsiders have to get permission from the canton chief. The category 3 is the case where natives may simply inform the Djaoro or Lawan of their intention to create new fields while the outsiders need to go to the Lamido. This is generally the situation where the free bush is neither very large nor very little and people start thinking about the future; 4 = 'sensible control' i.e. natives have to get permission from the sub-chief while outsiders must see the canton chief. The category 4 is the highest level of regulation noticed in the Mindif region for the moment. At this stage both outsiders and natives have to ask the Djaoro or Lawan and eventually call to the Lamido to obtain the validation of their rights over the piece of bushland they cleared for cultivating. This happens where there is only very little part

of free bush left and which needs to be protected or kept for the future generations or for pasture; 5 = 'full control' i.e. both natives and outsiders have to see the canton chief with outsiders being refused in some cases. This full regulation and strict control of land does not really exist yet. Around Mindif centre and in the surrounding villages the land tenure is still soft and flexible depending on many variables such as type of soil, kind of relation between the actors and so on. Nowhere in the Mindif region can one find strict measurement during the allocation of bush fields surfaces.

According to these regulation phases, it appears that all the villages in the Mindif region are ranged between 2 and 4 as shown in Table 3.12. This means that there is no village with no regulation at all nor a village with full regulation of bush use. Where there is enough bush the regulation is looser and where there is a little bush left it is more strict. However the real problem comes from the overlap of local social regulation with state regulations of bush or land use (see Chapter 6).

TABLE 3.12 – Number of respondents indicating levels of control, by ethnic area.

Ethnic area	Level 2	Level 3	Level 4	no answer	Total
Giziga	43	9	6	22	80
Mundang	22	5	21	-	48
Tupuri	7	-	13	1	21
Fulbe	3	1	16	-	20
Mindif centre	2	8	21	-	31
Total	77	23	77	23	200

Level 2 = no asking for natives and asking the sub-chief for outsiders; level 3 = no asking for natives and outsiders go to the lamido; level 4 = natives ask the sub-chief or higher and outsiders the lamido.

The rules for cropland acquisition are not equally applied to all the applicants by the land authorities. There are many small variables influencing the procedure of getting a piece of land nowadays so that it becomes difficult to say or to know the exact normal way. That is why some people prefer saying they don't know instead of taking the risk of saying things that could happen to be or seem wrong. In fact, as stated above, the land authorities had taken advantage of land scarcity to gain more money from transactions such as land borrowing, giving and selling. For each form of transaction they are consulted for validation of the arrangements and they receive something from both sides. This may be a percentage of the total amount of exchanged money or a quantity of goods from the crop yields. But all this happens in an informal way for it is forbidden to sell land by both local traditions and State laws; only people holding private title on a piece of land can officially sell it. The current situation can therefore be described as a black market for land speculations. This is a public secret that the land authorities still do not acknowledge.

3.6 Population dynamics

Population dynamics of the Mindif area result from two processes: (1) the positive balance between birth and mortality rates and (2) the balance between in-migration and out-migration. With respect to the former, three demographic stages have been identified in the history of the world population's evolution. The first phase is marked by high mortality and high birth rate; the second phase still has a high birth rate but a reducing mortality rate and the third stage has both reducing birth and mortality rates. Like many other regions in Cameroon, the Mindif area is likely to be in the second of the three demographic stages. The reducing mortality rate observed in this demographic phase is the consequence of improvements in primary health conditions, while the high birth rate comes out as a result of lack of family planning. The general balance is a high population natural growth rate which is observed in African countries in general, and in rural areas in particular. The low population growth rate of the Fulbe is an exception to this general tendency (Boutrais et al., 1984: 131).

Demographic data of the study area are scarce and dispersed. Nevertheless, the results of Podlewski's research (in Roupsard, 1987) on the social dynamics within the main ethnic groups of the entire North of Cameroon from 1961 to 1968 provides many interesting insights about the population growth. This study demonstrated that the population growth rate varied from one ethnic group to another with the average rate of 2% per year. The population growth rate from 1961 till 1968 oscillated between 1 and 1.5%, then it shifted to 2% from 1968 to 1976, and 2.9% from 1976 to 1987 (Roupsard, 1987: 61). From 1987 onwards, the population growth probably stayed around 3% per year (Eurostat, 1994). The general population of the study area had been subject of division in 1983 when the former great North Province was broken into three provinces and, like many others, the Mindif subdivision was also broken into two subdivisions: Mindif and Moulvoudaye. The Mindif subdivision remained with less than half of the 60,449 inhabitants registered during the 1976 general population census i.e. roughly 28,000 inhabitants. In 1987 the population was 30,000 inhabitants (Seignobos and Iyebi-Mandjek, 2000: 61). This means a general population growth rate of 2.7%. With the population growth rate oscillating between 2.9% and 3% from 1987 onwards, the updated total population of the Mindif subdivision may turn around 49,000 inhabitants in 1997. The research area, as presented in section 3.1., includes populations from 3 other subdivisions: Moulvoudaye, Kaélé, and Moutourwa. Assuming a 5% omission for the households census, and with the average family size of 6 persons, the total additional population from the 3 other subdivisions may turn around 4,000 inhabitants or more, which makes a total population of around 53,000 inhabitants.

The second cause of population increase, as said, is the balance between in-migration and out-migration. In the olden times, out-migration was rare due to the hostility of the neighbouring environment. With the colonial pacification and the introduction of the 'white man's schools' brought in by the missionaries, out-migration started. Many rural people left their native villages for towns to look for salaried jobs in the administration, the urban factories, or other opportunities in urban centres. This has especially been the case for Mundang, Tupuri and Giziga groups (Boutrais et al., 1984: 151). During a long period of out-migration in the 1960s and 1970s, the rural areas were almost abandoned to old men and uneducated people with their youngest children. The high population growth rate did not cause a great harm to the environment because there was no important need to increase the fields' size since the food demand did not increase. The flows of migrants coming in did not compensate for the flows of village members going out. Consequently, the population increase was very slow, like in the Fulbe and Mindif centre (Roupsard, 1987: 61). The slight increase of the local population was marginally influenced by rare cases of immigrants coming from abroad and village youngsters who dropped out of school and decided to stay in or go back to the village.

However, it should be noted that family members living in urban areas come back very often for family matters. Depending on the distance, the frequency of the visits ranges from once a month to once every six months. Due to these socially required visits to the homeland, there is a continuous flow of populations between urban and rural areas, and since government censuses usually take place during the holidays, many urban citizens have been censused in their villages.

The substantial increase of the rural population of the study region started after the Mindif region had been invaded by migrants from other parts of the Mayo-Kani division around the early 1950s (Boutrais et al., 1984: 131). This immigration phase was followed some decades later, in the 1985s, by a massive return of village members from the South due to the events of April 6th, 1984.[8] This political crisis had caused the death of many soldiers, many of whom were natives of the Mayo Kani division thus belonging to the four main ethnic groups. Many women with large numbers of children had to leave towns and go back to the native villages of their husbands. Once in the village, they had to create farms to earn their living and survive. In the

8 The 6th of April 1984, a group of soldiers of the presidential guards decided to overthrow the president Paul Biya but their attempt failed. In retaliation, many of them were put in prison and others killed in the battle field with loyal army. Both killed or imprisoned dissidents had their salaries blocked and their women and children who could not survive without money had to go back to their native villages where they could be helped by family members and start rural activities.

absence of systematic surveys, more than 50 of such families were reported throughout informal talks with the informants during the fieldwork in the study area.

With the economic crisis starting in 1986, the State started having problems in assuming its financial duties, and civil servants started complaining about certain restrictions imposed on them by the laws. The complaint was the incompatibility of their job with secondary income-generating activities. In reaction, after it was established that civil servants usually abandoned their offices on Friday afternoon and showed up only the following Monday, a presidential Decree declared Saturday as civil servant 'farming day'. The aim was to encourage and help civil servants to invest more in agriculture in order to enhance «national food self-sufficiency» through the development of this economic sector. From the 1990s onwards, many citizen of urban centres started going back to their native lands, often creating large farms as they have money to pay for a labour force. The Far North and the study region were affected by the consequences of this political decision as well. More than 80 cases were registered in the study area according to the research informants. They constitute a kind of temporary migrants in the rural areas, and they have had a noticeable impact on cropland expansion and partly on deforestation process through commercial tree cutting. For comparison: the average cultivated surface of 6 ha per household multiplied by 80 makes 480 ha which represents 1.2 % of the total cultivated areas of the region (39,364 ha; Table 3.2).

As the economic crisis continued and got worse, the financial problems of the State also started to generate perverse effects on the populations. Confronted with lack of cash, the government became more and more incapable of doing its duty. This led to the close-down of many factories and other organisations where the State had 50% of the capital. The first resulting social consequence was unemployment for thousands of people. The steady aggravation of the treasury tensions led to two salary reductions (1991, 1993). At the same period, older civil servants were systematically put on retirement. And the place to spend one's last days is the native land among the family members.

In 1995, the government decided to reduce the number of civil servants. Thousands of people were sacked out of the public service and possibility was given to voluntary resignation as well. The two categories of functionaries were paid in cash with the aim to help them invest in other economic sectors. The first destinations for most of these people were their native villages.

The currency, the CFA Franc, was devaluated in 1994. This decision brought a large price increase of manufactured goods, thus worsening the socio-economic conditions of hundreds of urban households. Due to the combination with the 50-65% salary cut, the devaluation of CFA franc and the rise of

unemployment, the purchasing power dropped, especially for urban people. Many inhabitants of the cities started packing and returned to their native lands. Most civil servants started asking to be posted in places closer to their respective villages.

All categories and villages added up, some 152 cases were registered as mentioned by the research informants in the Mindif region between 1993 and 1995. Although numerically negligible, these people have played a noticeable role in cropland expansion of the region.

Many of these new settlers of rural areas could not start other activities than cultivating, stock-raising or firewood cutting. Furthermore, retirements and lay-offs had mostly affected low class civil servants, employees and soldiers who did not have the financial means and skills to invest and deal with other economic sectors, in addition to others constraints on the development of non-farm activities. Therefore, the extra population in the village had to earn their living from the land, and they turned to bushland to create farms and graze their animals. As a consequence of the combined effects of all the above populations dynamics, land has been increasingly used and even abused, leading to continuous landscape modification.

4 Functions of the Bush

In many parts of the world, nature continues to fulfill the task of providing human societies with means of survival. The extent to which natural resources contribute to the sustaining of peoples' life is correlated with the level of development of the concerned human groups or societies. The more they are developed the less the societies physically depend on 'mother nature'. On the other hand, developed societies may 'rediscover' nature in a more spiritual sense, cherishing it for recreation, contemplation and intrinsic value. This chapter explores the different patterns of bushland use and the various ways the bush contributes to the local people's welfare in the Mindif region with regard to both cultural and economic dimensions. To do this, the chapter presents the general classification of the functions of the environment presented by De Groot (1992: 235) from which local functions and supra-local functions are derived. The first subsections present the general concepts and classification of the functions of the bush in the daily life of local people in theoretical terms, emphasizing the local people's understanding of the environmental functions in general, and the bush functions in particular. The next subsections deal with more detailed links between bush existence and the level of welfare of the households through the functions it performs for the livelihood activities.

4.1 Functions classification and valuation

4.1.1 Introduction

For people the functions of environment or bush represent the provision of means to meet human needs through the backing of their culture and livelihood. For nature the function of environment or bush represents the ecological support to the maintenance of biodiversity.

The rural populations of the Mindif region are fully aware of their dependence on bush products as is shown in the Table 4.1 which presents the degree of dependence according to construction materials, nutrition, body care, and leisure. In the interview guide people were asked to say how much they depend on the bush in terms of percentage, according to housing, daily diets, health and leisure. The numbers presented in Table 4.1 represent the average percentage taken up by bush products for each item. For instance, according to Giziga viewpoint, bush products represent on average 79% of their construction materials, 43% of the items in their daily diet, 31% of of the items in

their illness treatment, while 4% of the people indicate they use the bush for 'leisure', i.e. recreation, meditation, reflection or rest.

Table 4.1 – Degree of dependence on bush products for the households of the study region

Ethnic area	House (%)	Food (%)	Health (%)	Leisure (%)
Giziga	79	43	31	4
Mundang	81	45	28	6
Tupuri	91	36	33	6
Fulbe	83	49	36	11
Mindif centre	57	28	19	1

Source : Interviews sample (N = 200)

4.1.2 Classification concepts

Many people have tried to make good classifications of these functions and some others have tried to estimate their values in economic terms. One of these authors, De Groot, (1992: 232-235) has classified functions as Carrying, Production, Signification and Habitat (CPSH) functions, to which Processing and Regulation functions were added. These latter functions should only be counted when they are not accounted for implicitly in CPSH already. Some other levels or classification concepts include direct/indirect, local/supralocal functions. I will use CPSH as the backbone of the chapter, with the other concepts used as additional; to make sure that nothing will be forgotten.

Through the Carrying functions, the environment provides the space and substrate for human activities and animal species to live reproduce and develop.The value of carrying functions is to be considered for all human activities for which the environment is basically only 'dead space'. Here are ranged construction functions, transport functions, waste disposal functions, anthropocentric recreation functions, space and substrate reservoir functions. For the Mindif region, these functions are not of significant importance and I will not elaborate on them. On the contrary, the Production Functions are so important in the region that I will separate them into 'joint' and 'natural' production functions, as De Groot (1992) calls them. For the sake of fluency of structure, I will discuss the PSH functions in reverse order. The final section will provide an overview and conclusions.

The Production functions include two types: Joint production functions and Natural production functions. Joint production function is the type of relationships in which human decisions and inputs are dominant factor, but the environment is also actively involved, providing soil fertility and the natural capacity inherent in plants and animals. The sub-categories here concern agricultural production functions, intensive animal rearing functions, and others. One illustration for instance, is that the crop productions are made

possible through the combination of natural and environmental inputs with other inputs provided by humans. Nature provides rainfall, the environment provides land and good soil for crop production and the human populations furnish the seeds, fertiliser, and removal of competitive weeds.

Unlike the Joint production functions, the Natural production functions refer to cases where the environment produces largely on its own and human beings are only the harvesters of the physical products. Here are ranged natural forestry functions, natural fisheries functions, extensive ranching, wildlife functions, 'minor products' functions, drinking water functions, abiotic natural production functions and natural production reservoir functions. Some examples of natural production products may be for instance, fruits, timber, firewood, thatch grass, vegetables etc. people take from the natural bush vegetation. People simply have to go in the bush and collect these items without any other additional efforts, for the bush has already produced everything on its own.

The Signification functions refer to the situation where the environment again largely 'produces' on its own and human beings are simply the 'harvesters', but this time 'harvesting' is related to the cognitive and spiritual domains, especially those of science, nature-oriented recreation, cultural identity and spiritual participation. The sub-categories here include signal functions, scientific signification functions, cultural orientation functions, relationship functions, participation functions, contemplation functions and signification reservoir functions. The way people act in an environment depends on how they perceive it. In the Mindif area for instance, the bush is used and perceived quite differently by sedentary populations and nomad pastoralists due to their different cultural orientations. For the sedentary people, the bush is the unknown wild environment where unfriendly spirits live whereas for the Mbororo nomads the bush is the home where they feel at ease with the familiar bush spirits. The bush is used not only to sustain physical life, but also to sustain the mental and psychological equilibrium of the human groups at its surroundings.

The Habitat functions apply not to humans but to the other inhabitants of the earth; habitat function is the provision of their ecological home. These Habitat functions which are related to biodiversity sustaining conditions and enhancement include two main sub-categories: providing the conditions for the development of species and ecosystems and habitat reservoir function, meaning providing space, rhythms, patterns and mechanisms for the bioevolution to continue. In relation to this aspect, the bush for instance, provides vital space for wild species.

The Processing functions refer to the capacity of the environment to undo the harm or risk inherent in human actions. Processing functions include abiotic processing functions, biochemical processing functions and biotic

processing functions. An example here is the bush vegetation cover which helps restore soil fertility during fallow period.

The Regulation functions refer to the capacity of elements of the environment to dampen harmful influences from other components. It is the action of regulating processes that tend to go too fast or fluctuate too widely. Here are included shield functions, meaning providing protection against too high levels of radiation, hurricanes, floods etc. and dampening functions, meaning dampening of processes that tend to be too fast or too fluctuating. For instance, the bush vegetation performs regulation function for the rain water by reducing run-off through the facilitation of infiltration, thus reducing soil erosion and adding to the underground water stock.

All these functions (Figure 4.1) may be further arranged into local and supra-local functions and direct and indirect functions. This implies also a wider set of bush functions than just the direct provision of material and energy inputs. Many of the gains from the bush functions cannot be evaluated in terms of monetary gain: some other benefits are to be found more in the quality of life than in any increment to economic output (Pearce and Turner, 1990: 122).

Local functions are defined as benefits accruing to people living in or close to the bush areas. The direct livelihood functions of the bush refer to the bush outputs for the local populations. This refers to the contribution of bush with regard to the production of natural goods used by humans and wildlife. It includes the production of wild products meaning fruits, legumes, roots, fuelwood cutting, hunting, fishing, The bush provides soil fertility to enhance forestry and vegetation cover maintenance, and these are being exploited by both humans and animals for food, health care, timber, habitat, etc. Direct functions also include cultural and psychological dimensions.

The indirect local functions refer to the fact that the bush serves as basis on which other activities can be performed, such as soil fertility enhancement and water table maintenance. For the joint production function, for instance, the bush furnishes soil humidity to enable good soil natural fertility (Keletigui, 1996: 74). The bush provides land and good soil conditions for crop production in association with rainfall which is natural, and with human populations who furnish the seeds, additional non-bush inputs, labour and species of animal to be fed of bush driven fodder.

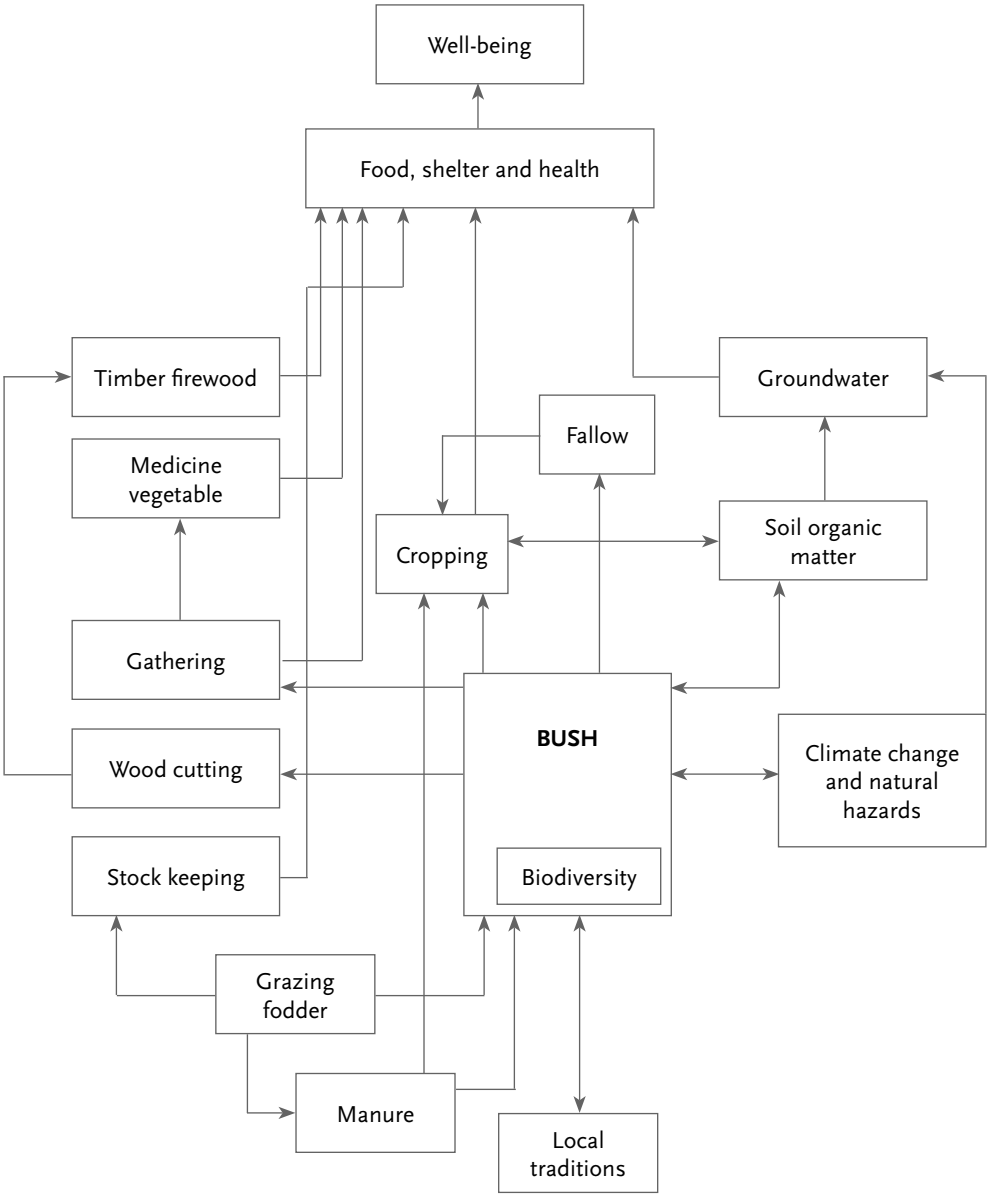

FIGURE 4.1 – Functions of the bush: overview

Supra-local functions refer to the functions the bush performs for people or any entities situated outside the area directly close to the bush, to the intrinsic or existence value in terms of biodiversity, the global functions, and the supra-local option value. Apart from local level, this function is related to external use of bush functions driven output. The supra-local functions are mostly linked with habitat, processing and regulation functions. Here are emphasised the ecological and biodiversity roles of the bush functions. General

climatic conditions and tourism for instance, are dependent on ecological and biodiversity maintenance. A linkage between vegetation cover and global climate, for instance, is that trees, if burned for firewood, prevent fossil fuel burning and hence helps to prevent climate deterioration at the global level (Van Gelder and De Groot, 2001: 34). Due to the strong climate/vegetation coupling that climate models indicate for the Sahel, and combined with the fact that most global climate models predict that the Sahel will become dryer in the decades to come, the natural vegetation will be an important buffer to cope with the process. Therefore, if people keep the Sahel green, they will be rewarded by increased or less reduced rainfall, and if they destroy or let go the natural vegetation, drought risk will intensify.

4.1.3 Valuation of bush functions

As stated earlier, the local functions are defined as benefits accruing to people living close to bush areas, both directly and indirectly. To concretely appreciate this bush utility, it may be necessary to evaluate its incidence in the people's livelihood in terms of gain or benefit. To do this, one should refer to the economic theories on environmental value measurements.

Economic theories refer to Total value as the sum of direct value, indirect value, existence value and option value. The calculation of many of these is controversial, however, and I will not venture in this morass here. I will focus only on those values which can be estimated without great conceptual difficulty. For the bush, these especially are the (local) natural and joint production functions. The calculation then is simply to take these various productions and multiply them with their respective market prices (of firewood, fodder, timber, bush food, etc.).

Many of these prices fluctuate depending on space and time and on the periods of the year. The average prices of crops, livestock, bush products and land are calculated from two or three periodical prices during the year. For example, the average price for crops used the prices at harvest time, at 'soudure' period, and between the two periods in 1997; the prices of firewood were taken in dry season and rainy season, while those of the wild foods were taken at the fruiting period and at non-fruiting period, etc. These prices include the market price and the other prices practised along the road sides and on fields during harvest. The calculation did not take into account the value of labour in term of time and energy spent on carrying the activities. The reason was that, people do not perceive their time and energy spent on these activities as a necessary labour input like they do for cropping or herding. They consider bush products as 'given products' by Mother Nature (Milton, 1996: 117). Therefore, nothing is considered to be spent or invested to obtain them. The result is summarised in Table A6 of Annex.

4.2 Habitat: the biodiversity of the bush

4.2.1 Introduction

The environment is the habitat of many species of plants, mammals, and birds etc. Forest or bush for instance, usually serves as a vital space to animals and birds which feed from other elements' products like fruits and roots. Thus the quantity and quality of the regional biodiversity is both determined by area and state of the type of vegetation cover. Consequently, its degradation in one sense or the other leads to the progressive loss of the initial biodiversity riches. This is applicable to the Mindif region as well. The continuous reduction of bush had gradually contributed to the disappearance of a great part of the natural biodiversity of the area. Some examples here include the disappearance of lions, panthers and antelopes, some bird species etc.

To have a clear understanding of what is getting lost with the disappearance of bush, it is necessary to examine the remaining biodiversity which can be rehabilitated, developed or protected.

The present bushland still bears an important vegetation cover with more than 35 tree species and 40 grass species that serve as habitat of several mammal and bird species which have survived the combined negative effects of climate change and human activities. Below, I will list them all without referring to overall criteria such as rareness or naturalness, which I must leave to biologists.

4.2.2 Tree species

The tree species presented in Table 4.2. are those found in the observation units of the transects in Mindif. There are some other species not included, such as *Faidherbia albida, Azadiracta indica* and *Kaya senegalensis*. The *Faidherbia albida* is hardly found in natural vegetation nowadays because its seeds do not survive the bush fires. *Faidherbia albida* trees are mostly found on fields due to their integration in the local farming system. Well known for its soil fertilising action and provision of fodder for small ruminants, the *Faidherbia albida* is more and more protected by farmers in the area (Harmand et al., 1995: 7). Meanwhile the *Azadiracta indica* or 'neem' is an exotic plant tree used for shadow; it usually constitutes the high proportion of trees in the villages. It is also the case of *Kaya senegalensis* which provides shadow and is used as central tree for village meetings. This tree had almost disappeared in the natural vegetation due to natural death. People do not use it neither for timber nor firewood for it is considered to be a most preferred tree for bush spirits. Even for the village-located *Kaya senegalensis*, there are some periods of the day and night during which one should not be under that tree. The presence of *Azadiracta indica* and that of *Kaya senegalensis* is always linked to human settlement.

TABLE 4.2 – Proportion of tree species in the bush zones of the study area (%), ref. Figure 3.4. This concerns numbers of all trees above 3 meters high

Tree species	Z1	Z2	Z3	Z4	Z5	General
Acacia nilotica	6	2	18	29	33	19
Acacia ataxacantha	39	38	2	3	9	15
Anogeissus leiocarpus	5	8	16	13	10	11
Acacia seyal	2	1	23	12	8	11
Balanites aegyptiaca	5	5	8	16	9	9
Combretum collinum	0.5	7	10	4	1	4
Guiera senegalensis	7	11	1	-	2	3
Piliostigma reticulatum	0.5	1	6	4	-	3
Commiphora pedonculata	5	1	0.5	4	2	2
Ziziphus mauritiana	1	3	5	1	3	2
Dichrostachys cinera	3	-	2	3	2	2
Cadaba farinosa	0.5	6	1	-	5	2
Bauhinia rufiscens	3	1	0.5	2	2	2
Combretum glutinosum	-	0.5	2	2	2	1
Sclerocarya birrea	1	1	1	1	1	1
Dalbergia melanoxylon	-	3	1	1	1	1
Ximenia americana	1	2	1	-	1	1
Tamarindus indica	-	1	0.5	1	0.5	0.5
Butyrospermum parkii	-	-	1	-	1	0.5
Diospyros mespiliformis	-	-	-	0.5	0.5	0.5
Boswellia dalzielli	-	-	-	-	1	0.5
Hexalobus monopetalus	-	-	-	0.5	-	0.2
Sterculia setigera	-	-	-	-	0.5	0.2
Gardenia ternifolia	-	-	0.5	-	-	0.1
Caparis corymbosa	-	-	0.5	-	-	0.1
Ziziphus mucronata	-	-	0.2	-	-	0.1
Calotropis procera	-	-	-	-	0.5	0.1
Acacia polyacantha	-	-	0.2	-	-	0.1
Annona senegalensis	-	-	-	-	0.5	0.05
Parkia biglobosa	0.1	-	-	-	-	0.04
Cassia siamea	-	0.2	-	-	-	0.02
Adenium obesum	-	-	-	-	0.1	0.002
Undetermined species	20	10	1	3	5	7

Sources: Transect observation units

As may be seen in Table 4.2, the proportion of the tree species varies greatly according to the different bush zones of the study area. This variation can be linked with the variation of soil type and, to a certain extent, with the vegetation or landscape dynamics through which some species are disappearing and being replaced by others. For example, the *Acacia ataxacantha* is a sign of a degradation process of the initial natural vegetation cover. According to local populations, this tree is now spreading as a consequence of intensified grazing.

TABLE 4.3 – Distribution of grass and herb species cover over the study zones (%) (ref. Map 4)

Grass species	Z1	Z2	Z3	Z4	Z5	General
Aristida adscensionis	24	26	34	35	44	34
Setaria pallide-fusca	4	10	16	33	9	16
Rootboellia exaltata	1.5	2	19	7	20	11
Zornia glochidiata	24	27	2	0.5	5	9
Axonopus compressus	12	10	3	3	5	6
Eragrostis aspera	10	6	2	3	1	4
Pennisetum pedicellatum	2	1	6	2	2	3
Cassia obtusifolia	3	6	1	1	2	2
Pennisetum polystachyon	1	–	2	2	1	1.5
Spermacoce stachydea	1	1	1	1	1	1
Ipomea eriocarpa	–	–	3	–	–	1
Dactyloctenium aegyptium	1	1	–	1	–	1
Cyperus rotondus	1	–	1	0.5	–	1
Brachiara lata	1	–	1	0.5	–	0.5
Kyllinga squamulata	2	–	–	–	0.5	0.5
Cassia mimosoides	–	–	1	–	1	0.5
Eragrostis tremula	1.5	–	–	–	–	0.5
Sida stipulata	–	–	–	1	1	0.5
Sesbania pachycarpa	–	–	0.5	1	–	0.5
Brachiaria deflexa	2	–	–	–	–	0.5
Phyllanthus amarus	–	–	1	0.5	0.5	0.5
Paspalum laxum	2	–	–	–	–	0.3
Aristida sp.	–	–	–	–	1	0.3
Andropogon gayanus	–	–	–	1	–	0.2
Borreria seabra	–	1.5	–	–	–	0.2
Euphorbia heterophylla	–	0.5	–	0.5	–	0.2
Oryza barthii	1	–	–	–	–	0.2
Crotalaria retusa	–	0.5	–	–	–	0.2
Eragrostis pilosa	–	–	0.5	–	–	0.2
Pannicum laxum	–	–	–	0.5	–	0.1
Ischaemum rugosum	–	–	–	–	1	0.1
Vernonia perrottetii	–	–	–	–	0.5	0.1
Aspilia bussei	0.5	–	–	–	–	0.1
Cyperus difformis	0.5	–	–	–	–	0.1
Acanthospermum hispidum	0.5	–	–	–	–	0.1
Monechma ciliatum	–	–	–	0.5	–	0.1
Ingigofera hirsuta	–	–	–	0.5	–	0.1
Commelina benghalensis	0.3	–	–	–	–	0.1
Striga hermonthica	0.2	–	–	–	–	0.05
Ageratum conyzoides	0.2	0.3	–	–	–	0.03
Hibiscus asper	–	–	0.2	–	–	0.02
Commelina forkalaei	–	–	0.04	–	–	0.02
Mitracarpus villosus	–	–	–	0.05	0.1	0.02
Leucas marticensis	–	–	–	–	0.1	0.01
Euphorbia hirta	0.1	–	–	–	–	0.01
Undetermined species	1.5	6	3	5	2	3

Source: Transect observation units

4.2.3 Grass and herb species

The grass and herbaceous species make up the second component of the bush vegetation cover. They are found all over the region and are composed of many different species.

The most important species are spread all over the bush zones, while some species are only present in some of the zones. Most of the species are used for grazing but the most preferred ones are *Oryza barthii, Pannicum laxum, Setaria pallide-fusca, Pennisetum pedicellatum, Pennisetum polystachyon, Permacoce stachydea, Ipomea eriocarpa, Brachiara deflexa, Brachiara lata and Andropogon gayanus*. The Table shows significant differences in the cover of these species over the zones Apart from grazing for animals, the plant species also serve as vegetable to the human population. These include *Cerathotheca sesamoides, Corchorus olithorus, Hibiscus esculenta, Cassia tora, Solanum suprium and Vernonia sp*. The preferred thatch species are *Andropogon sp., Pennisetum sp., Paniceum anabapitistum, Zornia glochidiata and Ludetia togoensis*, though some other species are used as well depending on the situation. In case of abundance, a selection is made, while in case of scarcity, people use whatever is available.

4.2.4 Mammal species

The fauna of the study area has been richer in the past than it is now. The former animal population was composed of many different species including hyena, cynhyena, squirrel, doe, gazelle, rat, mouse, snakes, varans, jackals, hedgehog, antelope, lion, leopard, monkeys, hare, mongooses, African civet, elephants, rabbit, giraffe, porcupine, savannah baboon, etc. (Keletigui, 1996). Many of these animals cannot be found anymore in the study area. Hunting activity has been reduced to a simple game or a cultural masquerade just to pay a tribute to an ancestral tradition, and mostly for fun for youths. Some of the important species which have disappeared include giraffe (*Giraffa camelopardalis*), common warthog (*Phacochoerus africanus*), lion (*Panthera leo*), Roan Antilopes (*Hippotragus equinus koba*), feral dog (*Canis familiaris*) and leopard (*Panthera pardus*). Although not permanently, elephants continue to show up from time to time, especially during the rainy season, causing damage to local people's crops. The crop damage by elephants is cited among the most crucial problems of the study region as stated in section 1.3. of chapter 1.

4.2.5 Bird species

The bird species used to comprise partridge, guinea-fowl, white – necked stork, tawny eagle, chestnut- flanked goshawk, pied crow, wood ibis, sacred ibis, marabou stork, collared pratincole, crowned crane, mourning dove, ostrich, spur-winged goose, little African swift, pink-backed pelican, black-headed heron, cattle egret, pintail, short-toed eagle, stone-partridge, harlequin quail, African blue quail, yellow-bellied fruit-pigeon, vinaceous dove, bar-breasted mousebird, white wagtail, African pied wagtail, plain-backed

pipit, melodious warbler, swamp fly catcher, spotted fly catcher, yellow white-eye, rock bunting, yellow-fronted canary, village weaver, fire-crowned bishop, red bishop, bush-sparrow, pin-tailed whydah, indigo finch, hooded vulture, white-backed vulture, secretary-bird, and more (Serle and Morel, 1977). Like the mammals, many of these species are not observed in the research area nowadays. In my own observation, the most visible birds nowadays include species such as guinea fowl (*Numida meleogris galeata*), chestnut-flanked goshawk (*Accipiter castanilius*), little African swift (*Apus affinis*), black-headed heron (*Ardea melanocephala*), cattle Egret (*Ardeola ibis*), stone partridge (*Ptilopachus petrosus*), yellow-bellied fruit pigeon (*Treron waalia*), vinaceous dove (*Streptopelia vinacea*), mourning dove (*Streptopelia decipiens*), plain-backed pipit (*Anthus leucophrys*), melodious warbler *(Hippolais polyglotta*), rock bunting (*Emberiza tahapisi*), village weaver (*Ploceus cucullatus*), bush-sparrow (*Petronia dentata*) and hooded vulture (*Neophron monachus*).

4.3 Signification function: the bush in the Mindif cultures

The people-environment relationship is usually marked by strong interactions through which people develop attachment to their homeland. Through the processes of negotiations and re-negotiations with their environment, people attribute signification or meaning to things. Consequently, a look into the people's cosmologies is indispensable for the full understanding of the ways they manage their natural resources. The surrounding environment bears different significations for the local people connected to its various utilities. In any African village surrounded by bush, there exist, to a certain extent, a kind of social topography of the space. In the study area for example, the bush is mentally and concretely divided into areas for pasture, forest and hunting areas, and as well as game and initiation areas. For some of the human groups, the bush provides a more suitable place to perform special ceremonies by enabling uncommon relationships between those specific human groups and super-natural elements located in the bush. The bush landscape is subdivided into many psychological spaces with bush for hunting, for vegetable and fruits gathering, for timber and firewood, sacred groves reserved for rituals, bush for cropping, grazing, etc

Most, if not all, the African traditional societies have a dual conception of life which applies to all the natural beings. Following that conception, life presents simultaneously physical and spiritual dimensions interacting with each other. Living and sharing the environment with other natural elements, the human groups integrate them deeply in their social life. All the mental categories are applied both to human and natural beings, leading to a socialised vision of nature (Chombart De Lauwe, 1956: 248). The environment, therefore, thinks feels and acts like a human being. And as such, it displays both physical and abstract dimensions, just like mankind does (Erny, 1987: 264).

The surrounding natural environment plays good and bad roles in the local people's life conditions depending on events and the type of perception forwarded. This relationship between people and their environment is marked by each having a big influence on the other (Moles and Rohmer, 1978: 165). For instance, good or bad harvests are not attributed to climatic conditions only; they are also and even more seen as a sign of a good or bad relationship between the spirits living in the surrounding bush areas and the concerned human group. There are many stories in traditional African societies about places that have been deserted after the death of family members for which the bush spirits or gods had been accused.

The spatial organization in many African cultures has always contained the notion of areas reserved for special uses. Unlike the modern concern for environmental conservation motivated by scientific reasons, the reserved forests have survived in many rural areas of Africa because they were surrounded by spiritual sanctions. The existence of some sacred groves or places of the past has helped so far to conserve a minimum of bush areas around most of the rural human settlements, owing to the role played by cosmologies. Local cosmologies often embody notions which far from being 'barriers to progress', serve to protect the community and its lands from the depredations of the individual and so act in the long-term interest of environmental conservation (Richards, 1975). Unfortunately, some of those protected areas which had resisted into the present are now threatened by arable cropland expansion and a changing socio-economic context that makes the cultural prohibitions ineffective against the driving forces and the actors responsible for the bush reduction process (Blench, 1998: 8). This is also the case with the main groups living in the Mindif region. All the groups see the bush as God's creation and whose power is beyond human control.

Cultural diversity also means different conceptions of the environment. For instance, the Dogon people of Mali for whom the bush is central to human life, strongly believe that bush and village together make up a single spiritual and moral entity. To them, village and bush, human, forest, animals and birds are complementary and by no means opposed. As a consequence of this perception the Dogon show a deep respect to their bush. The bush is seen as the source of all power, knowledge and life (Croll & Parkin, 1992: 18; Milton 1996: 117-120). Contrasting with the Dogon, the Kasigau, (see also Van Beek, 1992: 67), feel to be at the mercy of environmental forces, while the Mende conception of the bush varies according to social groups or categories. The way people act in their environment depends on the way they perceive it.

For the sedentary Fulbe in the Mindif area, the bush represents the 'unknown' meaning that one never knows what the bush can do or cannot, and it may surprise them at any moment (Van Ommeren, 1998: 52). According to them, there are places in the bush where spirits live, such as trees, termites' hills,

mountains, rivers or streams and wells. They also believe that spirits may be found in houses of abandoned villages. Of all these places, trees are the most preferred by the bush spirits, especially *Ficus platyphylla* (Dundehi), *Ziziphus Mauritania* (Jaabi), *Kaya senegalensis*, *Ficus gnaphalocarpa* (Jibi) and *Sclerocarya birrea* (Edi) (Van Ommeren, 1998: 53). Consequently, it is forbidden to cut these trees because it bears great risks for the person and for the village as a whole if the spirits get upset because of the destruction of their home.

The opinion of the Mbororo nomads, also called 'bush Fulbe' is slightly different from that of the sedentary Fulbe (Boutrais et al., 1984: 131). The bush is their 'home', and the villages of the non-Mbororo are, in a way, their 'bush areas'. Reflecting a bit the case of hunter-gatherers, all the life time of a Mbororo is spent in the bush just like the other populations do in the village. The proximity with bush spirits has compelled the Mbororo to adapt. Every activity is negotiated over with the bush spirits from whom Mbororo people borrow mystic power. It is a common knowledge in the region that the Mbororo have the reputation of being unbeatable in the field of mystic practices (Boquene, 1986: 324). While living in the bush, the Mbororo learn about all the values of the bush and its products. The bush here could be assimilated to a 'giving environment' which provides them with everything they need (Milton, 1996: 117). They also learn how to make 'friends' with the neighbouring spirits and benefit from their protection and help. They pass over the first stage of simple belief to go deeper and have direct relationships with the bush elements including plants, animals, and spirits with which they 'signed a pact of friendship and mutual respect' (Keletigui, 1996: 85). This is psychologically necessary to feel at ease in their space and develop a life style. As a result of this full integration of the bush in their conception of life, the Mbororo don't conceive a life without bush. It is simply not possible to them.

The Giziga and Tupuri groups have a social topology of bush areas including sacred places and spirits habitat as well. Apart from gathering, cropping and hunting, these two groups don't have other important social activities in the bush. They think that the bush spirits have a hierarchical order among them and stay in different places. For the Giziga, the bush spirits ('Moulvoung') are found on trees, in water courses or streams and in stagnant waters surrounded by trees. According to Tupuri belief, the bush spirits are led by their chief ('Manhouli'). The other spirits can stay in stagnant waters or other water courses found in the bush. Besides these, there are wind spirits (Lembezat, 1961: 104, 126).

For the Mundang, the bush plays a more active role in cultural life. For this group, the bush provides places to develop special rituals and cultural activities such as initiation and circumcision. These two activities play very important roles in Mundang society for they are at the turn of social status change from infancy into maturity (Adler, 1998: 175). Furthermore, the Mundang

strongly believe that their ancestor came from the bush and wilderness. The initiation held in the bush is a kind of tribute they pay to that origin. The initiation, during which male children of the age ranging from 7 to 10 are circumcised, is a social institution with the duty to prepare the child for adult life style shaped by the society. Once they are circumcised and in the process of initiation, the boys have to stay three to five months in a camp located in the bush. During their stay in the bush, these young males are being taught how to be a man and how to behave as a man. This 'bush formation' aims at building a strong personality in young males vis-à-vis the females for the rest of their life (Schilder, 1994: 61-63). The main items of this male training are the practical skills for hunting and combat, the social and gendered know-how, and the development of male virility (Fadibo, 1998: 58). Consequently, for this ethnic group, the bush area will always be needed for these cultural activities as far as these will survive the modern way of life.

Sometimes some youngsters go to bush areas for a walk for pleasure and to kill the time, enjoying the freedom and feelings that come with being away from people. It is mainly during such walks that some people or youngsters also get afraid and run back to the village due to frightening situations based on their cultural beliefs about bush spirits. Similarly, hunting is not only economic (section 4.4.2.) but also fun, especially when it is done collectively. During group hunting youngsters take pleasure in doing sport, in challenging each other on running after purchased animals and on their ability and precision in using the sticks. It is also believed in Giziga group that collective hunting makes rainy season start earlier.

In general, apart from the Mbororo who still present similarities with hunter-gatherers communities, all the other groups are in the situation of plural conception of the environment. There is a high diversity of bush perceptions within each of the ethnic groups due the combined influences of Christianity and modern schools, especially for the Mundang, Giziga and Tupuri. Social interactions between rural populations, school graduates, Christians and businessmen have generated a tremendous diversity in the bush and environmental perception. The deep respect and fear for the bush like that of the Dogon (Van Beek and Banga, 1992: 57-75) now belongs to the past for many people of the research region. The bush tends to be more reduced to an economic resource base to be exploited either for its extractive products or for agriculture.

4.4 Natural production functions

The availability of bush products varies with climate and season. The level of provision for the different items varies with the quantity and quality of annual rainfall. But at any season or period of the year, there are always some goods to be collected from the bush by the people and their animals.

4.4.1 Food collection

People enter the bush areas every day for various purposes. While some people are looking for additional field plots, others are in search of good pastures to graze their animals, and some others are in search of construction materials, medicines, wild vegetables and fruits, animals to hunt, etc.

Although reducing, wild products gathering continue to play a noticeable role in the economy of the rural households. It provides them with fruits and vitamins of the diet. Wild food from the bush also provides the households with the ingredients of the relish which accompanies the cereal staple for the meals. In case of true famine or hard times, all the rural households enter the bush to look for a broad range of bush famine products (De Garine, 1988: 237). The importance of bush products varies both in space and in time. Depending on the socio-economic position of the household, these products may contribute more or less to ensure food security of the families. However, what is mostly observed is that wild products are used as complementary consumption goods for the poorer households (Scoones et al., 1992: 158-160).

The bush products for direct consumption include wild food and construction items. The food comprises fruits, vegetables, honey, meat, insects, while the construction goods concern timber, thatch grass and ropes. Besides all these, there is firewood exploitation for both the direct consumption of the households and for sale. Tables 4.4, 4.6, 4.7, present the annual average quantities of bush products the various categories of household extract from the bushland. Table 4.4, for instance, says that for all the Giziga area households, the total vegetable collection in a year is 15 'tasses' per household.

TABLE 4.4 – Annual average quantity of bush food per household per year in each ethnic area

Ethnic area	Vegetable (tasse)	Termites (tasse)	Fruits (tasse)	wild meat (kg)	Honey (liter)	N
Giziga	15	3	1.5	3	0.8	80
Mundang	12	7	2	3	1	48
Tupuri	17	4	3	4	1	21
Fulbe	13	7	3	0	3.7	20
Mindif	13	4	2	1	2	31
Overall	14	4.6	2.0	2.5	1.3	200

Vegetables include some varieties of leguminous species some of which are available only in the wet season (*Corchorus olitorius, Cassia mimosoïdes, Ceratotheca sesamoïdes, Hibiscus esculenta, cassia tora, Solanum suprium, Vernonia sp*), and others only in dry season (leaves of *Adansonia digitata, Balanites aegyptiaca and Moringa pterygosperma*). At the beginning of crops harvest period coinciding with the end of rainfall (September-October), vegetables which are available only in the wet season are collected in great quantity and dried in the sunshine, then stored in special baskets for later use in dry season. Depending on the family's need, each type of vegetable is collected at a variable rhythm, whether in wet season or dry season (Seignobos, 1993: 23). In general, green vegetables of the rainy season are collected every day while the vegetables of the dry period are collected once a week by the gatherers.

The same applies for fruits which are also available in different periods of the year. Edible fruit trees include *Lannea humilis, Capparis corymbosa, Boscia senegalensis, Grewia* sp., *Aloe buettneri, Asparatus flagellaris, Hexalobus monopetalus, Ximenia americana, Cadaba farinosa, Ficus gnaphalocarpus, Vitex doniana, Vitellaria paradoxa, Diospyros mespiliformis, Ficus platyphylla, Lannea acida, Annona senegalensis, Ziziphus mucronata, Ziziphus mauritiana, Strichnos spinosa, Ficus* spp. Apart from *Tamarindus indica, Parkia africana, Ziziphus mauritiana, Balanites aegyptiaca* and *Sclerocarya birrea*, the fruits cannot be stored for later use. Moreover, some fruit varieties such as *Parkia africana, Ziziphus mauritiana, Balanites aegyptiaca* and *Sclerocarya birrea* are transformed and traded on markets, thus becoming temporary income sources for some families. At the peak of the production period, fruits are generally gathered almost every day by consumers.

Wild meat refers to animals such as porcupines, rats, mouse, varans, rabbits, antelopes, hares, birds of these smaller kinds. Some of these are hunted at any time when needed (birds, antelopes, monkeys, baboons) while others are hunted mainly in the dry season (mice, rats, varans, hedgehogs). Although hunting is free, not all the villagers have the skill or like to hunt. There are special people known as good hunters who provide wild meat to the rest of the village. They share one part of the hunted meat with family members and sell the rest to the other people of the village. If necessary, wild meat is dried up in the sun and stored for later use by some women.

The edible termites are harvested during the wet season and honey is usually collected in the dry season. Both termites and honey can be treated and stored for later use when necessary. Depending on the market demand of the moment, both termites and honey can also become important sources of income for some households, for they can be sold at good prices in the village and on the market.

The use of the bush items depends on their availability and on the willingness of the households to gather them. Therefore, they are differently integrated into the various households' strategies to cope with food security in their livelihoods. Each category of household chooses the items according to its needs in accordance with its beliefs. For instance, the Muslim Fulbe do not eat wild meat due to Islamic rules.

For economic valuation, the average quantity of bush products consumed per household is multiplied by the price (Refer to Table A.6 of Annex) to have the financial value. The values per bush item are added up and divided by the number of items to get the average value. This average is calculated per category, per ethnic area and for the sample.

TABLE 4.5 – Value of the average quantity of bush food consumed per household per year, by category and by ethnic area (Fcfa)

Category	Giziga	Mundang	Tupuri	Fulbe	Mindif	Average	N
Rich	6,000	11,000	24,000	26,000	72,000	28,000	38
Middle	13,000	8,000	14,000	30,000	121,000	37,000	66
Poor	8,000	17,000	10,000	14,000	46,000	19,000	41
Herder	7,000	9,000	10,000	15,000	65,000	21,000	22
Cropper	18,000	18,000	17,000	40,000	107,000	44,000	33
Overall	10,810	12,180	15,135	25,960	87,845	30,995	200

As said earlier, each household takes from the bush what it needs depending on its coping strategy. The quantity and quality of bus items being taken from the bush is based on three elements including the household size, the state of the surrounding bush and to a certain extent, the distance separating the village and the exploited bush area. When the bush area is well furnished and near the village, people tend to take more of its products, whereas when it is degraded and far from village, the tendency is to take more less, due either to the lower opportunities offered by the bush area and/or transportation problem or to both reasons. This is what partially explains the observed differences between ethnic areas displayed by Table 4.5.

4.4.2 Firewood, timber and grass collection

The bush non-food products refer to timber, ropes and thatch grass for houses, grass and fodder for cattle, firewood for home consumption and for sale. Table 4.6 indicates the quantities of bush non-food products in number of tree branches for timber, number of bundles for thatch grass, firewood and ropes. Timber, ropes and thatch grass are collected during the dry season when houses and roofs are repaired or newly constructed. A roof lasts on average two to 3 years. Almost all the households have thatched roofs and each of them has at least one roof or one new house made each year, which means that each household uses a certain quantity of timber, ropes and thatch grass

every year. The quantity usually needed for an average thatched roof is 9 big tree branches and 6 smaller ones, 4 bundles of ropes and 10 bundles of thatch grass. For the region as a whole with its 6257 households, this represents roughly (9 x 6257 =) 56,313 big timber branches and (6 x 6257 =) 37,542 smaller timber branches, (4 x 6257 =) 25,028 bundles of ropes and (10 x 6257 =) 62,570 bundles of thatch grass for an average of two to three years. The slight differences observed between ethnic groups are simply due to the way each group uses the tree branches and this depends on the availability of timber trees at the surrounding. When timber tree branches are easy to get, people tend to increase the used number of branches for a roof for the traditional construction technique is really flexible in that sense.

TABLE 4.6a – Annual average quantity of bush non-food products per household per year, by ethnic area

Ethnic area	Number of timber branches	Number of firewood bundles for home	Number of commercial firewood bundles	Number of thatch grass bundles	Number of rope bundles	N
Giziga	34	104	240	16	10	80
Mundang	28	104	192	18	9	48
Tupuri	27	104	96	15	12	21
Fulbe	33	104	48	25	8	20
Mindif	33	104	148	17	5	31
Sample	32	104	180	17	9	200

TABLE 4.6b – Annual average quantity of bush non-food products per household per year, by category

Category	Number of timber branches	Number of firewood bundles for home	Number of commercial firewood bundles	Number of thatch grass bundles	Number of rope bundles	N
Rich	27	104	0	15	6	38
Middle	34	104	192	16	8	66
Poor	38	104	240	18	14	41
Herder	17	104	0	15	6	22
Cropper	39	104	144	26	10	33
Sample	32	104	136	18	9	200

Firewood is used for cooking in all the households of the Mindif area and in addition to this, some households also sell it. The extraction of firewood from the bush is done twice (2 bundles) a week for cooking and once (1 bundle) a week for selling. In the dry season however, the extraction rhythm may rise for fuelwood cutting for sale, ranging up to two and four times (2-4 bundles) a week. The aim here is to make a good provision for the rainy season dur-

ing which cutters are mostly busied with cropping activities. This means for the region as a whole roughly (104 x 6257) = 650,728 bundles for home consumption and 517,392 bundles for sale a year in the Mindif area. All this represents a total volume of wood of (44,000 + 123,000) 167,000 m³ of wood extracted from the bush zones of the study area. The bush dynamics driven by firewood extraction will be given full attention in section 5.1.3 of chapter 5. Here, I simply mention the extracted quantity and value of firewood.

TABLE 4.7a – Value of the annual average quantity of bush non-food products per household per year, by ethnic area

Ethnic area	Timber	Home firewood	Firewood for sale	Thatch grass	Ropes	Total	N
Giziga	4,000	21,000	48,000	6,000	3,000	82,000	80
Mundang	4,000	21,000	38,000	7,000	3,000	73,000	48
Tupuri	4,000	21,000	19,000	6,000	4,000	54,000	21
Fulbe	4,000	21,000	10,000	10,000	2,000	47,000	20
Mindif	4,000	21,000	29,000	7,000	1,000	61,000	31
Sample	4,000	21,000	35,810	6,795	2,695	70,145	200

TABLE 4.7b – Value of the annual average quantity of bush non-food products per household per year, by category

Category	Timber	Home firewood	Firewood for sale	Thatch grass	Ropes	Total	N
Rich	4,000	21,000	00	6,000	2,000	33,000	38
Middle	4,000	21,000	38,000	6,000	2,000	71,000	66
Poor	5,000	21,000	48,000	7,000	4,000	85,000	41
Herder	2,000	21,000	00	6,000	2,000	31,000	22
Cropper	5,000	21,000	29,000	10,000	3,000	68,000	33
Sample	4,150	21,000	27,165	6,865	2,575	61,755	200

Table 4.7b shows that the poor category has higher benefit because it also takes more of bush non-food items compared to other categories. This is because it has lower financial capacity and less alternative possibilities compared to others.

4.4.3 Grazing and fodder

Livestock creates manifold benefits in Mindif society, such as production of milk, production of manure, enhancement of prestige, payment of bride prices. Furthermore, livestock is the essential capital and security asset for the households, providing means of survival in times of drought and need. The value of the the grazing function of the bush could be assessed by adding up all these cattle benefits i.e. reasoning 'from cattle to people'. Alternatively, one may reason 'from bush to cattle', in other words, assessing the value of

the food (grass and fodder) that the bush delivers to maintain the cattle. This is the approach of the present section.

Still today, natural grazing with free roaming of animals is the most widespread stock production system. Only a minority is trying to combine this old system with food complementation with crop and other residues at home during the night. This activity comes first in terms of bush functions needing among the bush – related activities. The contribution of bush functions to livestock – raising can be measured through the animals' food intake as they graze on natural pastures. The quantity of animal food therefore, represents the contribution of the bush functions to animal-raising. The annual level of contribution of the bush to livestock-raising activity is represented by daily uptake of the animal species multiplied by 365 days of the year. Here we take the example of the cattle, but this could also apply for the small ruminants, donkeys and horses. Cattle are chosen because they are more fully dependent on the bush than the other domestic animals due to their number and the quantity of fodder they need. In addition, number of heads but especially individual value of cattle is far more important than for other species, so their value will dominate and to a large extent determine the final result which is the value of fodder. Crop residue on which cattle also feed is not taken into consideration in the calculation because it is not of significant importance in the animal feed at present. Usually, rural people sell their crops residues to urbanites and let their own animals graze on natural pastures. Therefore, complementing the cattle feed with crops residue and cotton residue is not very common in the rural areas of the Mindif region. The rare cases mostly concern small ruminants instead of cattle.

The main problem in calculating the value of fodder is the fact that there is no market price and that calculating a shadow price is not easy. Two approaches are possible. The first is to look at the price of the occasional trade in very small quantities of fodder sold at the village level, mainly for sheep or goats. The animal food is sold fresh or dry in bundles made on demand. The bundles are not really of same size or quantity for the same price. Prices vary depending on the familiarity between the seller and the buyer and on the quality of fodder, but one could take the average of these prices (Table A6 in annex). This proxy has the main disadvantage that the price is more a reflection of the value of labour to get fodder to the village than the value of fodder itself (which explains why it varies with familiarity). Also, rounding off to the nearest smallest CFA coin to pay for small bundles has a large impact and would bias extrapolation to all cattle forage immensely. The second approach is to state that cattle survive every year due to bush fodder, and that the bush is therefore worth the total capital of all stock every year. This approach seems inferior to the second thst I will use here. This calculation is as follows.

In section 3.2.3 the number of cattle in the Mindif region was estimated at 75,000 heads, based on the sample data. The most important production costs for the cattle maintenance are fodder (= bush) and herder labour. Veterinary costs and construction of enclosures are negligible, taxes are considerable but not a production cost. Main profits are in the production of milk and production of meat. Production of milk is roughly equivalent to costs of herder labour, as illustrated by the fact that some herders receive entitlement to the herd's milk as their main salary. So we can say that the net value of the bush to the cattle owners is the value of meat production, at the rate of sustainable offtake. Reasonable assumptions are an annual offtake of 10-15% and a price of 80,000-200,000 FCFA per head (see table A6 in annex). Hence a conservative estimate of fodder value of the bush would be 10% x 75,000 x 100,000 = CFA 750,000,000 for the Mindif region or CFA 10,000 per head of cattle.

As has been evaluated by Ngambeki et al. (1992: 324), an average cow of 286 kg of live body weight requires approximately 6.365 kg of food dry weight per day. This daily uptake multiplied by 365 days gives the annual quantity of food taken by an average cow. The Use Value of bush fodder expressed per kg is thus CFA 4.3. With 75.000 animals grazing on natural bush vegetation every day, consumption is roughly (75,000 x 6.365 kg) = 477,375 kg of bush grass and fodder each day and roughly 174,241 tons per year.The annual profit out of bush vegetation for our interview sample households are shown in Table 4.8.

TABLE 4.8 – Annual cattle food intake[9] and its value per household per year, by ethnic area

Ethnic area	Average cattle	Annual intake (kg)	Value of intake (cfa)	N
Giziga	7	16,261	70,000	80
Mundang	13	30,199	130,000	48
Tupuri	16	37,168	160,000	21
Fulbe	16	37,168	160,000	20
Mindif	27	62,721	270,000	31
Sample	13	31,090	133,000	200

The general level of the profit varies according to the ownership of cattle. Therefore, the more a household has cattle the more it makes profit from the bush food. On aggregate, the cropper and poor household categories gain less than cattle owning categories (Table 4.9).

9 The Mindif region has the potential to produce on average 1,250 kg of dry matter per hectare (Boudet, 1978 in Dabire, 1995: 64). Based on this assumption, the surface of bush needed for a cow can be obtained by dividing the quantity of annual intake by 1,250 kg.

TABLE 4.9 – Value of the annual average quantity of fodder per household category, by ethnic area in FCFA

Category	Giziga	Mundang	Tupuri	Fulbe	Mindif	Sample	N
Rich	160,000	120,000	170,000	270,000	580,000	260,000	38
Middle	50.000	80,000	70,000	90,000	100,000	80,000	66
Poor	0	0	0	0	0	0	41
Herder	520,000	530,000	680,000	1,110,000	1,840,000	940,000	22
Cropper	0	0	0	0	0	0	33
Sample	104,100	107,500	130,200	203,100	345,600	179,200	200

4.4.4 Health: medicine, micro-climate and drinking water

Medicinal plants are collected from the bush as well. They are used to cure a huge variety of diseases. The shadow price of modern health care costs may show their value and relative importance in the life of rural households. But unfortunately, and due to the indefinite list of cured diseases in traditional healing, it is really difficult to make a reasonable quantification of the shadow prices. Whereas we know by experience that village people go to hospitals only in extreme cases and at the last resort. Most of the illnesses are cured with roots, leaves or fruits from bush vegetation.

The vegetation cover has an important function for the local climate. More trees give more shade and a forest usually gives cooler temperature. In the Mindif area, where there is enough tree cover in or around the village people tend to complain less about the burning heat of sunshine. This is for instance, the case of Zacklang, Gagadje, Kobo and Gadas villages to take these few examples, where there is still enough tree cover in and around the agglomerations.

A third important factor in people's health is the availability of water in protected wells and forage. The level of underground water depends, firstly on the quantity of rainfall and, secondly on the existence of good infiltration conditions among which the presence of good bush with good soils and a river (mayo) are the most important factors. For the rain water to infiltrate, it needs to have a good soil bearing a vegetation cover including trees whose roots serve as entry to the underground water reserve (Chleq and Dupriez, 1984 in Sale, 2000: 85). Some indicators of water tables include the level of water in the wells, the water flows in the seasonal rivers (mayos) in the wet season, and the duration of water in the river bank when it does not rain. In the Mindif area people say that more rainfall brings in more vegetation and well flooded rivers which in turn result in more rainwater infiltration to fill up the underground water reservoir. This shows that they are aware of the link between the refilling of underground water through rainfall and the level of water in wells, forages and in the Mayos during the year. But locally,

nobody seems to link up the high level of water table with the existence of healthy bush at the surrounding.

Hydrogeological studies carried out in the 1960s have provided certainty for the existence of underground water in the Kaélé plain including the Mindif region (Boutrais et al., 1984: 84). In the past, the distance at which underground water is reached varied from one village to another, depending on the distance from a river, and the depth was less than 20 meters. Nowadays, this situation remains the same for several villages, but for some others things have totally changed and the underground water takes 30 to 50 meters to be reached (Naah, 1990; MINMEE, 1993; Moreaux et al., 2002: 14). Due to water table fluctuations some modern wells (9%), traditional wells (14%) and forages (6%) dry up after a while and others see the level of their water varying from one year to another (Moreaux et al., 2002; Sale, 2000: 5). Since the bush natural vegetation has been considerably reduced while at the same time the average annual rainfall has stayed almost stable during the last decade, one may be tempted to conclude that the progressive disappearance of bush has a negative effect on the level of water table. Unfortunately, in the absence of viable data, it is difficult to relate the variations of water tables to the dynamics of bush state.

4.5 Joint production functions

The ways in which the bush contributes to crop production and livestock – raising have been presented in a figure by De Groot (1994: 184). That figure shows the multiple exchanges between the bush and the farm land. Through fallow, the bush helps to replenish the soil fertility. The sustainability of this positive link requires a permanent equilibrium of the exchanged elements between bush and cropland. This means having a certain surface of healthy bush in order to help fallow continue to perform its regenerative functions for the soil fertility on which cropland productivity largely depends.

Soil restoration: the fallow function

Due to their long practice, Mindif farmers have a good knowledge of the strong relation between bush and farm. A few households confronted with land shortage are now compelled to cultivate on the same plots without fallow, but a large majority of the rural households are using shifting cultivation as farming system. The livestock production did not change either.

Table 4.10 gives an overview, showing, for instance, that for the Giziga, cotton is grown in a fallow system by 65% of the households.

TABLE 4.10 – Percentage of fallow users differentiated per crop, within the ethnic areas of the interview sample

Crops	Giziga	Mundang	Tupuri	Fulbe	Mindif	Total
Cotton	65	83	38	40	13	56
red millet	99	92	95	95	61	90.5
sorghum	95	85	81	95	97	91.5
corn	10	83	24	20	23	32

The big majority of the farmers use simple fallow while few people are doing or starting improved fallow which consists of applying manure on not cultivated plots. As the populations still have the possibility to create new fields in the empty bush, the major part of the soils don't need great intervention with more inputs yet implying that they are not yet exhausted. This is why many farmers keep to simple fallow as their best farming or soil conservation technique. The fallow is able to fulfil the function of helping soils recover their nutrients with the help of bush vegetation. Some households who want to raise their crop production combine fallow with manure, while some put more emphasis on manure than fallow to reach the same objective. Besides, there are other families who are already getting short of farm land and who have to shorten the duration of the fallow and make intensive use of manure when they can afford it. Such cases are present within all the ethnic groups including even the Giziga villages although they are still surrounded by large surfaces of empty bush areas.

TABLE 4.11 – Distribution (in percent) of the duration of fallow period for the households of the sample

Ethnic area	1 year	2 years	3 years	4 years	5 years	6 years	N
Giziga	9	31	30	15	8	7	80
Mundang	10	32	38	8	6	6	48
Tupuri	14	57	19	5	5	-	21
Fulbe	15	50	20	10	5	-	20
Mindif	23	55	16	6	-	-	31
General	12.5	39.6	27.6	10.4	5.7	4.2	200

As said above, the duration of fallow period depends on the availability of free lands where new farms can be created. In the past, the periods of fallow usually ranged from 5 to 10 years. The progressive reduction of land reserve as a result of demographic pressure has gradually compelled farmers to shorten these fallow periods progressively. As shown in Table 4.11, nowadays, the great majority of the households can hardly do more than three years. The fallow periods within the ethnic areas vary a bit ranging from 1 to 4 years in general depending on the availability of empty bush at the surroundings. Land scarcity seems to be more acute in Tupuri, Mindif centre, and Fulbe ar-

eas which present respectively 71%, 78%, and 65% of their households situated at 1 or 2 years of fallow.

Based on the interviews of the 200 households, the value of the fallow function of the bush may be estimated as follows. Table 4.12 shows that old bush fields under cotton have a persistently lower yield than new bush fields, i.e fields freshly cleared after fallow. (I have taken only unmanured fields in order to avoid interference of the manure gift on the field). The same holds for the bush fields under red millet. A reverse picture is shown by yellow sorghum (muskwari), but that cannot be attributed to the fallow. As explained by Njomaha (2004: 205), muskwari yields depend primarily on soil clay content and water retention and not on fallow-dependent nutrients, and the fact that new fields yield less may be ascribed to that old fields are positioned on better soils ('karal') and have better established man-made water retention ridging. Thus, I focus on the two fallow-dependent crops only. There being no compelling reasons to assume that new fields are better treated than old fields in terms of the seeding, weeding etc., I ascribe the full difference of the yields to the fallows. The value of the fallow function, per household, then is the acreage of the household of cotton and millet bush fields (ha), multiplied by the yield difference (kg/ha) and multiplied by the price of the crop (Fcfa/kg), see Annex A.6. Table 4.13 is the result.

TABLE 4.12 – Comparative yields between (unmanured) new fields and (unmanured) old bush fields per household, by ethnic area (kg per ha)

Ethnic area	Cotton	red Millet	yellow Sorghum
	old new difference	old new difference	old new difference
Giziga	584 691 107	334 600 266	699 574 – 125
Mundang	133 554 421	451 926 475	614 616 + 2
Tupuri	276 501 225	656 854 198	1 386 637 – 749
Fulbe	517 745 228	615 1 493 878	1 975 1064 – 911
Mindif	319 812 493	375 1 039 664	563 453 – 110

TABLE 4.13a – Value of the fallow function, in Fcfa per household per year, based on cotton and red millet

Ethnic area	Average surface of new cotton bush field	Value of the fallow function	Average surface of new millet bush field	Value of the fallow function	Total
Giziga	0.91	17,000	0.5	13,000	30,000
Mundang	0.84	62,000	0.82	39,000	101,000
Tupuri	1.00	39,000	1.00	20,000	59,000
Fulbe	0.85	34,000	0.5	44,000	78,000
Mindif	1.36	109,000	1.2	80,000	189,000

TABLE 4.13b – Value of the fallow function, in Fcfa per category per year, based on cotton and red millet

Category	Average surface of new cotton bush field	Value of the fallow function	Average surface of new millet bush field	Value of the fallow function	Total
Rich	1.00	43,000	0.25	10,000	53,000
Middle	0.75	32,000	0.5	21,000	53,000
Poor	0.81	35,000	1.3	54,000	89,000
Herder	0	0	0	0	0
Cropper	1.00	43,000	0.74	31,000	74,000

As shown in Table 4.13b, the fallow function is mostly for cropper households. Hence, it not surprising that purely cropper households (cropper and poor) come first in terms of profit making compared to rich and middle households. Due to their lowest financial and social capacity, poor households are more prone to looking for new field plots compared to rich, middle and big cropper households. Big cropper households always look for new field plots in order to make a reserve of land for cropping and prevent from land shortage in the future.

4.6 Overview and conclusions

The aim of this exercise was, firstly to assess the main bush functions and secondly, to give concrete illustrations of some of these bush functions contributions to the local people's direct livelihood maintenance. Table 4.14 summarises the main bush functions and some concrete ways in which they contribute to the backing of life conditions for the local people and the maintenance of local environment in the Mindif area.

TABLE 4.14 – Local functions partly valuated (Fcfa/year per household) of the bush in Mindif region

Functions	Valuations
Habitat function	Significant biodiversity, see sections 4.2.2-4.2.5
Signification function	Enrichment of life and culture, see section 4.3
Natural production function	
• bush food	FCFA 6,000-127,000, with Middle household having 37,000, see section 4.4.1
• bush non-food	FCFA 31,000-85,000, with Middle household having 71,000, see section 4.4.2
• grazing, fodder	FCFA 0 -1,840,000, with Middle household having 80,000, see section 4.4.3
• medicine, water	Significant contribution, see section 4.4.4
Joint production function	
• fallow	FCFA 0-189,000, see section 4.5, with Middle household having 53,000.

The wealth base of the rural household is fed by annual flows and capital or buffer assets. These figures receive additional perspective when put in the context of the livelihoods as a whole. The annual flows refer to income generating activities conducted in a year such as cropping, bush food and non-food gathering. The capital or buffer assets concern cattle and some other forms of saving. Tables 4.15a and 4.15b depict this distinction, added to which is the value of the crops grown, so that the total depicts the total livelihood.

Financial values of bush fallow and direct food/non-food are significant compared to crops, and robust. Values of cattle-related functions are higher, but less robust due to technical difficulty in estimating shadow price for grass and fodder. The difference in robustness cautions interpretation of Table 5.15a, in which the less robust figure for fodder appears to dominate the total, especially the mean for wealthy cattle owners; this must not eclipse the high value (in absolute terms) of the other functions.

TABLE 4.15a – Financial inputs from crops, capital maintenance and direct livelihood contribution of bush functions per household and per year, by ethnic area, in FCFA

Ethnic area	Value of crops excluding the value of fallow	Value of fallow contribution of bush crops	Direct livelihood contribution of bush: food, non-food	Capital maintenance: grazing/fodder	Total
Giziga	403,000	60,000	91,000	813,000	1,367,000
Mundang	161,000	202,000	84,000	1,510,000	1,957,000
Tupuri	299,000	118,000	69,000	1,858,000	2,344,000
Fulbe	373,000	156,000	69,000	1,858,000	2,456,000
Mindif	83,000	378,000	135,000	3,136,000	3,732,000

The gains from bush functions for an ethnic area vary according to cattle possession rate and according to bush use in the cropping system. As a result, maximum bush-related benefits are achieved in integrated crop-livestock systems.

TABLE 4.15b – Financial inputs from crops, capital maintenance and direct livelihood contribution of bush per household category and per year, in FCFA

Category	Value of crops excluding value of fallow	Value of fallow contribution of bush crops	Direct livelihood contribution of bush: food, non-food	Capital maintenance: grazing/fodder	Total
Rich	505,000	106,000	61,000	3,020,000	3,692,000
Middle	312,000	106,000	108,000	906,000	1,432,000
Poor	68,000	176,000	103,000	00	349,000
Herder	00	0	52,000	10,872,000	10,924,000
Cropper	263,000	148,000	111,000	00	522,000

As displayed in Table 4.15b, a clear distinction appears between household categories which have different shares from cropping and bush functions. On aggregate, herder households make higher profit from bush functions while poor and cropper have the lowest gains. Rich and middle which are in between the two extremes are also the ones for whom the bush continues to be very important. Therefore, when one considers the fact that these two categories concern 3,891 household heads (ref. Section 2.3.3 of chapter 2), representing 62% of the censused households of the Mindif region, it is evident that the bush functions play and will continue for a while to play an important role in the general economy of the area.

5 Social dynamics of the bush decline

As discussed in the preceding chapters, it is the bush area and quality which is being reduced due to extensive agriculture expansion and exploitation and that this poses significant problems to livelihoods. This chapter will give more detail on this problem and try to find out and discuss the social dynamics underlying the process. It makes a kind of typology of the actions and the actors with the corresponding socio-economic constraints and motivations in relation to the general context of the study area. As announced in chapter 2, the Action-in-Context approach was chosen to help analysing these social dynamics driving the bush decline in the study area. This chapter starts out by an analysis of the problem and then proceeds by giving a brief overview of the basic principles of the AiC framework, before getting into the analysis of the actions and motivational factors of the actors, ending up with the actors field and deeper analysis of the general and global context of the region.

5.1 Problem: the loss and degradation of the bush

Land use categories distinguished in section 3.2.2. are field, fallow, pasture and unused bush, the last three together are called 'bush'. The land cover change is driven by two dynamics: cropland expansion leading to change in bush surface and tree cutting leading to its diffuse degradation.

5.1.1 Loss through cropland expansion

Cropland expansion is the net change from (fallow/grazing/unused) bush to fields. The factors driving cropland expansion are many. In the study region these factors have been the booms of cotton production from 1950s to 1970s and from 1994 to 1997, and the continuous increase of the number of farmers due to a rise in food demand. The statistics of the Mayo Kani division, of which the Mindif area is part, allow for a first insight.

Cotton in Mayo Kani division

The introduction of cotton as cash crop during the 1950s provoked an increase of the fields leading to a reduction of bush. The process slowed down and stabilised after the first decade due to soil degradation which progressively led to the fall of cotton production. This decrease coincided with adverse natural conditions which had occurred between 1970 and 1974, the effects of which lasted until 1978. Cotton acreage was then reduced to one quarter of the maximum production level of the first cotton boom attained in 1969 (Roupsard, 1987: 371).

The cotton firm Sodecoton tried to solve the fertility problem with little success. The population continued to grow cotton, not primarily for money it used to provide, but rather for the fertiliser's positive effects with good yields of red sorghum after cotton in a rotation farming system. Deforestation for cotton fields augmentation had stopped, until the second boom of cotton production.

The second boom of cotton production followed the devaluation of the CFA Franc in 1994. The significant rise of cotton price, from 90 to 145 Franc CFA, raised the motivation of peasants who were confronted with the various effects of the economic crisis. Compared to what had been the price so far, cotton really became a cash generating crop according to the farmers. And of course, the households whose number has almost doubled during the last decades, rushed again to cotton production, destroying empty bush in the process (Van Andel, 1998: 71).

In the Mayo Kani division, the cultivated area planted with cotton which was approximately 16,000 ha during the boom period between 1950 and 1970, and fell after 1982 to only some 7,000 ha. The surfaces kept on around 10,000 ha and 14,000 ha till the start of the second boom starting in 1994 with areas rising from 16,000 ha to 23,000 ha in 1997. See Figure 5.2.

Muskuari and millet in Mayo Kani division

The muskuari acreage had dropped in 1984/85 to only 14,000 ha from 18,000 ha of the preceding year, but climbed up directly the following year to 22,700 ha before decreasing again in 1991, falling to 19,500 ha. After that, muskuari production increased steadily, reaching 34,000 ha in 1997. The red millet cultivated surfaces also followed the same curve and steps. Covering a total surface of 21,600 ha in 1983/84, red millet production had a fall the following year dropping to 19,900 ha before rising again reaching 21,700 ha in 1985/86 and 24,500 ha in 1986/87. It fell down again in 1990/91 to 17,000 ha before recovering rapidly the following years and rising up to 22,700 ha in 1991/92, 26,900 ha in 1993/94. After that, the surfaces continued rising reaching 33,700 ha in 1994/95, 36,400 ha in 1995/96. They decreased a bit during 1996/97 campaign falling to 23,200 ha. The general tendency therefore, is a staggered increase of cultivated surfaces of both cotton and food crops. See Figure 5.2.

Figure 5.2 also allows for a major conclusion on the role of demographics, since it also shows the population of the division. With the population rising from 200,000 in 1984 to 320,000 in 1996, this increase of 60% is roughly the same as the trend in crop acreages. In other words, population increase rather than increasing acreage per capita is the major component of the cropland expansion. Only cotton shows a real increase in acreage per capita (after 1993). Njomaha (2004) supports this.

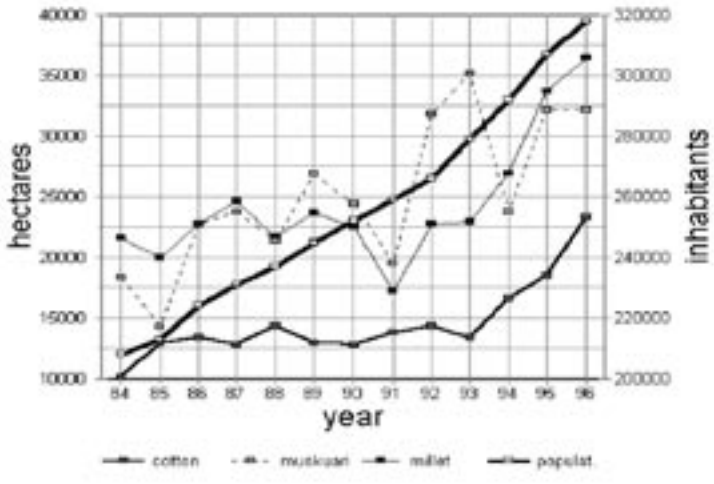

FIGURE 5.2 – Evolution of crops cultivated surface and the population between 1984 and 1996 in the Mayo Kani Division. Source: Divisional Delegation of Agriculture (Kaélé)

Cropland expansion is hard to directly assess in the field, but easy to calculate because of constancy of arable land surface per household. The same conclusion holds on a wider scale. If we take the Mayo Kani population growth of 60 % in 12 years (Fig. 5.2), this implies a population growth of some 3,754 households from 1997 to 2009 in Mindif. This combined with a constant acreage of 5 ha per household, the loss of bush will be (3,754 x 5) = 19,000 ha, hence some 1,600 ha per year. The next section looks at this in detail.

5.1.2 Degradation through new fields in unused bush

New fields created in unused bush are partly land that changes from unused bush (forested, 'good bush') to fields, and usually back to fallow fallow some years later. These fallows usually have fewer trees than the unused bush. In other words, new fields creation implies bush degradation.

TABLE 5.1 – New field plots and average surface per crop in 1997 (research sample)

Ethnic Area	N	number of creators of new fields	mean surface of new plots	cotton plots	millet plots	mus-kuari plots	total of new plots created (ha)	Total surface (ha)
Giziga	80	38	0.91	35	34	33	102	93
Mundang	48	29	0.84	24	21	20	65	55
Tupuri	21	10	1.00	9	10	10	29	29
Fulbe	20	6	0.85	5	5	5	15	13
Mindif	31	9	1.36	12	12	12	36	49
Total	200	92	0.97	85	82	80	247	239

Source: Interviews sample (N = 200)

Table 5.1 focuses on the sample of 200 households from the Mindif area. The Table 5.1 shows that almost half of the households in the sample cleared new fields in 1997, to an average of 2.6 ha per clearing household and 0.97 ha per household of the whole sample. This does not equal the net loss of the bush, because most of the same farmers also left land for fallowing in the same year, but as said, it does mean bush degradation.

Table 5.1 shows that fields are created for the main crops: cotton, millet and sorghum. Clearance of unused bush for other secondary crops like corn, beans, peanuts, etc. is not very common in the Mindif area. Only a few cases were observed for corn and beans, and only after our field work period.

The free spaces around and between the villages started being cultivated first by some of the resident natives and in-migrants but later also by a flow of people from towns. The resident crop growers of the villages are usually joined by their family members living in neighbouring towns (Maroua, Kaélé, Garoua, Yagoua) for sorghum and cotton cultivation. These people are natives of the area who usually have a compound in the village where they stay the week-ends or during the cultivating period and, as such, are considered by their relatives as resident farmers. Due to this consideration, they have been censused among the household heads of the villages without any distinction. Many of these 'non-farmer' cultivators, usually Fulbe, create large fields while having other permanent income sources in town at the same time. In fact, they do not accompany the resident crop growers in cultivating really for the same motivations. While the resident cultivators are producing for subsistence, people from towns do it much more for cash. After the harvest of their sorghum, they store a large part of it and wait for the period of food shortage in the rural areas, usually between July and the end of August. They sell their sorghum at a high price to make a profit, and if it works they will purchase some more fields or hire labour to clear bush for new farms in the villages in order to continue this activity. In doing this business therefore, they contribute to a large extent to the degradation of empty bush.

The bush where the new fields are cleared include natural vegetation and long fallows. For the population there is no real difference between the two categories of land cover. After transect checking, of the declared 239 ha of new fields per year, the unused bush cover represents only 52 ha while the other 187 ha represent old fallows. Hence, real bush degradation concerns only the 52 ha. Table 5.2a shows the use made of unused bush, excluding the old fallows.

TABLE 5.2a – Average surface of new fields in unused bush per crop and per ethnic area (ha)

Ethnic area	Number of creators	Cotton surface	Muskuari surface	Millet surface	Total surface
Giziga	22	12	6	9	27
Mundang	9	2	2	5	9
Tupuri	5	3	1	2	6
Fulbe	3	4	2	-	6
Mindif	2	3	1	-	4
Total	41	24	12	16	52

Source: Second round transect walks.

TABLE 5.2b – Sum of extrapolations within ethnic areas of total surface new fields

Ethnic area	Number in sample	Number of creators	Total surface cleared (ha)	Proportion of ethnic area in region	Clearing by all households (ha)
Giziga	80	22	27	42.5%	897.5
Mundang	48	9	9	25%	293.3
Tupuri	21	5	6	11%	196.6
Fulbe	20	3	6	16.5%	309.7
Mindif	31	2	4	5%	40.4
Total	200	41	52	100% (n=6257)	1738

In section 2.3.3 we explained why our sample results cannot easily be extrapolated to the entire research area. Here, we can extrapolate by taking a weighed sum of extrapolations within each ethnic group; Table 5.2b shows how the outcome is a total cleared area of 1,738 ha per year. It most be noted, however, that in some years there are many new fields while there are very few in some others, all depending on the contextual events or natural conditions. The year 1997 may have been a higher than average in terms of new fields clearing due to some contextual reasons among which the rise of food crop prices, the decrease in farm productivity rates, the effects of economic crisis, the cotton production boom etc.

Both in the previous section and here, we get an idea of the surface area of bush lost to agriculture. If we translate this into prospects for the future for the remaining bush of 65,000 ha, we find that the bush will be finished in (65,000/1,738) = 37 years. though slightly more optimistic, this concurs with the local people's own estimate in section 7.4 (Table 7.4.), which predicts the end of cropland availability in 30 years.

5.1.3 Bush degradation driven by firewood cutting

The bush areas are not only diminished in size through the creation of new farms, there are also activities which contribute to its degradation. These are

grazing and especially deforestation. Deforestation includes clear-felling and diffuse tree cutting for firewood and timber cutting for construction.

During the economic crisis, government imposed heavy levies on petrol products. The combination of transportation cost and the taxation of cooking gas led to a large price increase. At the same time the purchasing power of the households in the towns has also been reduced through salary cuts and devaluation of CFA franc. As they cannot afford cooking gas, inhabitants of the towns revert to firewood which is cheaper compared to gas. Thus in the rural areas, firewood became a cash income generating good. Very soon large dealers took over the market using lorries to carry wood from selling points in the villages to the towns. As a consequence of this rise of interest for wood, villagers turned into firewood dealers at the village level. Hectares of tree cover are being cleared gradually around the village settlements.

FIGURE 5.1 – Firewood selling point near Mizao village (photo Wassouni)

Selling wood used to be a minor cash-generating activity exclusively done by non-Fulbe women to purchase salt, dry fish and some stuff for the children and for herself. But under the pressure of the ongoing economic crisis, and due the cooking gas shortage in towns, the firewood trade has attracted men who got fully involved in the business, thus destroying larger and larger tree cover surfaces all over the province, with the Mindif region occupying the first place.

Formally concentrated in several places, the number of firewood selling points (Figure 5.1) has multiplied over the last four years. The former selling places were Doyang, Kirguim, Laf, and Mouda, all of them situated along the main roads. Nowadays, the selling points are found almost everywhere around and inside the study area with more than 15 villages having their own firewood market place. All the ethnic groups are involved in that business whereas it used to be a non-Muslim groups' exclusive activity. At the household level,

the firewood activity involves men, women and children. Depending on the quantity, the family head cuts trees and the wife and children carry the wood to the roadside or home and sell it. Sometimes, man and women cut trees, carry wood and sell firewood separately with the help of their children. In this case, the woman is helped by her daughters and the man by his sons. Men may split the wood into small pieces so as to make bundles for sale, but they don't sell firewood at the roadside. That is done by the women, or if they are occupied by the children.

Due to this intensive tree cutting, the bush areas are being cleared at a very fast rate, adding significantly to the bush destruction for cropland expansion. The Mindif area provides 927 m^3 of wood to Maroua town representing 36.9% of the total firewood quantity entering Maroua urban centre every week (Domga, 1996: 14). As a consequence of combined effects of new farm clearing and firewood cutting, the overall picture of the regional landscape is being increasingly marked by open spaces due to the fact that the loss of trees is widespread, both on farms and in woodlands (Anderson, 1987: 9).The extent of bush degradation due to firewood extraction may be estimated on the basis of some assumptions and the following figures.

The interview data show that an average household of 6 persons uses 104 bundles of firewood per year for home consumption, which makes a total number of 650,728 bundles (104 x 6257). According to our measurement, 1m^3 takes 15 bundles of firewood, which means 0.067 m^3 for each bundle of firewood. Therefore, the total number of firewood for home consumption represents a volume of 43,599 m^3 (650,728 x 0.067) of wood per year. Besides this, extraction for sale represents roughly an annual total quantity of 123,171 m^3 with 48,225 m^3 of wood going to Maroua town and the rest taking various directions including Garoua, Yagoua and Kaele agglomerations (Domga, 1996: 14; Madi & Peters, 1997: 5). According to my census data (Table 5.3), the total commercial extraction by the censused (i.e. resident) population is 517,392 bundles representing only 34,665 m^3, implying that the great majority (79,000 m^3) of the firewood is cut by outsiders (non resident or non native of the cutting area). Be this as it may, a total of some 167,000 m^3 (44,000 + 123,000) of firewood leaves the area annually.

Cropland clearance generates firewood as 'by-product' through clear-felling of trees on field plots. If all the wood cannot be used for the households's direct consumption, it can be sold for cash. This would mean that the evolution of quantities of wood follows that of the newly cleared field surfaces. As we said, cropland clearance in non-fallow land is about 1,738 ha/y. With the density of 86 firewood trees per hectare (Table 5.4), this surface area represents a total number of 149,468 useful trees or 40,057 m^3 of firewood per year.

TABLE 5.3 – Number of commercial wood cutters in the area and annual total quantity of fuelwood cut according to the census data

Ethnic area	Censused household heads	% of commercial cutters	Number of commercial cutters	Annual average number of wood bundles per cutter	Annual total number of wood bundles	Annual total in m^3
Giziga	2 584	56	1 447	240	347,280	23,267
Mundang	1 564	29	453	192	86,976	5,827
Tupuri	287	9.5	27	96	2,592	174
Fulbe	909	10	91	48	4,368	293
Mindif centre	913	58	529	144	76,176	5,104
Total	6 257	40.7	2 547	203	517,392	34,665

An optimistic approach might be to assume that all trees cut from these new fields creation is used as firewood and that only the rest is taken from the forest, while the pessimistic assumption would be that no wood produced by field clearance is used as firewood. The optimistic approach is certainly not true. Commercial cutters go to the best places, since there is no limit for the cutting of wood (Van Well, 1997: 22). New fields clearance takes place only once a year and lasts two or three months at maximum, while intentional cutting is done continuously all along the year. Newly created field plots occupy limited places whereas intentional cutting are extended continuously to new best places. Furthermore, the main actors of field creations are villagers and ordinary people who are, to a certain extent, controlled by civil servants, while the large dealers from Maroua town are much less controlled as they have cutting licence delivered to them by the provincial service in charge of environment and forests. Hence, it appears appropriate to assume that the pessimistic assumption holds true to a large extent. Therefore, it seems reasonable to assume that on the top of the 1,738 ha/y of degradation due to new fields creation, some 150,000 m^3 of firewood results in additional degradation. How problematic is this extraction of 150,000 m3 per year? The primary indicator is to compare this with the standing biomass and calculate the annual rate of extraction.

According to the transect walks data, the average density of tree species used for firewood is 86 trees per hectare (see Table 5.4) which means a total number of 1,002,072 (11,652 x 86) trees in the unused bush. But this represents less than the third of the standing biomass of the region. The observation units represent half of the bush areas visited so the result has to be multiplied by two. Secondly, the trees located in the intervals, in the long fallows in some fields were not taken into account. Considering all this, the total number of firewood trees has to be multiplied at least by three i.e. 1,002,072 x 3 = 3,006,000 firewood trees.

TABLE 5.4 – Average number of firewood trees per hectare, by tree species and by bush zone

Tree species	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Average
Balanites aegyptiaca	7	8	12	21	13	12
Tamarindus indica	-	2	1	1	1	1
Ziziphus spp.	1	5	8	1	4	4
Anogeissus leiocarpus	7	13	23	17	15	15
Dalbergia melanoxylon	-	5	1	1	2	2
Guiera senegalensis	9	17	1	-	2	6
Combretum collinum	1	11	15	5	2	7
Cassia siamea	-	1	-	-	-	-
Hexalobus monopetalus	-	-	-	1	-	-
Acacia nilotica	8	3	26	39	49	25
Acacia seyal	3	2	34	16	12	13
Gardenia triacantha	-	-	1	-	-	-
Butyrospermum parkii	-	-	1	-	2	1
Total	36	67	123	102	102	86

Source: Transect walks data

In order to estimate standing firewood biomass, we need the volume of the trees. Many formulas are used to calculate this volume. The needed field data to calculate biomass for the study area in one of these ways were not available. Instead, I decided to use the number of firewood bundles estimated by firewood exploiters of Doyang village, though it may lead to an underestimation or overestimation. This may come from the fact that all the firewood trees do not have the same morphology and size. Some have rectilinear trunk while others have non linear trunk. But I assume that the differences may be balanced between different tree species.

According to the Doyang wood exploiters, an average size tree of 20 cm diameter and 5 m height gives 4 bundles of firewood, meaning 0.268 m^3 (4 x 0.067) for a tree. The total volume of the wood therefore, is 806,000 m^3 (3,006,000 x 0.268) of standing biomass. This calculation then shows that the rate of extraction of the bush trees in Mindif would be, at least in 1997, 150,000/806,000 = 19 % per year. This indicates a problematic situation. It is difficult to imagine a dryland forest that can sustain such extraction.

In order to arrive at comparability with the bush degradation due to the creation of new fields, the extraction may also be expressed in hectares. We then imagine the firewood extraction to take place as clear-felling without regrowth. Because the standing biomass of firewood trees per hectare is (86x0.268 =) 21 m^3, the 150,000 m^3/y then means a degradation of (150,000/21 =) 7,000 ha/y. This figure is based on several steps of calculation, some of which may be biased due to assumption, extrapolation, generalisation of measuring error, but it is not the absolute value that matters. What I have tried to indicate is that the order of magnitude relates dramatically to the area of well-forested

('unused') bush of 11,652 ha. Simple arithmetics would predict that the well-forested bush would have disappeared within 20 months, in 1999. This is not truly the case because as well-forested areas become scarce, more firewood is extracted from the less well-forested remaining bush of 65.000 ha. That bush is also reduced by 1,738 ha/y through the creation of new fields. Firewood thereore will be available for more than 20 months, but the people's prediction that opportunity for firewood extraction will cease in 10 years (see Table 7.4) falls in line with our basic finding here.

5.1.4 Impacts: functions loss and social conflicts

Functions loss

Functions loss refers to the loss of the major elements mentioned in chapter 4. These included natural biodiversity, bush food and non-food products, grazing and soil fertility through fallow function. The biodiversity loss will concern the reduction in both number and diversity of plant, animal and bird species or even their total disappearance. The bush food and non-food functions loss concerns the disappearance of fruits, vegetables, timber, firewood, thatch grass, ropes and medicinal plants. Firewood will be gone found only on home garden, from village trees or from field trees if households undertake agroforestry. Cropland expansion will constrain grazers to use crop residues that may not be enough to feed huge herds of cattle, especially of transhumants.

Fallow function loss concerns soil fertility. Farmers complain already, but statistics do not yet show yields decline, see Figure 5.4. This is possibly due to masking because of fertiliser, manure and/or more labour. Quite likely too, bush loss is not severe enough yet; there still many places with relatively good bush to be found to open new fields. The soil fertility effect will manifest itself later, but surely.

We know the importance of the bush for soil fertility. Hence theoretically, bush decline means fertility decline, if there is no change in the farming system. Farmers in my interviews and group discussions totally agree with this and state that the continuous degradation and reduction of bush areas are followed by a drop of farmland productivity, especially for food crops. To them, hardé spots seem to be expanding, which indicates that the land is getting exhausted and dying.

Statistical data, however, tell another story at least up to 1995, if we refer to the evolution of crop yield in the Mayo Kani division (Fig. 5.4). During the last decades, crop yields varied from one year to another but did not show a declining trend. In the absence of reliable data about soil and environmental conditions, it is difficult to assess the functioning of the relationship between bush state, soil nutrients dynamics, farming practices and crop yields. Possibly, farmers compensate the loss of natural fertility with fertilizer used on

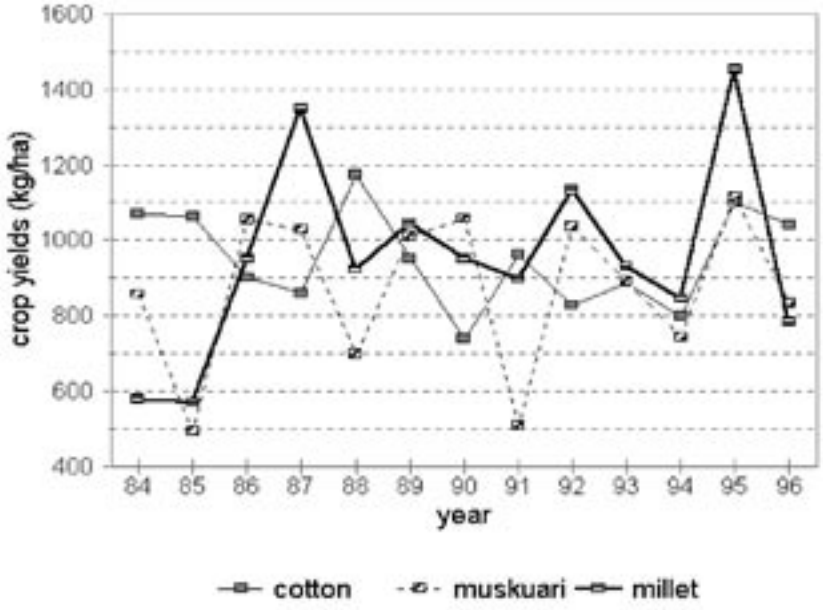

FIGURE 5.4 – Evolution of crops yields in the Mayo Kani Division between 1984 and 1996. Source: Divisional Delegation of Agriculture of Kaélé

the cotton fields (that doubled in size between 1993 and 1996), by applying more crop care labour or by intensified ploughing. Moreover, good bush for new fields were still well available up to 1995.

Social conflicts

Apart from negative economic impacts, bush degradation also gives rise to competition and social conflicts. Social conflict is a state of tension between groups or parts of population, often due to unequal access to and control over resources or inequitable share of benefits derived from the exploitation of given goods. Conflicts may arise at the level of the household, at the level of the village, between villages or groups of villages in a region. The common denominator of all these is the growing scarcity of the disputed resources which leads to more and more restrictions and selectivity pertaining to the access and use as there is an increasing number of people competing for reducing natural resources. Of all the arenas of social tension, the conflict between livestock producers and cultivators is at present dominant in Africa as a whole (Blench, 1998: 2) and in North Cameroon, as we will show through illustrative cases in the next section, and with more details in chapter 6.

The arena of competition leading to social conflict in the Mindif area is bush resources use. There is a competition between crops growers, livestock producers and firewood dealers. Farmers are pressured by increasing food demand due to population increase and variability of the crop yields, by the

perverse effects of the economic crisis which had tremendously reduced their purchasing power thus preventing from investments needed in farming system to raise the crop yields. The livestock producers are pushed back by the growing scarcity of pastures due to cropland expansion into the grazing blocks while they have to increase the size of their herds of cattle to meet their increasing needs for subsistence. It should be noted here that herdsmen buy cereals with their earnings from dairy production. Culturally, it is only acceptable to sell cows in case of emergency (De Garine, 1988: 236). The firewood exploiters who do not have any tree plantation and take wood from the bushland of the surroundings are encouraged by the rise of the firewood market price in urban areas. All these groups may one day intensify their production (e.g. intensive cattle breeding, firewood plantation and intensified cultivating) and hopefully one day they will. But at present they do not do so significantly, and tensions over bushland prevail. No quantitative data are available, but the following examples from the study area, gathered during the field work, may serve as illustration.

CASE 1 – Gaban vs. Kolara

One of the land conflict cases has occurred between two neighbouring villages: Gaban and Kolara. Gaban is a Mundang village running out of cropland, while Kolara, a Fulbe village, still holds large areas of unused bush. To solve their land scarcity problem, the people of Gaban decided to break into the empty bush belonging to Kolara and create new fields. The land authorities of Kolara raised complaints and brought the case before the Prefect of Kaélé and alerted their external elites in Yaounde. The people of Gaban, in turn, alerted their external elites in Douala and Yaounde too. The tension went down when the presidency of the republic issued a note asking the Gaban people to keep out of the place with the argument that the invaded bush is part of the third grazing block of the former Mindif – Moulvoudaye Project. This bush was reserved to grazing activity not to cultivating. Instead, the people of Gaban were asked to enter into negotiation with their neighbouring land authorities of Kolara to find more peaceful arrangements pertaining to their land scarcity problem.

CASE 2: Tupuri immigrant cultivators – Mbororo nomads

The second land conflict case is still in Kolara, but this time opposing Tupuri immigrants who are cultivators and Mbororo nomads. The nomads had their campsites in the bush area where they settled during the rainy season. They leave the place during the dry season for transhumance and return back to the following wet season. In 1996, they found their campsites occupied by fields created by Tupuri immigrants who were looking for fertile lands to crop. The choice was motivated precisely by the fact that these places were manured by the large cattle herds of the Mbororo. The latter complained and brought the case before the Sub-Prefect of Moulvoudaye, who asked them to wait after the harvest and take back their land, as the fields were already sown in. But the following year, the place was not liberated and the number of Tupuri settlers had even increased. The Mbororo went back to the Sub-Prefect who gave them the same answer with the same argument. Two years later the problem was not solved whereas the number of settlers had tremendously increased.

CASE 3 – Firewood large dealers from Maroua – village people
The third case concerns local people in Doyang, a Mundang village fully involved in firewood selling as it is located close to the road linking Kaélé to Maroua with Mindif at the middle. Situated some 20 to 40 km from Maroua, many lorries used to go and collect firewood at the village selling points. Usually the local people cut firewood in the bush and bring it to the roadside for these large dealers. But with the increase of firewood demand in Maroua, the village people increased the price of wood by reducing the number of wood pieces of the bundle. On the other side, the large dealers decided to have their own cutters and get into the bush areas directly instead of collecting at the roadside as usual. This led to substantial income loss for local people who started mourning about bush wood exploitation. Unfortunately there is nothing they can do against the large dealers who have their cutting licence delivered by the same civil servants who used to come and warn the villagers about the possible negative effects of uncontrolled wood cutting on their environment and life conditions. As a consequence of this dualism, village people are getting more and more angry against those large dealers from Maroua.

5.2 Principles of explaining the problem

The Action-in-Context approach is an explanatory tool developed by De Groot (1992: 305-349), which is an actor-based method of studying the social causes of environmental problems. This method can integrate case studies, factor studies and political-economic insights, and connects local actors to wider-scale contexts including the international actors. The purpose of connecting the proximate actors and factors to the higher-level and contextual actors and factors is to help identify options for local, regional, national and global policy making with regard to the environmental problem.

The Action-in-Context methodology emphasises empirical causality, focusing on concrete decisions of concrete actors. This stands from the assumption that institutional relationships, markets, cultural visions, socio-political structure, economic infrastructure, etc., all play a role in the decision-making of the actors, even though actors are the active entities who concretely make things change. The research explanatory sequence here runs counter to the direction of the social causality. Every actor is connected to its actions, to the action alternatives ('options') and motivational factors from which the chosen actions arise, and then to its own structure and culture in which these options and motivations are embedded. This means that, the explanatory structure should depart from the relevant action outwards, going through the options and motivations to the basic structure and culture of the actors. In order to understand the actors' decisions, the researcher has to put himself in the place of the latter and look at the cultural limitations and the structural dilemmas within the context of these actors through their eyes (De Groot & Kamminga, 1995: 15).

Actions and actors

In AiC terms, an action is a behavioural unit about which an actor has made a decision. In environmental science, the term 'activity' is often preferred to 'action', because 'activity' refers to more regular or generalized categories of actions, whereas 'action' is usually associated with more singular events. To facilitate the understanding and open them up properly to AiC explanations, actions can be decomposed in subcategories. Therefore, the first and most important thing to do is defining carefully the most relevant action category with the related most appropriate subdivisions. The AiC framework prescribes the clear identification of the relevant actions first, before focusing on the actors as data suppliers with respect to these actions.

Actors are either people or any other social entities that act, individually or collectively. Social entities may be actors with respect to a certain activity if they exercise a significant decision-making capacity with respect to that activity. What is considered 'significant' here depends on the research objective. Actors, either individual people or social entities, should be seen as holistic entities focusing on a certain objective. This objective is usually what the activity is considered by the actors to be good for some objective. Then it is from that objective conceived by the actors themselves that the alternative options to their actions can be defined. The most important task in this second step of AiC is to avoid any form of bias in identifying the parties that have significant decision-making capacity over the activity under consideration, before looking for their respective options and motivations.

Options and motivations

In AiC, the options refer basically to the list of possible actions connected with an objective of the actor. In general terms, the options may be known or unknown to the actor, they may be positively or negatively appreciated by the actor, as well as they may be available or unavailable for the actor. The formulation of the actor's objective is therefore very determinant in identifying the proper options list of the given actor. The most relevant options list is then the number of options the actor actively takes up in his spontaneous declarations and easily talks about. The AiC approach distinguishes two types of options: potential options and implementable options. Potential options are defined as everything the actor might do with respect to the goal to be achieved, and implementable options are the subset of what the actor can do, as opposed to the wide set of potential options. Discussing the set of options with the actor helps to deepen the understanding of the actor's choices and serves as support for the identification of the actor's motivational factors.

In the AiC terms, motivations are the normatively relevant (to the actor) operational characteristics of the options under consideration (by the actor). The motivation tells what is important about an action, and where the actor places the option's importance in the range of his values. But some precau-

tions need to be taken at this level of analysis because motivations are simply the support of an informal choice process of the actor. The actors should not be expected to be consistent of using a coherent set of operational characteristics for every option. Actors motivations may be superficial or contradicting and more unified motivational factors may only be found at a deeper level.

The 'actors field'
In AiC, the actors identified as connected directly to the environment are called 'primary actors'. Actors do not stand isolated in society, however; they are influenced by actions of other actors. These are called 'secondary', 'tertiary' etc. actors in AiC. They are identified by seeking who has an influence on the options and motivations of the primary actors, because that (and not through the personal connections in social network) is how influence (power) runs through society. That way, the actions of farmers may be seen connected to those of chiefs, government agents, projects and so on.

The 'deeper analysis'
Underlying the options and motivations of all actors (primary, secondary etc.), we find the culture and structure of society. The deeper analysis analyses these, going into the actor's potential options, autonomy (defined as the degre to which actors can implement these potential options), economic motivations and non-economic motivational factors.

Policy design
The actors field analysed in AiC generates the list of all possible target groups for policies addressing the environmental problems. The deeper analysis, in its turn, generates the exhaustive list of policy options out of which the policy may be composed (De Groot 1992: 369).

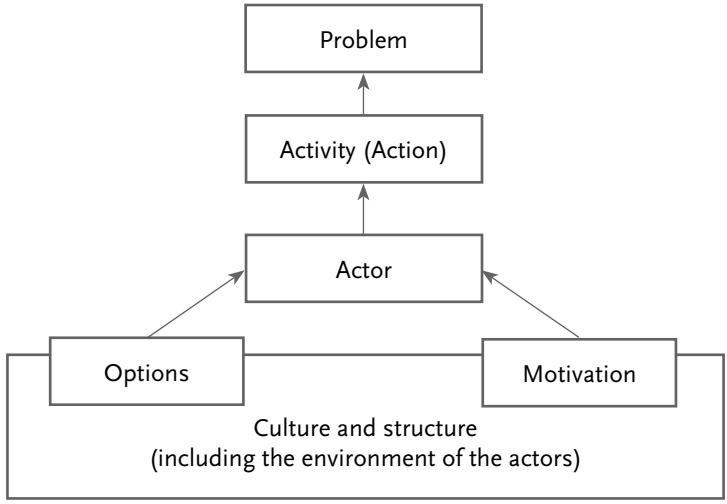

FIGURE 5.2 – Basic element of AiC (De Groot, 1992: 306)

5.3 Primary actors of the bush decline

The most important actors at the base of bush decline are the new field creators and the commercial firewood cutters. Cropland expansion transforms the bushland into fields, thus reducing the extent of bush areas. Firewood cutting for sale destroys the bush tree cover, exposing it to risks of degradation. The cattle grazers and wood cutters for home consumption could be considered as bush degradation actors to a lesser extent. Housing, hunting and the activities connected to the other bush functions (Chapter 4) are much less important bush consuming activities. The actors for our further AiC analysis are the household heads, because they make decisions at the level of their compound, whether or not in consultation with family members.

5.3.1 Problematic actors

Bush clearers for new fields
During the field interviews, the respondents were asked if they have opened a new field in the bush during the current year. The result shown in Table 5.5 represents people who said yes. The new fields creators come from both the natives and the immigrants. New fields are being created by the youths, by the households whose size has increased, and by immigrants who start a new household.

TABLE 5.5 – New fields creators during 1997 in the ethnic areas (N=200)

Ethnic area	Number of natives	New fields creators		Number of immigrants	New fields creators		Total of area	New fields creators of area	
		N	%		N	%		N	%
Giziga	69	27	39	11	11	100	80	38	47
Mundang	38	21	55	10	8	80	48	29	60
Tupuri	12	8	67	9	2	22	21	10	48
Fulbe	14	5	36	6	1	17	20	6	30
Mindif	18	6	33	13	3	23	31	9	29
Total	151	67	44	49	25	51	200	92	46

As shown in Table 5.6, the new fields creators are found in four of the five main socio-economic categories of the households. However, it can be noted that the majority comes from the mixed or middle group, followed by large cultivators' households without cattle and the rich households with large herd of cattle.

TABLE 5.6 – Socio-economic categories of the new fields creators

Ethnic area	Rich	Middle	Poor	Cropper	Total
	n %	n %	n %	n %	n %
Giziga	5 33	20 62	3 19	10 67	38 47
Mundang	4 40	12 92	7 58	6 60	29 60
Tupuri	4 57	5 62	0 0	1 50	10 48
Fulbe	2 67	4 100	0 0	0 0	6 30
Mindif	2 67	5 55	2 29	0 0	9 29
Total	17 45	46 70	12 29	17 52	92 46

In general terms, the primary actors in farm creation live most in the Giziga, Mundang and Tupuri areas, and are mostly middle size households. The poor households are less represented compared to the other categories.

Commercial firewood cutters

Table 5.6a shows the numbers and percentages of native and immigrant people involved in commercial firewood cutting

TABLE 5.6a – Commercial firewood cutters according to ethnic area in the interview sample (N=200)

Ethnic area	Number of natives	Commercial wood cutters		Number of immigrants	Commercial wood cutters		Total of area	Commercial wood cutters	
		N	%		N	%		N	%
Giziga	69	36	52	11	9	82	80	45	56
Mundang	38	9	24	10	5	50	48	14	29
Tupuri	12	2	17	9	0	0	21	2	9.5
Fulbe	14	2	14	6	0	0	20	2	10
Mindif	18	12	67	13	6	46	31	18	58
Total	151	61	40	49	20	41	200	81	40.5

Both natives and immigrants appear to be involved in firewood cutting for sale, but Tupuri and Fulbe only in very low numbers. It is the accessibility to road which partly explains the important involvement of the Mindif centre and the Giziga, and the average implication of the Mundang areas (Musa, 1995: 34). Most of the large selling points of the groups are found along the good roads. While the Mindif centre and the Giziga area households are fully involved in it, with respectively 58% and 56% of their households implicated in that activity. The Mundang are in-between the two groups with 29% of their households carrying out that activity. The sale of firewood takes place usually along the main roads, and the Tupuri are very far from the large roads along which firewood is mostly sold. Immigrants of Giziga and Mundang areas are most involved in commercial firewood cutting, with 82% and 50%, respectively, doing it.

TABLE 5.6b – Commercial firewood cutters in our interview sample according to socio-economic categories and ethnic areas

Ethnic area	Rich		Middle		Poor		Cropper		Total of area	
	n	%	n	%	n	%	n	%	n	%
Giziga	11	73	19	58	9	56	6	40	45	56
Mundang	2	20	4	27	2	17	6	60	14	29
Tupuri	1	14	0	0	0	0	1	50	2	9.5
Fulbe	0	0	2	29	0	0	0	0	2	10
Mindif	1	33	12	86	4	57	1	25	18	58
Total	15	39	37	48	15	37	14	42	81	40.5

From Table 5.6b, it can be noted that, although to a variable extent, almost all the socio-economic categories are implicated in firewood selling. The low interest of the Fulbe group is caused by that the Fulbe see it as low-grade activity, a sign of poverty. However, some Fulbe are found among the large dealers using trucks to collect firewood from the selling to Maroua town. Moreover, tree felling is more easily combined with farming than cattle herding. Fulbe generally only switch to the firewood business if they have an opportunity to do it at a large scale, with trucks, but not for small quantities of wood as a secondary activity. Nevertheless, poorer Fulbe are progressively joining the other groups in the firewood selling activity, specifically in urban area (see the figures of Mindif).

A survey in the Mindif region on that issue has confirmed the growing implication of the male population, even though women still have stronghold on the sector as can be seen in Table 5.6. A special survey conducted on firewood selling points in 1998 confirms the variable implication of the various ethnic groups. Tupuri villages were not concerned by this survey since there was no selling point in their area. The Tupuri appearing amongst the firewood sellers in Table 5.4 are those who live in Giziga, Mundang, Fulbe and Mindif centre villages.

TABLE 5.7 – Firewood sellers according to sex and ethnic groups

Ethnic groups	Female	Male	Total
Giziga	448	148	596
Mundang	252	41	293
Tupuri	128	54	182
Fulbe	4	5	9
Mindif	5	18	23
Total	837	266	1 103

Source: special field survey in 1998 by the researcher

The actors of firewood activity are mainly women who are helped by their men and children in doing it (Mbairamadji, 2000: 108). The distinction of the degree of involvement of each family member at the level of the household is thus difficult to assess, because there seems to be a distribution of roles varying with the types of task to be completed in wood cutting for sale.

5.3.2 Potential problematic actors

Cattle grazers

As already stated above, animal husbandry is the secondary main activity in the Mindif region, and it occupies 27% of the rural households. Both sedentary and nomadic herdsmen graze their animals on bush pastures. Feeding animals on bush grasses does not cause a great harm to the vegetation cover as it is dominated by annual species which usually disappear in dry season, and starts growing again with the return of rains. The harmful action in grazing is the feeding of animals on tree leaves which requires cutting down branches. Sometimes, herders cut down the trees to feed their animals, and depending on the year and number of the animals, more and more trees are being killed every year, thus contributing to the degradation of the bush tree cover. However, this tree cutting is less destructive compared to new farm creation and firewood cutting. Furthermore, the animals' excrements contribute to help the natural regeneration of the bush vegetation cover. What happened in the Mindif area is that, the pastures are being reduced through cropland expansion while the herders continue to keep large herds of cattle, and sometime even increasing the size. This means more and more trees to be cut on more and more decreasing grazing places, which ends up with overburdening of the natural regeneration capacity of the environment. From the moment the losses are beyond the natural capacity of the bush to replace them, the deforestation and desertification processes are on the way, coming out, not only as a consequence of tree cutting, but also and even more, as a result of competition between two types of bush users: cultivators and herders.

Since cattle possession was used to distinguish socio-economic category of the households (refer to methodology in chapter 2), grazing actors are found among three of the five socio-economic groups, meaning households with cattle. Basically, grazing actors are predominantly found among the rich and middle wealth households. When looking at the ethnic group of grazing actors, Table 5.7 shows that the Tupuri have the highest percentage of gazers among the households heads in the interview sample (81%), coming before the Fulbe (70%), and followed by Mindif centre (64%), the Mundang (54%) and finally the Giziga (61%). However, it should be noted that the high proportion of grazers within Tupuri households is due to the presence of Fulbe cattle owners among them, which implies that the real intra-group percentage of the Tupuri is usually lower than that of the Fulbe. Similarly, many of the grazers among the Mindif centre are Fulbe. The aggregate of the Tu-

puri, Fulbe and Mindif centre grazing actors are dominated by Fulbe. The Mundang who have lower representation among the grazing actors do have a higher average number of domestic animals than the Giziga who are really the last in that domain. What all this means is that, the grazing actors are in decreasing order, predominantly Fulbe, Tupuri, Mundang with Giziga coming last in that bush related activity.

TABLE 5.8 – Sedentary grazers according to socio-economic categories and ethnic areas

Ethnic area	Rich	Middle	Herder	Poor	Cropper	Total area	
						N	%
Giziga	15	32	2	0	0	49	61
Mundang	10	13	3	0	0	26	54
Tupuri	7	8	2	0	0	17	81
Fulbe	3	4	7	0	0	14	70
Mindif	3	9	8	0	0	20	64
Total	38	66	22	0	0	126	63

Timber, ropes and thatch exploiters

Timber, ropes and thatch exploiters are not problematic actors at present. But considering the increasing number of the users of these bush items, they deserve early attention in order to help people be aware of the risk and prepare themselves accordingly. Furthermore, some protective measures could be taken to ensure the sustainability of this sector. Moreover, these complementary activities are of crucial importance to rural households, especially those related to housing and healing (chapter 4). The different ethnic groups and socio-economic categories differently make use of the various bush products. The use of an item depends on the need and the wealth base level of the households. The quantities of consumed bush products also vary, depending on the ways they are being used. For instance, the roofs of sedentary Fulbe use much more grass, timber and ropes than those of the Tupuri or Mundang. On the other hand, the Mbororo or nomadic Fulbe roofs use much less materials than those of any other group. The interviews have shown that, of the timber cutters, the Fulbe come first with all the households heads involved in the activity. They are followed by the Tupuri, Mindif people and Mundang, with the Giziga coming last. This difference can be linked to the quantities needed for construction according to the specific building techniques of the different groups. This applies for all the construction items as can be seen in Table 5.8. The medicinal plants are used in all the Tupuri households, followed by Fulbe and Mundang, with the Mindif urban people coming last after the Giziga. This can be linked to the availability of health centres in Mindif agglomeration and in many villages of the Giziga area.

TABLE 5.9 – Percentage of non-food bush products exploiters within the ethnic areas

Ethnic area	Timber	Thatch	Ropes	Medicinal plants	N
Giziga	79	61	40	46	80
Mundang	83	87	31	90	48
Tupuri	86	95	29	100	21
Fulbe	100	95	50	90	20
Mindif	84	84	52	32	31
Total	84	78	40	64	200

TABLE 5.10 – Percentage of non-food bush products exploiters within the household categories

Categories	Timber	Thatch	Ropes	Medicinal plants	N
Rich	89	71	71	58	38
Middle	87	85	33	65	66
Poor	68	68	34	63	41
Big herder	50	50	50	100	22
Big cropper	88	82	27	70	33
Total	80	75	41	68	200

As Table 5.10 shows, more than half of the people in each socio-economic category make use of bush non-food products for construction and healing. The bush rope and roof grass are being progressively replaced by alternatives manufactured items such as corrugated sheet. In rural areas, bush products and modern materials are so often mixed, giving heterogeneous and mosaic aspects to village settlements outlook. This outlook may be an indicator of the inclination for modern or traditional life style. The same applies to the use of medicinal plants which depends on the financial possibility and cultural inclination with regard to health care, but traditional healing is preferred for a certain number of diseases which are hardly cured by modern medicine, such as yellow fever, stomach ache, and many other forms of chronic illnesses. The natural plants used by skilled healers have proved to be efficient in such cases. The only problem is to be able to separate good healers from charlatans who abound.

Hunters and wild food gatherers

It should be noted here that gathering is predominantly a women's and children's activity, even though men also participate sometimes, while hunting is exclusively male's monopoly. Therefore, hunters here are the family heads, whereas wild food gatherers refer to female members and children of the households. In this study I counted the household as one actor, for both gathering and hunting. This is to reduce the complexity of having many catego-

ries of actor for one and the same household consumption goods. However, the differing involvement of the family members in the livelihood activities are presented and discussed in section 5.2. dealing with options and motivations of gathering actors.

TABLE 5.11 – Percentage of wild food gatherers and hunters within the ethnic areas

Ethnic group	Vegetables	Fruits	Honey	Termites	Meat	N
Giziga	57	65	35	47	21	80
Mundang	52	35	42	58	40	48
Tupuri	81	29	9	81	71	21
Fulbe	100	95	25	60	10	20
Mindif	84	55	29	26	45	31
Total	67	55	32	51	33	200

As is shown in Tables 5.10 and 5.11, the items gathered vary with ethnic group and socio-economic status. For instance, vegetable and fruits collectors are much more found among Fulbe, while Mindif centre gatherers are primarily interested in vegetables and wild meat. The Tupuri have equal number of collectors for vegetables and termites, and a larger number of people preferring wild meat, while the Giziga and Mundang gathering actors have balanced interests for the different wild food items. In general terms, gathering actors are more frequent in the bush to look, in decreasing order, for vegetables, fruits, termites, wild meat and for honey.

TABLE 5.12 – Percentage of wild food gatherers and hunters within the household categories

Categories	Vegetables	Fruits	Honey	Termites	Meat	N
Rich	66	50	18	55	29	38
Middle	77	62	39	55	37	66
Poor	63	54	27	44	34	41
Big herder	50	50	0	50	50	22
Big cropper	48	48	36	48	27	33
Total	64	55	28	51	35	200

As mentioned earlier, hunting plays only a marginal role in the food system of the groups. The reduction and degradation of bush areas is accompanied by a proportional reduction of the wild animals. Progressively, hunting has been reduced to a seasonal activity, and has mainly a ritual and prestige role. Furthermore, it has been banned by the Wildlife and Forestry Departments in order to fight bush fires which, most of the times, are the result of mouse and rat hunters. On the contrary, gathering still plays a noticeable part among the groups, providing much of the fruits and vitamin requirements of the diet (*Zyziphus jujuba, Tamarindus indica, Balanites aegyptiaca, Hyphaene the-*

baica, Borassus flabellifer, Ficus gnaphalocarpa, etc.) Food collected from the bush provides the ingredients of the 'sauce', the stew which accompanies the cereal staple every day. In the situation of true shortage and hunger, all the populations revert to a broad range of bush famine products (De Garine, 1988: 237). As it is well known that items related to cooking activity are always associated with female concern in most of the African traditional societies, one understands why wild food gatherers are predominantly women and children.

5.4 Explaining the problematic primary actions: options, motivations, culture and structure

For our analysis, it is necessary to specify the options and motivations underlying these actions and then relate them either to secondary actors in the actors field, or to underlying culture and structure. This section focuses specifically on this issue for the two problematic primary actions at the base of bush decline: new fields creation and commercial firewood cutting.

5.4.1 New field creation

The general tendency in new fields creation is especially the Mundang people open many new fields. This can be explained by population pressure leading progressively to cropland scarcity which seems to be harsher in the Mundang area than in others. But looking in more detail at the status and socio-economic categories of the new field creators there are some other trends. In fact, the new field creation is done by all the ethnic groups but there are some subgroups that do it more than others. For instance, immigrants have a higher tendency to create new fields than natives, and within the immigrants those of Giziga and Mundang areas do more than others; poor households open less new fields, etc. Nevertheless, apart from differences pertaining to capital or capacity, the motivational factors of the new field creation are almost the same for all the subgroups. Hence, we will take the 'new field creators' as a single actor category.

From the viewpoint of the local people, the options for new field creators are (1) make cropland in the unused bush, (2) migrate and settle elsewhere and (3) intensify crop production on the existing field plots. The migration option is not attractive (yet) in the Mindif area. The intensification option is also not really considered as a feasible option by the majority of the people. Following the findings of Den Heijer and De Groot (2000) and considering the wealth base described in section 4.6, it appears that no severe capacity problems exist with respect to intensification. This means that, people in the Mindif area are poor but not so poor that they would not be able to invest in soil fertility improvement and better land management if they would have the knowledge and the motivation. Some knowledge limitations with respect to intensifica-

tion exist but there are possibilities to solve the problem. Institutions such as the state and Sodecoton extension services and NGOs can help if any demand were formulated by the people.

Restrictions with respect to the three options do not predominate. In some areas of the Mindif area (ref. section 3.5 of chapter 3), cropland expansion is restricted to certain areas by the traditional authorities and ancestral culture. However, this has not stopped the cropland expansion up to the present. But in the future, if the present process of progressive bush reduction continues, both the traditional and modern authorities will have to effectively restrict further encroachment of bushland by cultivators. Due to this, and since they have some influence on the new field creation procedure, the land authorities may be considered as secondary actors already today. In many cases, if the bush encroachment continues, it is mainly because these land authorities do not really take actions against it, thus meaning 'no restrictions'.

It can be concluded that the decision of farmers to make cropland in new bush or not is a matter of motivation and not of capacity factors. According to AiC, motivational factors should be elaborated in economic terms such as the cost and benefits of the various options as well as their non-economic normative characteristics such as, in our case, attachment to the land, good membership of the community and status. Underneath, the cost and benefits of the three major options are assessed and all the motivational factors are subsumed under the broad categories of 'cost' and 'benefits'. These terms comprise financial elements such as fertiliser, risk of fines and crop sales but also elements of time expenditure, subsistence use of crops and psychological elements. Both short-term and long-term aspects are included. Some cost and benefits refer to collective action, e.g. the cost of avoiding conflict or the benefit of sharing knowledge. Some costs and benefits are taken up because they may become important in the future.

Cost of new field creation

The cost of field preparation, apart from cutting, clearing, ploughing etc., includes the cost of getting permission from the authorities. Where the bush is abundant, this cost is almost nil; one only has to inform the Djaoro. Where the remaining bush is threatened, however, things are different and depend on the relationship between the applicant and the local chiefs and/or the Lamido. If the relationship is very good on each side, the applicant will get some favour and open a new field almost for nothing. But if the relationship is neutral or not good, especially with the Lamido, then the applicant will have to negotiate seriously with the help of the Djaoro or Lawan in order to get the permission to open a new field. In this case, the applicant may variably have to give a good amount of money to the Lamido under care of the friendly Djaoro or Lawan who acts as an intermediary. The latter also takes his own share by the way. Since there is no standard amount of money to pay

for field opening, it is difficult to say exactly how much the unlucky applicant may have to pay for a new field clearing. In general, people spend on average from 2000 to 10 000 cfa francs for one hectare of new field. This is only done after the villagers have collectively decided under the supervision of the local chief (Djaoro or Lawan) how to organise the village territory's occupation in terms of cultivating, grazing and gathering areas for the year. The new fields are then created alongside the fallowed fields for those who need to enlarge their crop acreage and those who need to open new fields. In general, new fields are hardly opened in isolation in the 'open' bush but more often they are created close to the old fields, thus simply extending cropland into the unused bush. In this way, the crop protection from animal damage becomes easier and is done collectively and passing herds hardly cause harm to the fields. The herdsmen know the place already and take care their cattle do not enter the fields when passing by. In the collective implantation of fields the risk of competing for the same cropland also hardly occurs because everybody knows that the cropland belongs to the first clearer. The risk of fines due to trespassing of rules is also minimised and as well as the risk of going into conflicts with transhumant herdsmen. On the contrary, when a field is created in 'open' bush alone, there exist a great risk of crop damage by animals and conflicts with the cattle owners, unless the clearer makes a solid fence with *Acacia seyal* or *Balanites aegyptiaca* branches.

For well-embedded villagers therefore, the real cost of new fields clearance is then only the energy spent at work and eventually some kola nuts but hardly money or gifts. Only people having problems with the local rulers and strangers have to pay. The collective decision to group the fields makes crops protection and conflicts avoidance much easier. So there is no real expense other than for ordinary plot cultivation, like seeding, weeding, crop care and harvesting. Even bridging the distance from home to field psychologically means no additional efforts to make in terms of energy spent in covering the distance. Hence, new fields appear to be obtained almost for free or at least easily for most people.

Benefits of new field creation

The first benefit of new field clearance is the possible sale of firewood from cut trees during field preparation but the most important benefit is the good harvests expected in the first years of cultivation, even though these harvests decline in later years. This means double profits for the clearer with the firewood considered as by-product from cropland expansion obtained for free. The expenses in terms of energy or money spent in preparation of the field, seeding, crop care and harvesting are largely compensated by the income from selling wood and the good yields in the first years of production. The third type of benefit concerns the property rights of the clearer on the plot. According to traditional and partially to modern rules, as long as the new field clearer stays in the village, nobody can deny him the ownership of his

plots. However, he may lose his rights on the plots and may be chased away from the village in case of particular conflict with a local community or the local chief. For instance if he is accused of witchcraft or of trespassing a strict social rule. As long as the new field clearer complies with the local land use and social rules, he keeps the property rights on his plots and can even continue to open other new fields without any problem. This way, he is also offered the opportunity to make a good reserve of land in prevention of future land scarcity and also to make a 'store' of land for the children.

In general, the benefits of cropland expansion largely exceed the costs. Clearing a new field locally is a low cost and high benefit activity.

Cost of intensification on existing fields

Intensification implies more investments in terms of agricultural implements and inputs, hired labour, seeds, crop care, harvesting and soil quality maintenance. More importantly, like in other Sahelian areas, the Mindif farmers are risk-averse peasants because of the various types of uncertainty attached to their natural and social environments. These uncertainties include variations of climate, unstable markets, insecurity due to the vagaries of state action and laws and poor market information and other imperfections (Ellis, 1993: 82-95). In this context, intensification in the Mindif area looks risky; people have great fear for unsuccessful results. All this results in unwillingness or slowness of the people to adopt innovations that are unavoidable in the process of intensification. From the various group discussions, it became clear that fear of failure is the main obstacle to intensification.

Concretely, the intensifier would have to buy the seeds from the agricultural research institute IRAD, to purchase ploughs and chemical fertiliser from the cotton company (Sodecoton), to buy or negotiate animal manure from cattle owners, to pay money to some people who would work for him during field preparation, weeding, crop care, harvesting, crops storage and transportation. Before all this, the intensifier would also have to pay for an appropriate training to acquire knowledge and mastery of new agricultural techniques and technologies. The land preparation and soil quality maintenance total cost comprise various expenditures related to manure acquisition and transport from the place of production to the fields, bounding, pump acquisition, composting and labour. For irrigated crops such as onions or young fruit trees, capital requirements are really substantial. All this put together represents a lot of money to spend for the intensification process to go through. However, most of these costs may be sensibly reduced if the acquisition of the needed items is organised collectively by the farmers at the village or canton level through village associations such as GICs, AVA/AVP or CD mentioned in section 3.1.3 of Chapter 3.

It should be noted that in some cases, the risk of losing all investments due to insecure land tenure is another cost of intensification, as well as jealousy of neighbours. These cases may also exist in the Mindif area and could be considered as determining factors of non-choice of intensification option. For instance, if the intensifier would be accused of witchcraft practice or homicide, he could be chased and banned from the village, thus losing all the investments he may have done on the land.

Benefits of intensification on existing fields

The benefits of intensification comprise the good and permanent harvests on the same plots leading to substantial income. The problem with intensification is that most of its benefits accrue only in middle and long-term periods, whereas most of the farmers are short-term oriented. Apart from the problem of long-term benefits of investments, the intensification bears some other benefits such as the prestige of being a good farmer, the certainty to leave good land to the children (Timmermans and De Groot, 2002). Intensification means adopting some innovations and being an innovator makes the person become a subject of admiration for the other farmers, but only if he would succeed in his initiative. Otherwise he would become an object of mockery. In other words, one who has the courage to start intensification should make sure that he succeeds in doing it and then serve as a reference for the other community members. The failure would make him look shameful and lose face before the other farmers. The success would not only help the innovator gain some prestige but would also and more importantly help him leave good land with better land use and management model to the children. This would also generate admiration for the family and the village in the history of agricultural development of the region. For example, the people of Makebi, a small village of Lara, where the first extension station of CFDT – Sodecoton was implanted, are always very proud to be cited as first extension agents for ploughing in the entire North region of Cameroon. Likewise, the rich urban traders who created large and beautiful orchards alongside the seasonal rivers around Maroua and Kaélé towns did that for personal prestige and for their children instead of looking for quick money.

Although very important, the benefits of intensification are not attractive enough so as to motivate common farmers to choose this option because of their high costs and they accrue only after a long period whereas the people are poor and therefore short-term oriented due to pressuring primary basic needs that cannot wait. Most of the rural people are surviving through daily struggle in their livelihood, which means that there is very little place for long-term investments.

Cost of out-migration

The prime and most sensible cost of moving is psychological: it is always hard to leave one's home, society and native land. The first difficulty facing

a migrant is to survive the de-attachment from ancestral land because of the fear of the unknown. Leaving one's society for a new one means renewing social life, learning and living with new power structure, new rules and regulation practices, acquiring new rights etc., all things which are not always evident. The second important thing is the transport cost. Depending on the distance to be covered, the migrant would have to take a car, go on foot or use donkeys or horses. In any case, he would have to spend either money or physical energy to arrange his belongings, charge it on the car or on draught animals and then discharge it at the place of destination or even carry them on head. The third problem is the cost of assertion of the property rights. These costs are nil in official resettlement schemes, but may be substantial in situations of settlement in 'open' bushland against the will of traditional or modern authorities like the case of the Tupuri settlement presented in conflict case 2 in Chapter 6. In such cases as we have seen, the risk of going into conflicts due to crop damage by animals or competition between cultivators and the other users of the same land etc., is very high. But here also, the cost may be low if collectively organised. If an important number of people were critically touched by a harsh sanction from land authorities, the group could expect some understanding from these officials. Administrative authorities always try to avoid bad social consequences that may be caused by their actions even if they are simply doing their work as it has been the case for the Tupuri cultivators referred to above.

With respect to property rights, migrating should be considered as two-shaped knife. On the one hand the migrant runs the risk of losing his land rights about the plots he has at the area of origin after more than 3 years of non cultivation, and on the other hand he may have much difficulties to acquire enough good land to open new field plots at the place of destination. It will then take a lot of money, chicken, kola nuts and psychological investment in new social relationships development to obtain field plots and more importantly, get definite property rights on the plots.

Field negotiation with the local chief does not bear a standard cost and everything depends on the impression the applicant makes on the chief. Nothing is really clear about what and how much to give for a given surface of field. In general, one who makes good impression on the local chief obtains more favours and in the reverse situation the applicant would have to spend much money and time to get the same thing. Since nothing is systematic about the amount of money to pay for a piece of land, it is hazardous to give a price to 'arrangements' with the local chief. The final price in such negotiations is determined by some individual factors such as the origin of the applicant, his ethnic group, political background, the reason which made him leave the place of origin, the situation of land to crop in relation to the remaining surface of unused bush in the village, etc. However, some chiefs who try to be

impartial use the land-lending price practised in the area, thus considering that the applicant has been lent some land to crop by the chief.

In case of official or collective resettlement, these costs would be very low because the administration and eventually some other institutions interested in the given population move, would partially or entirely take charge of the costs.

Once at destination, the migrant will have to support the costs of houses construction, learning about existing power structures and soil properties, building up new social networks etc. These costs may be less if building of houses is organised through mutual help groups or with the help of family members or friends present in the area, if knowledge acquisition and sharing is organised collectively and if moving is done collectively or if people move to places where clan members are settled already. Alongside the social integration cost, the migrant will also have to face the cost of field preparation which comprises arranging with the local authority, cutting, clearing, and ploughing.

Benefits of out-migration

The first benefit of moving is the sale of firewood either from cropland preparation or simply from the bush while waiting for the cultivating period. This is only possible if the demand exists, however. The other benefit concerns the good harvests of the first years if the migrant gets fertile portions of land. But the more important benefit with respect to cultivating is the property rights over the new piece of land, something which is not so often evident. In addition to this, there are also the benefits related to avoidance of land competition if there would be enough unused bush in the new place and to the freedom from old ties. This freedom includes the avoidance of other forms of conflict at the place of origin. This offers the migrant the opportunity to build up his own authority and prestige. He has the possibility of building up a new image of his family and virtually expand his 'home' including both in place of origin and destination. At the place of origin where he is a native, he will always have a place whenever he decides to go back while at the same time he is trying to make a new 'home' in the new place of settlement. With good friends and good relationships with the authorities, he may gain importance and power, and even become a notable, thus becoming a powerful member of the community. Then, he would have two homes at the benefit of children and relatives. One example of such case is that of the first Lamido of Midjiving who was a Mundang coming from Léré in Tchad, and who decided to settle close to the Giziga area. He negotiated and married many wives from the neighbouring Giziga villages of Moutourwa chiefdom and decided to use the Giziga language for communication within his own kingdom. The population of Midjiving progressively became mixed, composed of Mundang

and Giziga. This has helped the Midjiving canton to live in peace with the two neighbouring cantons of Moutourwa and Boboyo.

The overall impression one may have is that the costs of moving are psychologically and financially so important that they overrule the expected benefits. Consequently, if not compelled by some events, people are not inclined to move from their present place for a new one, especially if there is a possibility to expand cropland in the same place. For many people, however, intensification comes only in third position after cropland expansion and moving to somewhere else.

Underlying cultural and structural aspects

The collective action and cultural aspects of the motivational list may clarify also why different ethnic groups have a different overall behaviour when it comes to cropland expansion, intensification or moving out. Of the Dogon in Mali, for instance, it is said that they are well capable of organising collective action in times of stress such as drought; they survive not by moving out but by staying put and helping each other. In the Mindif area, Den Heijer and De Groot (2000) have speculated that the more cattle-attached Fulbe would be later 'intensifyers' than the more land-attached Mundang. Scholten (Peter Scholten in prep.) studied collective action among the Tupuri and speculates that the Tupuri are well able to support each other in situations of new settlement but not when land qualities decline; this would make them good 'movers' and poor 'stayers' and intensifyers. We may note also that in their history the Mundang are more fixed to their place compared to the more 'volatile' Tupuri, while Fulbe are divided between sedentary Muslim urban people and nomad Mbororo pastoralists.

A speculative conclusion is that the Mundang are more likely to be the first to start intensification if they feel the necessity and have the financial capacity to afford the costs. They may be followed by either the Giziga or Tupuri who are also cultivator by tradition. Of the cattle-attached Fulbe, the urban El-hadjis may try crop intensification if the opportunity presents itself. For the moment the costs look too high in the context of high risks with respect to market crop inputs and outputs imperfections, to high variation of rainfall, to high costs of new technologies acquisition and maintenance. As for the bush-attached Mbororo nomads, it is unlikely that they settle, let alone intensify in the near future, even though a few exceptions have been observed.

Traditionally, the collective action capacity exists among all the ethnic groups, based on the solidarity principle. Due to external influence through religion and modern schooling, some subtle differences are now showing up from one group to another. In the current situation, the Tupuri have a higher collective action capacity compared to the three other groups which more or less limit solidarity to cases of emergency. These may be political events,

droughts or other unexpected events leading to harsh famine or any other forms of suffering. In normal life, collective action is often restricted to the level of family members and seldom to extended clan members. Apart from this, broad schemes of collective action are often influence by modern religions such as Christian Church and Islam.

In the long run, the population will increase, which will make more labour available, generate more intense flow of ideas, thus bringing in enabling social conditions for the adoption of innovations (Boserupian theory). These are given full treatment in Chapter 7. Moreover at the regional level, population growth may create larger urban markets and a spreading of intensive agriculture around the urban centres (Thünian theory).

5.4.2 Commercial firewood cutting

For the village firewood sellers, commercial firewood activity comes in support of cultivation, as additional income source. Due to the increasing demand in towns, firewood became a cash income generating good in both urban and rural areas. For urban people it became very profitable, especially for large dealers investing in large trucks to carry wood from selling points of the villages to towns.

The firewood cutters in the village have three options; (1) tree cutting in the natural bush, (2) making a private tree plantation, (3) trading other marketable items. Although people have the capacity to carry out some alternative activities, they choose firewood selling. Motivations are described underneath.

Cost of commercial firewood

The costs of firewood exploitation vary between urban and rural dealers. For the peasant rural cutters, the costs comprise the energy spent at work, meaning felling, arranging, splitting, transportation and selling at the roadside. Peasant firewood dealers have to leave their other activities while cutting and transporting wood from the bush. This means some hours of work which could have been allocated fruitfully to other income generating activities such handicraft, building of houses, petty trade, etc. As the necessary financial capital to start these activities is not easily available, peasants find it more convenient to fell trees for sale the near bush. Here they have nothing more than their energy and time to spend in order to get profit. As they do not consider their energy and time costly, they see the commercial firewood dealing as totally profitable activity bearing no or very low cost. Because of this positive perception of commercial wood, they sell it a very low price compared to that in town.

The low rural price leaves a large margin for traders, which is why it has attracted large urban dealers. For the urban dealers, the costs of commercial firewood include the cost of cutting permit, the cost of fuel and vehicle main-

tenance and the cost of road control by MINEF line agents and sometimes policemen. In order to operate quietly in the commercial firewood sector, the dealers have to obtain the cutting permit by paying a certain amount of money to the provincial delegation of MINEF in Maroua. Since he uses a truck to gather a large quantity of wood from the bush or village selling points, the dealer has put fuel in the vehicle, to keep the car in good state of functioning. Apart from these basic precautions, he has to pay transport fee (peage and technical control of vehicle) and sometimes has to negotiate with MINEF line agents if they happen be out in order to check out and control the quality of wood being transported. It should be noted that the cutting and selling of fresh wood is strictly forbidden according to the state laws and the MINEF agents have the duty to ensure that the dealers comply with this regulation. If not, the trespasser would be sanctioned and would have to pay fines to the state. For some dealers who use their own cutters from town, there is an additional cost for the payment of these workers. As an example the monthly amount of all these costs represent on average 160 000 to 200 000 cfa francs for a pick-up vehicle.

Benefits of commercial firewood

Usually the local people take the wood from the bush for free and sell the bundle of firewood representing roughly 15 kg to urban dealers at the price of 200 CFA. This bundle of 15 kg is sold at the price of 600 CFA in town. The village sellers can gather up to 3 bundles a day, especially in the dry season when most of the time consuming other activities are on a hold. This makes 600 francs per day or 18 000 francs a month at maximum. Contrary to village sellers, commercial firewood generates huge monetary gains for urban large dealers. The cutting permit is delivered to the large dealers for a period of 3 months. Since the distance between the town and the bush or village selling points turns around an average of 30 to 50 kilometers, a pick-up can make 3 to 4 rounds a day. In one round, a pick-up takes from 40 to 60 bundles, which means some 160 to 200 bundles a day and 4,800 to 6,000 bundles a month. This makes from 960,000 to 1,200,000 cfa francs per month at maximum. The monthly beneficial margin ranges from 800,000 to 1,000,000 cfa francs. Profits are even larger for those who use larger trucks such as 15 tons or 20 tons lorries.

Cost of trading other items

A distinction should be made again between urban large dealers and the rural small sellers. For the urban people there is a cost of business transactions including registration and various forms of taxes, the transport cost including negotiations with policemen and some civil servants in charge of customs duties, transport regulation etc. but all these do not really exist for the small rural traders, except the unique tax called 'impôt libératoire'. The latter freely go to the market and buy some goods to be sold in the village without any burden from civil servants. Apart from this, the two categories of

traders have to afford cost of transportation and various transactions, the cost of financial capital to start and run the activity, the cost of storage, the cost of risk related to eventual loss of products due to the combined effects of lack of market demand and bad conservation of the articles. To all these one may even add the cost of labour and some miscellaneous. Starting trade business requires some amount of money and social networks which rural peasants usually don't have, and the urban people who have many other opportunities have to go through an opportunity analysis of cost and benefit before choosing the option which yields more money in the current context.

Benefits of trading other items

Trading other items represents other income generating source through possible benefits and profits accruing after the trading cycle transactions. In general, a commercial sector is selected based on a cost benefit analysis. Trading other items also represents a kind of diversification of income sources for the trading households. This helps compensate eventual losses from other activities when the context becomes non-opportune to them. At the moment the firewood selling presents the best opportunity cost and benefit and that is why it has been preferred to other trading items by urban people and rural commercial firewood dealers.

Cost of private tree planting

To start a tree plantation, the operator will have to get land by arranging with the local chief. Since tree plantations are not common in the area, the local chief will not be very eager to give a portion of land to someone who wants to try a private plantation.

Therefore, the land will be obtained at a higher price than usual and the fruits accrue only after a long period of time. If he wants to keep the property rights definitely, he will have to start a titling procedure, which will cost money. The cost of land acquisition may be lower for natives of the area, however. Besides, the private operator has to buy all the necessary working tools and inputs. Then he will have to afford the cost of labour for land preparation which includes cutting of trees, cleaning, digging holes and filling them with some tree nutrients inputs, transplanting of seedlings, fencing to protect the small trees from animal damage etc. There are also the costs of knowledge acquisition and project feasibility analysis by an expert. Before this, the tree cultivator will have to buy the seedlings from ONADEF or municipal seeding units. After all these costs the operator will have to support the repetitive expenses related to labour for tree care which includes treatment, watering and protection for at least four to five years before the first harvest happens. Here also should be included some costs pertaining to technical advice and control of the civil servants who usually ask for fuel to move from their office to the place of intervention which is here the tree plantation. Then the labour costs of planted trees exploitation will set in with cutting, splitting, binding,

loading on lorries, transporting to the selling points, to which some transactions costs should be added.

Benefits of private tree planting

The first advantage of private tree planting is permanent supply of firewood for the community and for home consumption of the dealer. The second benefit may be the permanent income source for the household, freedom from natural vegetation dependence, hence reduction of state's property right and intervention, civil servants' and local chiefs' power abuse. Other benefits are the maintenance of good land through better soil fertility maintenance enhanced by the presence of trees. The place may be used for other purposes in the future in case of necessity. This sustainability may bear some benefits for the global environment in terms of processing and regulation functions to entire region. Some benefits may accrue to the local community through exploitation taxes and salaries of tree plantation workers. Besides this, the operator will have a personal prestige and honour of rendering public service to the community members, and will mark the history of firewood production in the area. This innovation will also serve the interest of international community as a significant contribution to scientific debate on the best way to deal with firewood supply sources or production schemes. But for the moment, nobody knows whether private tree planting for commercial firewood is profitable or not. And nobody seems to have the courage to try.

Underlying cultural and structural aspects

As already said, tree cutting for firewood used to be a women's activity till the recent boom of firewood trading. Now that the men have discovered the financial advantages of firewood selling, some of the male commercial firewood cutters may think of private tree plantation, because men are usually engaged in cash income generating activities (Ellis, 1993: 178). But this interest for private tree planting could be transformed into reality only if they are convinced that the natural bush wood is finished and/or if this activity presents a good opportunity. This concerns mainly the Tupuri, Giziga and Mundang groups who have almost neutral attitude towards firewood dealing nowadays but who still tend to believe that the bush will never finished since God is there to make sure that this never happens to mankind. The sedentary Fulbe would try private tree plantation for firewood but only if it proves to generate substantial profit. Whereas the Mbororo nomads are very far from envisaging a tree plantation in the Mindif area whatever happens. For them, firstly God would not be so bad to let the bush wood get finished and secondly they still have the possibility of moving somewhere else.

5.5 Identifying the linkages between primary and secondary actors

Secondary actors (and their actions) are all those that have a significant influence on the options and motivations of the primary actors, as elaborated above. In order to build up the actors field as concretely as possible, actors are noted for each of the factors related to options and motivations. This yields ideas and elements for more general discussions of these actors in later sections.

New field creation
Cropland expansion is connected to agencies propagating the use of a plough and sometimes supplying credits to buy it. In our case, it was Sodecoton that introduced the plough in the 1950s and it usually provides farmers with credit to help them buy it. In recent days some NGOs have joined Sodecoton in agricultural credit supply to farmers. In that domain we have Credit du Sahel and SAILD, for instance. The cost of seeding or crop care is connected to agencies developing new crops and care systems such as Sodecoton, PNVRA, IRAD, and DPGT.

The cost of conflict or conflict avoidance comprises the risk of fines from land authorities (civil servants, local chiefs) when trespassing rules but also the risk of crop damage by passing herds and/or the cost of going into conflict with others, be it herdsmen or with people competing for the same cropland. The farmer takes the risks of going into conflict and to assume all the consequences of such events if they really happen during the growing period. These costs are connected to the modern State, traditional authorities and to groups or authorities protecting the herdsmen or other bush users (ref. conflict case 1 of Chapter 6 opposing Mbororo nomads and Mindif centre sedentary cultivators.

The benefit of cropland expansion through the sale of firewood from cut trees is made possible owing to the existence of firewood traders motivated by the firewood demand in towns. Likewise, the benefit of cropland expansion through the sale of extra quantity of crop is made possible by the presence of actors that operate in the sector and organise the market for inputs and outputs. These actors include Sodecoton which is more important in this respect, but also crops traders including urban Muslim elites, and transport companies.

Intensification on existing fields
The intensification process bears some costs pertaining to knowledge and seeds acquisition which link up the operators with the institutions such as IRAD, Sodecoton and INADES- formation. Besides, the costs of land preparation and soil quality maintenance through manure finding/production and

transport, bunding, acquiring a pump, composting etc., make a link between the option and motivations of the intensifiers and the state extension programme, PNVRA and some NGOs such as Credit du Sahel, CAFOR, SAILD etc. The cost of the risk of losing all investments due to insecure land tenure is connected with the land authorities including both state, line agents and traditional rulers. The benefits of intensification on existing fields link up the intensification actors with the urban dealers and rural people looking for new income sources through wage employment. The village people offer a low-cost wage labour to the intensifyers.

Moving to somewhere else
The cost of moving with respect to de-attachment from the ancestral land links up the motivations of the migrant with his society or community of origin. The costs of new fields acquisition and that of assertion of the property rights represent links between the migrant and the new land authorities in the area of resettlement, meaning modern authorities state and traditional rulers. The transport cost is connected with the transport companies and eventually draught animals sellers. The cost of learning about existing power structures, soil properties etc., is connected with the members of the new community of resettlement as well as does the cost of building up new social networks. The benefits of moving with respect to the sale of firewood from cut trees links up the actors' option/motivation with urban firewood traders and other travellers of the main roads. The advantages of moving in terms of freedom from old ties and opportunity to build up one's own authority are connected to both the communities of origin and destination.

Commercial firewood
Firewood cutting for sale connects the rural cutters with large dealers and the latter with urban consumer households. Trading of other items establishes a link between the traders and the consumer households of both rural and urban areas.

Private plantations link up rural people and urban dealers and consumer households. It also makes a link between the tree cultivators and the land authorities, civil servants and with some institutions such as ONADEF and the Municipalities which operate in seedlings production.

5.6 The secondary actors and their context

Now that the secondary actors of the two actors' fields (new field creators and commercial firewood cutters) have been identified, tertiary and quaternary actors can be added so as to make a complete actors field. One may already note that many actions and motivations in the case of Mindif land use problems are strongly interwoven and concentrated in the hands of relatively few

secondary and tertiary actor categories. This section gives an overview of the roles of these actors.

As has been already mentioned earlier, influences on livelihood activities stretch beyond the immediate farm setting to external influences, including extension recommendations, incentives provided by development projects, market prices, and legal constraints (Scoones et al., 1996: 94). This influence follows the lines of social determination standing from the socio-economic and power structure of the society. This line of influence functions irrespective of whether these actors know each other, see each other, or not. With respect to this line of reasoning, the main secondary actors for the bush decline are the administrative and traditional authorities, the civil servants, the cotton firm, Sodecoton, the developmental projects and NGOs and the markets and traders. But as we will see below, the secondary or tertiary actors do not seem to have more than a maximum of two or three options between which to choose.

Civil servants

State line agencies (refer to section 3.2.2. of chapter 3) are the feet and the legs of the state for the operational work in rural areas. The civil servants, administrative and traditional authorities serving on behalf of the state institutions, have the duty to regulate social and economic activities nationwide. They have to comply with the law to ensure the continuation and the enforcement of the state regulations. Formally, they do not have many options than doing what they have been devoted to, and to work out with local people all possible ways of improving the regulations to adapt them to the changing world. Whether the state laws are fully implemented or not, whether they are known to local people or not, depends on the degree of intensity of the line agencies' field work and willingness to explain the legal principles to local populations. Here again, their efficiency in the field is mixed and even contestable when one looks at the result in terms of land and bush use regulations.

The growing financial limitations of the State led to a gradual loss of control over the line agencies. As the state is unable to provide them with necessary materials and good conditions to be operational, they cannot work, and no work means no report to make to higher-ups in the hierarchy. Due to this situation, the respect for superiors has reduced over time, to the extent that hierarchy hardly means anything to low grade agents nowadays. Besides, the growing importance of informal ways of solving social problems, including the use of kin relationships, enables lower grade agents to circumvene the formal power of their administrative superiors. The common expression used to depict this fact is '*au Cameroun on ne sait pas qui est qui, et qui peut faire quo*' meaning in Cameroon today, nobody knows who is who, and who is able to do what. The collapse of the state power provoked by the fall of its financial capacity to provide satisfactory working conditions to civil servants

has degenerated into a generalized disobedience within the whole state apparatus. This in turn has induced corruption to become the common mode de vie of civil servants. Professional ethic and moral satisfaction of good administration have disappeared and been replaced by the art of having well placed social relationships to protect one's position and cope with emergencies.

Traditional rulers

Being keepers of local traditions, the canton chiefs are supposed to be the voice and the spokesmen for their people. Following this line of reasoning, they have the duty to work out with local populations a genuine integration of traditional and modern formal social institutions with the aim to enhance a smooth movement of social change from a purely traditional to an integrated society. This should be conducted through a process that takes into account the basic interests of all the sub-groups to guarantee peace and equity among the people as clearly suggested by the 1974 land law. The general political issue here is to shift slowly from traditional and monoethnic societies to an integrated multiethnic society which provides conditions with enough flexibility to incorporate positive modern elements. The idea behind this is to avoid brutal social change which may bring in more problems than solutions to local populations who are busy with the daily struggle for survival. For these sociopolitical reasons, the state authorities allowed the local chiefs to decide over land allocation at the level of their respective territories. The results with regard to these sociopolitical aims so far are marked by a mixed success. Depending on their personalities and their political inclinations, local chiefs have different levels of achievement with regard to land allocation.

The frequent implication of traditional authorities in black market transactions about land rights and rules has been followed by a growing disrespect towards these bearers of traditions. A local wisdom states that, one who wants to be respected should first show respect to himself. And respecting oneself here means complying oneself with the rules of doing things in the conventional or normal ways. This is locally expressed by 'feeling the shame' (*avoir honte*). According to the populations, since the chiefs do not feel ashamed to get involved in illegal transactions to make money out of the common land, they do no longer deserve respect, because they don't respect themselves either. Consequently, the former allegiance to canton chiefs has tremendously eroded.

Politico-administrative elites

The elites, either local or supra-local, are people who normally have no specific duties with regard to land use. But on the request of family members or for personal purposes, they intervene in the land use dynamics, thus having variable influence on the actors' options and motivations. The actions of the elites come through financial support of family members, land appropriation and titling, investments in housing. Support given to relatives helps them

invest in agricultural implements or draught animals and enlarge their fields with the aim to increase production. Many of native elites also appropriate large surfaces of land through registration and titling, and most of the time the appropriated land is former cropland. This means pushing the former owners who conceded their farm land, willingly or not, to look for new farms in the surroundings, or somewhere else. As they have the financial capacity for investments, some elites build large compounds in the villages, thus occupying plots of home fields whose owners then have to go clear bush to create new farms. In one way or the other, native elites do have influence on the primary actors, at least to a certain extent.

Besides this fact, the emergence of powerful politico-administrative elites has provided additional source of power for local people who can count on them and ignore the chiefs. Through contamination, the disrespect towards local authorities is being generalised to all the traditional institutions. All the traditional values and customs are declining, being progressively replaced by new ones, and not always good ones.

Sodecoton

The cotton company is motivated by profit making. As a commercial institution, it has to increase its rates of benefit in order to maintain itself. To increase cotton production the cotton company provides some incentives to producers in the form of rural credit to help farmers purchase agricultural implements, chemical fertiliser, pesticides, and extension agents for other production activities. By offering these facilities to cotton producers, especially through AVP/AVAs (see Zuiderwijk, 1998: 168-175), the incentive of Sodecoton encourages local populations to enlarge their fields into the unused bush areas. This is how and why it contributes to more and more new cotton fields creation, thus motivating more and more bush encroachment in the Mindif region. Besides the cotton production activities, Sodecoton is selling various types of linseed cakes, a waste product of cotton than can be fed to cattle. This provision of linseed cakes makes it easier for the pastoralists to solve the problem of lack of fodder during the dry season and some people may keep their herds from transhumance. Thus, Sodecoton provides incentives for both farmers and herders to increase or at least maintain their activities.

Projects and NGOs

The development projects and NGOs offer funds to finance development activities in the rural areas. Their funds come in support of the extension activities in specific sectors. They help in the adoption process of some new technologies or forms of organisation which have proven more efficient in production or management of the natural resources. In doing this they may encourage or stop people from clearing bush. One example is the attempt of INADES – Formation and CDD to disseminate and encourage rural popula-

tions adopt the improved or low-firewood stoves (foyer amélioré) in order to reduce the use of firewood and hence reduce bush decline. Even if the current attempts so far have a small effect on the intensity of bush wood cutting, there is still hope for a positive effect in the long run provided that these and additional institutions insist and persevere that way.

Market and traders

The rise of the food crops and firewood prices encourages people to produce more than needed for simple subsistence, and rapidly some people have taken advantage to involve themselves in these new trade channels. The development of the local markets for food crops has generated increasing crop production for market demand. Some traders come to rural producers and make transactions for crop production before harvest, especially for muskuari, through contracts based on mutual trust. In doing this, traders encourage producers to enlarge their field plots, thus clearing bush for new farms, and hence contributing to bush reduction. The same applies for firewood with the steady increase of demand in towns leading to intensive wood cutting for sale from bush areas. The emergence of large dealers in the firewood business plays an important role in the acceleration of decline through intensive tree cutting, whether for new farm creation or intentional cutting.

6 The Institutional Factor in Bush Degradation

This chapter focuses on the current land and bush use rules and regulations. As we will see, these rules and regulations are unable to take care of bush protection and conservation in the long run. Three examples of land use conflicts are then presented in section 6.2. to illustrate the role played by the lack of accurate implementation of the state laws in land use and natural resources exploitation. From the identified weakening elements of the present bush regulations, the chapter makes a prospective analysis for the future of the study region with regard to the bush' progressive disappearance.

6.1 Bush regulations: local and government laws compared

6.1.1 Traditional bush use regulation

The traditional regulation of land and bush use is based on collective ownership based on the principle of social solidarity under general supervision of the Lamido. Following this principle, land is allocated to someone by the Djaoro, Lawan or the Lamido himself according to his food needs derived from the size of his family (De Garine, 1988: 242). Although the land belongs to the Lamido, the organisation of land use and land management pertaining to land allocation for cultivating, grazing or firewood cutting is done at the level of the village under the supervision of the Djaoro or Lawan backed by some notables. Households used to have common objectives for bush use, implying the participation of all the individuals in conservation or protection measures. These consisted of common planning of bush activities according to their seasonality and avoidance of bush resources destruction in order to conserve this asset for future use. For instance, fruit trees of the bush were strictly protected from cutting and it was forbidden to collect the fruits before they are ripe (Kerkhof, 2000: 16). Tree cutting in sanctuaries or protected groves were strictly condemned by traditional rules in many villages. Bearing in mind the collective welfare of the kinship, only necessary quantities of bush resources were taken for household consumption (Niamir, 1990: 42). This traditional land management is usually depicted as being in harmony with nature. This view suggests that the sustainability of natural resources comes out as a result of intentional actions of the people. Actually, this intentional harmony is questionable in the Mindif area. Most of these former prescriptions are being forgotten nowadays. In fact, the sustainability of natural resources in situations of traditional management is a consequence of the combined effects of many factors of which care for future or intentional actions are one part, but low population densities another.

Customary tenure rules had a strong hold on the population and the land use regulations were strictly implemented and followed up. This form or social organization helped people to overcome the bad consequences of unexpected events such as droughts, the attack of insects, inter-ethnic wars etc., and survive collectively. For instance, a household which gets short in food may be supplied by a family member or obtain loans in cash or kind from relatives in order to overcome these temporary difficulties. This household is expected to have the same attitude towards other families when it is in position to do so, either for the similar case or for other forms of difficulties facing their relatives.

The necessities of food security also pushed the ethnic groups to develop social networks with the neighbouring villages about land use and land rights. As already said earlier, the social organisation of each ethnic group provided room for in-migration and out-migration. These social provisions provided people with many ways of getting land and the correlative rights of use. This means that they can have access to land for cultivating both in their native village and in the other villages, thus increasing their land security potentials.

The socio-cultural context of the past has contributed to the maintenance of a certain homogeneity at a low level of efficiency in livelihood activities. Indirectly, this helped saving the bush from destruction for cropland expansion as the food demand did not increase significantly. The existence of taboos, associated with animal totems, although not intentionally, has contributed to bush protection (Niamir, 1990: 41). The existence of places where strata of society should not go has helped to keep these areas safe from destruction by humans. Most of this is now dying away, with many people now violating these taboos, sacred places and increasing their crop acreages at will in the Mindif area nowadays.

An economic factor which acted in favour of bush conservation was the lack of a market for bush products. The fact was that the number of mouths to be fed was very low compared to the availability of land and bush products, and everyone had access to the large stock of nature. Neither land nor bush items were marketable as there was no demand, and the bush could be safe or decline only very slowly.

With respect to traditional land use regulations, there was no significant difference between the ethnic groups. Chiefs always had the last word for any decision on land use and people with special skills, such as large hunters, large herders had to pay special tributes to them in order to continue their activities.

Within sedentary groups, the rights for housing overrule those for cultivating, which in turn overrule the rights for grazing. This is the order of priorities within

the sedentary rural societies: physical health through shelter, followed by food to sustain health, and then grazing for livestock which improves one's livelihood. Needless to say, the nomads developed the reverse situation in which the rights for grazing come before those for settling. Since they did not crop, the rights for cultivating did not exist either. As everything comes from it, cattle represent the most precious wealth base deserving all the necessary care from the owners. Mbororo women often complain that cattle herds take up all the attention of their men. Apart from these differences, everybody was free to carry out any activity provided it did not bring any harm to other people of the community. In fact, variations observed in land use regulation practices were much more related to the specific character or personality of the local chiefs than to differences in the customary rules or principles.

The power of customary laws is in decline due to market incorporation and rapid population growth. The progressive invasion of the market economy is accompanied by the emergence of individualism, thus breaking down the former social organisation. This decline of the former solidarity which was at the base of land and bush resource conservation, is exacerbated by a variety of other factors, such as the break-up of tight lineage-based groups through population growth, lineage fission, in-migration of outsiders and the growing impoverishment of rural populations. There is also a change in attitude and the loss of a sense of community and belonging brought about by disputes, jealousy and witchcraft. The former solidarity and discipline characterising the use of bush products and resources has disappeared without being replaced by a new, well-accepted formal law. In many villages of the Mindif area, 'take and go' has become the rule in bush related activities (De Garine, 1988: 246). The case of firewood cutting is one of the shining cases. Everybody, either outsider or native, freely enters the bush and takes whatever he wants at will. Due to increasing demand for bush products, some of the former sacred groves, special tree species surrounded by mysteries and unnatural beliefs are being violated and destroyed. In some villages, every part of the bush has become profane and can be used for any purpose nowadays. Consequently, natural resources are being depleted due to lack of social responsibility. Nobody feels like taking care of the future of the bush and the living conditions of the rural areas.

Local chiefs at present need almost super-human levels of morality and long-term vision to continue allocating land for the good of the community and the future, instead of simply allowing any request if backed up by enough money. In other words, local chiefs need to be embedded in a strong state implementing future-oriented laws. That is the subject of the next sections.

6.1.2 The 1974 land law

Land use in Cameroon is regulated by the 1974 land law. The objectives of this law were to guarantee property rights to all sectors of society, with special care for the smallholder farmers, and to secure customary land rights for the rural communities in accordance with the local traditional rules. The idea was to avoid a brutal shift from customary land tenure to modern regulations for the majority of uneducated rural population. The spirit of the law was to stimulate national social integration and the development of smallholders' agricultural production. The provision of equal access to land for all the citizens was meant to enable people to settle in whatever region they liked without running the risk of being refused land for economic activity by the local authorities, especially administrators.

The provisions of the 1974 land law also meant to put an end to power abuse of the local chiefs. To get rid of this situation, the law divided the national territory in three types of land: national land, private land and state lands (Enonchong, 1999: 100). The unused bush falls in the first category, i.e. national land. This means that local communities no longer held their statutory rights of ownership, allocation, and control over their territory, including forest, fallow land, pastures, all of which became the state's exclusive property. The local populations can only exercise rights of use and exploitation through cultivation or occupation (Fisy, 1992: 34). The law provided the possibility for individuals to acquire private property rights over their piece of land by applying for a land title through a long and complex administrative procedure.

The 1974 land law expresses mainstream ideas on the conditions for economic development at the time of its conception. The equal access granted to all individuals expresses the notion that maximum competition will lead to maximum efficiency. It emphasises and values national integration as forwarded by the political authorities, and facilitates middle size farmers production for agricultural development. It also provides the possibility for private appropriation which in turn may play in favour of investments in the land. Finally, the jure abolishment of community property expresses the adage that land should be either state-managed or privately owned in order to prevent a tragedy of the commons.

Although relevant in its spirit, application in the field has failed to reach all the goals in practice. In fact, this law has brought in more problems than solutions. The expropriation of land property of local communities did not give the expected results because both local populations and traditional rulers were against it. From the colonial period till today, the administration has always relied on traditional authorities to have control over the local populations. These traditional chiefs have always been able to help because they had the exclusive land ownership through which they have power over the populations. Therefore, any loss of control over land also means a loss of con-

trol over people. Consequently, the state administration was forced to make a kind of agreement with those local chiefs and let them continue their reign over land to a certain extent, in order to get their collaboration in return.

The refusal of this law by the local populations is due to the fact that, in their conception, man is nothing without land, and there is no kingdom without a territory over which to command. A traditional wisdom says that, 'a chief without territory does not exist'. Due to these social and cultural elements, the local communities have never accepted the 1974 law's basic concepts (Van Den Berg, 1997: 195). Obviously then, the 1974 law does not provide local chiefs with incentive for community-oriented and future-oriented decision.

6.1.3 The 1994 forest law

In addition to the 1974 land law, there is a complementary and more recent law issued in 1994 focusing on the use or exploitation of the forest. Meant to set clear rules and regulations of forest management, this law presents gaps for the savannah or bush areas of the Northern region. The 1994 forest legislation does not make a clear distinction between rain forest and savannah vegetation. The law refers especially to moist forest and forgets about bush cover and bush use found in the North region. The spirit and the main objectives of the 1994 forest law were to make the exploitation of the rain forests more profitable for the government and to ensure better conditions for the sustainability of its biodiversity. The new law introduced some new dispositions enabling the large exploiters to have time to invest in regeneration of the forests in which they operate so as to assure the permanent availability of the moist forest with its biodiversity. Besides, the state also wanted to have a better control of the activities in the forest zones and the quality and quantity of the trees extracted by the logging companies.

In North Cameroon, the Ministry of Environment and Forests tries to adapt some dispositions in this 1994 forest law in combination with the 1974 land law in order to regulate the bush use. As a consequence of lack of vehicles and other displacement means, however, the agents are almost obliged to take taxes from applicants and deliver tree cutting permits to them without having a clear knowledge of the situation of the bush area where the cutters go to. This meant that they could not check whether the norms of cutting were respected or not or whether the areas present environmental risks or not. This absence of verification led to a generalized uncontrolled tree cutting in the form of firewood exploitation (see section 6.2). No follow up of civil servants resulted in no follow up of bush activities which in turn resulted in uncontrolled bush destruction, leading to progressive bush disappearance as observed. As we will see in more detail in section 6.3, the combination of absence of forestry agents on the field, the confusion around bush use rules, the stronghold of local customary rules gave room to a series of illegal practices oriented at personal profit making for the various actors. Farmers, herd-

ers, wood cutters for sale, all of them try to maximize their gains in carrying out bush activities using their bargaining power to reach their aims.

With respect to firewood cutting, civil servants hold the formal right to give permits to prospective firewood cutters. This is a source of many cases of misbehaviour, misinterpretations and misuses of the state laws for personal gain. For instance, a control agent of the Ministry of Environment and Forest who has the duty to verify whether commercial tree cutters have their authorisation or not, will instead take bribe money from law breakers and let them continue their illegal activity in peace, while at the same time he takes away the wood cut by common villagers under the cover of law implementation, and uses it for his own consumption. The impunity of misbehaving actors and the state's inability to supply its workers with good working conditions, the politisation of the land rules and the heavy administrative structures and procedures for land title acquisition, etc. are crucial factors in the progressive disappearance of the bush in the Far North province.

There is no real control and follow up of tree cutting in the bush areas with the local people being partly involved as actors and mostly powerless spectators of the bush depletion by large dealers from the towns. Moreover, the vague formal rules due to unclear classification of bush with regard to landscape categories distinguished by the laws, and to the poor implementation of bush use regulations, have enabled the local exercise of power to take advantage of the situation for the benefit of a local political administrative 'bourgeoisie' as stated above. This state of affairs has generated an ambivalent situation: while land is becoming more and more scarce for the natives, in-migration of outsiders is still accepted. This is because the openness of the traditional societies to in-migrations is still a reality on the one hand, and the state 1974 land law allows land access rights to all citizens wherever they are within the national territory, provided they get permission from local traditional chiefs.

6.2 Case studies of bush resource use conflict

In the present stage of the bush decline, the nomadic herders are the large losers. This section presents two cases of conflict between nomads and (expanding) cropland farmers in the region. A third case is about divergent interests conflict opposing two categories of bush wood exploiters. The cases are the same as in Chapter 5. Only, I give more detail here, focussing especially on the role of institutions and authorities.

CASE 1 – Nomands and cultivators around Mindif centre

Neither traditional nor state rules restrict access of outsider herders or other bush users to the bush areas. Herds from other villages and nomads have all the right to use the rangeland around a village. At the most there is a system of customary rights which gives more weight to cultivating compared to grazing for the use of bushland. In the project area between 1978 and 1988, the Mindif-Moulvoudaye Project created grazing blocks from which nomads were excluded; to better handle the desired controlled system of grazing, the project decided to work only with sedentary cattle herds. These grazing blocks were considered protected areas, and therefore, were ruled according to the corresponding state laws. This exclusion of the nomads worked during the life time of the project. As there was no follow up after the project closed down, the grazing blocks were invaded by cultivators and the (Mbororo) nomads also came back to their traditional sites, thus creating competition between them and local farmers.

As a consequence of uncontrolled use of the grazing blocks of the former Mindif- Moulvoudaye Project, a conflict arose between twenty cultivators and some nomad groups during the growing period, July – August 1997. The cultivators, composed in majority of Tupuri but including some Giziga, Mundang and others, raised complains at the subdivisional office (the sous-Préfet), accusing some nomad groups to let their cattle destroy their crops. When informed of the cultivators' complaint, the concerned Mbororo nomads called on the traditional Mindif canton chief (Lamido) for discussion session as recommended by usual customary rules. The Lamido invited the complaining cultivators for a discussion session with the nomads. No agreement was found at the end of the session, and the cultivators went back to the subdivisional office. The chief had no other choice than handing the case over to that formal instance.

Both traditional rules and dispositions of the state laws have multiple stages in land conflict solving procedures. For the customary rules, the first step is at the level of the Djaoro or Lawan, the second at the level of the Lamido who takes the final decision. The cattle owner, if honest, informs the Djaoro or Lawan about the damages caused by his animals to some fields and asks to meet the concerned farmer for arrangements. The Djaoro or Lawan informs his populations and the victims present themselves. The Djaoro or Lawan invite the two parties and together agree on a date to visit the concerned fields in order to evaluate the level of the damages and appreciate the approximate quantity of crop according to the usual yield. The cattle owner is asked to pay the equivalent of the crop in cash to the victims. After that, both the victims and the cattle owner have to give the 'goro' or Kola nuts to the Djaoro or Lawan. In fact these two parties give a symbolic reward to the local authority for the fair arbitration of the conflict. The 'goro' is to local traditional chiefs what court fees and taxes are to the state judiciary system. If one party is not happy with the solution proposed by the Djaoro or Lawan, then the case is brought before the Lamido who will put an end to the situation, whether the solution is satisfactory for all the parties or not.

For the state judiciary system, the first step is the direct negotiations between the victims and the cattle owners, and the second step is the formal administration and judiciary court. In the first step, the cattle owner goes to the village and looking for the victims through the

Djaoro or Lawan. Like for the traditional rules, if they find a peaceful solution in order to avoid tensions between herders and cultivators, the two parties once again have to show their gratitude to the local chief with the traditional 'goro'. It is only if one party is not satisfied with the solution that the case is brought before the administrative authorities who will have to arbitrate the conflict. The administrative authority will organise a collective visit to the conflict site to evaluate the level of damages, and ask the cattle owner to pay the equivalent to the victims. At this level nothing has to be paid to the mediating officers by both victims and accused cattle owner. If one party is not happy with the solution, then the case is sent to court for a final solution.

In the present conflict, parties did not follow the steps of the normal procedure. The cattle owners did not call on the local Djaoro or Lawan and neither did the victims who raised their complains directly before the Lamido and the administrative authority.

Neither the Lamido nor the Sub-Prefect has legal competence to take final decisions about a land conflict concerning protected areas. All they can do is try to cool down the situation to avoid open conflict between parts of the population. The problem at the Lamido's level was that the cultivators had no confidence in him arguing that he is Fulbe, thus susceptible of being more complaisant with Mbororo who are of the same ethnic group. Moreover, cultivators suspected the chief of taking bribes from the nomads. The chief was aware of the cultivators' feeling and felt relieved when the case was brought before the Sub-Prefect.

At the Sub-Prefect's level the nomads were disappointed and discouraged since they had no idea of the formal rules about bush use regulations. Besides their ignorance of the state rules, they needed an interpreter since they did not understand French which is used as official language in the administration, whereas the cultivators (most of whom attended at least primary school) did. Worse, as the Sub-Prefect happened to be a non-Muslim Tupuri, the nomads felt really hopeless, suspecting the Sub-Prefect was more favourable to cultivators of his own ethnic group. They took part in the first two discussion sessions and after that they commissioned their resident representative to attend and follow up on the discussions on their behalf. Because a reciprocally acceptable solution was difficult to find, the Sub-Prefect kept on delaying the final solution, subordinating it to the physical presence of the accused Mbororo nomads, who are not likely to ever come back to table of discussion.

Both customary rules and modern laws are being used without a clear distribution of roles and competence between them. Depending on the context or objectives, people choose to follow the one which seems more likely to help them achieve their goals case by case.

The introduction of controlled grazing exclusively for sedentary groups ran counter to the traditional access rights. Following the customary regulations, the nomads have to report to the canton chief as soon as they enter his territory in order to signal their presence and to get his protection in case of unexpected problems. Therefore, the Lamido was the only authority they used to meet. So they were surprised and upset by the decision of the project to exclude them from the grazing blocks. They were not aware of the changes in the land

regulations with the shift of control power from chiefs to the state for national domains. From the moment the Lamido declared his inability to solve the problem and brought the case before the administrative authorities, the nomads had the feeling that their case was lost. In the field, they worked out an agreement with the cultivators on how to live side by side in the remaining bush areas including the former project site.

In contrast to with nomadic cattle owners, the cultivators took advantage of the provisions of both traditional and state rules. They settled in the bush outside the grazing blocks, and created fields inside the grazing blocks without asking permission from the canton chief as they saw nomads grazing their cattle in the blocks that were forbidden to both of them. The problem is that both cultivators and nomads are illegally using the blocks, but the nomads are at least right before the customary rules. But how can the Sub-Prefect handle and decide on a conflict resulting from officially illegal actions of both parties involved? The only way out provided by the formal laws is the 'arrangement à l'amiable' or mutually acceptable agreement between the implicated parties. Unfortunately, the nomads kept themselves away from the negotiations, and till this day, it is not sure that this problem has found a definite solution. This case is left pending, waiting for final words to come from the state which should provide the local authorities with additional measures or legal means to handle such cases.

Because of the 1974 land law, no traditional or local government authority has the legal means and rights to solve tensions over bush land use (Moritz, 1994: 25).This, combined with the generalized poor implementation of the state laws due to confused power distribution between traditional and administrative authorities, implies that the state plays an important role in the continuation of conflicts (Noorduyn and De Groot, 1999: 30). This situation of legal pluralism gives way to many unusual practices with people using either their social position or status, their ethnicity or financial power to have access to land, sometimes by breaking the laws, including both traditional and formal ones. The disorganised penal system in which room is left for unfair decision – making by the state authorities, social conflicts will be more and more recurrent (Sougnabe, 2000).

Given this context, people have developed a strategy in the form of the so called 'débrouillardise' or surviving tricks, hoping to benefit from the state institutions' 'understanding'. This consists of doing illegal things for personal interest and wait for the civil servants' intervention to stop it. As far as these agents keep silent, these 'débrouillards' or survivors continue their actions till an unexpected event throws attention of the civil servants on them. Such events may be, for instance, conflicts or natural disasters. When the illegality of their activities will be raised, these survivors will beg for the state's forgiveness and understanding, forwarding their investment as arguments. They may ask for prolongation of the delay to prepare for quitting the position or stopping the activities. Meanwhile, instead of looking for alternatives, many of the survivors will negotiate to stay, using their relationships to obtain favours from the authorities and the agents. Most of the time, such situations are left pending. The civil servants never come back to check and people continue the way they started.

CASE 2 – Tupuri cultivators and nomad pastoralists

The conflict between Tupuri cultivators and nomad pastoralists happened in the bush zone located in the south-east of the study area. Situated at the boundary of the Tupuri native area, the villages of this part of the study area receive predominantly Tupuri immigrants (ref. Chapter 3). Tupuri immigrants into the Mindif area are always looking for best places for cultivating. As the fertile land belongs to the indigenous people, they have to look for new good places for cultivating in the surrounding bush. In the dry season of 1996, seven Tupuri households occupied former Mbororo nomads campsites, having in mind that those nomads will camp somewhere else the following wet season. Unfortunately, the latter did not see it that way and claimed back their usual places.

In order to prevent further reduction of the bush in the future and to avoid the risk of conflict with other nomad sub-groups, the nomads claimed their former site by raising a complaint to the land authorities. Nomads are composed of Mbororo groups and some Choa Arabs. The bush space is divided between the Mbororo and the Choa Arab groups, with each of them having its own transhumance route and campsite places. These scissions facilitate the spatial dispersion and the mobility of the nomad groups (Boutrais, 1992: 123). The bush campsite of nomads looks like a village with settling places divided by family groups. Therefore, changing the location of a campsite for a nomad sub-group or family means to run the risk of entering into conflict with another sub-group.

The nomads filed a complaint at the level of the Lawan of Daram village who immediately declared his inability to chase Tupuri immigrants off the campsite and recommended to report to the sub-divisional office of Moulvoudaye. The Sub-Prefect decided that the seven Tupuri families could stay for only the running rainy season and would have to leave after harvest of their fields. The reason behind this decision was that the eviction of the cultivators was not possible on legal grounds. Besides this, the cultivators were not willing to leave and it would be a delicate situation to force them as their fields were already sown in. The nomads accepted this temporary solution and found another campsite for the rainy season. When they came back the following rainy in June 1997, the Tupuri cultivators were still occupying the campsite. Worse, the number of families had increased with the settlement of nine other households. The nomads went back to the Sub-Prefect who proposed the same solution adopted during the preceding season. They refused that solution and tensions rose between them and the farmers. On many occasions the herds of the nomads entered the fields at night causing serious damages to crops.

Once more, both traditional and administrative authorities were unable to find a mutually satisfactory solution for the two parties due to the unclear legal status of land use rules and regulations. Formerly, such events were considered as accidental and were usually solved through mutual negotiations under the supervision of the Lawan. The situation was not 'normal' because the Tupuri immigrants did not ask permission from the Lawan to settle in the nomads campsite, and they even refused to listen to him when he asked them to find another place. The Lawan therefore, continued to decline his responsibility for the conflicting situation and refused to handle the case.

On the other hand, the nomads stopped going to the sub-divisional office and continued their activities in the bush. Their herds can enter fields at will without fear of prosecution from the land authorities. Several confrontations between them and Tupuri cultivators happened, with fortunately no serious casualties registered so far. This situation continued the following years till the end of 1999 rainy season. The nomads' campsite was still occupied by a growing number of households, around twenty families. And yet nothing came up from the land authorities. For the nomads it was obvious that they would never recuperate their campsite unless they would declare open war to the Tupuri farmers. But they cannot do that because they would be banned from the area by the state authorities for assault on other citizens which entails penal sanctions. The best alternative solution was to find ways of mutual understanding with the Tupuri farmers and set a new basis for a reciprocally profitable collaboration as neighbours.

The temerity of immigrant Tupuri cultivators before nomads and local authorities is backed by the political context. There is a strong force of the MDR (Movement for the Defence of the Republic) political party in the sub-division. Headed by a Tupuri, this political party was fighting for the emancipation of non-Muslim or non-Fulbe groups. Aiming at reverting the Fulbe political and economic domination over the non-Muslin groups, especially Tupuri, this political party tried hard to make the latter benefit from the state laws and feel at home everywhere, and more specifically in the neighbouring Fulbe territory of Mindif. Counting on this political backing, immigrant Tupuri cultivators can use the advantages of both formal law and customary land regulation rules, depending on what they are aiming at.

In their confrontation with the nomads, the Tupuri cultivators are taking advantage of the customary regulations for which the rights on land cleared for farming are stronger than the grazing rights of nomad pastoralists (Moritz, 1994: 26). That is why the cultivators can gradually occupy the bush, progressively reducing the pastures to the disadvantage of the nomad pastoralists. A second factor behind the priority accorded to cultivators is that the authorities know they can have full control over them while it is not possible with the nomads. The cultivators are sedentary people who are within the reach of local land authorities, whereas the nomads just stay in the region for three to four months a year. Living in the bush, it is difficult for the authorities to handle them.

Before the land authorities, the Tupuri immigrant farmers have the benefit of the advantageous dispositions of the formal laws which provide rights to all citizens to settle wherever they wish and have access to the national domain for economic activities within the national territory. Nomads are not considered to be fully native people, thus having fewer rights with regard to land. The authorities know they can find other places to settle for their three months' stay in the region. Finally, many authorities expect some benefits from the continuation of the conflict owing to the widespread system of corruption at work in the country. They may get bribes either in kind (several cows) or in cash (money) from both parties in order to win the process. The incentive, therefore, is to continue the conflict rather than ending it.

CASE 3 – Firewood dealers from towns and the local people

Although the bush is officially not divided, each village has its territory, over which the Djaoro or Lawan takes decisions with regard to exploitation, especially the clearing of new fields. Until the 1975s, tree cutting either for home consumption or sale was free for the natives. Outsiders were allowed to enter the bush areas of the village and cut as well, but not in large quantities or on a regular basis. Otherwise, the concerned individuals should have to make some arrangements with the village chief. This has also been the case for Doyang till the firewood boom of the 1995s, which has brought many outsiders to the exploitation of these villages' bush areas for wood. Some large dealers of firewood from Maroua have joined the local people in wood cutting for sale from the surrounding bushland. These large wood exploiters sometimes come with their own cutters and have a tree cutting permit delivered to them by the provincial service of Environment and Forests located in Maroua. According to dispositions of the state laws, the local chief has no control over them and they cut as much as they wish. Moreover, they practice clear-felling to economise the time spent in the bush, thus fully depleting the bush resource base. The Doyang people therefore, have more than one reason to be upset: outsiders are making money out of their bush areas with the help of the state laws and worse, these wood exploiters are undermining the bush resource base which serves as the natural resources asset of the local population.

The problem for the Doyang people is that they are reduced to spectators without any possibility to intervene and stop the process. They may complain before the administrative authorities or the civil servants of Maroua, but to do that they would need to show evidence of environmental risks. The only way to get that proof is to have competent civil servants on the field in order to check and assess the level of the environmental risks. Unfortunately, this was not possible as the line agents did not have the transportation means and incentives to do that. They also refused to consider complaints raised by the village representatives who came to meet them in Kaele and Maroua pretending that they did not have the skills to ascertain such evidence. Therefore, the Doyang people have no other way out than praying God to help them. Since the conflict cannot be solved at his level, the local chiefs kept silent on the issue. Firewood dealers from Maroua usually ignore the local chiefs since they obtain their cutting permit in Maroua, and because of this, the Lawan of Doyang has no legal means to control or stop them. In order to at least have some profit from the process, Doyang villagers decided to take an active part in the activity, thus enhancing the acceleration of bush destruction. This phenomenon is the illustration of such latent conflicts which are widespread in the Mindif region and in other parts of the Far North province.

Once more the blame for this situation should be put on the state laws and the inability of the state to ensure proper implementation of its laws in the field. The 1994 forest law is not properly applied, which leads to depletion of bush resources to the detriment of the ecology and the local populations while it allows a large margin of benefits to large dealers from town. Consequently, it serves the interests of urban outsiders much more than of rural natives, favours the acceleration of bush disappearance, and creates social tensions among users of bush resources. Normally, large dealers should be controlled at the cutting sites to

avoid clear-felling and to respect the quality and quantity to be taken from the bush as stipulated by dispositions of the law. In fact, the large dealers simply do whatever they want in the bush, being sure of their impunity. They are only concerned with the present profit to make from the firewood business and have no care for the future of the region. State intervention is therefore crucial to save the bush from total disappearance in the years ahead.

6.3 Conclusion

Although the 1974 law gives the state total power over the territory, its impact on land tenure in the rural areas is not effective. The state failed in managing the national domain due to the powerful influence of customary laws on local people's mind. The majority of the rural population is ignorant of the state laws as the state did nothing to sensitise them on this issue. Consequently, the behaviour of the rural people is still much more determined by their traditional rules, even though decreasing, and by individual land acquisition strategies. To obtain a piece of land to crop at the village level, people still ask the Djaoro, Lawan and Lamido. They do not know that they can have the same thing by writing an application to the line agency of the sub-divisional service in charge of land management. But even those who are aware of the possibility prefer going directly to the Lamido, because the administrative procedure takes too long to be completed. The ordinary farmer cannot wait several years as he has to live out of the current production. The formal way of getting land is much more used by the well-educated elites who want the land for other purposes than cultivating, especially for housing. They therefore apply for both use rights and private appropriation through titling. Here again, they have to start from the traditional local chiefs before going to the state line agency. Otherwise they would be in trouble with the Lamido who would not hesitate to use all his power to destabilise the trespasser of this customary rule. Some traditional chiefs may even use witchcraft against the concerned person to discourage future candidates.

In fact, the changes made in the institutions so far were not strong enough to overcome the determination of the local chiefs to keep their power stronghold on their territories, especially of Lamido Ahmadou Bouhari of Mindif (Sali, 1998: 234). As a matter of fact, there is no way one gets a piece of land without calling to the local chief, and offering a gift. Depending on the nature of the relationship between the chief and the applicant, the amount of money will be higher or lower. But in any case, something has to be done in the favour of the chief. This is the way of having their 'gari' meaning the way of earning their living as they usually say. And the state authorities have to close their eyes on these behaviours for political reasons as stated earlier.

The implementation of the 1994 forest law is different from that of the 1974 land law in the sense that chiefs do not play an important role here. Tree cutting either for timber or firewood used to be free. In fact it did not consume bushland because it used to be a temporary activity. Furthermore, firewood selling did not usually generate a lot of money so as to attract the covetousness of the chiefs. So it did not deserve much attention for the traditional chiefs till the 1994 forest law, which, as already said, does not clearly refer to savannah vegetation cover. The role of local chiefs is taken over by the agents of the state line agency in charge of environment and forests. Some of the civil servants use their power to make profits from the confused situation of land use rules, for instance, by being bribed by the firewood dealers in compensation for the tree felling permit and non-monitoring in the field. When these agents do happen to go to field, they rather scare village people selling firewood by the roadside and take money from them under the pretext of application of the law. Thus, nothing is done to ensure a sustainable management and exploitation of the bush. Invested with powers of the state, these agents are legally out of reach even of the powerful traditional chiefs. Nevertheless, the latter can counterbalance the state's power abuse using their political influence or witchcraft power. To avoid such risks, the civil servants usually work out a kind of mutual understanding with the chiefs through specific arrangements. This complicity, of course, plays against the interest of the local populations who are then easy prey.

Local chiefs generally pay much more attention to land use rules for cultivating and grazing activities, and the most interesting actors for them are immigrants and nomad pastoralists. They are largely open to in-migration because the increase in the number of households also means increase of potential benefits to make through various transactions, especially on land use matters. An immigrant has to pay a visit to the local chief to announce his arrival and ask for permission to settle (which costs money). After that, the person will have to look for cropland following the customary procedure as described in Chapter 3, thus meaning additional money to pay to the chief. If he is not lucky to get good land, he will have to go through the procedure again for an additional piece of land, as any other member of the local community does. Although staying only for few months, nomads represent another source of profit for the traditional authorities. As they are Muslims, they have to pay 'Zakat' a religious tax due to the local chief. As many of the nomads are wealthy, they constitute an important source of income for the traditional authorities. The Djaoro, Lawan or Lamido expect gifts from the nomads in cash or in kind. Most of the time, nomads use cows as gifts to local authorities.

As the state cannot have an agent posted everywhere in rural areas, people feel free to do whatever they want in the bush. Customary rules and rights, though often supposed to disappear progressively, are so rooted in society and culture that they still largely regulate the relationship of individuals and

communities with land (Kobo, 1990: 225). The conflict between cultivators and nomads resulting from the invasion of the former Mindif-Moulvoudaye project site is a good illustration of the cacophony that results from the conflict between state and traditional laws.

The local chiefs are taking advantage of the weaknesses of the state services to maintain their stronghold on land use management, sometimes even going beyond their duties and rights to exploit the ordinary people on behalf of the state. Although well known to them, the administrative authorities are complacent with local chiefs for political reasons. The diffuse role played by chiefs in the land use regulations favoured by the lack of implementation of the law generated a context in which it becomes difficult to distinguish true rules from false. Different rules are applied to different people or group of people, depending on a variety of social factors or reasons known to the chiefs only. In the end, this practice has convinced people that, the most efficient ways in land use matters are the use of money, administrative pressure and political influence. Since the resulting social conflicts of this discriminatory application of the rules is a source of income for the local authorities, the latter have no good reason to stop doing it.

The uncontrolled activities of many actors on the same and reducing bush areas has led to more and more competition around bush resources, resulting in conflict cases. Conflicts are sometimes exacerbated by ethnic overtones between the opposed groups. Social conflicts arising around bush use are not only a matter of land scarcity, but there are other determinant factors lying within the nature of relationships between the ethnic groups (Laurent and Mathieu, 1994: 39). A conflict between Tupuri cultivator and Fulbe nomad is not simply an opposition between a farmer and a herder. It is also a confrontation between 'Fulbe dominators' and 'subordinated Tupuri' struggling to gain consideration in the social arena (Azarya, 1996: 20). Linked to ethnic pride, Fulbe have low consideration for Tupuri, and the second respond by allergic repulsion towards Fulbe. Consequently, in all their contacts, the groups react according to the social image they have of each other. For the specific case of Tupuri cultivators – Fulbe nomads conflict, this social factor may have played an important role. The firewood conflict between large dealers from town and village people is not simply an opposition between two categories of bush exploiters, but moreover, it is a confrontation between 'rich Fulbe urban people' and 'poor non-Fulbe rural agriculturists' fighting for survival. Each type of conflict has a second layer standing from the culturally constructed ideal-types of representation of the other groups. This aspect of deserves a great attention when dealing with conflict opposing different ethnic groups.

The nomads do not show important social or cultural change compared to sedentary people, and of the sedentary groups, the Fulbe present less social change than the other groups with respect to land use rules. Mbororo no-

mads are still strongly attached to their ancestral habits and culture and stick to the customary rules, especially for land use. They feel less concern for the modern laws and administration compared to the traditional authorities and procedures. As a consequence of their non-adaptation to the changing world, they are facing more and more problems in their relations with other land users, especially immigrant cultivators who are looking for new places to create their villages. Slowly but surely, the nomads seem to be gradually forced towards sedentary life in the future.

7 Looking to the future

This chapter draws the conclusion from the social dynamics of the land use change analysed in the preceding chapters. It addresses the current position of the Mindif area in the light of Malthusian and Boserupian scenarios and the possible bush protection policy options considering land use in the current socio-economic and politico-administrative context. The chapter starts by analysing the level of life satisfaction with the current bush from the local people's view point and later on discusses issues pertaining to agricultural transition pathways to improved well-being for the households of the area. The final sections of this chapter examine the policy options for bush protection and agricultural transition.

7.1 Current life satisfaction

As the standard of living is subject of controversy because of the subjectivity attached to it, it has been investigated what 'welfare' means to the local people of the Mindif area. So, during group discussion sessions, people were asked to appreciate their current level of quality of life, using their own standards. The welfare question was broken into three sub-questions, with one referring to the current livelihood activities, second to the owned or freely accessible goods, and third to quality of life conditions with specific reference to rainfall, health condition and social atmosphere. Scaled in 6 categories, going from very good to very bad, the responses varied but the general impression did not show great differences between ethnic groups.

TABLE 7.1 – Level of satisfaction with current bush-connected owned goods

Goods	Giziga	Mundang	Tupuri	Fulbe	Mindif
Bush items	2	3	2	2	2
Crops	3	3	3	3	3
Livestock	3	4	4	3	3
Fodder	3	4	2	3	3

Legend: 1= very good; 2= good; 3= average; 4= almost bad; 5= bad; 6= very bad
Source: group discussions

One of the questions was: do you actually own enough of the main goods now in the house, compared to the level you wish? The answers as presented in Table 7.1 show that the quantity of bush items such as wood and thatch is considered as satisfactory by the local populations, while crops, livestock and fodder supply provisions are judged as only at average level of satisfaction.

Another question focussed on access rather than ownership. The question was: is there enough of these goods around to get if you need it and go for it outside? From the answers presented in Table 7.2, the level of satisfaction for livelihood sustaining possibilities ranges between good and almost bad. Fields and firewood have the best position, followed by grazing, hunting, wild food gathering and timber cutting. The four other activities, including fallow practice, initiation in the bush, medicinal plants and ropes collecting, are tending towards bad level position. Therefore, not a single activity is at very good level, even though none is at very bad level either. At the same time, people also know that the general tendency is downwards, because of the bush decline in terms of quantity and quality as was shown in chapter 5.

TABLE 7.2 – Level of satisfaction with the remaining bush-connected livelihood activities

Activities	Giziga	Mundang	Tupuri	Fulbe	Mindif	Mode
New fields creation	2	2	2	2	2	2
Firewood cutting	3	2	2	3	2	2
Hunting	4	3	3	4	3	3
Food gathering	3	3	3	3	3	3
Timber cutting	3	2	3	4	4	3
Grazing	3	4	4	3	3	3
Fallow	4	4	4	4	3	4
Medicinal plants	3	4	3	4	5	4
Initiation	4	3	4	3	5	4
Ropes collecting	4	4	4	4	4	4

Legend: 1= very good; 2= good; 3= average; 4= almost bad; 5= bad; 6= very bad
Source: group discussions

TABLE 7.3 – Level of satisfaction with the main elements of the current living conditions

Conditions	Giziga	Mundang	Tupuri	Fulbe	Mindif	Mode
Peace	3	3	4	3	5	3
Rainfall	4	4	4	4	4	4
Health	4	4	4	4	4	4

Legend: 1= very good; 2= good; 3= average; 4= almost bad; 5= bad; 6= very bad
Source: group discussions

The third question asked to the people was: how do you see your actual living conditions ? As can be seen in Table 7.3, the quality of life included three dimensions; rainfall, health and social atmosphere or peace. From the local populations' viewpoint, climatic and health conditions are below the average level of satisfaction, while the social atmosphere is at the average level of satisfaction. The unsatisfactory aspect of rainfall concerns not the quantity but distribution in time and space. The overall impression here is that people experienced rather low welfare, even in 1997 when substantial areas of bush were still around.

7.2 The Malthusian scenario

What would it mean if the bush disappears? People's own views will be presented in section 7.4. Here, I will review current scientific insights on the pessimistic scenario without agricultural innovation.

If the bush disappears, the decrease of soil cover may lead to erosion and to 'hardeization'. The landscape will be totally open with only hardés, infertile arable fields and some planted forests scattered over the region in settlement agglomerations and some fields with agro-forestry. The end of bush will also mean the strong decline of the bush products usually gathered by the households, like construction wood, thatch, firewood, wild food, hunted animals. If the local populations fail to promote technical change so as to produce more in order to meet their growing food demand, this will pose a crucial problem of food supply for poor households in rural areas as well as an energy problem both in the villages and towns (Coleman and Schofield, 1986: 32).

The region will be facing 'environmental scarcity' defined as decreased supply of the natural resources due to depletion and degradation, increased demand due to population growth or increased per capita resources consumption, and unequal resources distribution (Homer-Dixon & Levy, 1995: 191). In concrete terms, reduction in the quantity or quality of the resources shrinks the resources pie, while population growth divides the pie into smaller slices for each individual, and unequal resources distribution means that some groups get disproportionately large slices. This situation may result in frequent social tensions due to worsening life conditions leading to more and more disparities and frustration among the local populations (Homer-Dixon, 1994: 9). Conflicts between individuals and groups may become endemic among the population, thus threatening social peace on a permanent basis. This may lead to the breakdown of the former social ties and the positive customary rules of the social security system.

Without or with only very few trees, soil nutrient recycling and water infiltration will be less efficient. Less rain water will reach underground to fill up the water table. Less vegetation cover will lead to less dry matter to be converted into soil nutrients, hence reduction of soil fertility and water retention capacity. Besides, fewer trees will mean a hotter micro-climate in the region. Therefore, maintaining the yields will require more and more manure or chemical fertiliser. But where will the manure come from? In other words, even if people would be motivated to invest in agricultural intensification and better land management, they will not have the capacity (manure, livestock capital, time for experiments etc.) any more.

The loss of the bush functions may lead not only to more competition about land for cultivating and grazing, but also to a growing need for investments

for soil fertility rehabilitation and sustainability. As these will not be within reach of all the households, agricultural and pastoral production will be insufficient for the growing population, thus leading to a situation of permanent food insecurity in the region. As, like all the drylands, the region is prone to droughts and unexpected other natural events, the local populations will live in an increasingly stressing environment.

Due to the low level of implementation of state and local regulation on land use, the land use rules and regulations may degenerate more and more into a lawless situation with intensification of land speculation. Irregularities and law trespassing will become the common way of dealing with land acquisition, and land rights will be more and more precarious. The combination of a degrading natural environment and the fragile land rights will generate more anxiety, thus pushing people to do everything they can do to survive, and thereby leading to dramatic competition around land.

Food thefts and destruction of crops by cattle, which were banned in the past, will become very common causes of conflicts among the populations as shown by the conflict case studies presented in chapter 6. Increasingly, 'people will sleep with their arms during the shortage period to prevent their stores from being stolen '(De Garine, 1988: 246).

7.3 The Boserupian scenario

An alternative to the Malthusian scenario is the Boserupian scenario (Boserup, 1965), which depends critically on 'agricultural transition'; the change from bush-dependent extensive to sustainable and intensive farming systems (De Groot, 2000: 3). Following our calculations in section 5.2.2. of chapter 5, the bush will be finished by the year 2037. In the group interviews, the local people put the end of unused bush, pastures and nomadic cattle around year 2027. Gradually, the bush will be filled up with cropland and pastures. The process will end up with only cropland around the settlements implying the necessity to improve crop and livestock productions on reducing pieces of land. Therefore, intensification of agriculture and animal production will become unavoidable. In the Boserupian scenario (see section 1.7), people indeed intensify.

The Boserupian scenario is more positive and desirable for the Mindif area (see also section 1.7). In the last two sections of this chapter we will see if transition is technically possible and likely to be achieved, respectively. The present section focuses on what is needed to make the transition happen.

The technical requirements for agricultural intensification are land availability, soil fertility maintenance, labour, agricultural implements and appropri-

ate technology, and market demand. So far, the possibilities of starting innovations towards intensification do exist. Access to land and labour are still possible to most farmers. The use of manure as input combined with fallow practice and ploughing are still possible. Combining them with tree planting, which already exists on many farms, may raise the yields significantly. The market demand for agricultural products exists as well, even though marginal so far. The great question is: will they be enough to support agricultural intensification? The further steps which may consist of variable levels of combination of innovation and diversification will depend on the motivation and the capital, especially on the financial capacity of the households to invest in agriculture. The ways to obtain the basic capital do also exist. These include small trading, rural employment, and remittances from friends or family members, village savings clubs or tontines. Above all, livestock may offer the best investment source as it has high returns. The former herders may sell a part of their herd and use the money as capital to be invested in agricultural intensification. They can even help to develop the market of agricultural inputs and outputs in association with the extension services, NGOs, and other actors.

Farmers may start by simplified forms of innovation integrating diversification of crops and economic activities, while the additional number of people due to population growth will furnish the necessary labour force to start and improve progressively agricultural intensification. This means clearly that, the former nomadic herders and the grown up children will furnish necessary labour inputs to set up new bases for an improved farming system, and financial investment in agriculture may gradually become profitable as the market demand for food will be growing under demographic pressure.

The household will have to respond to the effects of population growth, to changes in the markets and to the variable, semi-arid climate of the region. Appropriate response to population growth may mean increasing crop production, while insurance against drought will be storing food or money, supplementing cultivating with livestock which could be sold in case of necessity, and having family members involved in non-farm activities for additional income. For all this to happen, the household will have to find out the best combination of production factors to make good use of the erratic rainfall. This means that the household may have to optimise the diversification of activities of its members so as to increase the resource base of the production unit, including consumption goods, sources of information and income sources for further investments (Tiffen et al., 1994: 153-155).

The underlying conditions here may be maintaining the family as economic unit, through which knowledge and capital flow between those engaged in farm, non-farm and educational activities. Within the family, women and children may have to play a progressively important role in decision-making

about resource use or allocation. Increasing the number of educated members may help increase the trade and membership of co-operatives and self-help groups or savings clubs (Nhuvira, 1992). Such social networks may help farmers develop useful contacts with banks, NGOs, and financial institutions in general, through which they can get funds to invest in agricultural intensification. Social frameworks of production such as self-help groups may also lead to the creation of community assets and the transformation of social life. For instance, community forests could be planted and pastures better managed, while the social domain would see the social rise of the women through the official recognition of their important role in the economy of the households and of the village or region in general. These elements may strengthen the households' income generating activities.

Income diversification is another way out in communities prone to growing land and food shortages (Reardon et al., 1988). The sedentarization of the nomads combined with the population growth rate will generate a surplus of labour in rural areas which may be exported to urban areas. While working in these urban areas, these people can earn money and send it back in the form of remittances to relatives for investments in rural agriculture. Some people may also migrate seasonally to cities in search of occasional jobs during the off season and return to the village with necessary funds for further investments in land exploitation (Maliki, 1993: 41).

The local population may benefit from the external help for information and contact with new things, norms or techniques. In the Mindif region, most of the new techniques should come through extension activities or programmes conducted respectively by SODECOTON agents, IRAD (Institute of Agronomic Research) in collaboration with state services and recently by PNVRA (National Agricultural Research and Extension Programme). The adoption of new techniques or innovations usually brings in new ways of thinking i.e. a change in the life conception of the concerned populations. Therefore, extension operations may lead to new forms of social organisation or networks such as GIC, AVP (Village Association of Cotton Farmers), AJDV (Youth Association for Village Development), CD (Development Committee) and so on, which may become central elements for rural development.

The great question then is: can all this be enough for the Mindif region? Will motivation and capacities to intensify land use both be high enough, and coincide in time, for the Boserupian scenario to be possible? Before we go into that question, I will first take a look at what local people themselves think and themselves do in connection with this question.

7.4 Local views of the future

During group discussion sessions held in the villages, open questions were asked to people about the future evolution of the situation in their area. The themes included land use, land degradation and its effects, demographic tendency, land availability for cultivating, pastures, livelihood activities, level of well-being or welfare, living conditions including rainfall, soil fertility, nomadic activities, etc. Their answers were grouped and tabulated and analysed to get their perceptions of the future.

One of the questions was about the time limit for the availability of some key elements or activities, what will be finished in 10, 20 or 30 years' time (from 1997, year of the interviews). In the local people's view, many changes will occur in 30 years, especially for cropland, bush extent, firewood activity, pasture, fallow possibility and nomadic pastoralism.

TABLE 7.4 – Local people's projection of the deadline year for bush-related activities

Bush and activities	+10 yr.	+ 20 yr.	+ 30 yr.
Free bush availability	–	x	–
Firewood cutting	x	–	–
Cropland availability	–	–	x
Pastures	–	x	–
Fallow possibility	–	–	x
Nomadic cattle	–	x	–

Table 7.4 shows, for instance, that firewood cutting will be finished soon (10 years) but that the availability of free bush to create new fields may take longer (20 years). The date of full disappearance of all possibility of cropland expansion is set at 30 years. Note the good general agreement with the researcher's own calculations presented in chapter 5, where the total disappearance of the bush was predicted at 37 years (section 5.1.2) and where firewood resources were found to be probably more acutely threatened (section 5.1.3).

Following the changes as foreseen by the local people, the quality of life will drop because of bush disappearance. During group discussions in all villages people were asked how they see the future for rainfall, health, peace, crop productivity, bush products quantity, other income sources, stock-raising, considering the ongoing process of bush disappearance. The answers were coded in six categories; levels into very high, high enough, high, not too low, low, very low, and quality into very good, good enough, good, average, bad, very bad. Table 7.5 shows that, apart from the Fulbe about other income sources, all the ethnic groups are pessimistic about the future possibilities for the livelihood activities. The relative optimism of Fulbe may be linked to their familiarity to off-farm and trade which may make them feel less anxious about the future conditions of the rural livelihood.

Table 7.5 – Local perception of the future level or possibility for livelihood activities

Activity	Giziga	Mundang	Tupuri	Fulbe	Mindif	Mode
crop production	4	4	4	4	4	4
bush items	4	5	5	5	5	5
cattle-raising	4	5	5	4	4	4
other income sources	4	4	5	3	4	4

Legend: 1 = very high; 2 = high; 3 = average; 4 = low; 5 = very low

Table 7.6 shows that people perceive rainfall, health and social peace to degrade in future, meaning less welfare. 'Health' here refers to modern health care which requires money to buy drugs. As the bush medicinal plants used in replacement of modern health care will be finished, people will have no other alternative than to go to hospital or suffer. At the same time, income sources will become scarce, crop production rate will fall, meaning less possibility to get the necessary financial means to sustain living and pay for health care.

'Peace' here refers to the absence of social conflict between either individuals or groups. In the local people's viewpoint, peaceful living among families or villages depends on the level of satisfaction of the basic needs such as food, education, and health. As the activities generating the necessary means to meet those needs are getting more and more scarce, thus bringing in more and more competition among people, the situation will lead to social tensions. These tensions will be exacerbated by the growing individualisation. People start feeling that family and ethnic boundaries will be gradually lost and at the end, nobody will feel concern for anynobody. Competition for individualised goals always leads to conflicting interests that may sometimes break out into open conflicts between families or groups of the society. The villagers are already experiencing this to a certain extent.

The situation of growing food insecurity is seen by the elders as a sign of malediction coming as a response of God and ancestors to the bad habits adopted by the youths and the new generations. This opinion was strongly supported in the group discussions in the villages; not a single village has contradicted this assertion.

TABLE 7.6 – Local perception of the future quality of life conditions

Domain	Giziga	Mundang	Tupuri	Fulbe	Mindif	Mode
Rainfall	4	4	3	4	4	4
Health	4	4	5	4	3	4
Peace	5	4	4	3	5	5

Legend: 1 = very good; 2 = good; 3 = average; 4 = bad; 5 = very bad

Local people may exaggerate a bit about the severity of future problems. This may be related to the observed rapid changes occurring in their environment. These environmental changes, touching on ecology, society and economy, have had a negative impact on their living conditionsPeople's own visions coincide with Malthusian scenario.

7.5 Local innovations towards intensification

In this section, we move away from people's views and focus on what they are actually doing. In the field we are interested especially in all signs of Boserupian investments.

The transitional process is the direct consequence of a series of innovations in human activities. Innovation is the act of making a change in the way of doing something either by introducing new technology or by changing the modalities of the social or physical actions to be carried out. Concretely, the explorative assessment of innovations in the Mindif area has consisted of discussing with local people the new things or ways they have or were trying either for fields or cattle herds. All reported experiments were checked. Checking consisted of transect walks, visits to farmlands of the concerned innovators, to the local veterinary offices for verification of animal treatment and membership of village social networks was checked out by local key informants.

Through direct observations and group discussions, some domains and significant elements were selected for examination of innovations. These domains include farming and stock-raising techniques, new forms of social organisation and sources of information. Farming and stock-raising registered some innovations with the introduction of new techniques at the reach of the average farmer, and these include sowing techniques, ploughing, use of herbicides, crop treatment, terraces, use of chemical fertiliser for farming, manuring through cattle park on the farm, multi-cropping, keeping or protecting trees on farm, mixed system of cattle feeding, disease treatment, vaccination of animals and a stock enclosure system. Our investigation of sources of information was oriented towards ways or channels through which villagers get information about the existence of new techniques or technologies to be adapted to their local context. The aim here was to see how people have access to these sources and how it works. Did new things still come through the common sources, meaning peer-to-peer networks ('adapt and adopt'), extension services and educated youngsters, or were there any other sources of information at their reach? The new forms of social organisation refer to new types of associations unusual in the local community such as village development associations, village youths associations, savings & credit social networks at the village level, etc. These associations are often at the base of

the emancipation of rural communities who learn progressively to defend their rights vis-à-vis local and administrative authorities.

TABLE 7.7 – Percentages of innovators per item and per ethnic area

Ethnic area	Manure park	Multi-cropping	Pesticide herbicide	SWC	Farm trees	Savings credit	Stock treatment	N
Giziga	19	0	14	14	30	29	4	80
Mundang	27	4	25	14	48	31	4	48
Tupuri	48	5	19	20	43	19	5	21
Fulbe	65	0	29	30	40	25	10	20
Mindif	58	10	45	32	39	42	10	31
Mean	34.6	3	23.5	19	38	30	5.6	200

TABLE 7.8 – Percentages of villagers involved in innovations per item and per ethnic area

Ethnic area	Manure park	Multi-cropping	Pesticide herbicide	SWC	Farm trees	Savings credit	Stock treatment	N
Giziga	37	0	47	26	63	58	10	19
Mundang	100	22	56	33	100	78	22	9
Tupuri	100	33	67	33	100	67	33	3
Fulbe	100	00	60	60	80	40	40	5
Mindif	58	10	45	32	39	42	10	1
Mean	67.5	8.3	52.5	33.0	76.6	60.7	18.8	37

In Tables 7.7 and 7.8 any family head is considered an innovator who is experimenting at least one innovation in one of these domains of activity. Manure park refers to the way of manuring the farm by parking the cattle herds on the field for certain period of time in the year. This may be done by cattle owners on their own fields or by other household heads who make an arrangement with cattle owners to park cattle on their farmlands. The soil and water conservation or SWC concern specifically a kind of terrace made to retain rain water and facilitate its infiltration in soils devoted to muskuari growing. This is being done on the types of soil showing some signs of degradation or 'hardeization'. The use of pesticide and herbicide here concerns food crops, which is unusual in the region, in contrast to cash crops: pesticides and herbicides were introduced by Sodecoton and only applied to cotton fields. Although the state extension services advised their use for other crops, people were not willing to try it till the last years. The innovation found here is mainly their use on cowpea fields. Multicropping includes relay cropping on a periodical basis and the association of some crops in the same fields during the same growing period, for instance groundnuts, Bambara nuts, sesame ans sometimes millet. Farm trees consists of leaving some trees on the fields for shelter and for soil fertility rehabilitation, usually Faiderhbia albida as taught to farmers by Sodecoton and various extension agents. Stock

treatment concerns cattle vaccination and illness treatment though state veterinary services which takes place at least one per year. Formally, cattle owners refused to let their cattle be vaccinated. Fortunately, apart from some nomads, this reluctancy is on the downards trend nowadays. Savings and credit activities concern money sparing system developed by village associations which may be mixed i.e. including men and women or homogeneous i.e. regrouping only men, women or youths. This may be done on a monthly basis or every t week etc., depending on the main objectives of the association.

As may be seen in Table 7.7, some of the innovations are practiced by a low percentage of the farmers, but others such as manure parks, soil conservation and farm trees run up to 20 or locally almost 50 percent. People's actions are certainly not passively Malthusian. Note that all these changes have been initiated by the farmers themselves, without pressure from outside agencies, with people responding to the need for maintaining or increasing production through both strategies commonly associated with a Malthusian pathway (cropland expansion, more labour) and the more Boserupian innovations, comprising both indigenous innovations and innovations offered through extension services. In that sense (and largely in terms of content, too), they are quite analogous to the changes described by Mazzucato and Niemeijer (2000) of farmers responding to increasing population densities in Burkina Faso.

The levels of innovation may also refer to the number of innovations being conducted by the household head. Thus, the 'small innovators' refer to those who have registered two or less of the innovations listed above, 'middle innovators' 3 or 4 items and 'large innovators' 5, 6 or all the seven cases of new things. The comparison of the levels of innovation between ethnic groups shows some slight differences as can be seen in Table 7.6 which presents the intra-group percentages of innovators.

The main information displayed in Table 7.9 is that the relative majority of the peasants (44.5 %) are carrying out 3-4 innovations which place them at the 'middle' level of innovation, while the rest of the households' heads are almost equally distributed between those carrying 1-2 and 5-6 innovations or 'small' innovators (27.5%) and 'large' innovators (28%). Not a single peasant remains at the stage of 'no innovation' at all.

For comparison between ethnic groups, the percentages of intra- individuals and intra-villages of the ethnic area have been used. The intra-individual percentages show the level of extension of the given innovation inside the village while the intra-villages percentage shows the spatial extension of the new things under consideration. The two percentages permit to see whether innovations are concentrated in some specific areas or spread over the region, and thus give more visibility between the ethnic groups. Using this classification method, an ethnic group comes first when it has the highest percentages

TABLE 7.9 – Percentage of innovators per ethnic area and innovation level

Ethnic area	Small innovator		Middle innovator		Large innovator	
	N	%	N	%	N	%
Giziga	23	29	43	54	14	17
Mundang	14	29	22	46	12	25
Tupuri	6	29	9	43	6	28
Fulbe	5	25	7	35	8	40
Mindif Centre	7	23	8	26	16	51
General	55	27.5	89	44.5	56	28

simultaneously for intra-individuals and intra-villages for a given innovation, and the other groups fallow depending on these criteria. For each of the innovations, the classification scale ranges from 1, meaning first position, to 5 which represents the last position.

TABLE 7.10 – Ranking of ethnic areas according to the level of adoption of the innovations in their areas

Innovation	Giziga	Mundang	Tupuri	Fulbe	Mindif
Manure park	5	2	3	1	4
Multi-cropping	5	2	1	5	3
Pesticide & herbicide	5	2	1	3	4
SWC signs	5	3	4	1	2
farm trees	4	1	2	3	5
Savings & credit	3	1	2	5	4
Livestock treatment	5	3	2	1	4

As can be seen in Table 7.10, Mundang and Tupuri come first in terms of intra-group proportion of innovators. They are followed respectively by Fulbe, Mindif inhabitants, with the Giziga coming last. The performances of the Fulbe and Mindif centre's respondents have been increased by the presence of some Mundang and Tupuri in their villages and in Mindif urban centre. Actually, as they have been socially dominant group and served as model to other ethnic groups, Fulbe tend to be more conservative and less willing to change things, though having better financial possibilities needed for substantial innovations.

The first position of Mundang area is the effect of Sodecoton extension service. The neighbouring Tupuri and Giziga have benefited from the expansion of these extension activities. These three ethnic groups, who also happen to be the most scolarized of the region, are more open and receptive to new ideas. This may partly explains the lower rating of the Fulbe and Mindif centre, where the former canton chief stood firmly against the implantation of a Catholic Church and the creation of primary school (Sali, 1998: 249). This

situation has changed, however, with the implantation of the former Mindif – Moulvoudaye Project. The general feature remains that people apparently can innovate, and to a certain extent, they do. In fact, in spite of Malthusian view, people show signs of Boserupian behaviour.

7.6 Discussion: bush protection for agricultural transition

The situation of the bush is not yet dramatic. The level of production of the current livelihood activities is still able to meet the food demand and sustain an acceptable living. There is no severe natural disaster, fallow is still possible and the fertility is only slightly on a downward trend. Not all the potentialities are used to optimum level. For instance, all the diversification channels for the crops have not yet been tried, manure is not yet used at optimum, and innovations are still reduced to a minority of households involved in relatively simple innovations.

The Malthusian scenario predicts the end of the bush whereby households will be caught in a vicious circle of poverty and land degradation. Boserupian views forsee the end of bush with significant improvement in agricultural production through intensification. The two extreme scenarios both envisage the future of Mindif area without bush. But realities in the Mindif region do not completely fit neither in Malthusian nor in Boserupian trend. The area is in-between the two opposite situations, without a clear future. The current trend shows some half-way intensification with bush lost anyway because of the combined effect of population growth and cropland expansion considered in both Malthusian and Boserupian processes. But a different picture also seems possible for the Mindif area: a picture with a feature not forseen in both the Malthusian and the Boserupian scenarios. This may consist of limiting the further reduction of bush through protection measures in order to have some bush standing, hence saving some biodiversity and some pastures from disappearing, while opening way to further intensification process and enhance better life satisfaction for local people. Concretely, how this can be possible in the Mindif area?

In literature, two pathways from agricultural growth to improved well-being have been described (Kates et al., 1993: 11). One way is the subsistence needs driven by population density due to population growth. Improved agricultural production leading to well-being in this case passes through input intensification and/or cropland expansion. The second path is market demand or access driven by integrated market through economic growth. Channels to improved agricultural production and well-being here include economic diversification and cropland expansion. Cropland expansion comes in second position for the two ways, thus meaning that it could be dropped if needed investment capital would be available. Actually, this is possible in the current

context of Mindif area, especially since the bush itself, through its economic functions, can provide capital for investments – if still standing by the time that farmers become motivated for such investment.

As said earlier, succesful intensification requires high population density, land scarcity, good external markets, good soils and capital, and that the key element is capital needed for investment. This capital usually comes from off-farm activities, especially from urban sources (Murton 1999). Furthermore, there have been cases of intensification without some of these conditions like around Kano (Mortimore 1998) and Machakos (Murton 1999). Sometimes intensification startes without external markets and good soils like in Mandara mountains (Njomaha, 2004: 163). Mindif, as so many other Sahelian regions, is half-way with regard to these conditions, with population density of 42 inh/km2, arable land getting scarce, weak internal markets for crops, cattle and bush products, medium soils and an average number of 13 cows per household serving as capital. Mindif area is located between two urban areas (Maroua and Kaélé) where it already exports some products including firewood, crops and cattle but at the same time, these external markets are small compared to Kano or Nairobi (close to Machakos).

Intensification with bush standing is then really feasible and it also looks more attractive for the main activities including cropping and stock raising. The feasibility stands from the fact that people are motivated for bush protection as will be shown in the next section, and some of them are already starting some agricultural intensification. To sustain the system, cattle owners can obtain investment capital from cow selling and invest in agricultural intensification and as well as in many other off-farm activities. The other effect of this system on agriculture would be rapid saturation of land, hence rapid incentives for intensification. The important element here is that, this happens before the bush is lost and when people still have the cattle capacity. In fact, this proposition calls for a kind of land management plan for the villages which may reserve a substantial proportion of land set aside as well-managed good quality bush for grazing, firewood and the other bush functions. Direct, indirect and biodiversity functions and as well as option value of the bush would be available on a permanent basis, with the additional advantage of keeping nomads in the picture.

In general, Mindif farmers hardly reach the optimal quantity of 5^{10} tons per hectare required to obtain good results in crop production with animal manure. Most of the time, they use at maximum around 1 ton per hectare per hectare, which is not enough to boot crop yields. But potentials to do so do

10 According to Ngambeki et al. (1992: 327), 5 tons per hectare of animal manure can supply 100 kg of nitrogen, 17.5 kg of phosphorus, and 50 kg of potassium.

really exist for many farmers. As has been estimated by several authors, four cows can produce enough manure to fertilize 1 ha of crop field which needs to be manured every 2 years (Donahue et al., 1977: 291; Singh and Ngambeki, 1988) in Ngambeki et al. (1992: 327). The average number of cows of 13 (ref. Table 3.4 of Chapter 3) in the Mindif region is sufficient for the production of the required quantity of manure to replenish soil fertility for the 5 ha (ref. Table 3.4 of Chapter 3) of average total cropped area per household in two years period.

This shows that reconciling the Boserupian process with bush protection is concretely possible. In fact, intensification and bush protection reinforce each other through crop-livestock integration in the profit of both croppers, sedentary herders and nomads, and as well as of biodiversity and environment in general. Furthermore, sustainable crop-livestock integration would not mean less cattle per household than it is now, but simply better integration. In this system, cattle graze in bush and in the intensive systems, while serving as draught animals and buffer as it is already the case with the large sedentary cultivator families. In turn, cattle provide manure that can be used to replenish soil fertility in fields and in the bush. In addition to this integration, the diversification of crops to be grown will help maximize the production. This will mean multiplying the number of crop varieties to grow and as well as relay cultivating, or rotation. Peasants will look for best allocation of types of soil to types of crop with the aim to reach double production by growing twice or more on the same plots on a yearly basis.

7.7 Policy for bush protection and transition

7.7.1 The local voice

When questioned in interviews and focus groups about the possible options to reduce the bush disappearance rate, local people made many propositions. Depending on specific reasons, the propositions weighted differently from one ethnic group to another, with a clear tendency towards empowerment of local populations however. The propositions could be grouped into social and economic policy options, bush management options, farming system improvements and faith in God.

The social options concern demographic change, bush management organisation, tenure and regulation rules, and leadership. The demographic change consists of reducing birth rate through limitation of women fertility, keeping outsiders away from the village bush areas and restricting immigration possibilities. The management of bush use and regulation rules has to be done by local organisations that may be headed by the Lamido or Lawan, but which may be also headed by elected persons from among the villagers. To reach this aim, it is necessary to divide the bushland by village where it was not the

case, leave the responsibility of planning and management to local populations, with the civil servants from the government acting as technical assistants or consultants for their organisations. All the tenure regulations need to be handled at the local level under the supervision of either the Djaoro, Lawan, Lamido or the elected leader, depending on the people's choice.

As the low farmland productivity constitutes one of the main causes of bush clearance, local people propose to increase soil fertility of the existing fields through increased use of manure and reduce the average cultivated surface per crop and per household. This way, the bush destruction through new field clearance could slow down a bit and the duration of bushland could be extended proportionally. Of all the necessary measures, the most urgent one is to stop anarchic tree cutting for firewood, which is only possible if the state gives back the control power to local people. The alternative could be the effective enforcement of state law governing the bush wood exploitation, but the state has shown its limits to do so. The fight against bush fires must follow the same line of devolution of power to the communities, according to the local people.

In support of the above propositions, local people also think of diversification of income sources so as to supplement bush-related activities of the households. Although they do not specify, one may guess that they are thinking of petty trade, handicrafts, rural employment, small livestock and small size cattle-keeping. Some of the respondents also refer to God's protection against bad events that may occur as a consequence of bushland mismanagement or depletion. To them it is urgent to pray God and implore his blessing to prevent the area from natural disaster or environmental collapse due to harmful human activities.

The protective measures weigh differently from one ethnic group to another and are displayed in Table 7.11. Of the 13 propositions, four weigh heavily in the general opinion; reducing birth rate, increasing cropland fertility, village organisation of bush management and leaving control power to the Lawan represent the most wished measures to ensure sustainable bushland use. The others are of relatively little importance and vary with ethnic groups.

These variations in opinion express that people have different perception of the problems due to the different social context in which they live. The Giziga are less sensitive to the increase of cropland fertility because they still have enough bush areas and the yields in good years are still very satisfactory. On the contrary, they would like to take part in the decision making on bush management through village organisation. They would also like their local Lawan to take decisions about bush and land use instead of referring to the Lamido living further away. The Mundang, who are already running out of agricultural land, show more interest in increasing cropland fertility, and

TABLE 7.11 – Relative importance of the measures according to ethnic area

Measures	Giziga	Mundang	Tupuri	Fulbe	Mindif	General
Bush control power to Lamido	x	–	–	x	xxx	x
Bush control power to Lawans	xxx	xxx	xxx	x	–	xx
Bush control power to community	xxx	xxx	xx	xx	x	xx
Refusing outsiders in bush	xx	–	xx	xx	–	x
Restrict immigration	xxx	x	–	–	–	x
Divide bush by village	–	–	xx	–	–	x
Increase land fertility	xx	xxx	xx	–	xx	xx
Reduce cultivated surface	x	x	–	x	xx	x
Look for other income sources	–	–	–	x	xx	x
Stopping intensive tree cutting	x	x	–	–	x	x
Pray God for his blessing	x	x	x	x	x	x
Reduce birth rate	xxx	xxx	x	–	–	xx
Have no idea	x	–	x	x	–	x

Legend: – = no mention; x = less important; xx = important; xxx = very important

share almost the same opinion with the Giziga for the rest of propositions. The Tupuri would like the Lawan to take decision for the same reasons forwarded by the Giziga and Mundang. But besides this, it should be also noted that, most of the Tupri are immigrants who need the support of the Lawan to avoid all kinds of problem in the village. The Lamido who is living far away in Mindif centre would not be of great help in case of trouble. They would like to have the bush divided by village and keep outsiders away from the village territory because of harsh competition about land use in the area, and which has led to conflicts as presented earlier in chapter 6. The proposition of village organisation of bush management is based on the same reasons given by the other groups. The Fulbe prefer keeping outsiders away, for the same reasons as the Tupuri, and the option of taking part in bush management to be organised at the village level. They would also like their Lawan to take decisions on bush management, as well as to reduce cultivated surfaces, to start off-bush activities.

The respondents of Mindif centre are influenced by the presence of the Lamido in their town and therefore insist on having the decision-making done at his level. The wish of village organisation of bush management, which contradicts their preference for the Lamido, might be the result of the combined effects of the former Mindif-Moulvoudaye agro-pastoral project and their urban life. The functioning of the Project and the multiplication of urban associations may have suggested them the idea of organising themselves for a collective management of their natural resources, thus becoming independent from the state and traditional administrations. The propositions of starting off-bush activities and reduce plot surfaces per crop and household are the results of the urbanization process at work in the Mindif urban centre and the growing land scarcity in the surrounding villages. One general con-

clusion stands out. All communities avidly express that power to control the bush should be moved from central government back to the local level.

7.7.2 The policy option for bush protection

The number of protective measures proposed by local people is an indication that they are aware, at least to a certain extent, of the need for reform of land use policy and regulation rules. This section discusses the types of protection or conservation options for the various levels of decision-making, going from the local to the national level.

The first responsibility of the state is to move away from its current lack of any vision for the Mindif and suchlike areas. The state should recognise that the future of the area is in the mutual reinforcement of protection of the bush, intensification of agriculture and devolution of power to the local level, tied up in a single package.

If something needs to be done in favour of the bush protection and conservation, it may concern reducing bush encroachment rate for new fields, stopping uncontrolled wood exploitation for firewood, and perhaps also limiting the number of cattle herds to be grazed on a given surface of natural vegetation if applicable. This means providing enabling measures and conditions to intensification, checking on field the wood cutting activity, encouraging afforestation, ensuring permanent availability of cooking gas in towns, and controlling grazing activity in the bush.

To do this, there is a need for the state to take short-term and long-term decisions pertaining to natural resources management including bush use. The urgent short-term measure from the state is to have its laws effectively and properly enforced. To avoid overcutting of firewood in the bush, the state should provide its line agents with all the necessary means and conditions to do their job, sanction outlaws and reward good behaviour.

Through land use rules reform, the state should look for ways to increase the responsibility of local people in land management, and more specifically as to the unused bush areas around the villages which now belong to the national domain formally ruled over by the state exclusively. Giving more responsibility to local populations may generate better management and control of bush resources use as they are the main beneficiaries. They must be given the opportunity of holding their own destiny in their hands, in order to take their responsibility. Meanwhile, the civil servants may be playing the role of watchdogs to make sure that the environment is safe and that the bushland is being used in compliance with the state regulations. One example is that state officials should no longer give bush cutting permits to urban capitalists, but set and enforce, if necessary, limits on the cutting activities of communi-

ties. In doing this, the state must sanction bad behaviour and reward good behaviour by using necessary incentives in support of its policy.

In order to solve the energy problem, the state, with the help of some NGOs, should promote intensive afforestation. To get better results than the former 'Operation Sahel Vert', this afforestation process should be conducted with the full participation of local populations and, if possible, with the help of some NGOs. Other sources of energy such as cooking gas, petrol and sun energy also need to be promoted or subsidized by the state in order to avoid intensive tree cutting for firewood which contributes a lot to bushland degradation.

Conflicts opposing users of bush resources need to be prevented or to be taken care of earlier enough. These social confrontations may be avoided through well-negociated co-management contracts or networks involving all the actors, with the state playing the role of mediator. Sitting side by side and discussing face to face usually helps reduce tensions through dissipation of misunderstandings that are often causes of social conflicts. To prevent from power abuse of the authorities, mixing up of responsibilities, obligations and rights, there is a need for appropriate clarification about the specific roles to be played by each of the actors involved in bushland management, along the basic lines brought forward here.

Economic supportive measures needed to be taken for agricultural intensification include the commitment of the state in issuing out enabling measures for access to agricultural inputs (manure and fertilizer) for the majority of farmers, the reform of land use rules and the improvement of the socio-economic infrastructures (especially roads). The increase in the use of manure may help reduce bush destruction rate due to cropland expansion. Fertiliser prices have to be controlled by government which, in case of necessity, may subsidise it in order to make it affordable to the majority of farmers (Scoones et al., 1996: 117).

7.7.3 Policy context

In order for the new picture become reality, it would greatly help if some state laws be changed, especially the 1994 forest law. This may be done by modifying it or by adding another law specifically designed for Sahelian zones including bush areas of the country. Several current development projects and programmes need to be thoroughly implemented, adapted to the new vision if necessary. Examples are the the *Plan National de Gestion de l'Environnement* (PNGE) and the *Progamme Sectoriel Forêt Environnement* (PSFE). The same holds for developmental projects such as *Progamme National de Developpement Participatif* (PNDP), the *Programme d'Appui au Développement Communautaire* (PADC). Additionally, national projects directed at poverty alleviation such as *Projet de Reduction de la Pauvreté et Actions en Faveur des*

Femmes de l'Extrême Nord (PREPAFEN), may be crucial to strenghthen local people's financial capacity for further agricultural intensification.

Programmes and projects such as these can and should incorporate the vision of mutually strenghthening bush protection and agricultural intensification. The same holds for key institutions such as local government, Sodecoton and NGOs.

The most basic of institutional objectives is the full devolution of land management to the local communities, coupled with a safeguarding by the state of sustainability and biodiversity. This form of co-management concentrates the role of the state on issues it is fully justified to handle and falls in line with the process of political decentralization at work in Cameroon.

Local communities may need training and other support to strenghthen the capacity to fulfil their role, e.g. through the development programmes and projects mentioned above. Also the state needs to be better equipped. Bisides training and suchlike needs, the most basic condition is that the state needs to get rid of at least the most harmful aspects of the generalised corruption and moral crisis Cameroon is facing. For this to happen, state agents need to be provided with more rules of accountability to the community they serve and more severe sanctions, but also with better working conditions and more stimulating objectives.

International donors such as the World Bank, the African Development Bank and bilateral development agencies, but also international conservation-oriented NGOs may be interested to support the implementation of the new vision, insofar communities and government cannot help themselves. At the basis of this possible willingness lies the fact that the vision coherently provides for both biodiversity and sustainable poverty alleviation.

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Annex

TABLE A.1 – Distribution of the sampled households according to status in the village, by ethnic area

Ethic area	Native	Immigrant	Total
Giziga	69	11	80
Mundang	38	10	48
Tupuri	12	9	21
Fulbe	14	6	20
Mindif	18	13	31
Total	151	49	200

TABLE A.2: Distribution of the sampled households according to socio-economic category, by ethnic area

Ethnic area	Rich	Middle	Poor	Cropper	Herder	Total
Giziga	15	32	16	15	2	80
Mundang	10	13	12	10	3	48
Tupuri	7	8	2	2	2	21
Fulbe	3	4	4	2	7	20
Mindif	3	9	7	4	8	31
Total	38	66	41	33	22	200

TABLE A.3 – Average size of crop field cultivated surface and family size per household, by ethnic area

Ethnic area	Crop surface (Ha)	Total surface (Ha)	Household size
Giziga	0.93	5.42	6
Mundang	0.84	4.31	6
Tupuri	0.51	4.24	6
Fulbe	0.60	3.37	5
Mindif	0.62	3.90	5
Sample	0.70	4.25	6

TABLE A.4 – Annual average quantity of goods and number of animals per household of the sample in 1997 (flows and stock)

Products	Giziga	Mundang	Tupuri	Fulbe	Mindif	Sample
Cotton	119	32	112	120	67	89
Sorghum	18	10	10	17	10	14
Millet	5	7	10	8	6	6.5
Cattle	7	13	16	16	27	13
Goat	7	7	10	6	7	7
Sheep	9	5	5	3	4	5
Timber	34	28	27	33	33	32
Firewood for home	104	104	104	104	104	104
Firewood for sale	104	52	52	5	15	52
Thatch grass	16	18	15	25	17	18
Ropes	10	9	12	8	5	9
Eatable termites	3	7	4	7	4	4.4
Vegetables	15	12	17	13	13	14
Fruits	1.5	2	3	3	2	3.7
Wild meat	3	3	4	0	1	2.8
Honey	0.8	1	1	3.7	2	1.5

Legend : cotton, fruit and meat(kg), sorghum and millet(sac), animals and timber(number), firewood, fodder, thatch grass and ropes(bundle), vegetable and termites(tasse), honey(liter).

TABLE A.5 – Contribution of food sources to the daily diet of the Mindif households(%)

Ethnic area	Crops &others	Bush products	Manufactured goods	Total
Giziga	54	43	3	100
Mundang	51	44	5	100
Tupuri	61	36	3	100
Fulbe	45	49	6	100
Mindif	60	28	12	100
Average	54	41	5	100

TABLE A.6 – Average annual prices in the research area (cfa)

Products	Kilogram	Unit	tasse	bundle	hectare	Liter
Cotton	175					
Sorghum	150					
Millet	100					
Corn	150					
Beans (niébé)	200					
Peanut	250					
Sesame	250					
Bambara nuts	100					
Bush meat	1000					
Honey						1000
Firewood				200		
Thatch grass				400		
Fodder	100			25		
Ropes				300		
Termites			150			
Vegetables			70			
Fruits			50			
Big timber branch		200				
Small timber		50				
Average cow		80 000				
Bull		200 000				
Average goat		10 000				
Average sheep		15 000				
Donkey		20 000				
Horse		30 000				
Land rent					9000	

NB: 1 bundle of fodder = 0.25 kg = 25 Fcfa, hence, 1 Kg of fodder = 100 Fcfa

TABLE A.7 – New bush field plots mean surface, yields and crops prices

Ethnic area	Bush field surface (ha)		Bush field yield (kg/ha)		Crops price (Fcfa/kg)	
	Cotton	Red millet	Cotton	Red millet	Cotton	Red millet
Giziga	0.91	0.5	107	266		
Mundang	0.84	0.82	421	475		
Tupuri	1.00	1.00	225	198	175	100
Fulbe	0.85	0.5	228	878		
Mindif	1.36	1.2	493	664		

TABLE A.8 – Average surface area of new cotton and millet new field per household per category

Category	Cotton new surface	Millet new surface
Rich	1.00	0.25
Middle	0.75	0.5
Poor	0.81	1.3
Herder	00	00
Cropper	1.00	0.74

TABLE A.9: Value of average bush products per household per ethnic area

Ethnic area	Fallow function	Food function	Non-food function	Total
Giziga	30,000	9000	55000	94,000
Mundang	101,000	11000	45000	157,000
Tupuri	59,000	15000	45000	119,000
Fulbe	78,000	22000	38000	138,000
Mindif	189,000	73000	36000	298,000

TABLE A.10 – Value of average bush products per household per category

Category	Fallow function	Food function	Non-food function	Total
Rich	53,000	28000	33000	114,000
Middle	53,000	37000	43000	133,000
Poor	89,000	19000	58000	166,000
Herder	00	21000	31000	52,000
Cropper	74,000	44000	44000	162,000

TABLE A.11 – Value of the average crop production per household category, by ethnic area (cfa)

Category	Giziga	Mundang	Tupuri	Fulbe	Mindif	Average	N
Rich	610,000	340,000	601,000	668,000	570,000	558,000	38
Middle	481,000	338,000	269,000	460,000	275,000	365,000	66
Poor	219,000	131,000	132,000	156,000	146,000	157,000	41
Herder	00	00	00	00	00	00	22
Cropper	337,000	208,000	280,000	599,000	261,000	337,000	33
Average	431,000	262,000	358,000	451,000	272,000	319,000	200

TABLE A.12 – Value of fallow function from new field creation per household per ethnic area

Ethnic area	Number of new cotton bush field creators	Total value of fallow function based on cotton	Number of new millet bush field creators	Total value of fallow function based on millet	Grand total for the area
Giziga	8	136,000	16	208,000	344,000
Mundang	9	558,000	14	546,000	1,104,000
Tupuri	4	156,000	5	100,000	256,000
Fulbe	2	68,000	1	44,000	112,000
Mindif	2	218,000	5	400,000	618,000
Total	25	1,136,000	41	1,298,000	2,434,000

TABLE A.13 – Value of fallow function from new field creation per household per category

Category of household	Number of new cotton bush field creators	Total value of fallow function based on cotton	Number of new millet bush field creators	Total value of fallow function based on millet	Grand total for the category
Rich	5	216,000	3	30,000	246,000
Middle	4	178,000	9	147,000	325,000
Poor	7	295,000	14	706,000	1,001,000
Herder	0	00	0	00	00
Cropper	9	447,000	15	415,000	862,000
Total	25	1,136,000	41	1,298,000	2,434,000

Summary

In dryland areas such as North Cameroon, bush areas play an important role in the people's livelihoods and the sustainability of the extensive land use systems. They serve as grazing areas, produce firewood, help restore soils after being used for crops, and harbour significantly biodiversity. The starting point of this study is that good bushland appears to be rapidly disappearing. This has led to the following research questions. To which extent does the surface and quality of the bushland decline indeed? What losses would that bring to local livelihoods? What are the social factors driving the process? What might happen if the process continues? Is there a way to avert negative consequences? These questions are addressed while focussing on the Mindif area in the Extreme North province of Cameroon, a region of some 30 x 40 km and a population density of 42 persons per km². This population density, combined with the ongoing population growth, necessitates intensification of the current extensive fallow-based land use system. Can this transition be made in time?

The first chapter of the study presents an overview of the setting and perspectives in the research area. It provides information on the region's historical background, going from the beginning of settlement to the current situation of bush crisis.

The second chapter deals with the conceptualization of the bush reduction problem that integrates local people's opinions and scientific views. The basic bush problem concepts are defined for further analysis and explanation. The research questions are formulated to help design the approach and the methodology for the fieldwork (census, interviews, group discussions and field observation, carried on in 1997 and 1998). Relevant methods and tools for data collection are presented.

The third chapter of the study comprises a general description of the current situation of the Mindif region. It presents the social organisation and institutions including traditional and modern administration. This presentation shows that the main livelihood activities of the Mindif area are cropping, stock-raising, firewood cutting, gathering and several cases of off-farm activities. The farming system is shifting cultivation and the cultivation techniques include ploughing, use of manure, fertilizer, herbicide, pesticide and (rarely) bunding and relay cropping. Bush-related activities comprise cropping, grazing, gathering and firewood cutting. Arable land is obtained through inheritance and clearance of empty bush with the permission of local chiefs.

Depending on the local availability of bushland and other reasons, the procedure to obtain land follows different ways, depending, *inter alia*, on whether the applicant is a relative, a villager or unknown to the local chief.

In Chapter 4 it appears that the bush is a central component in the livelihood of the Mindif households owing to the important functions it performs on their daily life. Varying from one place to another, bush contributes significantly to the local people's welfare through housing, fallow, firewood, wild food, illness treatment, leisure and grazing. Additionally, the bush harbours significant biodiversity. Some bush values could be assessed economically. They represent substantial gains for the user households. The average contributions per year from bush functions range from 6,000 to 127,000 FCF for bush food; 31,000 to 85,000 FCFA for bush non-food; up to 189,000 FCFA for bush fallow; and up to 1,840,000 FCFA for bush grazing and fodder. On aggregate, herder households earn more from the bush functions than purely cropper households. Combining cropping with livestock-raising represents the best option.

Chapter 5 starts out with an analysis of the bush problem. One aspect is that the pure surface of the bush is declining mainly due to the expansion of cropland, that in turn is mainly due to population growth rather than increasing acreages per households. Extrapolating the current trend leads to an estimation that bushland will be completely gone in around one generation's time. The researcher's own estimation roughly coincides with those of the local people themselves. Besides pure surface loss, the functions of the bushland also decline by deteriorating quality, especially woody cover. This decline is mainly caused by commercial and domestic firewood extraction, as well as the opening up of new fields in forested bush. Such fields are likely to return to fallow after a few years, but unlikely to ever grow back into woody plots. The resulting quality decline goes more rapidly than pure surface loss. In 1997, both the researcher's calculation and the local people's own estimation predicted that all 'good bush' would be basically lost by 2017.

Chapter 5 also goes into the options and motivations of the bush decline actors. The proximate actors responsible for bush reduction are new field clearers and commercial firewood cutters. Field clearers are motivated by low cost and high benefit of this option compared to intensification and out-migration. Furthermore, the selling of firewood extracted from new fields represents an additional income for the clearer household. The commercial wood cutters are motivated by the cash earning from selling, greatly enhanced by the lack of cooking gas in urban areas (which eased after 1997). For urban capitalists, firewood compares favourably with other tradable items, especially in period of cooking energy crisis. For both local cutters and urban dealers private tree planting is not envisageable due to high production cost and to cultural habits. Tree planting is not common in the Mindif area.

Chapter 6 addresses the institutional aspects, showing that the low cost of making new fields and commercial firewood cutting are the result of poor implementation of state laws pertaining to land use and tenure regulation rules. Laws are either wrongly applied or not implemented at all. This is partly due to power abuse of certain land management authorities, and partly to political and financial influences (corruption) of many bush resource users. The failure of state laws comes out as a result of a confused situation at the junction between the traditional land use regulations and the state modern land laws. This confusion induces land authorities (traditional and modern) to play with the rules for their own short-term profit. This in turn, has resulted in social conflicts as illustrated by three cases opposing croppers and herders or local firewood cutters and outside cutters.

The last chapter starts out by presenting the current life satisfaction from the point of view of local people. Then the divergent land use change theories of Malthus and Boserup are presented to see which pathway the Mindif region is following. This chapter stresses that Mindif currently appears to be somewhere in-between the two processes, and that the Malthusian scenario may prevail if nothing is done to change the direction of the current bush reduction process. Trusting the Boserupian idea that people will spontaneously invest in agricultural intensification once necessary carries the great risk that the motivations of the farmer to incur the necessary cost (labour, cash, agency) may become high enough only after the bush is basically gone. Without good bush around, where will people then find the necessary capital (cattle etc.), and income (bush sources) to invest with? Like so many others, the Mindif area does not have the good soils or large external markets (cities) that characterize African cases of spontaneous agricultural transition. Therefore, this study proposes a third option, which is to induce intensification enabled through and stimulated by protection of the remaining bushland. When looking at the trends in the area, it comes out that, even though people have a basically Malthusian outlook, they also show some signs of intensification already, though still too sparse to enter the Boserupian process. Other findings raising hope concern the people's will to change things and protect the bush, their awareness of the negative consequences of the total disappearance of bush, and the currently still high cattle density. It appears clearly that intensification with bush standing is envisage able, based on successful crop-livestock-bush integration. This is effectively possible since many of required conditions are fulfilled to some extent. The population density is high, but not yet too high to play against the process; capital may be available through cattle selling and other income sources; though small, external markets do exist in Maroua and Kaele towns; agricultural inputs are available, especially from Sodecoton; credit systems do exist, even though too limited; capacity building structures are available (NGOs, Sodecoton, missions, state line agents). Therefore, potentials for innovation and intensification with bush still standing do appear to exist in the Mindif region.

An enabling socio-economic environment is important for these potentials to be fully realised. The state should take short-term and long-term decisions with effective application on the Mindif area. Of crucial importance, and quite in line with the communities' own desires, is the devolution of power to local people for bushland management and design of co-management plans with them, in which the state has the justified role of safeguarding sustainability and biodiversity. Other helpful measures are the construction of better infrastructure, promotion of afforestation and the eradication of corruption. International donors and conventions such as the CBD and UNCCD may play a stimulating role, because a mutual strengthening bush protection and agricultural intensification provides a synergy of biodiversity protection and sustainable poverty alleviation.

Samenvatting

In droge gebieden zoals Noord Kameroen spelen stukken land met gras, bomen en struiken ('bush') een belangrijke rol in het levensonderhoud en de duurzaamheid van extensieve landgebruiksystemen. Ze dienen als weidegrond, bron van brandhout, zorgen voor bodemregeneratie bij de braaklegging na het telen van gewassen en herbergen biodiversiteit. Het uitgangspunt van deze studie is dat goede bushgebieden snel aan het verdwijnen zijn. Dit heeft tot de volgende onderzoeksvragen geleid. In welke mate nemen kwaliteit en oppervlakte van de bush werkelijk af? Wat zou er dan verloren gaan voor het lokale levensonderhoud? Welke sociale factoren zitten er achter het proces? Wat zou er gebeuren als dit proces doorzet? Is er een manier om de negatieve gevolgen tegen te gaan? Deze vragen worden in dit proefschrift bediscussieerd met een focus op het Mindif gebied in de provincie 'Far North' in Kameroen, een gebied van ongeveer 30 bij 40 km met een bevolkingsdichtheid van 42 personen per km^2. Deze bevolkingsdichtheid, gecombineerd met voortdurende bevolkingsgroei, maakt intensificatie van het huidige extensieve landgebruiksysteem gebaseerd op braaklegging onvermijdelijk. Kan deze transitie op tijd gemaakt worden?

Het eerste hoofdstuk geeft een overzicht van omstandigheden in en perspectieven voor het onderzoeksgebied. Het schetst tevens de historie van het gebied, vanaf eerste bewoning tot de huidige 'bushcrisis'.

Het tweede hoofdstuk gaat over de conceptualisatie van het probleem van de verdwijning van de bush, waarbij de meningen van lokale mensen en wetenschappelijke visies geïntegreerd worden. De basale concepten van het bushprobleem worden vervolgens terdege gedefinieerd ten behoeve van verdere analyse. De onderzoeksvragen zijn zodanig geformuleerd dat ze helpen om de aanpak en methodologie van het veldwerk te ontwerpen (tellingen, interviews, groepsdiscussies en veldobservaties gedurende 1997 en 1998). De relevante methoden en technieken voor het verzamelen van gegevens worden gepresenteerd.

Hoofdstuk 3 geeft eerst een algemene beschrijving van de huidige situatie in het Mindif gebied. De sociale organisatie en instituties worden gepresenteerd, inclusief de traditionele en moderne overheid. Deze presentatie laat zien dat de belangrijkste activiteiten voor levensonderhoud in het Mindif gebied akkerbouw, veeteelt, verzamelen, kappen van brandhout en een aantal activiteiten buiten de landbouw zijn. Het landbouwsysteem is 'shifting cultivation' ofwel rotatielandbouw, en landbewerkingstechnieken zijn onder andere ploegen, gebruik van compost, kunstmest, pesticiden en herbiciden en, op veel kleinere schaal, het leggen van kleine dijkjes om de velden en geïrrigeerde teelt. Akkerland wordt verkregen door overerving of door het

ontginnen van een stuk bush, met toestemming van de lokale chief. Afhankelijk van de beschikbaarheid van bushland en andere factoren, waaronder de vraag of de aanvrager een onbekende, dorpsgenoot of familielid van de lokale chief is, kan de procedure voor het verkrijgen van land verschillende wegen volgen.

In hoofdstuk 4 wordt het belang van de bush voor het levensonderhoud van huishoudens in de Mindif regio duidelijk gemaakt, aan de hand van de belangrijke functies die het in het dagelijks leven vervult. Variërend per locatie draagt de bush substantieel bij aan menselijk welzijn door de rol in behuizing, braakgronden, brandhout, voedsel, verzorging van ziekten, ontspanning en beweiding. Bovendien herbergt de bush biodiversiteit. Enkele waarden van de bush kunnen economisch bepaald worden, deze blijken een substantiële aanwinst voor gebruiker-huishoudens te zijn. De gemiddelde bijdrage van de bush per jaar per huishouden varieert van 6.000 tot 127.000 FCFA voor voedsel uit de bush, van 31.000 tot 85.000 FCFA voor overige producten uit de bush, tot 189.000 FCFA voor braaklegging en tot 1.840.000 FCFA voor beweiding en diervoeder. Over het algemeen halen veetelers meer winst uit de bush dan akkerbouwers; een combinatie van landbouw en veeteelt is in dit verband de beste optie.

Hoofdstuk 5 begint met een analyse van het bushprobleem. Eén aspect is dat de oppervlakte afneemt door expansie van akkerland, wat op zijn beurt een gevolg is van bevolkingsgroei en niet een toename van areaal per persoon. Op basis van extrapolatie van de huidige trend kan men inschatten dat de bush binnen een generatie verdwenen zal zijn. Deze inschatting van de onderzoeker komt overeen met de inschatting van lokale mensen. Naast het verlies aan oppervlakte daalt de functie van de bush ook door kwaliteitsverlies, in het bijzonder de afname van houtige grondbedekking. Deze afname is voornamelijk toe te schrijven aan extractie van brandhout voor commerciële en huishoudelijke doeleinden en het ontginnen van nieuwe akkers in bosgebieden. Zulke nieuwe akkers zullen enige jaren later weer braak gelegd worden, maar het is onwaarschijnlijk dat ze weer uitgroeien tot bosgebied. Het resulterende kwaliteitsverlies geschiedt sneller dan de pure afname van oppervlak bush. In 1997 kwam uit berekeningen van de onderzoeker en van de lokale bevolking dat alle goede bush in 2017 verdwenen zou zijn.

Voorts gaat hoofdstuk 5 in op de opties en motivaties van de actoren achter de afname van de bush. De eerstelijnsactoren zijn landbouwers die nieuwe velden ontginnen en houthakkers voor commercieel brandhout. De motivaties van de landbouwers zijn lage kosten en hoge opbrengsten in vergelijking met alternatieven als intensificatie of emigratie. Bovendien brengt het verwijderde hout geld op bij verkoop als brandhout. Commerciële houthakkers worden vooral gemotiveerd door de cash inkomsten, wat tot 1997 nog sterk werd versterkt door het gebrek aan gas in urbane gebieden. Voor urbane in-

vesteerders is hout goede handel vergeleken met andere handelswaar, zeker in tijden van gebrek aan huishoudelijke energie. Zowel voor houthakkers als stedelijke verkopers zijn privé plantages niet voorstelbaar, ten gevolge van hoge kosten en culturele gewoontes: het planten van bomen voor brandhout is in de Mindif regio niet gebruikelijk.

Hoofdstuk 6 gaat in op de institutionele aspecten en laat zien dat de geringe kosten van het maken van nieuwe akkers en het kappen van brandhout het resultaat zijn van slechte implementatie van regels op het gebied van landgebruik en land eigendom. Wetten worden onjuist of helemaal niet geïmplementeerd, deels tengevolge van machtsmisbruik door sommige landbeheersautoriteiten en deels tengevolge van politieke en financiële invloed (corruptie) van veel bushgebruikers. Het mislukken van wetten is mede een resultaat van de verwarde situatie rondom de overgang van traditioneel landbeheer naar regulatie door de moderne overheid. Deze verwarring biedt traditionele en moderne autoriteiten de kans de regels naar hun hand te zetten, gericht op korte termijn voordeel. Dit resulteert vervolgens in sociale conflicten die geïllustreerd worden door drie cases waarin akkerbouwers, veehouders, lokale houthakkers en houthakkers van buitenaf tegenover elkaar staan.

Het afsluitende hoofdstuk geeft eerst de huidige tevredenheid over het leven vanuit het perspectief van lokale mensen. Daarna worden de divergente theorieën over verandering van landgebruik van Malthus en Boserup gepresenteerd om uit te zoeken welke weg de Mindif regio is ingeslagen. De conclusie in hoofdstuk 7 is dat Mindif momenteel in een fase tussen die twee processen in lijkt te zitten, en dat een Malthusiaans scenario werkelijkheid kan worden als er niets gebeurt om de huidige afname van de bush een halt toe te roepen. Het grote risico van vertrouwen op de Boserupiaanse idee dat mensen spontaan gaan investeren in intensivering van de landbouw zodra dat noodzakelijk is, is dat de motivaties van boeren om de bijbehorende kosten (arbeid, kapitaal) op te brengen pas groot genoeg zijn als de bush eigenlijk al op is. Als er geen goede bush meer is, waar kunnen mensen dan het benodigde kapitaal (vee etc.) en inkomen (mede gebaseerd op de bush) vinden om te investeren? Zoals zoveel gebieden zijn de bodems in Mindif niet zo goed en zijn er geen grote markten (steden) die zo karakteristiek zijn voor Afrikaanse cases van spontane landbouwtransitie. Daarom identificeert deze studie een derde optie, die inhoudt dat intensificatie opgewekt wordt, mede door striktere bescherming van de resterende bush. Als men kijkt naar de trends in het onderzoeksgebied, blijkt dat mensen, hoewel zij in beginsel een Malthusiaanse kijk op de wereld hebben, reeds tekenen van intensificatie vertonen, hoewel dat nog te bescheiden is om een Boserupiaans proces te starten. Andere hoopgevende bevindingen zijn de bereidwilligheid van mensen om te veranderen en de bush te beschermen, hun bewustzijn over de negatieve gevolgen van het verdwijnen van de bush. Intensificatie met

behoud van bush schijnt voorstelbaar, bij goede integratie van akkerbouw en veeteelt.

Er wordt voldaan aan vele randvoorwaarden om deze strategie te kunnen volgen. Er is een hoge bevolkingsdichtheid, maar nog niet te hoog; kapitaal kan vrijgemaakt worden door vee te verkopen en via andere inkomstenbronnen; externe markten zijn weliswaar klein maar wel beschikbaar in Maroua en Kaele; landbouw-inputs zijn beschikbaar, in het bijzonder via de Sodecoton; kredietvoorzieningen zijn beperkt maar aanwezig; en ten slotte zijn er ook structuren die aan capaciteitsopbouw doen, zoals NGO's, Sodecoton, missie en overheid. Het potentieel voor innovatie en intensificatie met de bush nog deels intact lijkt daarom aanwezig in de Mindif regio.

Ondersteuning en juiste socio-economische voorwaarden zijn belangrijk voor het waarmaken van bovengenoemd potentieel. De nationale overheid zou korte en lange termijn besluiten moeten nemen en die ook effectief maken. Van cruciaal belang en geheel in overeenstemming met de eigen aspiraties van de gemeenschap is de devolutie van macht aan lokale mensen om de bush te beheren. Hierbij zou tot een vorm van co-management gekomen moeten worden, waarbij de overheid de legitieme rol behoud om belangen van duurzaamheid en biodiversiteit te verdedigen. Andere nuttige maatregelen zijn de aanleg van goede infrastructuur, bevorderen van boom-aanplant en het uitroeien van corruptie. Internationale donoren en international conventies zoals de CBD en de UNCCD kunnen hierbij een stimulerende rol spelen, omdat de wederzijdse versterking van bushbehoud en landbouwintensificatie sysnergie betekent van biodiversiteitbehoud en armoedebestrijding.

About the author

Wassouni, born in 1960 at Malanegome in Far North Cameroon, started primary school at the Catholic Mission of Lara and continued in the government high school or 'Lycee' in Kaélé. After the secondary school he went to Yaounde University where he graduated in urban sociology. He entered a professional school (Teachers High Training School) and came out as Education Psychologist or Guidance Counsellor (Conseiller d'Orientation). He worked at the central services of the Ministry of National Education and the Ministry of Higher Education before being appointed chief of scholarship service at the Dschang University between 1989 and 1995. After administrative activities, Wassouni became staff member of the Programme Environment and Development in 1996 and completed a research fellowship at CML-Leiden University with a grant from NUFFIC. In September 2003, he was appointed Assistant Director of Garoua wildlife school. In May 2005 he was appointed Director of conservation and promotion of natural resources at the Ministry of Environment and Protection of Nature.