Sharing a Valley. The changing relations between agriculturalists and pastoralists in the Niger Valley of Benin

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Changes since the 1970s

The situation of proto-cooperation and complementarity between the various groups in the Niger Valley did not end abruptly. Gradually the linkages between the different modes of existence changed. This process is placed in a broader perspective in this chapter by an explanation of two long-term changes in the valley. Firstly a period of drought formed the background to changes in the resource base and put increasing pressure on resources. The way in which both groups adapted their modes of existence to the changing environment is analyzed as they had direct consequences on the linkages. Secondly there were political and economic changes in the 1970s and 1980s which influenced both modes of existence such as government intervention and technical innovations. These external factors are dealt with in the second part of the chapter.

Changes in the resource base

Periods of drought
The first development that needs to be considered in order to understand the changes in the resource base are the periods of drought. Periods of drought in the semi arid zones have always occurred (Matlock & Cockrum 1976: 233; Kessler & Ohler 1983:5; Stone 1991: 69). Particularly bad years are even given a name. For example the droughts of 1913-14, also described for other regions (e.g. for Mali by De Bruijn and Van Dijk 1995), have been named by the inhabitants of Karimama as Gande beri (meaning big, protruding chest).

Hulme (1993) stated that in Africa in general between the 1960s and the early 1990s mean annual rainfall was significantly lower than the long-term mean, but recent research (Dietz et al. 2001) has shown that in the 1990s mean annual rainfall
The mean annual rainfall over eleven years is calculated to eliminate the influence of the eleven-year sun cycle, a cycle that has a lot of influence on the temperature and precipitation on earth" (Put & de Vos 1999). Data of ASECNA were available until 1985. From 1985-1992 data from Carder are used.

Source: ASECNA/CARDER/Borgou

increased again in the semi-arid zone. However, the period under consideration, 1970-1992, was unusually dry.

In Malanville District for example in 19 out of the 23 years, rainfall was below its long-term statistical mean of 842 mm. Illustrative is what a notable of Tondikuaria said when asked to indicate which years were bad: "You ask me what were the bad years? For us, for a long time, all years are bad years". Only in four years did the rainfall attain the long-term mean, as illustrated in Figure 5.1 that shows the mean annual rainfall in Malanville1 over the 1943-1992 period.

The average amount of rainfall in the Malanville region from 1943 to 1970 was about 904 mm per year whereas over the 1970-1992 period the average was 763 mm. Figure 5.1 shows how the mean annual rainfall fluctuated over the years whereas the general pattern shows a gradual decrease heading into the 1980s and 1990s.

Another phenomenon influencing the resource base was the extremely uneven distribution of rain over the rainy season. As the rainy seasons became shorter, the levels showed great variations. On the one hand the start of the rainy season determines the moment of sowing; hence the abundance of crops at harvest-time. Farmers fear interruptions in rainfall patterns because they disturb seed germination and consequently

1 Rainfall data for Malanville instead of for Karimama are presented here because the meteorological service only started its measurements in Karimama in 1981. To be able to consider a long-term trend, data for Malanville are used to compose the figure. Malanville is situated at 11.52 N and 003.24 E; Karimama at 12.02 N and 003.10 E.
necessitate the re-sowing of crops. On the other hand the start of the rainy season determines the length of the period of *soudure*, the period during which the stocks of staple food are (almost) finished and the new crops have not yet ripened.

The statement by one of the respondents on the cropping season of 1992 shows that for the farmers the pluviometric characteristics like the annual mean are not enough to determine whether a season has been bad or good. That year many people harvested only one third of what they normally would have harvested:

In July it rained in the first two weeks and after that two weeks of drought followed. However, in the first and the last weeks of August suddenly so much rain fell it caused a flood along the flood plain that consequently destroyed our sorghum standing there. At the same time the cantharides\(^2\) were sucking out our millet, which was growing higher up in the valley. The month of September was worthless: only in the first week did the last shower of the season arrive - at least so we thought - and the heat fried the crops in the fields. Not even one drop of rain fell until the second week of October when suddenly, when nobody expected it any more, the *balaou hari*\(^3\) - the rain of misery - arrived. The rains and strong winds lashed down and thunderstorms flattened the sorghum stalks in the fields and destroyed the fodder which was stacked on the roof for the animals."

This demonstrates again that when precipitation is low, variability not only between years but also between adjacent geographical areas increases. In addition, extreme spatial variability in rainfall exists in the valley. In some years, the northern villages such as Monsey receive much less rain than a village like Birnilafia, which is located further south (see Map 4.1). In this respect 1991 was a year of extremes. In Kargui, Birnilafia and Karimama the harvests were good but in Kompa and Bogo Bogo the harvest was particularly bad.

In Chapter 4 the seasonality of the River Niger was explained. Twice a year the river flooded and deposited fluvial material on the flood plain. When the water retracted again from the flood plain, ponds remained in which fish were numerous. The river was an important communication route to Niamey. However, decreasing amounts of rainfall had a multiplier effect on the river's discharge, magnifying the variability of the rainfall in the source and catchment areas because of the higher potential evaporation levels. This is due to reduced cloudiness and atmospheric humidity in dry years (Grove 1985: 10). Until about 1975 one could reach Niamey with a motorized boat the whole year round, today the main stream of the Niger is only a trickle in the dry season. Also two of the three tributaries of the Niger in Benin (the Mékrou and the Alibori), which used to be filled with water the whole year, gradually started to run totally dry during part of the year while the third, the Sota, became a creek rather than a river during the dry season. In Malanville the discharges and water tables have been measured since 1953. Figure 5.2

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2 Also called 'Spanish fly' in English. Some species of the Cantharidae family damage millet by sucking the flowers of the plants. *Balaou* is an Arabic word which means 'punishment for a person who has sinned'.

3 *Balaou* is an Arabic word which means 'punishment for a person who has sinned'.
**Figure 5.2.**
Total mean annual discharge of the River Niger measured in Malanville, 1953-1988

*The gaps in the graph are caused by the absence of data for one or two months in a particular year. It was not possible to calculate all the annual means.*

*Source: Service de l'Hydrologie, Cotonou*

**Figure 5.3**

(Source: Service de l'Hydrologie, Cotonou)
illustrates the total mean annual discharge of the River Niger measured in Malanville from 1953 until 1988.

To understand the relatively higher decrease of water flow compared with rainfall, it is important to look at the mean distribution of the discharge over the months. Figure 5.3 shows the mean monthly discharge of the River Niger in Malanville. Each line represents the mean over a period of about twenty years: the dotted line over 1953-1972 and the second line represents the mean between 1973 and 1992.

Figure 5.3 shows a substantial lowering of the discharge over the different periods but it also clearly shows that there are no marked flood peaks any more nor can the intermediate period of *hari nea* in November be distinguished. *Hari nea* as well as the Malian flood (*hari bi*) get added directly to the local flood in October without any flood peak. The local flood arrives earlier because the run-off is quicker due to the decreasing vegetation in ParcW, where the tributaries of the Niger rise (Goossens 1992: 10). Occasionally the river overflows its banks a little but it never attains the water table of the years before the 1970s, leaving large parts of the flood plains dry and not depositing any fertile alluvial sediments. No flooding also means a loss of fertility of the cultivated soils of the flood plain (see also Rochette & Bogas 1981: 222 and Bio Bigou 1987: 494).

The lowering of the discharge of the river is for the greater part accounted for by the diminishing pluviometry. However, the decrease during the period of the Malian flood being relatively bigger than during the local flood suggests that anthropogenic changes up-stream in Niger and Mali, like the construction of dams or irrigation schemes, may have contributed to its reduction.

*Increasing pressure on resources*

The second development that needs to be considered is the increasing pressure on resources. In 1917 in his annual report, Jacques Gbay, a colonial administrator, wrote that the population was too small to fully exploit the "extra-ordinary wealth, which the Moyen Niger contained". At that time, about 8,650 people, including nomads, were living on the Benin side of the valley (ANB 1917; ANB 1918).

Sources on population growth and density over time are scanty and unreliable. The most reliable population data are provided by the national censuses. For the purpose of this study those censuses held in 1949, 1961, 1979 and 1992 give a useful indication of the large population growth in the valley (see Table 5.1).

### Table 5.1
**Population growth in Karimama and Malanville Districts 1949-1992**

<table>
<thead>
<tr>
<th>District</th>
<th>1949</th>
<th>1961*</th>
<th>1979</th>
<th>1992</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karimama</td>
<td>7,884</td>
<td>--</td>
<td>19,834</td>
<td>29,071</td>
</tr>
<tr>
<td>Malanville</td>
<td>10,091</td>
<td>--</td>
<td>36,442</td>
<td>67,387</td>
</tr>
<tr>
<td>Total</td>
<td>17,975</td>
<td>29,700</td>
<td>56,276</td>
<td>96,458</td>
</tr>
</tbody>
</table>

*Until 1978 Karimama and Malanville formed one administrative unit and these data are not available for each district separately.

In Karimama the population increased around 50 per cent between 1979 and 1992, which is about 3.8 per cent annually, higher than the 2.9 per cent growth per annum for Benin as a whole. As a result of this growth rate, the population density increased from 9.5 to 16 people per km$^2$ between 1979 and 1992. The valley still ranks amongst the lowest populated zones of the Borgou. However, it has to be taken into account that about 80 per cent of Karimama and 37 per cent of Malanville are officially closed off for the population. Table 5.2 shows that between 1961 and 1992 the population density in the valley tripled in real terms.

Table 5.2
Population densities in Karimama and Malanville 1949-1992

<table>
<thead>
<tr>
<th>District</th>
<th>Total surface in km$^2$</th>
<th>Surface in km without forest reserves</th>
<th>Population density (persons/km$^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karimama</td>
<td>3,590</td>
<td>765</td>
<td>10.3</td>
</tr>
<tr>
<td>Malanville</td>
<td>2,310</td>
<td>1,448</td>
<td>6.9</td>
</tr>
<tr>
<td>Total</td>
<td>5,900</td>
<td>2,213</td>
<td>8.6 13.4 25.5 42.5</td>
</tr>
</tbody>
</table>


Some of the population growth in Malanville is due to the transformation of the town from a local to an international market. The population growth was stimulated by the construction of a new bridge across the River Niger in 1959. The bridge created an improved connection with Nigeria and the Republic of Niger and led to the subsequent growth of the market of Malanville. The city grew from about 16,500 inhabitants in 1979 to 26,000 inhabitants in 1992. If this urban population is left out of the calculation, Malanville's rural population density increased from 13.8 persons per km$^2$ in 1979 to 28.6 persons per km$^2$ in 1992.

In addition to the natural population increase in Karimama and Malanville, an influx of foreigners contributed to the population growth as the favourable ecological circumstances attracted many groups of people from Niger and Nigeria. Some of the immigrants were agriculturalists in search of fertile lands or better living conditions in general. These agriculturalists who came from Niger settled mainly in the Malanville region. For them the expanding international market where commercial activities could be developed was very attractive. Between Guene and Malanville several new villages were established along the road; most of them founded in 1972, the others in 1985. Five of these settlements were established in the middle of the rangelands of the autochthonous Fulbe of Guene.4

4 The following inventarization has been made of settlements of agricultural immigrants: Beidou Tounga (Djerma from Niger, 1972), Baliloi I (Haussa of Niger, 1972), Goubra Fari (Djerma from Niger 1972), Baliloi II (Djerma from Niger, 1982), Allassane Tounga (Haussa from Niger, 1985), Kadé (Djerma from Niger arrived in 1985), Birtiga Darassalaam (Dendi from Goungoun in Benin
Another group who contributed to the population density was the pastoralists from neighbouring countries. As a result of the demographic push and two periods of severe drought, many pastoralists, especially from Niger, moved into the valley. Most of the time they just trickled in slowly but in 1985 they arrived in large numbers forced by the lack of rain to leave their own countries. The autochthonous Fulbe of Karimama named the year 1985 as *deeduwel ornaale*, meaning 'drought of the strangers'. According to the FAO (1988: 1), the whole cattle stock of Niger had left the country in 1985. The arrival of so many herds forced the autochthonous Fulbe to leave the Niger Valley in search of fodder in ParcW very early in the year and the foreign Fulbe did not linger in the valley either. The influx into ParcW was so massive that the army was sent in by the authorities in May 1985. Their mission was given the code name *Sahel*. The soldiers loaded the herders onto trucks and transported them to Gaya, a Nigerien village just across the border on the other side of the Malanville bridge. By then the rangelands and the park were covered with animal skeletons. Many of those expelled returned to the valley and settled there temporarily or even for a longer period. Because many people came and left in the years to follow, it is difficult to estimate the temporary increase in population between the national censuses of 1979 and 1992. Those who remained in the valley settled in camps outside the village scattered all over the districts of Malanville and Karimama. Table 4.3 shows the date of settlement of the different Fulbe households of the research villages. It appears that the majority of the Fulbe of Tondikuaria (75.4%) only arrived after 1970. In Kompanti however, this percentage was lower (36.6%). This is because a larger group of autochthonous Fulbe was already present in Kompanti before the 1970s and less space was available to accommodate new groups.

In addition to the immigrating groups of Fulbe and agriculturalists who contributed to the rise of the population density, there was another group using the territory of Karimama and Malanville temporarily. These were the transhuming Fulbe from Niger and Nigeria who started to arrive because of the prolonged dry season and the depletion of natural resources. This was more serious in regions further to the north and they were forced to extend their transhumance orbits (see also Beavilain 1979: 93). They arrived during the dry season in search of fodder and as soon as the rainy season set in, they returned to help their families cultivate. They did not settle in Benin.

Benin had to accept the influx of transhumants as it is a member of the Communauté Economique de l’Afrique de l’Ouest (CDEAO) in which the free circulation of cattle is guaranteed. Within the CDEAO, the Communauté Economique de Betail et de Viande (CEBV), which includes the five countries of Benin, Niger, Burkina

and Djerma from Niger in 1985). Most of the immigrant agriculturalists collect and sell firewood in Malanville. Others work on large farms of traders from Malanville.

5 In the 1985/86 annual report of the district, the Chief of District writes concerning these events: "Vu la position stratégique de notre district il convient de souligner particulièrement les efforts que mènent les agents de Force de Sécurité Publique et les autorités politico-administrives pour le maintien de la paix et de la sécurité. C’est ainsi que plusieurs actions ont été menées notamment pour lutter contre les envahisseurs étrangers qui immigrèrent sur notre territoire avec leurs troupeaux. A cet effet les operations Sahel 1 et Sahel 2 ont permis de ratisser le Parc National W".
Faso Ivory Coast and Togo, agreement was reached on a common vaccination programme and rules were established on transhumants.

The issue of transhumance in the Niger Valley and ParcW has been studied over the years or touched upon by a number of authors (Rochette & Bogas 1981; Oude 1986; Servoz 1987). In these studies it was always stressed that there is little known about the exact numbers of transhumants crossing the borders and that more research needed to be done. Van den Bogaard (1984) abandoned his efforts to survey the ‘foreigners’ altogether because he found it extremely hard to find them in the middle of the forest and plains. So the numbers are always estimations which differ substantially. An FAO report on transhumance in the agro-pastoral zone gives an estimate of the number of transhumants in various countries in the period 1985-86, the drought years. From Table 5.3, which is composed of the data in the FAO study, the total number of cattle of foreign transhumants received by Benin was estimated at 245,000.

Table 5.3
Estimate of distribution of transhumant cattle from CEBV countries and Mali, Nigeria and Ghana, 1985-1986

<table>
<thead>
<tr>
<th>Country of origin</th>
<th>Total number of cattle leaving the country</th>
<th>Number of cattle from transhumants received by country</th>
<th>Number of cattle from transhumants received by Benin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burkina Faso</td>
<td>470,000</td>
<td>235,000</td>
<td>100,000</td>
</tr>
<tr>
<td>Mali</td>
<td>425,000</td>
<td>120,000</td>
<td>10,000</td>
</tr>
<tr>
<td>Niger</td>
<td>1,145,000</td>
<td>5,000</td>
<td>65,000</td>
</tr>
<tr>
<td>Nigeria</td>
<td>80,000</td>
<td>860,000</td>
<td>70,000</td>
</tr>
<tr>
<td>Ghana</td>
<td>0</td>
<td>130,000</td>
<td>0</td>
</tr>
<tr>
<td>Togo</td>
<td>0</td>
<td>60,000</td>
<td>0</td>
</tr>
<tr>
<td>Ivory Coast</td>
<td>0</td>
<td>465,000</td>
<td>0</td>
</tr>
<tr>
<td>Benin</td>
<td>0</td>
<td>245,000</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>2,120,000</td>
<td>2,120,000</td>
<td>245,000</td>
</tr>
</tbody>
</table>

Source: FAO (1988: 105)

The numbers presented for Benin are for the entire territory. The Fulbe of Burkina Faso entered Benin via Atakora Province and most of the Nigerians passed through the more southerly provinces. The transhumants from Niger, estimated around 65,000, passed through Karimam and Malanville because the valley forms the only border between Niger and Benin.

Servoz, who was on assignment for the FAO in 1987 to calculate the fodder resources in the Niger Valley, estimated that about 40,000 to 50,000 foreign cattle entered Benin through the valley during the dry season. In the 1990 annual report of the veterinary project based in Karimama (PDEBB), at least 5,000 transhumant cattle and 10,000 sheep are reported. Compared to other estimates, for example those by the FAO, these numbers are extremely low although policy was being formed on the basis of these figures.

For the purpose of this study, a census was held amongst the transhuming Fulbe on their way back to their home villages in Niger in the months of July and August. In
Table 5.4 their provenance and the number of cattle are displayed. For the location of the districts in Niger, see Map 6.4 in Chapter 6.

Most of the herds consisted of cattle and some sheep. During the survey, the total number of sheep counted was 2,500. It is estimated that 30,174 is about two-thirds of the total number of transhumants from Niger because some of the herds would already have crossed earlier. Whatever the exact number, a minimum of 30,100 cattle should be added to the local number.

The most reliable data on the number of local cattle come from a survey conducted by the CARDER in October-November 1990. In Karimama 37,770 head of cattle were counted. Prior to the CARDER survey, estimates of 28,000 between 1984 and 1988 were made (see Table 5.5).

Impact on the resource base
The droughts in the 1970s and 1980s had far-reaching consequences on the ecology of the River Niger's flood plain. Ponds, lakes and marshes ceased to be permanent because of a shortening of the season during which the water table was temporarily high. This had four major consequences for the flood plain.

Table 5.4
Provenance of the transhumant herds which crossed Karimama District in July and August 1992

<table>
<thead>
<tr>
<th>Districts of provenance of the herd</th>
<th>Number of herds</th>
<th>Percentage of herds provenance</th>
<th>Number of cattle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaya</td>
<td>297</td>
<td>46.6</td>
<td>12,286</td>
</tr>
<tr>
<td>Birmi</td>
<td>171</td>
<td>26.8</td>
<td>9,583</td>
</tr>
<tr>
<td>Dosso</td>
<td>127</td>
<td>19.9</td>
<td>5,904</td>
</tr>
<tr>
<td>Dogondoutchi</td>
<td>43</td>
<td>6.7</td>
<td>2,401</td>
</tr>
<tr>
<td>Total</td>
<td>638</td>
<td>100</td>
<td>30,174</td>
</tr>
</tbody>
</table>

Source: Own survey 1992

Table 5.5
Number of cattle and sheep in the Karimama District 1979-1991

<table>
<thead>
<tr>
<th>Year</th>
<th>Cattle</th>
<th>Sheep</th>
</tr>
</thead>
<tbody>
<tr>
<td>1979-1980</td>
<td>19,528</td>
<td>10,000</td>
</tr>
<tr>
<td>1983-1984</td>
<td>25,000</td>
<td>90,000</td>
</tr>
<tr>
<td>1984-1985</td>
<td>28,000</td>
<td>90,000</td>
</tr>
<tr>
<td>1985-1986</td>
<td>28,000</td>
<td>90,000</td>
</tr>
<tr>
<td>1986-1987</td>
<td>28,000</td>
<td>90,000</td>
</tr>
<tr>
<td>1987-1988</td>
<td>28,000</td>
<td>90,000</td>
</tr>
<tr>
<td>1990-1991</td>
<td>37,770</td>
<td>37,381</td>
</tr>
</tbody>
</table>

Firstly, it created unfavourable conditions for the nutritious fodder crops like *burgu* (*Echinochloa stagnina*). Servoz (1987: 9) estimated that since the drought in the 1970s their surface area had at least halved from 20,000/30,000 ha to 10,000 ha in 1987. The vegetation that replaced the *burgu* like *Vetiveria, Sporobolus* and *Mimosa pigra* are less appreciated by cattle and their caloric value is much lower.

Secondly, the draw-down of the water in the ponds set in much earlier than before, which left the *burgu* free for roaming cattle at an early stage. There is less *burgu* available and for a shorter period and it is eaten by the cattle of the locals and by those of the transhuming Fulbe.

Thirdly, agriculturalists started using the flood plain. In 1993 about 100,000-120,000 ha of the 150,000 ha which the flood plain offered were used by fishermen and farmers to cultivate sorghum, maize and rice (Servoz 1987). By clearing the flood plain of its original vegetation such as the *Mimosa pigra* and the forest belts bordering the river lakes and ponds, an irreversible process started. If for example the *burgu* like cultures of rice and the field were abandoned after cultivation, wild rice (*Oryza longistaminata*) would recolonize the soil while the *burgu* would not return as it is less aggressive (Boudet 1984: 119).

And finally, the near cessation of floods caused a considerable slump in fish production because the life-cycle of fish is linked to the seasonal flood regime of the Niger as was described earlier.

For the higher grounds in the valley the situation changed. Servoz (1987: 20) observed that the Soudano-Sahelian ecosystem showed many signs of developing into a Sahelian ecosystem. A large number of the woody shrubs had disappeared to be replaced only by annual grasses. Furthermore he observed the gradual expansion of the existence of Sahelian trees like *Balanites, Guiera* and *Combretum glutinosum*.

The farmers in the valley practice shifting cultivation, clearing land by felling and burning the vegetation. This system is well suited to the environmental conditions of the valley as long as there are only a few people in relation to the amount of cultivable land. During the first few years the harvest is good but after a while, depending on the type of soil, it is necessary to let the land lie fallow to restore its fertility. With the increasing demand for land there is a tendency to make fallow periods shorter. Eighty-eight percent of the agriculturalists of the Niger Valley still follow this practice but about three-quarters of them let the land lie fallow for a period of less than 5 years which in this area is considered too short (de Haan 1997: 104). The reason is that there is not a large enough area available in the research villages to leave the fields fallow for a sufficient number of years. As a result, the quality of the soil deteriorates and witch weed (*Striga spp.*) becomes a major problem. Moreover, crop yields diminish and sheet erosion can occur: water and wind peel off the topsoil and the soil loses its capacity to absorb

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6 It affected the habitat of rabbits, herons, ducks, agoutis, snakes and tortoises. According to oral history, the hippopotamuses disappeared around the mid-1970s.

7 The weed is a parasite that attacks the roots of staples such as millet and sorghum. It is regarded as a constraint to increased food production in Sub-Saharan Africa and a more serious problem than insects, birds or plant-diseases (Spore 2000: 13). See also Pieterse (1993) on the ecology of the parasitic weed.
rainwater. The run-off increases and the land becomes more arid. Here and there increased run-off has led to gully erosion. In the fallow fields, bushes appear of the *Pilostigma* spp., which cattle cannot digest.

In 1992 the amount of nutrients in the topsoil from different locations in the research villages was analyzed. In comparison with other soils in semi-arid areas, the topsoil in these areas was slightly more acid but would not lead to cultivation problems. The amounts of phosphorous and kalium were sufficient and would not cause any problems with soil fertility. However, the nitrate level and the percentages of organic matter were very low and would result in low fertility and a loss of soil structure. In general, fertility was low as a result of a lack of mineral inputs, the effects of livestock grazing and burning of the vegetation. There was no significant difference between the soil qualities in Tondikuaria and Kompanti.

The largest part of the research area experienced a relatively restricted so-called 'sheet-erosion' whereby no gullies were formed but the water ran in a thin film across large areas to the roads, gullies, trek routes and rivers. There the water assembled and formed gullies. This form of erosion is less destructive than gully erosion but even so damage is done to the top layer of soil and the ash from bush fires, necessary for maintaining fertility, is removed. The reason why the erosion problem was relatively restricted was the low gradient in the area (mostly 1-2%) and the presence of fallow strips which, in spite of the bush fires, still have enough covering to break the running water.

Between 1979 and 1992 the cultivated surface in the valley increased threefold (de Haan 1997: 118). The reduced number of hectares available as pasture increased the number of cattle per hectare. Tyc (1988: 24) estimated that, in a region like Karimama District, 2-3 ha 250-kg animal (TLU) would be needed during the rainy season when production per hectare is high. However during the dry season this area would only cover 30 per cent of the needs for forage. He concluded that in total about 5 ha per TLU is needed if there is no mobility but in Karimama only 1.4 ha per TLU was available in 1988 excluding ParcW (Tyc 1988: 9). Although 5 hectares is the amount needed if there is no mobility and the pressure on pasture is not similar the whole year round, it gives an indication that the Fulbe have to increase their mobility and extend their pasture orbit outside the region.

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8 Analysis of the topsoil (5-10 cm) of a sample of 29 locations in the research villages gave the following results with regard to the most important nutrients:

<table>
<thead>
<tr>
<th>Location</th>
<th>Ph value</th>
<th>Phosphorus</th>
<th>Kalium</th>
<th>Nitrate</th>
<th>% organic matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tondikuaria</td>
<td>6.2</td>
<td>18</td>
<td>112</td>
<td>6</td>
<td>1.1</td>
</tr>
<tr>
<td>Kompanti</td>
<td>6.0</td>
<td>13</td>
<td>125</td>
<td>8</td>
<td>1.1</td>
</tr>
<tr>
<td>Total area</td>
<td>6.1</td>
<td>18</td>
<td>119</td>
<td>7</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Source: Fieldwork 1992

9 One Tropical Livestock Unit (TLU) is a 250-kg animal using 2,500 kg of forage annually (Peperkamp & Remie 1989: 57). Tyc calculated a total number of 25,700 TLU for Karima and 35,000 ha available as pastureland.
The influence of changes in the resource base on modes of existence

Droughts have been a recurrent phenomenon and, as elsewhere, people have developed their own coping strategies. The impact of the lowering water table of the River Niger on the core of the production system of the fishermen and the Fulbe was enormous: the former because of diminishing fishing resources and the latter because of declining burgu reserves. As is shown in the following sections, the inhabitants of the valley had to adjust to the changing resource base. Dendi fishermen changed their mode of existence by increasing their agricultural activities and the Dendi/Gourmantché agriculturalists and the Fulbe pastoralists found a way to extend their resource bases to previously unused areas such as the forest reserve.

Fishermen turn to agriculture

The lowering of the water table of the River Niger had far-reaching consequences for the mode of existence of the Dendi fishermen in the Niger valley. Normally the annual floods would cause enough flowing of the water to allow fish to migrate from the main stream into the flood pools in the flood plain and the tributaries of the Niger like the Alibori, the Sota and the Mekrou. The ponds and rivers were used by fish as a feeding ground and served as a breeding place.

The termination of the annual floods and the reduced rainfall caused a decrease in the quantity of fish. As the flood pools became smaller and dried up faster, the fish were caught before they were mature enough to hatch. After the 1970s, the fishing nets used had increasingly smaller meshes. The size of the mesh had been cut from the size of a fist to that of a finger by 1992. Although there were written and traditional rules that forbade the use of nets with small mesh, over the course of time these rules were less respected. In relation to dwindling fish reserves, the authority of the meroi and his assistants was undermined. From the government side there was one appointed fishery extension agent based in Malanvillé but his means of transport were restricted and he could not execute his task of controlling mesh sizes (Rochette & Bogas 1981: 208). In 1992 the last fishery extension agent left.

Not only the quantity of fish declined, but also their quality. Many varieties of fish that were highly valued on the market started to become rare in the 1970s. An example is the *Heterotis niloticus* (in Dendi: *Kouala*), which was a large commercially important fish that lived in ponds and shallow water. According to the fishermen who were interviewed in 1993, other fish such as the *Parophiocephalus obscurus* (in Dendi: *Korombou*) and the *Ctenopoma kingsleyae* (in Dendi: *Kakassa*) had not been observed since 1978.

The controlled access to fishing ponds was abandoned. Gradually the water tables became too low and the evaporation of the water too high to wait until the month of collective fishing arrived. Most of the ponds had dried up by then and the fish had already been caught. This also meant that the spawning areas were lost. According to the fishermen, the last big communal fishing event took place in 1976 and the last marshes and ponds lost their water between 1984 and 1986.
Since the 1970s, the importance of fishery as a source of income greatly declined. Over one third of the fishermen interviewed indicated that by 1980 they had already stopped earning anything from fishery. For 38 per cent of the fishermen agriculture became a more important source of income between 1980 and 1984 while for 25 per cent this happened only during the late 1980s. By 1992 nobody was earning anything from fishing any more although they still fished for their own consumption. The former fishermen became agriculturalists like their wives who also used to earn an income from selling fish. Although some women held on to their activities by buying fish from several fishermen and reselling it at the market, most of them took up agriculture.

*The flood plain becomes part of the farming system*

Population growth and the switch to farming by fishermen instigated a vast expansion of fields. Unlike other regions with the same population density as in Karimama, farmers were not forced to expand their fields to ecologically unsuitable soils (see Scott 1984: 6 for Nigeria). On the contrary, as it became dryer and the water tables of the river lowered, the flood plain gradually offered good quality farming land. The soils of the former ponds were especially fertile. Land rights to this new land were set up differently in the different villages. For example in Kompa, the extension service divided it among 'everybody who had paid their taxes', while in Tondikuria the plain was managed by the *delegué*, the village chief; and in Kompanti all groups were allowed to clear certain parts of the flood plain on the basis of which t became their property.

Fishermen who used to settle temporarily on special elevations in the flood plain during high water in the so-called *tounga* settled there permanently since the river had seldom overflowed its banks. These areas became permanent villages such as Maligoungou and Boyzeya beyond the village of Tondikuria. For the fishermen, the situation was ironic. As one of them stated: *'le poisson est devenu du mil'*, where once we used to go fishing now we cultivate cereals. Furthermore the fields on the flood plains with their water-retaining properties were in high demand since the rainy seasons were becoming shorter and intermittent droughts were occurring more often. Table 5.6 shows when the farmers in the research villages started to cultivate the flood plains.

*Table 5.6*

Start of flood-plain cultivation by respondents at time of survey (1991), respondents older than 45 years of age*

<table>
<thead>
<tr>
<th>Cultivation of floodplain</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before 1975</td>
<td>1.9</td>
</tr>
<tr>
<td>1975-1979</td>
<td>5.6</td>
</tr>
<tr>
<td>1980-1984</td>
<td>57.4</td>
</tr>
<tr>
<td>1985-1991</td>
<td>35.2</td>
</tr>
<tr>
<td>Total (N)</td>
<td>(54)</td>
</tr>
</tbody>
</table>

* Only the group of heads of households of 45 years and older are taken into consideration to rule out the possibility of the answer meaning that they started to cultivate for the first time in general, the question was not asked to the second batch in Kompanti and therefore N is lower.

*Source: Own survey*
Of all the respondents (N=203) some 70 per cent now have fields on the flood plain. However, the percentage is unevenly distributed over the villages. In Tondikuaria almost all the families have a field on the flood plain whereas in Kompanti about half of the households cultivate the plains. In this village the flood plain is much smaller and there is enough fertile land in the direction of ParéW.

By cultivating the flood plain the agriculturalists faced the new risk of losing their crops in addition to the risk of drought, to \textit{striga} and \textit{cantharidae} which affect the production of crops. Initially the Dendi and Gourmantché tried to spread the risk by cultivating their staple crop - sorghum - in the lighter sandy soils higher up in the valley as well as in the clay soils of the flood plain. In addition to sorghum, maize and some rice were cultivated on the flood plain and groundnuts and cotton were cultivated in fields situated on lighter sandy soils as before. (See Figure 5.4).

During the 1985-1987 period, the experience of a diminishing precipitation combined with an increasingly lower water table made farmers more and more confident about cultivating areas which might become inundated if the pluviometry returned to normal. They were prompted to do so because those who had cultivated sorghum on higher grounds during these dry years had a very bad harvest. Farmers who had taken the risk of putting all their cultivation efforts into the flood plain with its water-retaining soils had a good harvest. Farmers were tempted to think that this trend would continue in the future and they were prepared to risk cultivating sorghum on the flood plain. However, 1988 was the first year in four to have an exceptionally high pluviometry. High rainfall levels created a disaster for the fields in the flood plain. The infiltration rate of the soil had decreased as a result of the changed vegetation so that the run-off was faster and the local tide came in September just as the sorghum was standing in the flood plain. It destroyed 90 per cent of the crops there.

\textit{Figure 5.4}
Cross section of the Niger Valley with the different crops, soils and associated risks
Figure 5.5 shows the discharge of the River Niger from 1985 to 1988. The curve for the years 1985-1987 shows a clear decline whereas 1988 shows a large increase in discharge compared to the other years. In 1988 when 90 per cent of the crops on the flood plain were destroyed, the farmers could not fall back upon their traditional coping strategies like eating fish, wild fruits and leaves. Many people were forced to liquidate assets like livestock, ploughs and carts in order to buy food. Only highly insufficient amounts of food aid were directed towards the region by the central government. After the shock of 1988, agriculturalists divided their risks by cultivating fields on the flood plain as well as some higher up in the valley. Part of the area where the pastoralists stayed during the rainy season, was reclaimed, which caused tensions with the Fulbe (see Chapter 6).

Figure 5.5

The forest reserve becomes part of the pastoral system
The flood plains of the Niger were of major importance to the Fulbe mode of existence. Especially during the dry season, the valley offered enough fodder to subsist on until the next cropping season when the animals could again be fed on crop residues. Obviously the diminishing pluviometry and the subsequent drying up of the flood plain combined with the seasonal influx of Fulbe from the north had a detrimental effect on local vegetation. The vital link of the flood-plain resources to bridge the time between the exhaustion of the fodder resources in the valley and the start of the rainy season
disappeared. The Fulbe were forced to turn to transhumance to search for fodder and water elsewhere.\footnote{In situations where there is less pressure, there is also less mobility (see for example in Segbana: Van den Boogerd 1990 and in Bankoaaré de Haan 1997).}

Initially they only went to the edge of the park but gradually, when many Fulbe arrived from Niger, they were forced to penetrate deeper into the interior. ParcW was not a part of the traditional grazing orbit of the Fulbe of Karimama and they considered the crossing of the prohibited forest zone as a hazardous undertaking. Entering unknown zones has many disadvantages for the cattle. The greater distances cause loss of weight and diminish fertility. Furthermore there is a risk that cattle may catch diseases unknown in the original region. However, the introduction of prophylactic and curative drugs has opened the way through ParcW to south Borgou for the \textit{Bororoogi} and \textit{Keteeji} cattle. The prophylactic drugs for trypanosomiasis have been especially beneficial as these breeds are not tsetse-resistant like the \textit{N'Dama} cattle of the Fulbe of the South Borgou.\footnote{The occurrence of the tsetse fly which causes trypanosomiasis is limited to more humid zones. It prefers to stay in the riverine vegetation and patches of dense forest.}

Besides the risk of disease during transhumance, the foresters pose a danger as well because they shoot cattle and can issue huge fines. Furthermore, although a lot of big game have disappeared, a constant watch must be kept against predators and every year people and cattle are hurt or killed by lions. Because of these dangers, and the fact that transhumance is a relatively new phenomenon, the herders leave in groups headed by an older experienced person, the \textit{garso}, the chief of the herders. Although his function is not new, with the start of trekking towards the south his function has become more important once again. He is the person responsible for the well-being of the cattle and a group of three to ten herders are sent into the park under his supervision. He has to take measures in case of trouble and to direct the herds to the safest grazing areas by avoiding tsetse-infested regions and evading foresters.

The transhumance of 1985 serves as an example of the hardships faced. Although it was not such a bad year with respect to pluviometry, the late start of the rain and the large influx of Fulbe into the region influence the behaviour of the autochthonous Fulbe. Firstly it forced them to go south as early as January. Secondly, their cattle were exposed to a variety of diseases brought into the valley by the weakened cattle from the north. And thirdly, the transhumance route led them to regions a long way south and which were still unknown to them. Animals became sick by drinking bad water and suffered from illnesses unknown to the Fulbe of the valley. In April 1985 a vet reported '\textit{les zones de pâturage sont parsemées de cadavres d’animaux mort de faim}'. One of the Fulbe chiefs of Karimama lost 23 \textit{ujiri} and 40 \textit{Bororoogi} cattle. He and his herd went along the Mékrou, a dangerous move because the riverine area is known for its tsetse infestation. But there was no fodder available elsewhere. Although his animals were vaccinated against trypanosomiasis they still became ill.

In north-west Borgou rinderpest broke out and many Fulbe lost cattle as a result (see also Bierschenk & Forster 1991: 124). More Fulbe reported that even cattle vaccinated against trypanosomiasis fell victim to the disease. They tried to hurry back to
the valley to take care of their sick cattle at home but on the way they all died. The number of deaths among the Karimama herds was substantial. According to the Fulbe interviewed, most had reconstituted their herds since the 1970s and had the maximum number of cattle. Before 1985 the mean size of herds was about 60 animals and an average of 30 cattle were lost in 1985. Table 5.7 gives the percentages of cattle losses. The picture is common for the agro-pastoral zone in Africa. Toulmin (1988: 171) reported 60-70 per cent losses among cattle herds in Sahelian countries (citing FAO statistics).

Table 5.7
Percentage of cattle lost by the Fulbe in the
research villages during transhumance in
1985

<table>
<thead>
<tr>
<th>Percentage Lost</th>
<th>No loss</th>
<th>Less than 25%</th>
<th>25-50%</th>
<th>50-75%</th>
<th>75-100%</th>
<th>Total (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.5</td>
<td>11.8</td>
<td>37.5</td>
<td>33.8</td>
<td>15.4</td>
<td>(146)</td>
</tr>
</tbody>
</table>

*Source: Own survey*

Before the 1970s hardly any herders went on transhumance. Most went for the first time between 1970 and 1974. Since their first transhumance to the south, 80 per cent of the respondents stated that they had gone on transhumance every year. The other 20 per cent stated that they judged the situation year by year and decided whether to go or not to go. For example in 1990 up to 93 per cent of herds were taken on transhumance. Table 5.8 shows the year in which the autochthonous respondents (those born in the valley or arrived before 1960) went on transhumance for the first time.

Table 5.8
First year that autochthonous respondents or those who arrived in the valley before 1960 went on transhumance into ParcW.

<table>
<thead>
<tr>
<th>First year of transhumance to the south</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before 1970</td>
<td>-</td>
</tr>
<tr>
<td>1970-1974</td>
<td>61.8</td>
</tr>
<tr>
<td>1975-1979</td>
<td>9.1</td>
</tr>
<tr>
<td>1980-1984</td>
<td>9.1</td>
</tr>
<tr>
<td>1985-1992</td>
<td>20</td>
</tr>
<tr>
<td>Total (N)</td>
<td>(55)</td>
</tr>
</tbody>
</table>

*Source: Own survey 1991*
The Fulbe of Karimama leave on transhumance without women because of the hardships in ParcW. The women stay in their dry-season settlements either near the Dendi/Gourmantché villages or near the edge of ParcW where water is available. Some women have enormous difficulty in making ends meet because milk is not available and they can only feed their children on watery sorghum porridge until the herd returns. Furthermore the women of the Fulbe group who settled on the edge of ParcW in 1985 were vulnerable to intimidation by foresters because they can be fined at will. Most of the Fulbe women are not organized and in some cases their religion, a stricter version of Islam, prohibits them from visiting markets. Some of the women who are settled in Fulbe villages such as Mamassy Peulh earn an income from selling milk made of milk powder during the dry season.

The length of the period the herds stay away is determined by two factors. The first is the start of the rainy season in the Niger Valley, which is the sign to return to their home villages because fresh nourishing sprouts of grass become available. Secondly, it depends on the herders' personal circumstances. Some herders have to return quickly to assist the family with agricultural tasks, and the herding will then be taken over by children. Additionally, when the cereal stock is low, the supply of milk for the family is of utmost importance.

Although the fact that the Fulbe had to go on transhumance during the dry season was a major change to their mobility pattern, they also had to adapt to changing circumstances during the rainy season. The Fulbe could not use the flood plain any more because it was being cultivated by the Dendi/Gourmantché. Nor could they go to Sabongari-Bara in Niger at the end of the rainy season because there too the cultivated area had had to be extended. They could not reach the area without the danger of causing damage to crops of people in the area they had to pass through to reach the salty soils.

So during the rainy season they had to find another solution and they retreated into rainy-season camps on the uncultivated areas higher up in the valley in the direction of ParcW. Map 6.3 indicates these camps. To obtain the effects of the salt-cures, the pastoralists bought salt and potash in the markets.

Most of the Fulbe were already used to growing cereals in fields surrounding their camps. Now, after years of relative drought and high cattle mortality, the area of cultivated land had had to be extended. But even so, their principal aim remained the reconstitution of their herds. To adapt to the changing circumstances they increasingly started to cross-breed the much appreciated Bororooji with the Keteeji breed, a breed more resistant to longer periods of drought and somewhat more trypano-resistant. Also the Jaliji, a breed later brought into the valley by the Fulbe from Niger was crossbred with Keteeji.

Concluding remarks

Periods of dry years and population growth, partly due to the continued process of immigration of Fulbe in the 1970s and 1980s, created increasing pressure on resources in the valley which altered the resource base while at the same time the resource base itself

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13 The Fulbe call 'transhumance without the family' biggal.
was changing. These changes forced the population to adapt their modes of existence, which led to further demands on available land, for example by the former fishermen and women who were in need of farming land because subsisting on fishery was no longer possible. They, amongst others, used the lands that became available on the flood plain for farming. However as a result, the risks related to agriculture such as the risk of flooding in the fields increased.

Furthermore for the mode of existence of the Fulbe several aspects of drought and pressure on resources forced them to increase their grazing orbit by entering ParcW. By doing so the risks increased as well: that of diseases during transhumance and those related to their illegal entry into ParcW.

With the physical environment increasingly showing signs of strain, the pressure on social relationships rose as well. The relative drought and the demographic pressure formed the background of all these developments. However, changing technology and government policy also played an important role in this process. These changes are dealt with in the next section.

Changes in the wider economic and political context

The preceding sections described how the resource base of Karimama declined in the 1970s and the impact this had on the different modes of existence of the people in Karimama. Although these changes are important to understand the development of relations between Dendi/Gourmantché agriculturalists and Fulbe pastoralists, there were other influential factors. This section deals with the following developments: the introduction of new technologies in the region and sectoral government policy concerning agriculture, livestock production and nature conservation. In the last section of this chapter the influence of these external factors on both modes of existence is analyzed.

Technology

New techniques were continuously being introduced into the region. For example, as explained in Chapter 4, the introduction of European-manufactured cloth in the 1950s affected the activities of women and weavers. However, in the 1970s and the 1980s technical innovations succeeded each other at a quicker pace. New commercial crops and fertilizers were introduced, offering new opportunities to earn an income; the introduction of bicycles made horses redundant and the arrival of the grinding machine had a considerable impact on the time-allocation of women. This section addresses two major technical innovations, the introduction of the ox-drawn plough and irrigation pumps because of their impact on modes of existence on the one hand and on linkages between both modes of existence on the other.

The introduction of ox-drawn ploughs. Ox-drawn ploughs were introduced in Borgou Province from the 1960s onwards by two organizations, La Compagnie Internationale de Développement Rural (CIDR) and L'Association Française des Volontaires du
**Progress (AFVP).** The most important objective of the CIDR was to increase cotton production by introducing ploughs and the main goal of the AFVP was to make more rational use of cattle. The CIDR started its activities by creating a demonstration centre in the village of Angaradébou, in the far north of Borgou Province near Kandi (Kissezounon 1978: 133). The AFVP distributed ploughing equipment to farmers who could provide a pair of oxen that were exchanged for trained ones. The requests for trained oxen grew so quickly that the AFVP started to train people to train oxen themselves. Volunteers from the villages were selected carefully in all regions of northern Borgou to be trained in the practice of ox-drawn ploughing and to use oxen for drawing carts. The trained persons went home with a plough and a pair of trained oxen to show their fellow-farmers what they had learned, hoping to arouse their interest. The material and the oxen (if they had not brought them in from their own herds) had to be paid back within five years. In Karimama the plough was introduced by this method at the end of the 1960s thanks to the curiosity of an inhabitant of Tondikuaria. He retold the following during an interview in 1993:

One day I was cycling past a field near Guene. I stopped because I was very impressed by what I saw: two whites were busy with a pair of oxen. I chatted with them and understood that they were teaching the oxen to plough. After three weeks one of these people came to my village and asked if I was interested in taking part in the training. They would give me two oxen on credit. I had to collect them in Guene. The plough I also collected in Guene, by bike. Furthermore they trained me how to pierce the nose of the bull and how to plough a cotton field with the pair of them. When the news spread, people from everywhere in Karimama came over to Tondikuaria to watch the bulls doing what they could not believe they were able to do. The following year three more people wanted to learn it: one from Kargui, one from Karimama and one from Gouroubéri. I earned money by instructing others. For 10 days of instruction I received 1,000 FCFA.

The know-how became widespread in the valley. Because the first trainer lived in Tondikuaria it became the 'centre of adoption' and the local smiths and carpenters were trained by the government to manufacture spare parts around 1971. They formed the so-called **Coopérative Béninoise de Matériel Agricole (COBEMAG).**

The introduction of animal traction into the cultivation process in northern Borgou was successful considering the slow progress of the introduction of draft power in other parts of Sub-Saharan Africa (Kissezounon 1978: 184; McIntire et al. 1992: 48; Speirs & Olsen 1992: 43). For example in northern Togo and in Mali a shortage of cattle and the absence of a cattle market slowed down introduction (Starkey & Ndiamé 1988: 24). The success in Benin was due to the fact that several conditions essential for its rapid introduction were fulfilled:

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14 The CIDR was affiliated to the French textile company the **Compagnie Francaise de Développement des Textiles** (CFDT). This company was responsible for rural development in Borgou Province after 1966. The AFVP worked together with American volunteers of the Peace Corps.

15 In general the term oxen *(boeufs* in French) is used but in fact the majority of the bovines are not castrated and therefore should be called bulls (see also Morières 1984: 21).
- land was abundantly available in relation to labour;
- the profits of the cash-crops, which were introduced in the same period, could be used to finance the purchase of draft animals and the equipment and if no cash crop was cultivated people could sell off their cattle;
- the cotton development programme gave farmers access to credit (see next section);
- the population was used to keeping cattle in the farmstead for fattening; and
- the creation of the COBEMAG centres made the capital cost very low and spare parts easy to obtain.

Figure 5.6 shows the exponential growth of the number of ploughs.

**Figure 5.6**

Number of ploughs introduced in the 1960s and 1970s in Malanville and Karimama

![Graph showing exponential growth of plough numbers](image)

*Source: Kissezounon 1978: 171*

In the research villages more than 50 per cent of the agriculturalists bought a plough at some point. By comparison, in the cotton-producing region of Mali 69 per cent of the farmers used animal traction (Hijkoop *et al.* 1991) and in Mali in general 50 per cent, in the Gambia about 60 per cent of the farmers used animal power and in Burkina Faso 10-15 per cent did so in 1986 (Starkey & Niamé 1988). Between 1974 and 1979, food prices in Nigeria increased fivefold and the illegal export of cereals increased (Kruithof 1989: 324). This situation, favourable for earning money from cereal cultivation, probably further attributed to the increase in the number of ploughs. Table 5.9 indicates, most ploughs were purchased at the beginning of the 1980s.

Although the Fulbe engaged increasingly in farming as a result of declining numbers of cattle in their herds, it is remarkable that none of the Fulbe families in the research villages had a plough or oxen trained for ploughing. The reason put forward by the extension service of CARDER was that the Fulbe were too much attached to

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16 Only in Mamassy Peuhl, the largest Fulbe settlement in the Niger Valley, did a few families own ploughs. Most of the owners belong to the *maccube* population who live in the village with the Fulbe and are hired by the Fulbe to plough.
their cattle to pierce the nose of a bull (see also Van den Bogaard 1984: 28). However, this objection was never mentioned in the survey and the reason why the Fulbe did not have trained oxen is very practical. Firstly, the average surface of the cultivated area per Fulbe family in the research villages did not amount to the 3-4 hectares that make the plough profitable in the local context (Bio Bigou 1987: 439). Secondly, both the training of the animals and their guarding of the homestead demanded too much labour. Especially in the dry season just before the start of the rains the oxen have to be well fed. At that time Fulbe labour was in short supply because feeding the herd during that period required all the labour available. So, although the opportunity costs were too high to own a plough and oxen themselves, 53 per cent (N=144) made use of the plough by engaging farmers who ploughed for them. This phenomenon is further elaborated upon in the next chapter that deals with the changing linkages between farmers and cattle keepers.

In the light of this study there are two main consequences of the introduction of the ox-drawn plough: the extension of cultivated land on the one hand and the further integration of cattle keeping in the farmer's mode of existence on the other.

The size of the fields is determined by the labour peak period that occurs at the onset of the rainy season. By using the same labour force but combining it with animal draught power made it possible to increase field sizes considerably. The size of a groundnut field can increase by 60 per cent, a sorghum field by 30 per cent and a cotton field by 7.4 per cent (Toulmin 1983: 34; FAO 1977 cited in Van den Bogaard 1984: 25). The differences are explained by the labour necessary after ploughing. A field of cotton, which has to be treated with insecticide and artificial manure, has to be harvested carefully to obtain high-quality cotton and is therefore very labour intensive.

Although part of the extension of the cultivated area was due to population growth, the impact of the combined effect of the abundance of land, population growth and the use of animal traction led to an exponential increase in cultivated land (see also Kissezounon 1978: 160 and Speirs & Olsen 1992: 43). Figure 5.7 giving the total cultivated hectares shows that the size of the area increased considerably. If these data

<table>
<thead>
<tr>
<th>Year of purchase</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before 1975</td>
<td>13.7</td>
</tr>
<tr>
<td>1975-1979</td>
<td>16.7</td>
</tr>
<tr>
<td>1980-1984</td>
<td>44.1</td>
</tr>
<tr>
<td>Total (N)</td>
<td>(102)</td>
</tr>
</tbody>
</table>

Source: Own survey 1991/1992
are related to population growth, the number of hectares per person increased from 0.18 in 1981 to 0.44 in 1992.17

The plough facilitated the extension of fields onto the flood plain. Formerly the heavy clay soils were ploughed by hand and pockets were made to put the seed in. This was hard work, as was weeding. But when the area is ploughed for two subsequent years, weeding becomes easier because the structure of the soil changes from clayey to sandy.

Irrigation pumps. The second technical innovation which had an impact on modes of existence and on the linkages between both modes of existence was the introduction of irrigation pumps.

In certain areas of the valley, mainly along the banks of the Alibori and the Sota, off-season cultivation was already common as far back as colonial times when Moretti (ANB 1918) reported that the Dendi of Garou produced 5 to 6 tons of onions per year. Over time the irrigated crops diversified and now the main crops are onions, potatoes and tomatoes and to a lesser degree peppers, lettuce and courgettes.

Irrigation pumps were not introduced through a project as with the ox-drawn plough but the people gradually adopted the new technology themselves. It was one of the industrial products from Nigeria that became affordable at the beginning of the 1980s as a result of the favourable exchange rate of the FCFA against the naira. Although it was a considerable investment (e.g. in 1989 a pump cost 100,000 FCFA), it could be lent to other people. The irrigated surface increased considerably because the

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17 Due to lack of data, the hectares per head in 1981 are calculated on the basis of the 1979 population census with the addition of a mean annual growth rate of 3%.
international market in Malanville offered a good outlet for market-garden produce. Also the availability of artificial fertilizers was an important factor especially for the cultivation of potatoes. In addition, the proximity of the Nigerian border allowed illegal imports of cheap petrol because prices were much lower in Nigeria than in Benin. Rochette & Bogas (1981: 224) estimated the number of irrigated hectares in the dry season in 1981 to be between 350 and 700 hectares along riverbanks in addition to the 18,500 already cultivated during the rainy season.

A 1986 survey carried out by the Ministry of Rural Development found that the pumps were mostly used in Malanville District and to a lesser extent in Karimama. Of 440 households interviewed in both districts, 32 per cent of the households in Malanville had a motor pump. These households were concentrated in the villages of Garou, Tomboutou and Malanville. In Karimama District, 5 per cent of households owned a motor pump and were concentrated in the village of Bimilafia (MDRAC 1986: 28).

Although this small-scale irrigation developed without government intervention, a large-scale capital-intensive irrigation project started in the 1970s financed by the World Bank and managed by the Société Nationale d'Irrigation et d'Aménagement Hydro-agricoles (SONIAH). A strip of land about 5 km long and 1.7 km wide near the bridge crossing the Niger at Malanville was set aside for a rice scheme and more than 500 hectares would be irrigated to cultivate rice. The scheme covered a large part of the flood plain formerly used as vital grazing areas. The Fulbe demonstrated their anger by taking out the demarcation poles time and again (Seur 1983: 53) and in 1982 the project was abandoned due to the crop damage done by roaming cattle and also because the price of the rice produced could not compete with that of imported rice. Only in 1990 was the scheme reestablished with the aid of the West African Development Bank (BOAD). The management was altered into an organization of cooperatives and to avoid crop damage, more than 500 hectares were fenced off with barbed wire.

The advantage of irrigation is that an otherwise unproductive dry season can be used to earn money.\(^{18}\) In the future, individual market gardening may become increasingly important since the valley has great potential but because of scattered fields around watering places, the expansion of irrigation will make livestock rearing increasingly difficult. Access to the river is problematic, as few cattle paths have been laid out.

\*\*Government policy\*\*

Government policy is the second important external factor that influenced the situation at the local level. For the present study, government policy concerning two sectors is important: agricultural policy (including government policy regarding livestock production) and policy regarding nature conservation. Governments can naturally have an impact at the local level through its administrative apparatus and this is dealt with in the section on institutional linkage in Chapter 6.

\(^{18}\) In French: Ministère du Développement Rural et de l’Action Coopérative (MDRAC). During the process of democratization which began in 1990 the ministry changed its name to the Ministry of Rural Development (MDR).
Government policy regarding agriculture. Agriculture is the main economic sector in Benin because it provides an income to more than three-quarters of the population and because it accounts for 70 per cent of the value of export products (Niemeijer & Niemeijer 1994). In the period under consideration, agricultural policy was formulated within the Ministry of Rural Development and Cooperative Action (MDRAC). The general policy set out at the regional level did not change substantially over the years and was aimed at:

- increasing cereal production to assure self-sufficiency at household and national level;
- diversifying crops;
- diffusing knowledge about modern agricultural techniques;
- increasing the production of commercial crops like cotton and groundnut;
- encouraging 'off season' (irrigation) cultivation;
- encouraging meat-production;
- developing a policy of sedentarization of pastoralists, agro-pastoralists and farmers in order to attain an 'agro-sylvo-pastoral' equilibrium;
- taking care of collecting and marketing agricultural products; and
- supplying inputs and credits (Tossou 1995: 55 and Rapports annuels CARDER/Karimama).

To put its national agricultural policy into practice, the Ministry opened centres for rural development at the provincial and district level called Centres d'Action Régional pour le Développement Rural (CARDER). At district level, a chief of extension was appointed, the Responsable de Développement Rural (RDR), who was the general manager of the sub-section and did not require specific local knowledge. In addition a chief of agriculture, forestry and animal husbandry was appointed at the district level. At the local level the Agent de Vulgarisation Agricole (AVA) dealt with arable farming and was responsible for the implementation of the national agricultural policy. He also collected data for purposes of policy development. From 1975 onwards fourteen CARDERS were established at district level in Borgou Province.

Input distribution and credit administration were taken care of by the Groupements Villagois (GV). These self-governed village cooperatives were created by CARDER to serve as an independent mediating body between itself and the village population. The GV took decisions at the village level, for example on what sort of commercial crops would be cultivated. In Karimama District between 1975 and 1978 GVs were established in all the seventeen villages. According to the RDR of Karimama, everybody who worked the land was automatically a member of the GV. Credits could be

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19 In French: Ministère du Développement Rural et de l’Action Coopérative (MDRAC). During the process of democratization which began in 1990 the ministry changed its name to the Ministry of Rural Development (MDR).
20 The extension service has a history dating back to the colonial period. See for a detailed study Tossou (1995).
21 Findings from the study by Tossou (1995) indicated that the management of the GV is in practice limited to three members of the GV committee: the secretary, the chairman and the chief treasurer as they are all literate.
obtained through the GV with the *Caisse Locale de Crédit Agricole* (CLCA), which lent money for the purchase of agricultural equipment and for cereals to bridge the time between the exhaustion of the previous season's stock and the next harvest.

The number of appointed agents in Karimama increased gradually: in 1979 the payroll of CARDER in Karimama was 14 persons, by 1983 this number had more than doubled.\(^{22}\) Although in theory CARDER was responsible for executing the general agricultural policy, in practice attention was mostly devoted to the extension of the cultivation of commercial crops such as cotton and groundnut (Tossou 1995).

In Benin, cotton is one of the most important export crops and plays a key role in government policy. Cotton production on a larger scale was introduced in Karimama at the beginning of the 1970s. The government provided cotton seed, fertilizer and pesticides. In addition it held the monopoly for trading in cotton and its *Société Nationale pour la Promotion Agricole* (SONAPRA) purchased the entire yield at prefixed prices. This offered many advantages to the farmers as their market was assured and, more importantly, the government delivered all the inputs on credit. Credit was also granted for the purchase of ploughs, consolidating the introduction of the plough. Cotton cultivation grew exponentially between 1980 and 1992 for Borgou Province as a whole. Prices for raw cotton increased until 1986 when they started to drop on the world market and the government initiated a policy of active discouragement by reducing the subsidies for mineral fertilizers and pesticides. In 1990 pre-1987 levels were reestablished (Brüntrup 1997: 46).

However, in the Niger Valley in general and in Karimama District in particular, the cultivation of cotton was limited compared to other regions in the province. For example in 1986, just before the discouragement policy, cotton production in Borgou Province totalled 82 million kg. Karimama and Malanville only contributed 2 per cent or 230,000 kg and 1.3m kg respectively (CARDER/Borgou rapport annuel 1986/1987).

There are three main reason for the low interest in cotton production in Karimama. Firstly, the variable climate offered less favourable conditions than in southern Borgou. Secondly, only after the sowing of the staple crops was land allocated to cash crops depending on the available labour or assets to acquire paid labour. The consequence was that cotton was sown and harvested relatively late, leading to low yields, often far below 1,000 kg per hectare (see Table 5.10). Finally in the northwestern part of the valley, cotton was not cultivated at all because the roads were too bad for trucks to pick up the harvested product. CARDER had always perceived the propagation of cotton in the region as problematic. In the 1982 annual report, the RDR clearly showed his frustration.

\(^{22}\) In view of the geographical situation of the region (such as the distance from the capital), finding personnel has always been a problem. Most educated people live in the south and are not eager to be seconded there. Especially during the onset of the Kerekou regime, Karimama was considered the 'Siberia' of Benin and being posted there meant being punished. Later on however, during the 1980s when the market with Nigeria developed well, this border area of Benin became more popular as it offered interesting opportunities to engage in commercial activities. The increase in the number of public servants continued until 1992 when the structural adjustment programme of the World Bank forced the government to cut back on public expenditures by reducing the number of civil servants.
by accusing Karimama farmers of boycotting cotton production and accusing them of laziness: only 0.12 hectares of cotton were cultivated for each able-bodied man.

Because of discouraging cotton results, CARDER tried to increase commercial production by introducing a better variety of groundnut in 1983 for those agriculturalists who yielded less than 700 kg of cotton per hectare. Groundnut is more acceptable to the agriculturalists as the risks of becoming indebted are lower than with cotton because:

- if the government withdraws from the agreement to buy the stock, the groundnut yield can find its way onto the market as groundnut oil;\(^23\)
- groundnuts can be used for home consumption;
- if the groundnut harvest fails the residues can be fed to livestock; and
- debts are lower because groundnut requires fewer investments in the form of fertilizer and insecticides.\(^24\)

Although Table 5.10 shows that the absolute number of hectares under cotton and groundnut increased, as a percentage of the total surface cultivated it is modest. In 1990, for example, the number of hectares of commercial crops as a percentage of the total number of hectares was only about 5 per cent against about 40 per cent in Banikoara District, south of Parc W (Brüntrup 1998: 334 ). Table 5.10 also illustrates that the yields per hectare were highly variable. The amount of rainfall, the timing of sowing, weeding and the occurrence of disease all influenced the outcome.

**Table 5.10**
Cotton and groundnut production in Karimama in tons/hectare

<table>
<thead>
<tr>
<th>Year</th>
<th>Cotton</th>
<th>Groundnut</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ha</td>
<td>ton/ha</td>
</tr>
<tr>
<td>1979/80</td>
<td>160</td>
<td>131</td>
</tr>
<tr>
<td>1981/82</td>
<td>231</td>
<td>n.a.</td>
</tr>
<tr>
<td>1982/83</td>
<td>233</td>
<td>n.a.</td>
</tr>
<tr>
<td>1983/84</td>
<td>195</td>
<td>n.a.</td>
</tr>
<tr>
<td>1984/85</td>
<td>169</td>
<td>n.a.</td>
</tr>
<tr>
<td>1985/86</td>
<td>169</td>
<td>113</td>
</tr>
<tr>
<td>1986/87</td>
<td>230</td>
<td>n.a.</td>
</tr>
<tr>
<td>1987/88</td>
<td>109</td>
<td>0.61</td>
</tr>
<tr>
<td>1988/89</td>
<td>262</td>
<td>1.04</td>
</tr>
<tr>
<td>1989/90</td>
<td>449</td>
<td>1.14</td>
</tr>
<tr>
<td>1990/91</td>
<td>321</td>
<td>0.54</td>
</tr>
</tbody>
</table>

**Source:** CARDER/Borgou, Plan de campagne and rapports annuel CARDER/Karirnarn a and Rapports annuel CARDER/Malanville.

\(^23\) Processing groundnuts into oil and very protein-rich derivate is women's work. It replaced butter extraction of shee-nuts when they became rare. For the extraction of oil women prefer the local groundnuts to the improved groundnuts of the CARDER as they contain more oil. Local groundnuts are never found at the market in Karimama as they are immediately sold on to the women who transform the nuts into oil and other by-products.

\(^24\) For 1 ha of cotton a farmer needs 32 litres of insecticide (1,500 FCFA each), 4 sacks of artificial fertilizer (5,000 FCFA per sack) and most families hire salaried labourers to work the field (Grubben 1990: 60).
Plate 1
The Bororoji, cattle of a rapidly disappearing breed in the Niger valley of Benin

Plate 2
Most Fulbe now have Keteeji cattle, here feeding on crop residues
Table 5.11 gives a low number of hectares for commercial crops in Karimama. People were reluctant to cultivate more cotton because according to the agriculturalists of the research villages:

- after the cotton had been collected it was a long time before the government paid;
- insecticides and artificial fertilizer increased in price which increased the risk of debts after a bad harvest;
- there was no guarantee of compensation for fields destroyed by cattle;
- cotton required a great deal of labour and so competes with food crops; and
- the geographical position of Karimama enabled a lucrative trade in staple foods across the Niger and Nigerian borders (Igue 1985: 94)

It was not only the Dendi/Gourmantché agriculturalists who cultivated fewer commercial crops. The situation of the Fulbe of Karimama showed a similar picture. They also engaged less in commercial agriculture than Fulbe in other regions. In Banikoara 70 per cent of the Fulbe cultivated cotton and earned 33 per cent of their cash income from cotton production (Jung 1997: 52; Brüntrup 1992). In Segbana, one third of Fulbe households cultivated cotton in 1987 (Van den Booger 1990). The specific reasons the Fulbe of Karimama gave for not cultivating cotton were a lack of fields and labour and an unwillingness to sell animals to pay for labour. Especially in December when the herd has to be very well watched in order to prevent damage to crops, the pastoralist was forced to hire salaried workers with a high risk of losing money if the yield was low. Only in Kompanti did some Fulbe try to cultivate cotton but the costs were higher than the benefits and after one trial they stopped.

<table>
<thead>
<tr>
<th>Table 5.11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface area of different crops cultivated in Karimama District as percentage of the total cultivated area in 1991.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>1990/91 ha</td>
</tr>
<tr>
<td><strong>Cotton</strong></td>
</tr>
<tr>
<td>Groundnuts improved</td>
</tr>
<tr>
<td>Groundnuts local</td>
</tr>
<tr>
<td>Maize improved</td>
</tr>
<tr>
<td>Maize local</td>
</tr>
<tr>
<td>Sorghum</td>
</tr>
<tr>
<td>Millet</td>
</tr>
<tr>
<td>Rice</td>
</tr>
<tr>
<td>Beans</td>
</tr>
<tr>
<td>Manioc</td>
</tr>
<tr>
<td>Miscellaneous</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

*The category of miscellaneous includes okra, onions, tomatoes, eggplants etc.

**Source:** Rapport annuel CARDER/Karimama 1990-1991

25 Although 1990/1991 was a bad year as far as the harvest was concerned, this does not influence the table as these data were collected before the season started.
The government policy with regards to commercial crops led to a growth in the number of hectares of cotton and groundnut in Karimama. Although the increase over time was less significant than in other parts of Borgou Province, it did have an impact on the agricultural mode of existence.

Government policy regarding livestock-keeping. After independence, pastoral groups were poorly represented in the national government and livestock development policy was neglected. Livestock keeping does not supply export products from which the government earns foreign exchange. However, at the end of the 1970s the introduction of the ox-drawn plough necessitated good animal health programmes. Furthermore the government was concerned with diminishing meat production given the increasing demand for meat in the cities. As a result, in the 1970s programmes were set up to concentrate on vaccination and certifying the health of animals to be slaughtered for local markets (Quarles van Ufford 1999). To carry out the livestock policy, the Ministry of Rural Development (MDRAC) was extended with a new division the Direction National d'Élevage (National Directorate of Animal Husbandry). At the local level the veterinary officer, the chef d'élevage, were appointed (MDRAC 1979: 10). In 1978 in Karimama a veterinary officer was appointed who formed the Division de Production Animale within the district's CARDER office. Lack of funds, however, made the policy virtually ineffective. In Karimama the veterinary officer had only a motorcycle at his disposal to cover 76,500 ha and no cold stores for vaccines were available (Rochette & Bogas 1981: 208).

To improve the situation, financial support was sought by the FAO and at the end of the 1970s an important livestock development programme was able to start in the southern part of Borgou Province (Segbana, Nikki and Kalale). The programme aimed at intensifying meat production and turning stock keeping into a sedentary activity by offering improved infrastructure (FAO 1986a). The programme however, was not extended to northern Borgou and it was only in 1985 that another project started which was also carried out in Karimama. This project, called Projet de Développement d'Élevage Bovin Borgou (PDEBB), was financed by the European Union and came administratively under the National Directorate of Animal Husbandry within the Ministry of Rural Development. The project-structure divided Borgou Province into regions, sectors, posts and educational centres. In the Karimama sector, three posts (Kargui, Karimama and Kompa) and one centre of education (Monsey) were established.

The project aimed to increase meat production per head of cattle by 30 per cent and to improve veterinary care to reduce livestock losses. The activities carried out included: the execution of vaccination programmes; the introduction of mineral complements like salt-licks and the improvement of the fodder situation. The latter included cultivating fodder crops, ensiling grass; stocking straw, and enriching stocked straw by treating it with urea (MDRAC/PDEBB 1990).

Two vaccination campaigns were established: one in December to fight bovine pest and pneumonia and one in July against pasteurellosis and 'charbon symptomatique'. Vaccination parks were constructed to facilitate the administering of injections to the
herds and plans were made to improve the drinking-water situation. 'Witness herds' were followed for a few years to study the zoological and technical parameters.

In the project documents, a distinction was made between two different methods of cattle keeping: the éleveur-agro system, a system of crop production and cattle keeping in which transhumance is the most evident characteristic, and the agro-éleveur system related to the integration of cattle keeping in agricultural production by the use of ox-drawn ploughs.

From the policy measures it appears that the government aimed at crop-livestock integration. The integration would eventually develop into a mixed-farming system thought to be attractive to both pastoralists and agriculturalists. (This was similar to programmes set up by policy makers elsewhere in West Africa, see Slingerland 2000: 243). In their view, the éleveurs-agro practised an outdated form of pastoralism and it was presumed that they would change into agro-éleveurs by force of circumstances. In other words it was assumed that an autonomous process of transformation would take place.

The project tried to eliminate the bottleneck of fodder scarcity in the dry season to prevent stock keepers from going on the move. However, these measures are only applicable to households engaged in stock keeping with a small number of cattle, those categorized as agro-éleveurs. The Fulbe participated in an experiment to cultivate fodder but the amount available from one hectare of fodder crops was futile in view of the quantity necessary to feed a herd of more than 15 head of cattle during the dry season. Labour requirements to cultivate fodder were so high that in reality it was prohibitive in view of the available labour force. So although most measures were apparently more relevant to sedentary mixed farmers, the group in charge of most cattle was ignored. From the data of the last census of stock-keepers, it appeared that 85 per cent of cattle in Karimama (about 30,000 animals) were in the hands of Fulbe categorized as éleveurs-agro and pure pastoralists (CARDER 1993: 104).

Except for the vaccination-programme and the availability of salt-licks which replaced the salt-cures in Sabongari-Bara and which were highly valued, the Fulbe were not particularly satisfied with the government policy as the proposed techniques were not adequate for their circumstances. They had other paramount problems and during an evaluation of the project on 23 May 1991, the Fulbe stressed that even in the rainy season when there was supposed to be fodder in abundance, they had problems in pasturing their herds and finding a place for their tents. Furthermore, confrontations with the forest brigade in ParcW were underlined since the Fulbe were forced to incorporate the forest reserve into their pastoral system. It was evident that for the éleveurs-agro the problems were linked to environmental management: they needed pastoral zones and passages. In this context it should be noted that Benin, as a member of the CEVB, was forced to deal with an influx of transhumants. By decree number 89-385, the matter of passage of the Fulbe to the south was dealt with. A passage 60 km long and 200m wide was designed along the tarmac road, leading from Malanville to Kandi through the protected forests of Djona and Goungoun (see Map 6.4). The corridor ended in Angaradebou where the official reception zone for transhumants from the Niger Valley was situated. Cattle were allowed to travel along the corridor from December until April
Plate 3
The meroi, the headman of the fishermen at the time of 'white water'

Plate 4
Dendi fishing for autoconsumption in one of the ponds in the flood plain
(FAO 1988: 113). However, no research was ever carried out to determine how broad this band should be to deal with a huge number of cattle. The corridor might have been enough for the Fulbe of Benin coming from the Niger Valley but it was certainly not big enough for the foreign Fulbe as well. As a result of the corridor being too narrow, cotton fields along the corridor were devastated by the first-passing Fulbe (mostly from abroad). The Fulbe of Karimama stated that, apart from the danger of destruction of the cotton fields along the corridor, there was not enough fodder along the road for the journey because if calves were traveling in the herd, the herders had to set up camp every 20 km and it took them 3 days to reach Angaradebou.

Government policy regarding nature conservation. After a meeting of the different colonial powers in Africa during the so-called Convention of London in 1933, the first steps were taken towards the creation of forest reserves in West Africa (Bousquet 1992: 13). In Benin, 46 areas were set aside over the years as protected areas and were placed under the control of the colonial government. Most of the areas covered river catchment areas because the main objective was to prevent the long-term consequences of the destruction of the vegetation of river banks. Along the parks, *zones cynégétiques* or hunting zones were established to hunt the game which were regarded as products of the parks (Goossens 1992).

The most important protected area is *Parc de Pendjari*. Pendjari covers the whole southern catchment area of the River Pendjari and is situated in the Atakora, a region outside the research area. The second important park is *ParcW*, which is partly situated in Karimama District. It comprises the catchment areas of the River Mekrou and the River Alibori, two important rivers that flow into the River Niger. *ParcW* is situated in three different countries: partly in Burkina Faso (235,000 ha); partly in Niger (220,000 ha) and partly in Bénin (563,000 ha). *ParcW* was proclaimed a park by decree on 4 August 1954.

The forest band around the Niger Valley constitutes three protected areas:

- *ParcW* (563,000 ha) in which habitation, hunting and all other human activities are strictly forbidden. It covers two-thirds of Karimama District;
- the *Zone Cynégétique de Djona* (188,000 ha) where access is allowed with a hunting license from December until March, although the zone has been closed off for hunting altogether since 1982 because of a herd of elephants needing extra protection (Dauzan 1991: 41);
- the *Forêt de Goungoun* (73,200 ha) which has been almost completely cultivated by agriculturalists who settled there when they were chased from the *Zone Cynégétique de Djona*.

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27 The agriculturalists are prone to blackmail because they can only cultivate there if the foresters turn a blind eye. According to Article 5 of the forestry law, someone who cultivates in a protected area can be sentenced to imprisonment for one month and has to pay a fine of 5,000 FCFA. However the law also authorizes a so-called *reglement à l'amiable*. That is why no case has ever reached the tribunal in Kandi.
The government department responsible for the policy to protect the areas is the Direction des Eaux, Forêts et de Chasse within the Ministry of Rural Development (MDRAC). It appointed foresters to guard the national park against poachers and intruding pastoralists, to take action in case of bush fires and to prevent the illegal cultivation of fields.

At the time of the establishment of the park, neither agriculturalists nor pastoralists had much to fear from the forestry-service. Resources were abundant enough outside the park and only one anti-poaching guard was based in Kargui (Rochette & Bogas 1981: 208). Only the villages situated at the edge of ParcW like Loubouloumbou found themselves in a difficult position as they could not extend their fields towards the south to maintain levels of food production in line with population growth. To alleviate this problem, part of the park was declassified in 1962.29

Renewed interest in the protected zones occurred after the years of drought in the 1970s when the process of desertification started to preoccupy many policy makers. Furthermore there was strong international pressure to preserve the national parks claiming that "the benefits of conservation are long-term to humanity" (Kiss 1990: 5).

The first studies on the preservation of Pendjari Park and ParcW appeared in 1975 financed by the UNDP, the FAO and the European Union and subsequently a programme of activities was drawn up (Bousquet 1992: 113). However, only in 1985 the European Union provided the finances to start the Projet d'Aménagement des Parcs Nationaux (PAPN). During a seminar in 1985 on the threat of desertification of the northern part of Benin, it was concluded that the government should revive its policy with regard to protected areas. The pastoralists were considered as the cause of the continuing deterioration of the environment indicated as 'Sahelization'. In the context of the new policy, ParcW had to serve as a barrier against this Sahelization process (MDRAC 1985: 16).

The main aims of PAPN were to fight all aspects of degradation in the park and to develop tourism. Its first phase mainly focused on Pendjari Park but ParcW also benefited from the attention. The number of foresters increased and they got their own office and car which resulted in the park being much better guarded (Maché 1990).

Meanwhile negotiations between the governments of Benin, Burkina Faso and Niger and the European Union continued on a new project called Projet Régional de Protection des Aires Contigues that focused exclusively on ParcW. One of the conditions for EU funding was that an additional protected area be established as a buffer zone. Without much concern for human factors or sufficient analysis of the

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28 In 1992 the Directorate was renamed Direction des Forêts et Resources Naturelles (DFRN). Within this directorate a new division was created called Service de Gestion et de Reconstitution des Ressources Naturelles (SGRRN) which is responsible for the management of the protected areas.

29 The fact that the status of some declassified zones is disputed is probably the reason why the exact size of the park is not fixed e.g. Breukers & de Hon (1988) and Oude (1994) mention 502,000 ha. The number used in this study is rounded off from the number given by CENATEL, the Centre National de Télédétection: 563,280 ha.
changing environmental and social context, the request was accepted. The buffer zone was legally established in 1989.\textsuperscript{30}

In the buffer zone the same rules were applied as in the rest of the park. So the park was enlarged by 5 km. From the outset, the forestry service was not able to inform the population properly about what was happening and in an arbitrary way activities in the buffer zone were sometimes tolerated, sometimes not. As a result there was confusion about the park boundaries. The fact that the limit of the park was unknown was not a new phenomenon. Rochette & Bogas (1981: 215) acknowledged that even the administration and CARDER did not know the limits. The few signboards were of no help because they indicated the limits of the park proper and not the buffer zone. However, it seems that the uncertainty served as a trump card for the foresters because they could fine people at will.

The European Development Fund project never came through because negotiations between the three countries reached stalemate. Instead a new project covering the Pendjari and ParcW was negotiated by the World Bank and approved in 2000. The project appraisal document describes the actions to be undertaken in ParcW and will focus on the southern part of the park, undertaking its activities from Banikoara. The subcomponent 'action with villagers' will comprise socio-economic studies, training seminars for villagers, production and dissemination of didactic materials, and the development of demand-driven micro-projects (see also Box 6.1).

The influence of external factors on modes of existence

The technical innovations and the sectoral government policy had a differential impact on modes of existence. In the following sections three resulting trends are analyzed: firstly the increasing integration of cattle keeping in the agricultural mode of existence; secondly, the marginalization of the pastoral mode of existence; and finally the increasing commercialization within both modes of existence.


\textit{Increasing integration of cattle keeping in the agricultural mode of existence}

Although the agriculturalists had experience with fattening bulls on the farm since the 1950s, it was only with the introduction of the ox-drawn plough that cattle could be used for agricultural purposes with more than one bull at a time. The explicit aim of the AFVP campaign to rationalize the use of cattle herds and not only increase cotton production contributed a great deal to introducing agriculturalists to cattle raising. In training-centres oxen were trained and farmers were given information about other

\textsuperscript{30} Decree number 89-385 of October 1989 'portant modalités d'application de la Loi Number 87-012 du 21 septembre 1987 relative au Code Forestier de la République Populaire de Benin'. Article 7 states: 'Est considérée comme zone tampon la bande d'au moins cinq kilomètres de large du domaine protégé qui ceinture les forêts classées ou réserves de faun'. 
Plate 5
A typical herd of the Fulbe with the herders’ mentor, the garso (left)

Plate 6
One of the different huts of the semi-settled Fulbe: the bukaaru
aspects of livestock keeping such as the reproduction process and the judgment of age by looking at a cow's teeth.  

As the agriculturalists could increasingly use their cattle for a productive purpose (other than just as 'savings' and the incidental fattening of a bull), two separate livestock-keeping modes of existence started to emerge. The extensive system of the Fulbe was based on milk production and the production of young bulls on the one hand and the intensive cattle keeping of the agriculturalists on the other.  

At the region's main cattle market in Mamassy Peulh, the division also became apparent. The market was managed by a Fulbe committee after 1984, which only tolerates non-Fulbe intermediaries in the 'ox corner', the spot in the market where draft animals are traded. The Fulbe supply the agriculturalists with young bulls via the market and the agriculturalists raise them, train them, use them for ploughing and sell them well fattened to the merchants from the urban centres of Nigeria and Benin. In 1992 a two-year-old bull could be purchased for 27,000 FCFA and sold for an average of 65,000 FCFA three years later.

Table 5.12 shows that in the range of 5 to 10 animals both groups were well represented. One could conclude that both Dendi/Gourmantché and Fulbe are emerging towards a situation in which both cattle keeping and agriculture become mixed (defined in Chapter 2 as complete integration at farm level by recycling outputs) and that there is a sort of middle ground where they meet. In the terms of CARDER, this would suggest that the éleveurs-agro gradually turned into agro-éleveurs. This however, is not the case. Of the agriculturalists, 81 per cent of those who kept cattle had up to four male animals that they raised exclusively for the yoke. Revenues were generated by fattening the animals and sales of meat and to purchase replacements in the form of young bullocks. Bearing in mind that at least 16 animals (of which three to four are reproductive cows) are needed to be able to generate the cattle necessary to replace two draft animals, they always needed the supply of Fulbe bulls (Breman et al. 1987: 139). In the Fulbe herds, the majority of animals are female because their production objectives are milk and offspring. This is also reflected in the composition of the Fulbe herds in the research population: 63 per cent cows, 18.6 per cent heifers, 6.5 per cent bulls and 11.9 per cent bullocks (Own survey 1991/92). In Box 5.1 the genealogy of a herd of one of the respondents in the survey is given according to the method used by Jung (1989). It shows that all the male calves are sold and that the cows, female yearlings and female calves are only sold in an emergency.

Table 5.13 gives an overview of the household characteristics according to ethnic group. It shows that the area cultivated by the Fulbe is still much smaller than the area cultivated by the Dendi/Gourmantché. The Fulbe only engage in agriculture to

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31 Information that formerly belonged to the Fulbe. One of the fishermen from Tondikuaria who had a large herd with the Fulbe stated that it was only with the arrival of these Europeans (for the introduction of ox-drawn ploughs) that he discovered that a cow normally produces a calf every year.

32 Different terms are used to indicate the systems. For example Tyc (1988: 19) called the system of the Fulbe agro-pastoral naisseur and the system of the agriculturalists sédentaire lié à la culture attelée.
Table 5.12
The distribution of cattle owned in 1990 by agriculturalists and Fulbe in Tondikuaría and Kompani in percentages

<table>
<thead>
<tr>
<th>Number of cattle</th>
<th>Dendi/Gourmantché</th>
<th>Fulbe</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>28.6</td>
<td>7.1</td>
</tr>
<tr>
<td>1</td>
<td>9.9</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>22.2</td>
<td></td>
</tr>
<tr>
<td>3 or 4</td>
<td>20.7</td>
<td>4.5</td>
</tr>
<tr>
<td>5-10</td>
<td>10.3</td>
<td>17.6</td>
</tr>
<tr>
<td>10-20</td>
<td>5.9</td>
<td>23.4</td>
</tr>
<tr>
<td>20-30</td>
<td>0.5</td>
<td>11.0</td>
</tr>
<tr>
<td>30-40</td>
<td>1.0</td>
<td>11.7</td>
</tr>
<tr>
<td>40-50</td>
<td></td>
<td>7.8</td>
</tr>
<tr>
<td>50-100</td>
<td>0.5</td>
<td>14.9</td>
</tr>
<tr>
<td>100 or more</td>
<td>0.5</td>
<td>1.9</td>
</tr>
<tr>
<td><strong>Total (N)</strong></td>
<td><strong>(203)</strong></td>
<td><strong>(154)</strong></td>
</tr>
</tbody>
</table>

* The cattle entrusted to the Fulbe are included in these numbers

*Source: Own survey 1991/92*

Table 5.13
Holding characteristics according to ethnic group 1991/1992

<table>
<thead>
<tr>
<th></th>
<th>Dendi/Gourmantché</th>
<th>Fulbe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average number of persons per household</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Percentage of holding consisting of more than 1 household</td>
<td>16 %</td>
<td>23%</td>
</tr>
<tr>
<td>Average number of hectares cultivated per household</td>
<td>5.5 ha</td>
<td>1.3 ha</td>
</tr>
<tr>
<td>Percentage of holdings with more than 10 head of cattle</td>
<td>8 %</td>
<td>71 %</td>
</tr>
<tr>
<td>Average annual income from agriculture in FCFA</td>
<td>19,500</td>
<td>nil</td>
</tr>
<tr>
<td>Percentage of holdings cultivating commercial crops (cotton, groundnut)</td>
<td>44 %</td>
<td>nil</td>
</tr>
<tr>
<td>Average annual income from cattle sales in FCFA</td>
<td>18,800</td>
<td>76,500</td>
</tr>
</tbody>
</table>

*Source: Own survey 1991/1992*

meet household subsistence requirements. In 1991 only 30 per cent of the Fulbe succeeded in cultivating enough cereals to last them through the year, the others had to buy additional food. No cash crops were cultivated by the Fulbe. The average income from Dendi/Gourmantché cattle sales is 18,800 FCFA, which is high compared to their annual income from agriculture. Income from cattle sales is more than 50% of net annual income for 29 per cent of Dendi households.

The aim of the Fulbe cattle production strategy is to secure the investments of the family in the form of the herd (Bierschenk 1991). Engaging in agricultural activities only complements this strategy. According to Slingerland's typology presented in Chapter 2, most of the Fulbe in the Niger Valley can be categorized as 'security agro-pastoral'. Inhibitions about carrying out plans to increase agricultural production are related to a lack of fields and a shortage of labour. The agriculturalists partly integrate animal production for crop production intensification and partly to invest in cattle. In short,
**Box 5.1**
Composition of a herd of 14 cattle; offspring and history; 1993
(Source: Field work 1993)

<table>
<thead>
<tr>
<th>Number</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The oldest cow in the herd is 15 years old and of the Siwali breed. The cow was born in the herd and is the property of the herder's father. The cow has produced 8 calves of which only one is still in the herd:</td>
</tr>
<tr>
<td></td>
<td>* in 1980 sold to a merchant at Karimama market aged 2.5 yrs for 75,000 FCFA to pay for labour</td>
</tr>
<tr>
<td></td>
<td>* in 1985 sold to a merchant at Karimama market aged 3 yrs for 45,000 FCFA to pay for labour</td>
</tr>
<tr>
<td></td>
<td>* in 1987 sold to a butcher because it was ill aged 1.5 yrs for 10,000 FCFA</td>
</tr>
<tr>
<td></td>
<td>* in 1992 found dead from bovine pest on the banks of the River Niger aged 5 yrs; 5 calves as offspring</td>
</tr>
<tr>
<td></td>
<td>* in 1987 sold to an agriculturalist in Karimama aged 1.8 yrs for 23,000 FCFA to pay hospital bills</td>
</tr>
<tr>
<td></td>
<td>* in 1989 died: it was blind and fell into a pit aged 2yrs</td>
</tr>
<tr>
<td></td>
<td>* in 1991 sold in Mamassay Peulh aged 9 months for 12,000 FCFA to pay for clothes</td>
</tr>
<tr>
<td></td>
<td>* under one year old and still in the herd</td>
</tr>
<tr>
<td></td>
<td>* in 1988 sold at the market aged 1 year for 30,000 FCFA to pay for millet</td>
</tr>
<tr>
<td></td>
<td>* in 1989 died at the age of 2 months</td>
</tr>
<tr>
<td></td>
<td>* in 1990 born dead</td>
</tr>
<tr>
<td></td>
<td>* in 1992 sold aged 1 year for 25,000 FCFA to pay for labour</td>
</tr>
<tr>
<td></td>
<td>* under 7 months old and still in the herd</td>
</tr>
<tr>
<td>2</td>
<td>The second oldest cow in the herd is 8 years old and of the Siwali breed. The cow was born in the herd and is the property of the herder's mother. The cow has produced 6 calves of which two are still in the herd:</td>
</tr>
<tr>
<td></td>
<td>* in 1982 sold to a merchant at Karimama market aged 2 yrs for 50,000 FCFA to pay for millet</td>
</tr>
<tr>
<td></td>
<td>* in 1985 sold to a merchant at Karimama market aged 1.5 yrs for 15,000 FCFA to pay for labour</td>
</tr>
<tr>
<td></td>
<td>* in 1992 given as habanaaj (friendship cow) to a Fulbe family</td>
</tr>
<tr>
<td></td>
<td>* in 1991 given as a present to the mother's friend</td>
</tr>
<tr>
<td></td>
<td>* aged 2 years old and still in the herd</td>
</tr>
<tr>
<td></td>
<td>* under one year old and still in the herd</td>
</tr>
<tr>
<td>3</td>
<td>The third oldest cow is 4 years old and of the Jaliiji breed. The cow was born in the herd and is the herder's own property. The cow has produced 3 calves of which two are still in the herd:</td>
</tr>
<tr>
<td></td>
<td>* 3 years old; has not given birth yet and is still in the herd</td>
</tr>
<tr>
<td></td>
<td>* 2 years old and still in the herd</td>
</tr>
<tr>
<td></td>
<td>* at 1 year old sold in 1992 to a merchant for 14,000 FCFA to buy millet</td>
</tr>
<tr>
<td>4</td>
<td>The fourth oldest cow is 4 years old and of the Jaliiji breed. The cow was born in the herd and is the property of the herder's brother. The cow has produced 2 calves of which one is still in the herd:</td>
</tr>
<tr>
<td></td>
<td>* 2 years old; has not given birth yet and is still in the herd</td>
</tr>
<tr>
<td></td>
<td>* at 1 year old sold in 1992 to a merchant for 10,000 FCFA to buy millet</td>
</tr>
<tr>
<td>5</td>
<td>The fifth oldest cow is 3 years old and of the Siwali breed. The cow was born in the herd and is the property of the herder's brother. The cow has produced 3 calves of which one is still in the herd:</td>
</tr>
<tr>
<td></td>
<td>* in 1982 sold at the market for 10,000 FCFA to pay for labour costs</td>
</tr>
<tr>
<td></td>
<td>* died two months after birth</td>
</tr>
<tr>
<td></td>
<td>* almost two years old and still in the herd</td>
</tr>
<tr>
<td>6</td>
<td>The last cow is 2 years old and of the Keteeji breed. It is a friendship cow (Habanaaj) of someone in Kompanti.</td>
</tr>
</tbody>
</table>
Plate 7
Dendi and Gourmantché frequently have oxen to use for ploughing

Plate 8
Dendi tilling the soil
Table 5.14
Number of cattle per ethnic group of people who keep cattle in Karimama, 1990/1991

<table>
<thead>
<tr>
<th></th>
<th>Dendi/Gourmantché</th>
<th>Fulbe</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of number of cattle keepers in the district (N= 3,287)</td>
<td>74%</td>
<td>26%</td>
</tr>
<tr>
<td>% of cattle per ethnic group (N=37,747)</td>
<td>15%</td>
<td>85%</td>
</tr>
</tbody>
</table>

Source: CARDER 1993

although de-specialization takes place, the mixed farming mode of existence is still only beginning, assuming that was ever the aim.

Marginalization of the pastoral mode of production
Policy makers disregard the important differences between the production objectives of cattle keeping of the different groups. Although they acknowledge the presence of the transhumant- and semi-sedentary pastoralists in the valley they are not taken into account in agricultural policy. This is illustrated by the reference to the Fulbe in the 1984 annual report of the CARDER/Borgou where the modes of existence of the population of the Borgou are described. After pages of description of the agricultural system and agricultural groups, all that is reported about the Fulbe is "les Peulhs, souvent nomades, commencent à se sédentariser" (the Fulbe, often nomads, are starting to settle). As most civil servants came from the south they were not familiar with specialized pastoralists and were generally prejudiced against them. Their extensive production system was considered primitive and harmful to the environment. Monod (1975) called this phenomenon "the sedentary nature of the official mentality".³⁴

Although the local extension officer, the AVA, is supposed to collect data on family structure, availability of equipment and agricultural production from every family who engages in farming, the Fulbe households which live in tents in the surroundings of the village were not registered in his notebook. Almost all Fulbe engaged in farming (93.5%) and stayed near a particular village for some years - sometimes even their whole lives. They were still considered as temporary dwellers or as the chief of the extension service of Karimama explained it "they are always on the move". This might be true to an innocent observer but closer scrutiny reveals that their mobility pattern was well defined and mostly in the range of the territory of one and the same village with 85.1 per cent (N=154) of households on the same village territory for five years.³⁵

The consequence of this misperception was that they were not considered in the agricultural statistics and substantial miscalculations occurred because of this neglect.

³⁵ How the Fulbe themselves perceive the role of the RDR and hence the CARDER is illustrated by the following story told by an aged Fulbe chief. To the question "What has the government done for the pastoralists?" he said: "The RDR is like a father who has four sons with different occupations; one has become a forester, one a fisherman, one a farmer and the fourth has become a cattle keeper. His favorite son is the farmer and he gives him everything he needs: seed, artificial manure and machines. But the son who is a cattle keeper is not even granted a place to stay. Will a child which is always in trouble with his father ever go to him to solve his problems?"
For example the 1992 annual report by CARDER/Karimama gave a total Fulbe population of 1,498 persons for Karimama District, which contained fourteen villages but during the survey conducted for this study 1,286 Fulbe alone were counted near only two villages. These were not 'transhumants' as the administration would explain the anomaly because they had all cultivated in the region in the preceding rainy season. The government did not dare to deal with the most urgent problems such as the allocation of rainy-season camps and the protection of passageways to watering places. For transhumants arriving from Niger, measures taken in the framework of the CEBV, such as the corridor along the tarmac road from Malanvill to Angaradebou, were not realistic. These fallacies, which can all be traced back to the problem of not addressing the Fulbe as a separate target group, have greatly contributed to the problems in the region.

For the Fulbe having access to ParcW has become a matter of life and death. The improvement and increased frequency of the surveillance of the park led to a situation in which the pastoralists felt increasingly threatened and prepared to pay their passage. They have come up with their own definition of 'good' and 'bad' foresters: the good ones warned if a patrol was taking place in return for 'a little something'; the bad ones were the ones who could not be bribed. And even if they were arrested, running the risk of having to pay bail was usually cheaper than staying in the valley and buying fodder. In 1991 ten people from the research villages were arrested and together they had to pay 365,000 FCFA to be released. They found the money by selling cattle.

Commercialization of both modes of production
Commercialization is defined here as the integration of subsistence-oriented economies into the market economy by increasing sales of products and increased use of purchased inputs (Sikan & Kerven 1991).

The region of Karimama had been monetized since colonial times when the French introduced money by forcing the local population to pay taxes. People were used to selling fish as far away as Ghana but Karimama only seriously became part of the market economy after the introduction of export crops on a larger scale and the introduction of the ox-drawn plough. Rochette & Bogas (1981) estimated that in 1980 60 per cent of the value of the main agricultural and cattle products were commercialized in the Niger Valley although services and the products of secondary production were not included.

Consumer needs were increasing and stimulated the need for more cash income. The respondents in the survey debated this tendency at length and often elders referred to the fact that youngsters were materialistic. As one of the garso stated: "it is the taste of money which prevents the youth from working properly".

36 The foresters are on good terms with one of the main leaders in the largest Fulbe settlement. When they arrest 'foreign Fulbe' they take them to the Fulbe leaders, one of who speaks French, to start negotiations. The arrested herder is forced to reveal his identity and sign a paper on which it is stated the amount of money to be paid and the date of payment (mostly on Fridays when it is market day so he can sell stock). Then the herder is released temporarily to give him an opportunity to get cash by selling cattle or, if the herd is not his property, to consult the owner on what to do.
That the region gradually integrated into the market economy was visible in the replacement of thatched roofs with iron roofs, mud huts with cement buildings and donkeys with bicycles or motorbikes. At the market many goods such as plastic mats and kitchen utensils appeared, replacing the former self-produced goods. These goods became status symbols or in other cases they became indispensable because they were easy to use or replaced products that, because of ecological degradation, were no longer available in the valley. The Nigerian market supplied these products at a relatively low price.

New inputs such as artificial fertilizer became available to improve agriculture. The pastoralists also needed money for their inputs such as potash, salt (formerly freely found in the Sabongari-Bara) and money for vaccinations. In Table 5.15 the net annual income of the Dendi/Gourmantché and the Fulbe are given for 1991. The income from agricultural activities includes cattle sales and lending of labour equipment minus expenses for vaccinations, hiring of labourers etc. The table shows that most of the households had a net annual income of less than 50,000 FCFA.

Table 5.15
Net annual income in 1991 x 1000 FCFA in percentages of holdings

<table>
<thead>
<tr>
<th></th>
<th>less than 50</th>
<th>50-150</th>
<th>more than 150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dendi/Gourmantché (N=100)</td>
<td>68</td>
<td>26</td>
<td>6</td>
</tr>
<tr>
<td>Fulbe (N=100)</td>
<td>62</td>
<td>27</td>
<td>11</td>
</tr>
</tbody>
</table>

Source: Own survey 1991

Expenses are increasing. For example what the Fulbe had to pay for vaccinations and potash amounted to 10,000 FCFA in 84 per cent of the cases (N=100), the rest paid an amount of 10,000-50,000 FCFA. Increasing amounts of money were needed for social, events like marriages and baptisms (see Bierschenk & Forster 1987: 169). For the Fulbe the expenses related to continuing integration in the market economy are financed by revenues generated by the commercialization of cattle and have led to an increase in herd off-take.

Prices gradually increased in the 1980s but an agreement was reached around the disastrous year of 1985 that prices had to be lowered. Otherwise it would have become impossible for families to carry these heavy financial burdens. And finally work-relations commercialized and salaried work replaced reciprocal aid. This was also due to the fact that the larger surfaces could not be weeded by family labour alone.

Conclusion

This chapter has described the fundamental changes that have taken place in the Niger Valley since the 1970s and which have influenced the modes of existence.
First of all the changes in the resource base influenced the modes of existence. The resource base altered as a result of a few periods of drought years that had a multiple effect on the River Niger. The peak floods did not provide enough water to maintain the ecological equilibrium in the flood plain and the flood-plain resources changed. The users of these resources had to adapt their mode of existence. The Fulbe had to increase their mobility because the total area of rangeland was reduced at strategic times. They replaced their traditional grazing areas with a resource base elsewhere, namely ParcW. The fishermen became agriculturalists because fish production dwindled. Fortunately, the flood plain, the area where they once fished, provided excellent farming grounds. Also the situation beyond the flood plain changed due to other factors: the introduction of the plough; the incentive to grow cash crops; and the cultivated area's expansion as a result of population growth.

Secondly, the introduction of new technologies such as the ox-drawn plough had an effect on the modes of existence. Formerly cattle were entrusted to the Fulbe and sometimes a bull was kept in the homesteads of the agriculturalists and fishermen to be fattened. But with the introduction of animal traction, cattle keeping started to be integrated in the agriculturalists' mode of existence. Agriculturalists increasingly started to use the manure of their own cattle and collect fodder to be stored to be fed to their own stock.

Finally, the pastoralists are not seen as a separate target group for government policy and projects. According to the typology presented in Chapter 2, the Fulbe are semi-settled agro-pastoralists who engage in agriculture for opportunistic reasons. They cultivate to 'save' their cattle. The agriculturalists are agricultural stock-keepers and use their stock to increase their agricultural production through the use of manure and draught power. Livestock projects aim at improving the health of livestock but do not tackle the pastoralists' main problems that are different from those of the agricultural stock-keepers. How these new developments affect the linkages between both groups of people is described in the following chapter.