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GESTION DE TERROIR AT THE FRONTIER: VILLAGE LAND MANAGEMENT OF PEASANTS AND PASTORALISTS IN BENIN

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1. INTRODUCTION

Growing concern about land degradation and deforestation in Africa in the 1980s has led to increased interest in land management. The 1985 US National Research Council Conference on Common Property Resource Management (BOSTID 1985) marks an important shift in this respect. Greater appreciation of traditional land management systems, such as communal property regimes, accompanied this shift.
A new development strategy emerged in the same period in french-speaking West Africa, in order to cope with the failures of existing rural development programmes (Painter 1993). Population pressure, drought and mismanagement by national authorities encouraged policy makers and donors, primarily the French development cooperation, the dominant donor in this region, to stimulate local initiative and to build up local capacity in terms of income generation and the exploitation and management of local resources.
This has become known as the 'Gestion de Terroir' (Land Management) approach. However, there are different definitions of the concept and there is no overall conceptual framework.
The emphasis in the Gestion de Terroir approach strongly focused on peasants and crop cultivation, while pastoralists, as well as cattle raising by peasants, were neglected (Marty 1993, Bonnet 1990).
The raising of cattle is of vital importance in the Sahel and Sudan zones. Its integration, therefore, in the Gestion de Terroir needs to be investigated, including the conditions for successful implementation of resource management which takes cattle-breeding into account.

The North Borgou in northern Benin is a meeting zone of peasants and pastoralists. Environmental degradation has already become a serious problem in the region due to population growth, increased commercialization and the immigration of pastoralists from the Sahel. Conservation measures are being promoted among peasants and pastoralists in order to arrive at more sustainable land use, however these interventions have had little success because most farmers tend to escape from environmental degradation by migrating to sparsely populated and uncultivated areas, which are called 'the frontier area' in this paper, rather than to control it. However, signs of overexploitation are already appearing in this frontier area, which is also increasingly used by pastoralists. Only a Gestion de Terroir approach, encompassing both modes of existence, may result in a more sustainable exploitation of the area's resources.

The Research Group on Livelihood and Environment of the University of Amsterdam conducted investigations in 1992 in collaboration with the University of Benin. In four survey areas in the Borgou Province (from south to north: Kalale, Kandi, Banikoara and Karimama, representing a cross-section of the province) 100 peasants and 100 herdsmen were interviewed in two villages.
This paper focuses on North Borgou, encompassing the zones of Kandi, Banikoara and Karimama. Peasants and pastoralists occupy a frontier area, that includes a national park and forest reserves, situated in between these densely populated and cultivated zones. If land management in this frontier area continues as it is practised in the surrounding, densely populated zones, environmental degradation will develop as in these latter zones.
Only a Gestion de Terroir approach which includes both peasants and pastoralists, can lead to a more sustainable land use in this frontier area. Some scenario's for future land management, aiming at greater sustainability, will be developed in this chapter.

2. MODES OF EXISTENCE: PEASANTS AND PASTORALISTS

North Borgou lies in the north of Benin, between 11° and 12°30' north latitude. It borders Burkina Faso, Niger and Nigeria, and it encompasses the districts of Karimama, Malanville, Banikoara and Kandi. The North Borgou area

comprises roughly 27,000 km², being inhabited by more than 340,000 people. The population densities areas are low, on average 12 ppkm², but exceeding 60 ppkm² within the cultivated zones.

North Borgou is a transition zone of the Sudano and Sahelian climatic regions. The rainy season lasts from May to mid-October. Two main agro-ecological zones can be distinguished (see figure 1).
The first zone, in which the Karimama survey area is situated, has a Sudano-Sahelian climate with relatively little precipitation (700-900 mm). Ferruginous soils have been developed in sandy-clay sediments. Near the Niger river, relatively fertile soils can be found having, however, hydromorphic (pseudo-gley) properties. The soils are acid crystalline. The main food-crops are millet, sorghum and beans. Cash-crops are mainly onions and tomatoes, with some cotton and peanuts.

The National Park of the W, the Cygenetic (Wildlife and Hunting) Zone of Djona and the Forest Reserve of Goungoun are situated in this first zone. Farming, herding and housing are officially prohibited in this uninterrupted zone of protected areas. Vegetation in these territories is mainly characterized by bush savannah with gallery forests along the tributaries of the Niger river. These territories, together with the bush savannah adjacent to it in the south, make up the sparsely populated frontier area treated in this chapter.

Precipitation in the second zone, in which the Kandi and Banikoara survey areas are situated, is between 800-1200 mm.
Ferruginous soils have been developed on mainly crystalline basement rock; a high proportion of the soils are relatively deep. The soils are acid crystalline. Vegetation is a bush savannah. The main food-crops are sorghum, maize and beans. Cotton is a very important cash-crop.

This chapter deals with the cultivated zones of Kandi, Banikoara and Karimama and the sparsely populated frontier area in between these zones. The frontier area includes officially restricted zones such as the National Park of the W, the Cygenetic Zone of Djona and the Forest Reserve of Goungoun.

The pastoral Fulani people migrated to the North Borgou more than a century ago, in search of grazing lands. The Bariba, the Boko and the Dendi had settled in this region a little earlier. They had developed farming (Bariba, Boko) or farming combined with fishing (Dendi).
Since the peasants had the longest-standing rights, the Fulani had to ask them for permission to use the land. This principle still holds today.
Gourmanche peasants and Dendi peasant-fishermen in the Karimama area, in the extreme north of the Borgou, used to grow millet, sorghum and beans. The area is hardly commercialized at present, although groundnuts are cultivated commercially, while irrigated market gardening is becoming increasingly important. This type of land use is very important in the neighbouring district of Malanville.
Bariba peasants in the areas of Kandi and Banikoara cultivate cotton, maize, sorghum and beans. Cotton growing has turned these areas into the most commercialized agricultural zones in the Borgou.

A symbiotic relationship between peasants and pastoralists, including the bartering of goods, services, as well as ways of sharing space, ensured the best living conditions in the fairly capricious, sub-humid and semi-arid climate.
The Fulani settled in relatively permanent camps, where food crops were grown during the rainy season. The men left with the herds on transhumance in the driest months to areas where grass and water were still available. The remainder of the families stayed behind with some (milk) cows. The herds returned at the beginning of the rainy season, keeping a distance from the fields to avoid damage to crops, preferring grazing land a few kilometres outside the villages. After the harvest, the cattle browsed the stubble-fields. Flocks stayed overnight on request of a peasant on certain fields, depositing large quantities of dung, thus manuring the field. The peasant paid some cereals in return for this service. However, such "manure contracts" were exceptions rather than the rule in the Borgou.

The herds went again on transhumance as soon as the stubble and water pools were finished. Transhumance herding is an extensive, but satisfactory response to climatic instability. The seasonal drought forces herds to leave in search for water. They only come back after the first rains and thus do not overburden the land.

Peasants used to contract Fulani to look after their cattle, which was also taken to the transhumance pastures. The Fulani herdsmen kept the milk and some of the calves in exchange. These "keeper contracts" occurred regularly and are still practised, although to a lesser extent.

Circumstances changed since the 1980s, as tension between the two groups increased and the symbiotic relationship waned.
This tension was partly caused by a period of relative drought. Increased cattle death rates had a negative effect on peasants' trust in Fulani herdsmen (personnel communication A. Van Driel). Moreover, the number of foreign pastoralists that immigrated from the Sahel with their flocks increased considerably. Successful livestock health programmes of the government of Benin and the European Development Fund also resulted in an increase in cattle. The overall increase of cattle caused competition between peasants and pastoralists about resources.
The peasants on the other hand considerably extended the acreage under cotton, groundnut and irrigated market gardening, due to the introduction of draught animals and motorised pumps. Agricultural expansion thus reduced the area available for grazing.
Because of the urgent need for grazing space, the Fulani now use areas like the National Park of the W and the forest reserves (De Haan, Van Driel & Kruithof 1990; De Haan 1992; Breukers & De Hon 1988). A new frontier has opened up.

3. ENVIRONMENTAL DEGRADATION

Land degradation

Our survey revealed three important processes of land degradation that have occurred in recent years, i.e. soil erosion, topsoil deterioration and depletion of nutrients.

The most important types of **soil erosion** in the North Borgou are sheet erosion and gully erosion. Sheet erosion results in a loss of the topsoil and therefore in a loss of nutrients. It is caused both by farming and grazing and is found all over the region. Sheet erosion is not very serious but will increase if land use continues to intensify without improving the organic matter content of

the soil. Gully erosion, caused by heavy rains at the beginning of the rainy season, washes away unprotected soils. It occurs only locally on steep slopes in deforested farming areas, along roads and, especially, along rivers. Gully erosion can also be found along rivers, caused by cattle trails.

Agricultural commercialization and cotton production have stimulated the use of the plough and the application of chemical fertilizers. Ploughing results in an increase of the area under cultivation per farmer, but also causes a more extensive clearance of trees as compared to fields cultivated by the hoe. This results in a large surface without trees, which leads to more run-off.
Fertilizer increases the quantity of nutrients in the soil and permits the farmer to cultivate a field for a longer period without diminishing returns. However, an increase of organic matter content does not occur. The prolonged cultivation of a field through the use of fertilizers, makes it more vulnerable to erosion.

Topsoil deterioration in the North Borgou is mainly characterized by crust formation. A mixture of factors underlie this process. The first heavy rains in the beginning of the rainy season, directly followed by sun and wind, hardens the top soil, if the soils lacks sufficient organic matter content. This process is aggravated by human activities like vegetation clearing, grazing or deliberate fires in the fields just before the rains start, thus exposing uncovered soils to heavy rains. Rigorous pruning of trees during the dry season by herdsmen to provide cattle with fodder (called aerial grazing) also contributes to this process. The topsoil structure deteriorates as a result, which is exacerbated by the action of cattle hoofs along trails.
Crusts are found everywhere in the North Borgou: on agricultural fields, fallow fields, and even in the National Park of the W. The latter is protected area, but nevertheless used intensively by Fulani for grazing. Soil crusts occur on areas of more than several square kilometres, inhibiting infiltration of rainfall and stimulating sheet erosion through increased run-off. Less water is available for plants as a result, while the ground-water level drops. Run-off causes regular inundations in the lower parts of the area.

Depletion of nutrients is caused by crop harvesting without bringing nutrients back to the soil in one way or another. Even fallow periods of up to twenty years did not restore sufficient nutrients to the soil. The results of our soil survey show that all soils in the North Borgou are in fact exhausted. Organic matter content is low with an average of 1.6% (weight). Nitrogen content is very low with 15-50 ppm (parts per million), even in fields lying fallow. A quantity of 60 ppm. nitrogen is sufficient for crop production. Phosphorus content is usually low with less than 15 ppm. However, one manured field (no chemical fertilizer) reached 180 ppm. A quantity of 50 ppm. phosphorus is sufficient for crop production. Potassium content is usually low being less than 70 ppm. A manured field contained 340 ppm., which is well above the required level of 160 ppm.

Bush fires cause volatilization of nutrients, due to very high temperatures, especially at the end of the dry season when vegetation is very dry. Soil structure deteriorate as a result, preventing quick regrowth of plants and facilitating crust formation.

Degradation of Vegetation

Vegetation in the North Borgou is rapidly declining, partly due to increased cultivation. The vegetation of the large uncultivated areas, including the National Park of the W and the Forest Reserves, deteriorates. Tree crowns cover maximally 20-50% of the soil in the Borgou Province, but less than 20% in the Kandi, Banikoara and Karimama survey areas. Real forest areas, with more than 50% soil cover, are rare.
Increased grazing is an important factor contributing to the degradation of vegetation. The growing population of pastoralists in the Borgou, a better veterinary service and increasing numbers of peasants keeping cattle, has augmented the total cattle population considerably.

Analysis of Spot satellite images (Goossens 1992) showed rapid deterioration of tree cover, especially in the National Park of the W. Only 40% of the observed area of the park did not degrade in the period 1986-1990. Grass savannah has conquered large areas because extensive bush fires, causing bad germination, and roaming cattle have prevented regrowth of trees. The National Park of the W has

become in fact the most important refuge for Fulani herdsmen.
The Fulani usually prune trees at the end of the dry season, using the leaves as fodder. However, part of the Fulani prune trees nowadays during the dry season, and some even cut all edible parts, thereby destroying the tree.

Bush fires are widely practised by herdsmen and farmers at the beginning of the dry season to stimulate the growth of young offshoots. These young offshoots are more palatable and contain more nutrients for the cattle. At that time of the year living plant material is still omnipresent, preventing very high temperatures. Such bush fires are considered less harmful than those at the end of the dry season. The latter fires are meant to clean the grazing areas from old herbs and to facilitate new grass to grow when the rains start. Both peasants and herdsmen also start bush fires for other purposes such as hunting and vegetation clearing.

4. MODERN CONSERVATION PRACTICES

Farming

Traditional farming and conservation techniques in the North Borgou were based on a system of shifting cultivation. The outer fields were cultivated for a number of years, followed by a period of fallow, during which the bush savannah restored fertility. The home gardens were cultivated permanently, while fertility was maintained by depositing garbage and dung. Different varieties of crops were used to accommodate various soil characteristics. Occasionally, bunds and plant rows were designed to slow down sheet erosion or to facilitate run-off in order to improve drainage.
These traditional techniques are not adequate at present to secure a sustainable land use. Population growth and increased commercialisation require a higher level of resource exploitation.
The Ministry of Agriculture is responsible for the large scale agricultural commercialization of the past two decades in the Borgou, through its regional agency CARDER (Centre d'Action Régionale pour le Développement Rural) and its field assistants in the villages. By offering seeds, pesticides, fertilizer and ox-drawn ploughs on credit to the farmers the CARDER has stimulated cotton production in

particular. However, cotton growing and modern production methods are held responsible for part of the land degradation. Hence the CARDER also considers the introduction of conservation methods such as rotation, tree planting and the prevention of bush fires. Cotton production is, nevertheless, still the CARDER's most important field of interest.

The CARDER started a successful program in the late 1970s to promote ox-drawn ploughing, financed by the United Nations Development Programme (UNDP) and the World Bank. Today, many peasants own a plough as a result: 84% in Kandi, 63% in Banikoara and 45% in Karimama. Others borrow or hire that equipment from relatives or neighbours, so that ploughs are used by almost 90% of the peasants in Banikoara and Kandi, and by 64% in Karimama.

The CARDER promotes an improved **rotation** system of crops, in which cotton is followed by a leguminous crop, then cereals and finally fallow. Each crop should be on the same field for only one year. Only 15% of the peasants interviewed in Karimama practised some kind of rotation, including traditional patterns. Rotation use was much higher (>70%) in Kandi and Banikoara.
However, not every type of rotation is sufficient to counterbalance declining soil fertility and erosion. A distinction has been made between three different types of rotation in table 1. A rotation pattern is considered to be poor when a field is cultivated for a period of three years or more with one crop or a combination of crops from the same family, like millet and sorghum (both cereals). Every rotation period should be followed by a fallow period. A rotation pattern between two fallow periods is considered to be good when two years of cotton or a leguminous crop are followed by one or two years of cereals. A rotation pattern is considered to be very good if these crops alternate each year. The table shows that the rotation patterns are satisfactory in Kandi and Banikoara. These areas are the most important cotton producing zones in the Borgou. Peasants here seem to follow increasingly the advice of the CARDER on rotation methods.

Table 1 Percentage of farmers per type of rotation in the survey areas

		poor rotation	good rotation	very good rotation
Kandi	(n=71)	15.5%	63.4%	21.1%
Banikoara	(n=77)	28.6%	37.6%	33.8%
Karimama	(n=15)	40.0%	13.3%	46.7%

Source: survey results 1992

In addition, table 2 shows the percentage of farmers that have cultivated a field more than five years. This is considered to be the maximum cultivation period in the North Borgou, after which fallow should follow. Comparing both tables it becomes clear that rotation is well practised in both Kandi and Banikoara, but the cultivation periods in Banikoara tend to be much too long. Long cultivation periods are caused by land shortage on the one hand and application of chemical fertilizer on the other. The use of fertilizer allows fields to be cultivated longer without decreasing yields. However, this results, on the negative side, in an increased danger of erosion, since the organic matter content of the soil is reduced.

Note that only 224 out of 300 farmers practised fallow and that in most cases the fallow period is too short for a sufficient soil recovery.
A more sustainable agricultural system should include more use of manure. Only 40% (Kandi, Karimama) to 50% (Banikoara) of the farmers use some manure, while hardly anything is done to promote its use.

Table 2 Percentage of farmers cultivating fields less and more than 5 years before fallow in the survey areas

	less than 5 years	5 years or more
Kandi (n=82)	68.3%	31.7%
Banikoara (n=54)	38.9%	61.1%
Karimama (n=88)	67.0%	33.0%

Source: survey results 1992

CARDER field assistants are now trying to stimulate farmers to save as many trees as possible when clearing new fields in order to prevent excessive soil erosion. The CARDER aims at a coverage of some 40 trees/ha. Since many farmers cultivate their fields with ox-drawn ploughs, they are reluctant to follow this advice because of ploughing difficulties in fields with many trees. Alternatively, some village groups have planted rows of trees along the fields which may be considered as a first step towards **alley-cropping**. The planted trees in these examples are mainly fodder trees like Leucaena leucocephala. Some farmers plant trees for their fruits. However, these are rather exceptional cases.

Herding

Whereas Borgou peasants have a broad indigenous knowledge of soil properties and crop varieties, Fulani herdsmen are famous for their knowledge of different types of vegetation and their potential use as fodder. The drying up of watering-places was traditionally the impetus for the alternating use of pastures. If edible grasses were no longer available at the end of the rainy season, herders began pruning certain varieties of trees. Transhumance was even an exception in places were water and vegetation were abundant, such as in Karimama on the Niger river (personnel communication A. Van Driel).

Scientific opinion about traditional range management in Africa changed dramatically in the last decade. Success or

failure of traditional range management was initially judged by means of botanic indices, measuring the state of the vegetation. However, this type of assessment is questionable with regard to Africa (Behnke, Scoones & Kerven 1993; Scoones 1994; Behnke & Kerven 1994). The dominant factor in climatically unstable environments influencing changes in vegetation is rainfall, which lies outside the control of the herders. The only option for range managers, who cannot control the environment, is to adapt to it. This is called presently "opportunistic range management", which is characterized by the objective to maintain large and productive herds if rainfall and vegetation permit, while destocking as quickly and profitably as possible when circumstances dictate (Behnke & Kerven 1994).
Although the North Borgou is not as dry as the Sahel for which the debate was held in particular, opportunistic grazing is also dominant in the former region. This is not merely caused by climatic factors, such as the decrease in precipitation during the last two decades. For many Fulani in the North Borgou, opportunistic range management is customary as they are transhumants from Sahelian areas in Niger and Burkina Faso, or immigrated to the North Borgou the past two decades. Moreover, the autochthonous Fulani also originate from the Sahel.
In addition, the Fulani in the Borgou do not have clearly defined grazing rights, since they are relative newcomers. The lack of secure rights usually does not promote conservation strategies. There is no communal range management among the Fulani in this part of Africa. They tend to operate in small family groups and lack a clear, hierarchical power structure. With respect to the debate on common property regimes, their pastures can be regarded as open access areas, which favour individual free-rider behaviour.

The herdsmen interviewed in the North Borgou showed little interest in the condition of the savannah or fallow land where they tend their flocks. Although they assess the quality of the grazing areas by means of the species present, they do not think about activities to maintain its quality. They are well aware of the negative effects of rigorous aerial grazing on the regeneration of the vegetation. The same can be said about the disastrous effects of bush fires at the end of the dry season. Nevertheless, they continue their present behaviour because

uncertainty with respect to climate and land tenure precludes other options.

The CARDER installed demonstration plots in various villages to show the negative impact of **bush fires** on soil and vegetation. However, these plots are oriented more towards peasants than pastoralists. Starting bush fires was officially forbidden in Karimama and this rule has been obeyed for a number of years. However, in 1992 the whole area burned again (personnel communication A. Van Driel; see also De Haan 1995). Bush fires in the other zones are only allowed at the beginning of the dry season. Nevertheless many herders, especially in the frontier area, including the National Park of the W, set fire to the bush. Farmers still clear new fields with the help of fire and burn crop residues on their fields. The latter practice produces extremely high temperatures in the topsoil with the same negative effects as bush fires.

There is only one important project targeted at environmental conservation by Fulani and peasant cattle-owners (Projet de Développement d'Elevage dans le Borgou-Est; PDEBE), financed by the UNDP and the FAO and situated in the South Borgou near Kalale.
This project has constructed several small dams to serve as watering-places for cattle, which are a starting point for the construction of numerous other small pools in the Borgou. These small water reservoirs should remove herding from the watering-places in the forest reserves and other restricted areas. Committees of cattle-owners were established to manage the dam near Kalale. Each committee employs a guard who looks after the dam and the pool. He is paid from the collective account. Cattle are not allowed on the dam. Bush fires as well as crop cultivation around the pool are forbidden. Men and women are not allowed to wash or bath in the pool, which has only one entrance. After the rainy season, villagers must clean the area and repair the fence. Finally, farmers ploughing in the catchment area of the pool should follow the contour lines to diminish soil erosion in order to slow down silting up of the pool (De Haan 1995).

Escape to the frontier

The most important mechanism to avoid excessive environmental pressure in both modes of existence, i.e.

farming and herding, has traditionally been the mobility of both fields and animals.
Although this mechanism may have worked satisfactorily in the past, this is not the case any longer in the densely populated zones of Kandi, Banikoara and Karimama. Fields are cultivated longer than before and fallow periods are shortened. Soil fertility is not even restored after long periods of fallow, because bush fires and grazing cattle deplete the fallow fields. The mobility of the pastoralists' herds is hindered by expanding cultivation, conflicts with peasants about damage to crops and disappearing passages to grazing areas and watering-places.
An increased number of peasants decide to migrate to the frontier zone, while also keeping their plots in the home village. Numerous isolated farms and even hamlets have already been established. New fields are being cleared by means of fire. Cotton as well as food crops are cultivated.
The settlers mainly concentrate in the transit zone, and along the road, between Kandi and Banikoara. They usually stay out of the protected areas because their fields are easily spotted by the forest guards.
The frontier area is also being used by Fulani and conflicts about crop damage by cattle, well-known in the densely populated zones, are already reported. The Alibori river, often bearing water throughout the dry season, is a pole of attraction to the Fulani. Since pastoralists are more mobile than farmers, the Fulani can also be found throughout the National Park of the W, the Cygenetic Zone of Djona and the Forest Reserve of Goungoun, risking both legal and illicit fines from the forest guards. Cattle density is highest in the frontier area during the dry season because of the presence of transhumants from adjacent zones in Niger and Burkina Faso.
Numerous Fulani have more or less settled permanently in this area.
Colonization at the frontier temporarily reliefs environmental pressure in Kandi, Banikoara and Karimama. This probably reduces people's motivation to change farming and herding practices. However, the relief is only temporary and peasants and pastoralists will soon run into more serious environmental problems.

5. CONDITIONS FOR A SUCCESSFUL GESTION DE TERROIR

Gestion de Terroir is more an applied strategy than a theoretical concept, as it grew from experiences in

development projects. This is reflected in the current World Bank definition of PNGT (Programme National de Gestion des Terroirs) projects in West Africa: "a multisectoral, decentralized and participatory methodology, that uses the concept of a village territory, managed by a responsible village group with the objective of using the natural resources in such a way as to assure their sustainability" (Guéye & Laban 1992, p. 12).

Important experiences for a Gestion de Terroir approach were accumulated during the so-called community forestry projects in the late 1970s and 1980s. These small-scale activities promoted self-reliance, sustainable land use and community responsibility for the management of natural resources within a community's territory. Moreover, these micro-projects proved to be feasible in the local context, as long as active participation, collective action and participation of women were guaranteed. This process-oriented and bottom-up approach, promoted and diffused through a network of rural extension agents from various government and non-government agencies, like the forestry departments, the cotton boards and NGO's, proved to be quite successful (Hijkoop et al. 1991).
Integrated management of natural resources at village level became incorporated in integrated rural development projects as a result and were given political weight through its adoption by important funding agencies like the World Bank (Guéye & Laban 1992).

Gestion de Terroir implies on paper the definition of a territory (terroir), the establishment of sustainable production systems and the establishment of a development contract with the local population (Barrier 1990, p.36). However, from an inventory of Gestion de Terroir programmes (Réseau Recherche-Développement 1993) we learn that in practice the definition of territory is vague and large scale disparities may occur. In addition, natural resource management is not always the primary goal; intensification of cotton production or food security are principal objectives too.

Three different views on Gestion de Terroir can be distinguished. Firstly, Gestion de Terroir is considered a suitable spatial planning concept. It serves as an instrument to partition the village territory into different sectors with particular resource use priorities (fields, woodland etc.). It is hoped that conflicting

resource use can be avoided by drawing clear boundaries (Bonnet 1990).
The second point of view tries to work out clear legislation on the issue of land rights in order to avoid conflicts when the Gestion de Terroir is applied to larger areas. They recognize the complexity of the land rights issue and they insist, therefore, on a solid legal base as a starting point for land use planning schemes (Kinz 1992: Hesseling & Ba 1994). Thirdly political scientists and development agencies plead for more decentralization, to be implemented through Gestion de Terroir. They advocate a transfer of decision making power to local organisations based on territorial units (GRED 1993, p. 11).
These views assume that, at the local level, a kind of permanent consensus about the use of resources can be established. However, this does not reflect the nature of social relations in rural West Africa, which are characterized by many conflicting interests with respect to natural resources.
Livestock keeping, an important type of resource use, has hitherto received little attention in the Gestion de Terroir (Bonnet 1990; Barrier 1990; GRED 1992; Marty 1993). Moreover, the livestock sector is becoming increasingly complex in West Africa: herders settle and are engaged in crop cultivation, peasants pick up animal husbandry and even the national elite invest in cattle.

Thus the real issue at stake in the Gestion de Terroir debate is its underlying assumption that communal management of natural resources is still a viable option in rural West Africa.

6. PEASANT-PASTORALIST RELATIONS IN THE NORTH BORGOU

The two modes of existence in the North Borgou do not function independently from one and another, but are interrelated in many ways. Despite conflicting land use there is still a sufficient degree of interdependence, like keepers and manure contracts, and thus a communal basis for spatial planning of resource use.

The shortage of farming land, pastures and water has led to conflicts between peasants and pastoralists, about crop damage by cattle and blocking of cattle passages by peasants.
Table 3 indicates that 20 to 30% of the peasants suffer from crop damage. It is maintained in the Borgou that this

is caused by "irresponsible" foreign herders from Niger and Burkina Faso. However, our survey found out that crop damage by cattle belonging to foreign herders is less important than damage by autochthonous herders. Peasants and herders solve the problem between themselves in the majority of the cases (>70%), i.e. the herders pay for the damage or the peasants forgive them. Local authorities have to intervene in 18% of the cases, especially when a valuable crop like cotton is concerned. Occasionally violence, casualties and even deaths result.

Table 3 Percentage of farmers experiencing crop damage and origin of the cattle responsible

	Origin of herd				
	crop damage	autoch	alloch	peasant	unknown
Kandi (n=100)	33	64	6	-	30
Banikoara(n=100	20	45	-	5	50
Karimama (n=99)	33	64	6	-	30

Source: survey results 1992

Herders make use of passages to move from one pasture or watering-place to another in cultivated areas. These passages have to be at least 100 meters wide to prevent damage by cattle to the surrounding fields. However, the passages tend to become narrower because of land pressure. Most passages are still open in Kandi and Banikoara (table 4), but in Karimama, 65% of the herders are confronted with passages blocked by fields. These are mainly passages used in the dry season to go to the river Niger. Irrigated market gardening and other crops on the river banks hinder the herders to reach the river.

Table 4 Percentage of herders confronted with blocked passages

	blocked passage
Kandi (n=99)	3.0
Banikoara (n=97)	3.1
Karimama (n=99)	65.6

Source: survey results 1992

Fulani who arrived and settled in the North Borgou during the last two decades have no permanent camps as yet, but move their camps with their cattle to new pastures. Only 2% of the Fulani in Kandi and Banikoara had difficulties with peasants about finding a new site, but in Karimama 63% had encountered problems.

Peasants in the North Borgou accumulate their wealth in cattle, entrusted in secret (in order to conceal their wealth to relatives and neighbours) to Fulani. The Fulani friend thus became the treasury of the peasant. The keepers contract gave the Fulani the right to use the milk of the cows and the ownership of part of the calves.
However, the decrease of rainfall and the decline in pastures forced herders to go farther away on transhumance, which resulted in higher mortality rates of cattle. At the same time, the introduction of plough-oxen, which stayed at the farm the whole year around, acquainted peasants with cattle keeping. A tendency to reduce the keeper contracts has emerged in addition to the growth of conflicts about damage to crop, particularly in Kandi and Karimama (table 5). Today many farmers hire a Fulani herder on a seasonal basis to look after their cattle, which are combined in a village flock.

Table 5 Percentage of farmers having a keeper contract

	presently	stopped	before
Kandi (n=99)	31.3	18.2	49.5
Banikoara (n=99)	31.1	1.0	32.4
Karimama (n=99)	13.1	25.3	38.4

Source: survey results 1992

Manure contracts were formerly not very common in the North Borgou. Today, 2% of the farmers in Banikoara, 7% in Kandi and 9% in Karimama have manure contracts. The mutual advantage is that the farmer has his fields manured, as the herder locate the night kraal on his land, being allowed to feed his cattle with the stubble. Nevertheless, even without a contract cattle browse the stubble fields. Manuring is done less systematically in such cases, because

the farmer has no influence on the location of the kraal. At present peasants start collecting the stubble themselves to feed it to their own cattle or to sell it to the Fulani afterwards.

Although interdependence between peasants and pastoralists is diminishing and polarization is rising, there is still a broad communal understanding between both groups. Conflicts still involve only a minority of the people, and more important, most of the time they are solved privately. Polarization is more severe only in Karimama, squeezed between the National Park with its guards and the cultivated bands of the river, with many Fulani immigrants and transhumants from Niger. An approach towards communal resource management in Kandi and Banikoara may easily start with small groups of individual peasants and pastoralists, but in Karimama this process should be conducted by representatives of both groups.

7. GESTION DE TERROIR SCENARIOS FOR THE FRONTIER

A successful Gestion de Terroir, being a communal management regime of natural resources, needs a sound communal basis. This is still a viable option in the North Borgou. Gestion de Terroir scenarios for the frontier area in the North Borgou are being proposed below.

The availability of water for men and animals during the dry season is the limiting factor in exploiting the frontier area. Human settlements and herds are, therefore, being attracted by the Alibori river. Interesting experiences, involving the creation of small ponds, exist in the South Borgou. Several small dams were constructed to create watering-places for cattle. Joint committees of peasants and pastoralists and regulations about the use of water and land around the pond function as starting points for communal resource management in the surrounding territory.
These kind of small ponds will also be interesting to the peasants and pastoralists in the frontier area. The ponds can be a watering-place for cattle of both herders and peasants. The water may also be used for gardening and domestic purposes. A well distributed location of ponds may open up new pastures, too remote from watering-places at the moment. These small ponds may contribute to controlling

environmental variability within the broader perspective of the debate about opportunistic range management.

Small ponds can be created upstream in the catchment areas of the tributaries of the larger rivers Alibori, Sota and Mekrou. These locations are suited for small earth dams, that can be constructed without heavy equipment and expensive concrete but with substantial labour input of the local population. The small scale of the enterprise, the low costs, the local labour input and the limited water carrying capacity of the pond make it manageable for the local community. Collaboration between peasants and pastoralists can still be expected on the local level, thus providing a platform for communal management. As the water capacity of the pond is limited, few herds from outside the local community will be attracted to the place. Overgrazing by outsiders, so common around large wells and ponds in the Sahel, will thus be prevented.
These small ponds will carry water during the dry season, enabling the local population to control environmental variability, rendering transhumance superfluous. This has to be accompanied by other measures, such as the gathering or cultivation of fodder, the prevention of bush-fires, the improvement of pastures and fallow land, the rotation of pastures combined with the allocation of land use types to certain zones within the territory of the community, all in fact contributing to more sedentary livestock keeping and the integration of crop cultivation and animal husbandry. These measures will reduce environmental variability and contribute to a shift from opportunistic range management towards more stable, integrated land management.

An interesting question in this respect is what role the National Park of the W, the Cygenetic Zone of Djona and the Forest Reserve of Goungoun should play. These protected zones make up a large part of the frontier area and are in use by pastoralists. Any scenario for arriving at sustainable land use in the frontier area should also include these protected zones.
Two major types of scenarios can be distinguished. The first is characterized by preservation and the second by utilization. Within each type, some sub-types can be identified.

<u>The preservation scenarios</u>

The first preservation scenario represents a complete ban on utilisation of the resources in the protected areas by men and animals, foreigners and nationals. It requires large investments in personnel and equipment to enforce such a ban. The costs would by far exceed the investment capacity of the Beninese government. It is not yet clear to what extent foreign donors would be willing to supply the necessary funds.
Pressure on resources in the frontier area outside the protected areas will increase as a result. This would be objectionable in the Karimama zone where polarization is most severe. Here a system of small ponds will probably not be sufficient. For the frontier area south of the National Park of the W, between Kandi and Banikoara, the first preservation scenario would prevent the influx of Karimama and foreign transhumants and thus create a breathing space for the implementation of Gestion de Terroir around a system of small ponds.
The second preservation scenario would create passages from north to south through the National Park of the W, the Cygenetic Zone of Djona and the Forest Reserve of Goungoun in order to alleviate pressure on the Karimama district. These passages should have a width of several kilometres in order to allow cattle to graze during the passage and to prevent overgrazing. Thus the frontier zone south of the National Park of the W would serve as an overflow for the Karimama zone. Transhumants from outside the community should be accommodated within the local communities of herders and peasants. This might erode the local bearing surface for communal resource management. On the other hand herders from Karimama already stay in this area during the dry season. Their integration into local resource management is in any event a prerequisite.

The utilization scenarios

The first utilization scenario implies the lifting of all restrictions on the exploitation of resources by peasants and pastoralists in the protected areas. This would most certainly relief pressure in Karimama and in general will make the frontier area even more attractive than at present. However, within ten or fifteen years at the most, peasants and pastoralists will encounter a situation similar to today and the need for an environmental management strategy will again emerge. One may argue that such a period is needed to arrive at any viable Gestion de Terroir scenario at the frontier. Only in that case would

the first utilization scenario be acceptable. However, one may also argue that a certain degree of resource scarcity is needed to motivate peasants and pastoralists to participate in Gestion de Terroir. Full utilization of the protected areas may than be considered as a waste of time and resources.

Nevertheless some temporary or occasional utilisation of the National Park of the W, the Cygenetic Zone of Djona and the Forest Reserve of Goungoun could be desirable during the implementation phase of Gestion de Terroir in the frontier area outside these protected territories. In fact this second utilization scenario is the most promising for the pastoralists. It can be expected during the implementation of the program focused on a Gestion de Terroir approach around small ponds, that the pastoralists are not capable of abandoning opportunistic range management practices at once because environmental variability will remain important in the initial phase and land rights will not have been established immediately. Mobility of herds must be guaranteed in that case. Utilization of natural watering-places and pastures in the protected areas may than serve as safety-valves and contribute to a successful implementation of Gestion de Terroir.

8. CONCLUSION

A Gestion de Terroir approach organized around small ponds and combined with north-south passages through the National Park of the W, the Cygenetic Zone of Djona and the Forest Reserve of Goungoun, coupled with occasional utilisation, might be the most promising scenario for the frontier area in the North Borgou to arrive at more sustainable land use. There is still a mutual understanding between peasants and pastoralists on which communal resource management can be based. Foreign herders from Burkina Faso and Niger constitute the uncertain factor in this scenario. On the one hand they already make use of the frontier area and thus will be interested in participation in the Gestion de Terroir if advantages are clear. On the other hand their weak relations with local peasants and pastoralists might prevent such participation.

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