

## FARMERS DO IT BETTER: LOCAL MANAGEMENT OF CHANGE IN SOUTHERN BURKINA FASO

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### ABSTRACT

This paper focuses on the province of Sissili in southern Burkina Faso, an area that saw widespread immigration caused by the Sahelian droughts since the 1970s. This immigration caused concern over the economic and environmental sustainability of the province. However, over a period of two years of close contact with farming communities, adaptive and innovative actions were noted as people developed new resource-use patterns to safeguard both environment and livelihood. The study examines various aspects of the production and livelihood system of indigenous and immigrant ethnic groups and shows that: the purpose of the emerging new resource use arrangements is to guarantee subsistence for all; negotiation between ethnic groups and communities is the mechanism that guarantees subsistence; landscapes (lifescapes) are not static and are created through assimilation of information and different farming systems; the objective of local production systems is to maximize livelihood subsistence and to minimise negative environmental impacts which threaten long term sustainability. Copyright © 1999 John Wiley & Sons, Ltd.

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### INTRODUCTION

It is widely believed that subsistence farming systems in Africa are failing to respond to either environmental or demographic change. The latter is believed invariably to lead to environmental disaster. Heightening food insecurity and land degradation still top the development agenda, even if they have disappeared from the media headlines. In the World Food Summit in Rome (FAO, 1996), which brought together world leaders, Boutros Boutros Ghali talked of the catastrophic situation faced by Africa and the inability of the African continent to feed itself.

This paper explores how farmers adapt and alter their production systems to suit existing environmental conditions. Historically, West African farming communities have been highly mobile and highly adaptive in creating *lifescapes* which are mobile in both time and place, and it is these which provide subsistence to the household and ensure family survival. The term 'lifescape' was introduced by Somé and McSweeney (1996) from work by Nazerea in the Philippines. They defined it as the social, cultural and economic interactions that occur across the landscape. Lifescapes are more than physical landscapes; they imply a livelihood or production system which is linked, but not tied, to place; lifescapes are dynamic in both time and place.

Lifescapes are mobile in place and time. People create landscapes, they produce nature and it is the people–place relationship which is the critical variable. To understand environmental phenomena in the context of social environment, it is less appropriate to calculate carrying capacity, as the followers of Malthus did, and more appropriate to examine human agency, as Boserüp (1972) has done, to examine people's ability to create lifescapes. Lifescapes suggest that human agency and their relations with technology, economics, morality and opportunity create places which guarantee livelihoods for the community. We concentrate here on nine different lifescapes: three villages containing three ethnic groups where each ethnic group has a separate lifescape. A central characteristic of lifescapes is that there is interaction between

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them which is also a mechanism that ensures survival. This example also gives some indication of how the populations of the Sahel and its regions have created new environments and livelihoods throughout history. It also shows that the peasant mode of production is not only resilient, but also dynamic. The blending of cultures, religions and economies has been done throughout history to ensure survival of the community and the building of new lifescapes.

The point of departure for the study was to understand and explain the new resource-use pattern that is evolving as a result of the demographic changes since the 1970s. It was felt that the environmental crisis narratives put forward by several development organizations (see later) did not fit the reality on the ground, i.e. there were no signs of massive soil erosion or harvest decline in Sissili. Three villages formed the backbone of the research into the emerging land-use systems of the three ethnic groups in their respective territories.

As African landscapes continue to be studied in detail, new findings emphasize the creative and productive human influence, rather than the negative impacts of humans. As Tiffen, *et al.* (1994) showed in Kenya, more people meant less erosion: Fairhead and Leach (1996) showed that local people were the reason behind the increasing presence of forests in Guinea. This case study shows that the presence of twice as many people in one area, compared to 15 years ago, produces a vibrant economy and a productively managed environment.

### THE LOCATION OF THE PROBLEM

The province of Sissili, in southern Burkina Faso (Figure 1), experienced considerable population increase in the period between the early 1970s and the late 1980s as a result of immigration from the northern areas of Burkina Faso. The population of Sissili stood at 150 000 in 1975 and grew to 300 000 in 1990. The migrants were composed of two ethnic groups; the sedentary Mossi and the pastoralist Fulani: the Nuni were the original population. The provincial population is now composed of the Mossi, making 46 per cent of the population, the Nuni, 22 per cent and the Fulani, 11 per cent. The population increase put pressure on the original land-use practices, in particular the farming systems, in Sissili.

The sudden influx of people caused concern among national and local development organizations. These organizations called for development activities to be initiated to offset the effects of immigration, most notably the effects of deforestation. Since the mid-1980s, a number of development organizations have initiated programmes in Sissili concentrating on agriculture, forestry and land use. Their overall approach has been one of crisis mitigation.

In 1990, the Sixth European Development Fund (Sixième FED), based in Sissili, contracted a French organization, IBS, to study the deforestation rates in Sissili since 1988. Using Landsat and SPOT satellite images, the IBS produced vegetation maps that showed cleared areas, mainly due to agricultural colonization of the immigrants. Deforestation corresponded to the settlement patterns of the immigrants (mainly Mossi) in the province. On the basis of the figures produced from the study, extrapolations were made on areas of future deforestation suggesting that some 43 per cent would be deforested by 2010 (Table I).

Table I. Projected deforestation rates for the province of Sissili

Year	Deforestation rate (%)
1988	21.6
1993	24.7
2000	31.8
2010	43.1

Source: IBS, 1994a.

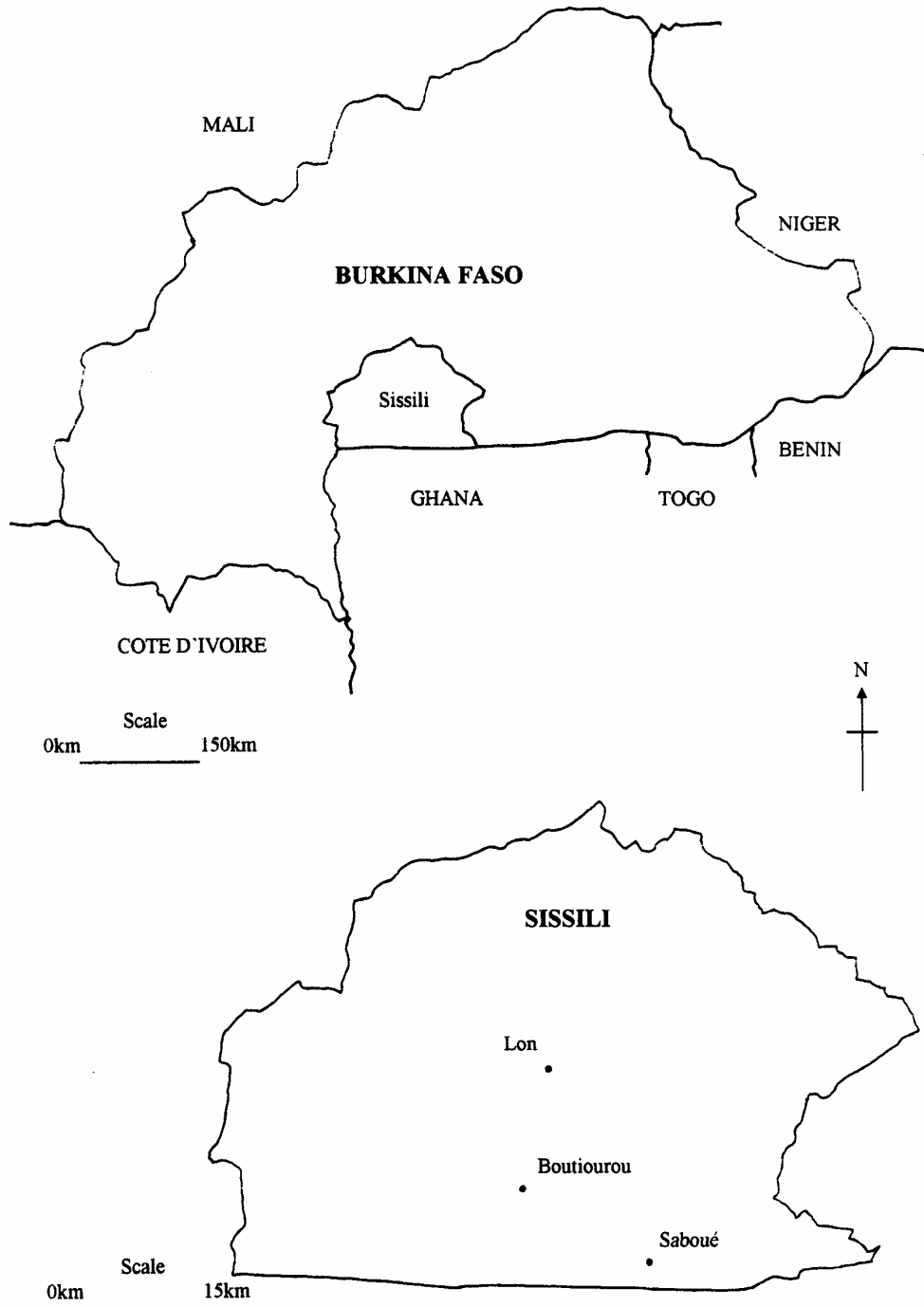


Figure 1. Burkina Faso, the province of Sissili and the case study villages

Agrotechnik (1991) described the likelihood of a total disappearance of savanna zones and forest fallows, maintenance of only delimited forest zones, and the development of a fuelwood deficit for Sissili and its urban centres. The decline of fallow lands suggested the loss of organic soil materials, especially in the humific horizons, an increase in runoff created by soil compacting and, probably the most worrying, a lowering of the water table. Agrotechnik suggested that the province could only support 30 persons per km<sup>2</sup> without irreparable damage.

Prior to the immigration, Sissili was characterized by low population densities in an area which was naturally endowed with a significant stock of natural resources, the most critical of which was woody biomass. Today, however, the situation is no longer the same: the population has more than doubled in the last 20 years and agricultural activity has not only increased, but the agricultural systems are also changing. These are the obvious results of immigration, but there are also other important implications. There is the introduction of other cultures, the introduction of Islam which has replaced Animism as the dominant religion and the introduction of new skills and information. The indigenous population's cultural identities are often challenged and the language of communication changes to the language of the immigrant.

### THE ACTORS

The indigenous Nuni practice a 'gentle' form of agriculture which is exclusively manual with little inputs, relatively low soil usage and use approximately 4.5 ha per family. Crops grown include: yam, maize, sorghum, millet, groundnut, sweet potato, cowpea, black-eyed beans and cotton. Yams are cultivated within large mounds (*buttes*) and other crops with small mounds. This is a very important characteristic of Nuni farming, indicating a very labour intensive farming technique requiring hard work with a small hand hoe (a *Daba*). The technique is indicative of bush farming, i.e. farming in the presence of a large number of trees and root systems, and does not cause great disturbance to the local agroecological system. Fields are farmed for an average of four to five years with fallows traditionally being 20 to 30 years. The Nuni also include uprooted weeds in their soil turning methods, again adding to soil structure. Women have their own small fields, dominated by groundnut cultivation which acts as a cash crop. They sometimes help their husbands with seeding and some parts of the harvest. No private tenure management is practised.

The Mossi practise an extensive form of agriculture with almost total field clearing, mainly for cereal production. On average, each family cultivates 6 ha. Women participate fully in all aspects of farming, increasing the labour input. The Mossi arrived in an unknown landscape and imported farming techniques (dominated by the cereal-cropping, mainly millet and sorghum) that were taken from generations of farming in a dry Sahelian environment. However, the Mossi have begun to adopt indigenous management practices and started growing crops grown traditionally by the Nuni, but unlike the Nuni, the Mossi increasingly seek to take advantage of economic opportunities and the women are involved with all agricultural activities.

The Fulani are agropastoralists and have recently come to Sissili, although some came earlier to herd the cattle of the Nuni. In total, 7 per cent of the Fulani arrived more than 20 years ago, the rest, 93 per cent, have arrived in the last 15 years. The main reason behind the immigration was resource degradation in the north and a consequent lack of pasture and dry season watering points.

The Fulani have now settled in most departments in Sissili. They tend to concentrate their animal herding in the zones of low-intensity agriculture in the periphery/wooded areas of the village's territory. Fulani farmers cultivate roughly 1.5 ha per family in old pasture zones which contain high levels of cattle manure and, consequently, harvests are usually comparatively high. In some areas, there exist conflicts between the Fulani and the sedentary farmers because of straying cattle and crop damage in the rainy season, however, these are rarely serious and are usually resolved amicably.

Table II provides a summary of the agricultural characteristics of the three main groups in this area.

The Nuni have a strong relationship with their land that has developed over many years. This relationship has developed, not in a static situation, but in a dynamic, ever-changing environment. There have been various wars, invasions, droughts and epidemics, which has meant that the Nuni communities have had to be

Table II. A summary of some agricultural characteristics of the three main ethnic groups in Sissili

Description	Nuni	Mossi	Fulani
Production system	Farming/sedentary	Farming/sedentary	Agropastoralism/semi-nomadic
Dominant grown crops	Tubers and cereals	Cereals	Cereals
Average cultivated area	4.5 ha	6 ha	1.5 ha
Language	Nuni	Mooré	Fulfulbé

inventive and adaptive in their resource-use patterns and survival strategies. The current one is the result of generations of adaptation which has again recently evolved to incorporate another two ethnic groups and their production systems.

The recent history of the Mossi is not significantly removed from their historical background, i.e. the Mossi have always moved. When there is movement, accompanied by settlement, there are two processes which occur. First, they bring their farming systems that they have employed in their zones of departure and, secondly, they adopt local farming practices. In this way their farming systems develop in response to local conditions.

The Fulani have a very different production system than those of the Mossi and Nuni and as a result remain relatively isolated from their neighbours. This is principally because grazing cattle and unprotected crops do not mix (the Fulani fence their own animals in the presence of their own crops). There does exist, however, a significant level of trade and exchange between the Fulani and the other ethnic groups which allows a level of assimilation and integration into the wider social system.

The three ethnic groups have different histories, production patterns and social relations. However, they all now share the same land area and they all share the same production objective; to guarantee subsistence, ensure survival and minimize risk.

#### *Tenure Management*

Each village in Sissili has its own definite village territory that has its origins in the local history of the area and the first settlers. Tenure management in the villages is controlled, under customary law arrangements, by the Nuni land chief (*Tiatju*). The principle role of the land chief is to oversee and supervise everything that has to do with the land, including the bush, the farms and the wildlife (the village chief, *Pio*, controls everything social in the village). He is seen as the mediator between the human world and the divine world of the ancestors and spirits. If a person needs new land to farm, the land chief must first be consulted. He will indicate which piece of land the person can cultivate, what he must do first, i.e. the sacrifices he must carry out and how much land is available.

Likewise, when the immigrants arrived in the village territory with the desire to settle, the first person they addressed was the village chief, then the land chief. It is the latter who decides whether there is land, in the territory, for the immigrants to farm. Depending on the village, there are different systems that the land chiefs use to allocate land and control the immigrant's effects on the village environments.

## THE VILLAGES

### *Lon*

Lon is the most densely populated village of the three case study villages and experiences the highest resource shortages and problems of production. Lon has a territory which covers an area of approximately 26 km<sup>2</sup>. The population, according to the most recent population census was 2978 in 1985 (INSD, 1988), which makes it the most populated of the three case study villages.

The three diagrams (Figure 2) show the evolution of occupied space from 1955 to 1983 to 1993. The diagrams are based on aerial photographs (Institut Géographique du Burkina Faso (1983) and Institut

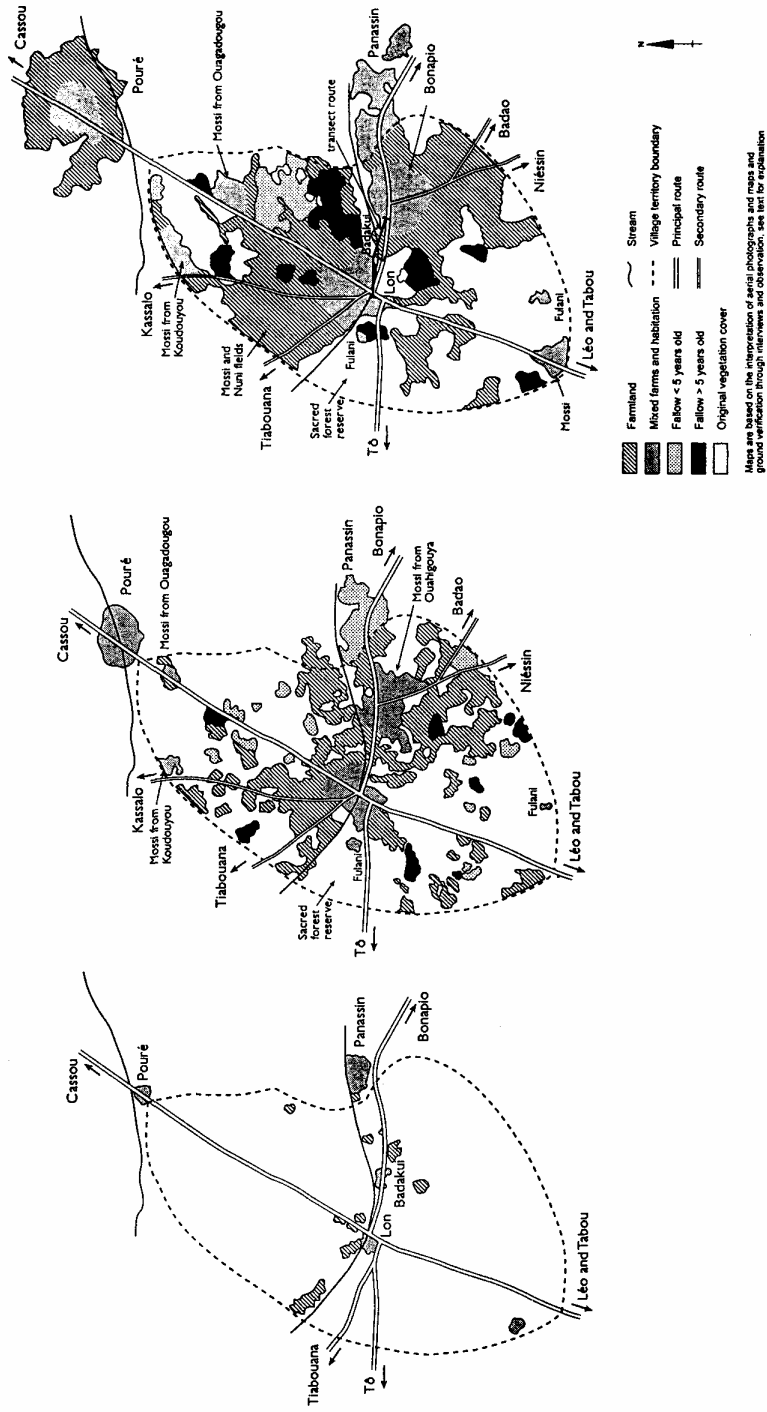


Figure 2. The evolution of the landscape in Lon, 1955–83–93 (not to scale)

Géographique National (1955)), and from a landuse map (IBS, 1994b) that was based on Landsat images from November 1988 and Spot images from December 1993.

The situation in 1955 was characterized by very small indigenous Nuni population inhabiting a large land area with high percentage cover of natural savanna bushland.

By 1985, the picture had radically changed. There has been a significant influx of people from the Mossi plateau and the population has increased far past the natural population growth rate. As the first immigrants arrived in 1975, the picture of occupation seen in 1983 is a result of 20 years of further immigration and immigrant land exploitation. Even so, the Nuni have preserved much of the southern, eastern and northern zones as forest and land reserves. The western and part of the southwestern area is a sacred forest reserve which no Mossi are allowed to exploit. A Fulani encampment exists in the eastern reserve to deter Mossi farmers, because of risk to their crops from Fulani cattle. There is another Fulani encampment to the south whose inhabitants are from Louga in the north. They remain isolated and also fulfil a bush protection role.

There are Mossi from a range of different origins in Lon's territory, and they have all settled in different parts. The Mossi from Ouahigouya settled first and these are the original Mossi of Lon that arrived in 1969 who became the dominant lineage, containing the Mossi chief. These Mossi can cultivate around their compounds, but outside of the immediate vicinity they must ask the Nuni chief. The Mossi of Ouagadougou have settled in the northeast and the Mossi of Koudougou have settled to the northwest. The Mossi to the centre west are from a mixture of origins.

In 1993, there was only a minimal expansion of land occupation in Lon; the farmed land has remained comparatively static since 1983. The east, north and southern areas that were reserved for future farming still remain. There is some encroachment, especially in the east where a large part of the reserve has been cultivated, although the 'sacred grove' remains intact. It should be noted that the land demarcated as farmland is not devoid of trees, in a Nuni field as many as 40–50 trees may remain in 1 ha and a Mossi field may count anything from 1–30. Table III shows the different categories of land cover in Lon between 1955 and 1993.

Although it is difficult to project future population growth, if immigration has stopped, then the occupation and use of the land in Lon will remain limited to the current resident population and their families. With over half of the territory in Lon still covered by woodland it is unlikely that, even with exponential resident population growth, the village will experience serious resource shortages in the near future. As the farmers in Lon know their available resources well, it follows that their decisions concerning their use will be based on sustainability, i.e. the ability of the land to guarantee subsistence for them, their children and grandchildren.

Due to the level of immigration in Lon and the immigrants integration into Nuni society, the traditional legal and administrative arrangements have begun to change.

The landscape of Lon has developed into one that is shared. It is in the interest of all tribes to safeguard the productivity of the land and so at present much of the decision-making about the function of the land, conservation measures and experimentation with new farming techniques, as well as occasionally discussions about land distribution, are taken by an intertribal group of elders.

Table III. The growth in the different categories of land cover in Lon, 1955–93

	1955 (ha)	% of area	1983 (ha)	% of area	1993 (ha)	% of area
Farmland	65	2.5	797	30	1200	45.4
Woodland	2579	97.5	1736	65.8	1198	45.2
Fallow <5 years	–	–	60	2.3	93	3.5
Fallow >5 years	–	–	51	1.9	153	5.9
Total	2644	100	2644	100	2644	100

Source: Based on the diagrams of the evolution of the occupation of space (Figure 2).

It is a logical progression that in a territory characterized by a high population of a relatively integrated nature that have been in that area for a long time with no major conflicts, that legal and administrative control take on a more consultative and wider ranging nature. Even if the final decision rests with the Nuni, there is a collaborative decision-making process which is necessary in an area where questions of resource use and distribution are paramount. There is significant interaction between all the three tribes, which shows not only cohesion, but also a recognition that each contribution is important for the overall production system. Table IV illustrates the level of inter-ethnic exchange in Lon. This closeness of tribal interaction shows a growing maturity in a production system that has recently been interrupted. There is continuity and change within the village where the local production system mirrors entitlement exchanges that were once part of the broader spatial boundary exchange systems. This occurs while each ethnic group maintains its own basic agricultural system.

### *Saboué*

Saboué's territory has an area of approximately 37 km<sup>2</sup> and has the smallest population of the three case study villages. In 1985, it had a population of 266, by which time the majority of the immigrants had already settled. The population is thought by the elders not to have altered significantly in the interim period.

Figure 3 shows the evolution of occupied space between 1955 and 1993, while Table V shows the development of land cover over the same period.

The natural vegetation in Saboué is more diverse than in the other two villages and there is generally less evidence of a significant human impact relative to Lon and Boutiourou, i.e. there is more natural bush. With the smallest population of the case study villages, there is still a Nuni majority. Also, unusually, there is a higher proportion of Fulani than there is Mossi, reflecting the quality of the bush for pasture, the proximity of Saboué to Ghana (for cattle trade).

In 1955, there was a minimal human population, numbering only a handful of families. The village was situated in the middle of two streams that passed either side of the houses and a sacred fishing area was found to the south.

In 1983, there had been an expansion of the farmed area and an introduction of the Missi and the Fulani. The Fulani have settled to the west in one camp made up of several families (where the bush is at its most dense), and the Mossi have settled to the southeast. The Nuni fields have moved outwards slightly towards the periphery, with their old fields lying fallow.

In 1993, there was further expansion of the cultivated area, most notably in the northern area where the Nuni farmers have increased their range. The Mossi remain confined to the southeast, with a slight expansion of their farmed area and a movement inwards towards the stream, in virgin bushland. The Nuni have moved their bush fields further south into the tuber-growing zone, as the need for more cash crops arises.

Saboué has the smallest farmed area in its territory compared with the other two villages and has the lowest population. The village still has over 80 per cent of natural woodland cover in its territory. Saboué, like Boutiourou, experienced the largest expansion of farmland from 1983 to 1993 which similarly shows the lateness of arrival by the Mossi immigrants as they travelled past the already densely populated northern and central areas of Sissili. (See Table V.)

The small size of the Nuni community means that dialogue and conflict resolution, in this case is not difficult. However, in the traditional makeup, the village chief and the village counsellor have decision-making control, with the neighbourhood leader below them and the consequent household heads below them all. The usual situation for decision-making is the coming together and dialogue between the male village elders. It is rare for one chief to make an independent decision. The ethnic groups in Saboué have the most minimal intraethnic contact of all the villages. This is because, at present, there is no reason to cooperate: there are no resource shortages, there is ample land available to allow for the large spatial differences in settlement patterns, and the proximity to the large market of Biéha (5 km from Saboué) means that intravillage trade is minimal. Biéha's size, its human resources (it contains extension workers from most



Table IV. Ethnic interrelationships in Lon

Direction of transfer	Activity
Fulani → Mossi	<ul style="list-style-type: none"> <li>● Cattle guarding</li> <li>● Milk/meat sale</li> <li>● Woven-mat sale</li> <li>● Medical information</li> <li>● Animal sale</li> <li>● Dung</li> <li>● Grazing animals on post-harvest fields</li> </ul>
Mossi → Fulani	<ul style="list-style-type: none"> <li>● Labour</li> <li>● Sale of cereals, foodstuffs and tools</li> <li>● <u>Dolo</u></li> </ul>
Fulani ↔ Mossi	<ul style="list-style-type: none"> <li>● Participation in some decision-making in communal village affairs (in village meetings some Fulani will participate, usually the elder males who have had most contact with the Mossi (and Nuni) through sale or guarding of cattle</li> <li>● Cattle vaccination, either with or without an extension worker</li> <li>● Celebration of religious festivals, marriages and baptisms</li> </ul>
Fulani → Nuni	<ul style="list-style-type: none"> <li>● Meat/milk sale</li> <li>● Dung</li> <li>● Animal sale</li> <li>● Cattle guarding</li> <li>● Medicinal information</li> <li>● Gifts</li> </ul>
Nuni → Fulani	<ul style="list-style-type: none"> <li>● Labour</li> <li>● Sale of cereals, foodstuffs, <u>soumbala</u> (a vegetable stock made from fermented tree seeds) and tools</li> <li>● Occasional loan of materials <i>sur place</i> (e.g. pestle and mortar)</li> <li>● Administrative control</li> <li>● Land</li> </ul>
Fulani ↔ Nuni	<ul style="list-style-type: none"> <li>● Some participation in meetings, more listening than voting or discussing</li> <li>● Participation in religious festivals and celebrations</li> <li>● Some skill sharing</li> <li>● Demonstrations of animal traction, veterinary issues and vaccinations, with extension agent</li> </ul>
Nuni → Mossi	<ul style="list-style-type: none"> <li>● Wives</li> <li>● Labour</li> <li>● Administrative control</li> <li>● Medicinal advice</li> <li>● Land</li> <li>● Sale of cereals, foodstuffs and tools</li> </ul>
Mossi → Nuni	<ul style="list-style-type: none"> <li>● Labour</li> <li>● Gifts</li> <li>● Sale of cereals, foodstuffs and some hardwares</li> <li>● <u>Dolo</u></li> </ul>
Nuni ↔ Mossi	<ul style="list-style-type: none"> <li>● Skill sharing</li> <li>● Labour exchange/sharing and knowledge exchange</li> <li>● Equal participation in men's and women's agricultural groups</li> <li>● Religious ceremonies</li> <li>● Transport and trade</li> <li>● Participation in decision-making concerning the use of currently (or about to be) used land</li> </ul>

Source: Author's fieldwork, 1993–95.

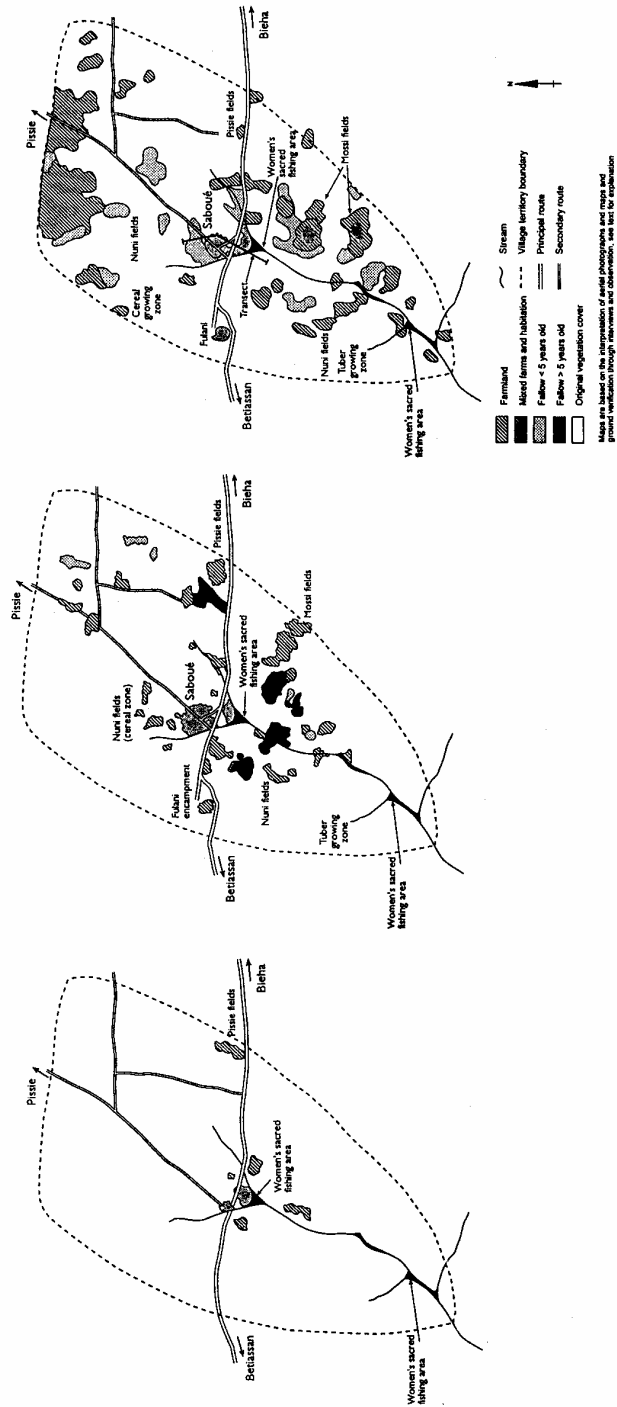


Figure 3. The evolution of the landscape in Saboué, 1955-83-93 (not to scale).

Table V. The growth in the different categories of land cover in Saboué, 1955–93

	1955 (ha)	% of area	1983 (ha)	% of area	1993 (ha)	% of area
Farmland	53	1.4	188	5	465	13
Woodland	3678	98.6	3442	92.4	3099	82.5
Fallow < 5 years	–	–	32	0.8	167	4.5
Fallow > 5 years	–	–	69	1.8	–	–
Total	3731	100	3731	100	3731	100

Source: Based on the diagrams of the evolution of the occupation of space (Figure 3).

subministries, health, animal and agriculture) and its Wednesday market means that any requirements in terms of advice, trade or commerce can be fulfilled. There are also other sizeable Mossi and Fulani communities nearer Biéha that provide points of contact for the Mossi and Fulani of Saboué. The ethnic interrelationships are given in Table VI.

#### *Boutiourou*

Boutiourou has a territory of approximately 24 km<sup>2</sup>. The population of Boutiourou numbered 77 people in 1975, 903 in 1985 (INSD, 1988). The Mossi form the majority of the population, with 71 compounds, followed by the Nuni with 16 compounds, and in the minority by the Fulani with 2 encampments. The Mossi

Table VI. Ethnic interrelationships in Saboué

Direction of transfer	Activity
Fulani → Mossi	<ul style="list-style-type: none"> <li>● Milk products</li> <li>● Woven-mats</li> <li>● Dung</li> <li>● Trade over Ghanaian frontier</li> </ul>
Mossi → Fulani	<ul style="list-style-type: none"> <li>● Labour</li> <li>● Sale of foodstuffs and cereals</li> <li>● <u>Dolo</u></li> </ul>
Fulani ↔ Mossi	<ul style="list-style-type: none"> <li>● Animal sale</li> </ul>
Fulani → Nuni	<ul style="list-style-type: none"> <li>● Milk products</li> <li>● Gifts</li> <li>● Dung</li> <li>● Animal sale</li> <li>● Grazing animals on post-harvest fields</li> <li>● Trade over Ghanaian frontier</li> </ul>
Nuni → Fulani	<ul style="list-style-type: none"> <li>● Land</li> <li>● Administration</li> <li>● Foodstuffs, cereals and tools</li> <li>● Labour</li> </ul>
Fulani ↔ Nuni	<ul style="list-style-type: none"> <li>● Trade</li> </ul>
Nuni → Mossi	<ul style="list-style-type: none"> <li>● Land</li> <li>● Administration</li> </ul>
Mossi → Nuni	<ul style="list-style-type: none"> <li>● <u>Dolo</u></li> <li>● Sale of cereals and foodstuffs</li> </ul>
Nuni ↔ Mossi	<ul style="list-style-type: none"> <li>● Some exchange of trade and information</li> </ul>

Source: Author's fieldwork, 1993–95.

originated from the province of Bulkiemdé and Oubritenga in the Mossi plateau. The Fulani also came from Oubritenga 17 years ago.

The farmed area in 1955, as seen in Figure 4, was minimal. Most of the farmed area is near the valley bottoms which is the Nuni's preferred farming area and the most fertile land. Note the position of the village in 1955 and the difference to 1983; this is the village move due to the conversion to Islam and the desire by the Nuni to distance themselves from their Animist past.

In 1983, the farmed area increased significantly and there is the first evidence of the impact of the Mossi immigrants. The Fulani had also arrived by this time and have settled to the southeast of Boutiourou's territory. There are two separate Mossi immigrant groups in Boutiourou's territory, the Mossi from the village of Taga, to the far west of the territory and the Mossi of Boutiourou to the centrewest.

The Nuni regulated immigration and forced the Mossi to regulate affairs on their own land with regard for the other members of the community (both Mossi and Nuni). The Nuni have bush fields close to the Mossi territory (on the best land on the lower slopes) to the west. In this way, the Nuni can survey and monitor the Mossi activities.

In 1993, there is a radically different picture with an expanded farmed area, most notably with the Mossi from Boutiourou. The Mossi from Boutiourou have almost completely filled up their allotted space with farmland. The Nuni have left the lower slopes to the west (the old surveillance fields) fallow and have now returned to some of the fields on the lower slopes next to the streams to the centre-east and southeast.

Boutiourou has the second largest population of the case study villages and has the second largest surface area covered by farmland. The largest expansion of farmland came between 1983 and 1993 which indicates that many of their total immigrants arrived between that period and came to join the original (mostly their own family members) Mossi. This is unlike Lon who already by 1983 had a significant amount of land under (immigrant) cultivation. However, Boutiourou still has significant woodland stocks, (almost 66 per cent) which includes an indigenous forest reserve. Again, with this amount of woodland (i.e. potential farmland) and an emerging coherent social group structure, it is unlikely that resource shortages will become apparent in the near future. (See Table V.)

Boutiourou seems to have the most controlled and regulated legal and administrative system, with each of the immigrant groups being confined to specific areas and the existence of land or woodland 'reserves' that are for *les enfants* (i.e. farms for the future).

When the Chiefs of Boutiourou realized that the northern Mossi immigrants were continuing to arrive in significant numbers into the late 1980s, they reached the decision that they must reserve a part of their territory specifically for them. Because of this limiting control, it was usually only the relations of the original Mossi that would be 'called' from the Mossi plateau or it would only be relations of the original Mossi that would ask. There would be communication between northern and southern Mossi before the arrivals or the Mossi chief may send back messages to his northern relations saying that there is no more land left to farm.

The Mossi consequently have their small Mossi kingdom in Boutiourou which is regulated by traditional Mossi rules. If there are problems which affect the wider population caused by a Mossi and which the Mossi chief cannot resolve, the offender is then sent to the Nuni chiefs who reserve the right to expel the offender from the village.

Table VII. The growth in the different categories of land cover in Boutiourou, 1955-93

	1955 (ha)	% of area	1983 (ha)	% of area	1993 (ha)	% of area
Farmland	93	3.9	204	8.5	810	34
Woodland	2299	95.9	2171	90.6	1462	60.9
Fallow <5 years	—	—	8	0.3	61	2.5
Fallow >5 years	5	0.2	14	0.6	64	2.6
Total	2397	100	2397	100	2397	100

Source: Based on the diagrams of the evolution of the occupation of space (Figure 4).

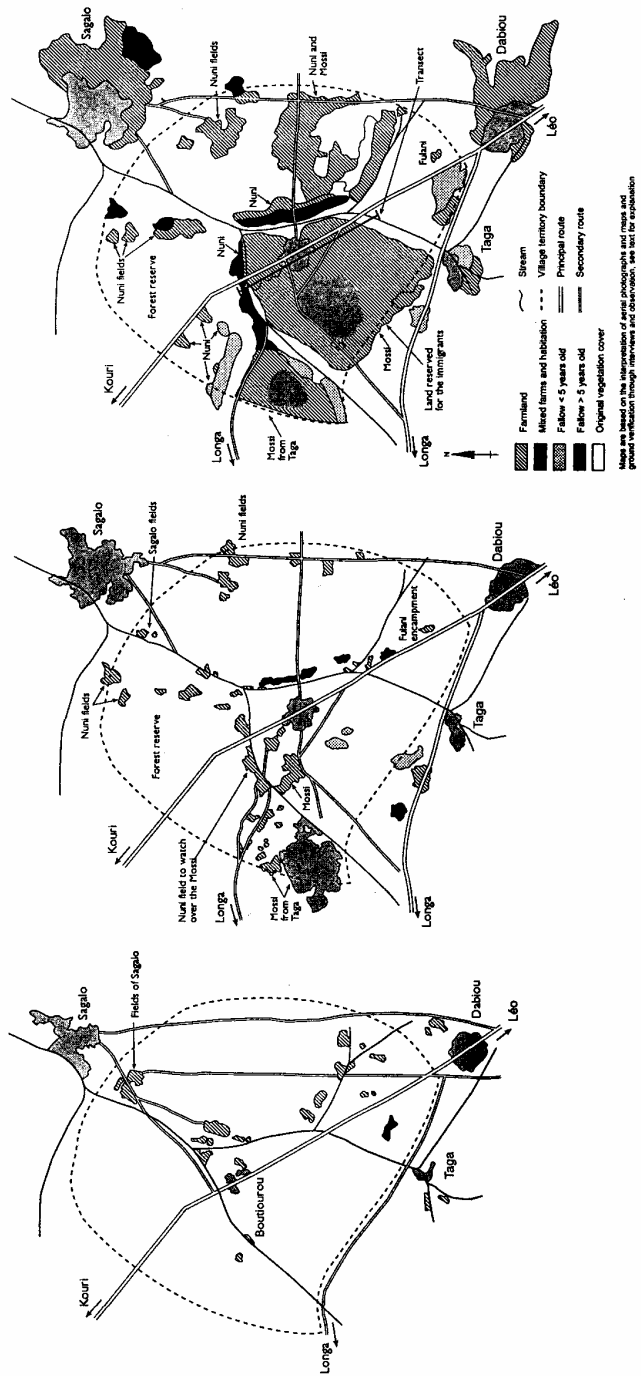


Figure 4. The evolution of the landscape in Boutitourou, 1955-83-93 (not to scale).

Table VIII. Ethnic interrelationships in Boutiourou

Direction of transfer	Activities
Fulani → Mossi	<ul style="list-style-type: none"> <li>● Sale of milk and meat</li> <li>● Cattle guarding</li> <li>● Dung</li> <li>● Veterinary advice</li> <li>● Sale of animals</li> <li>● Grazing animals in post-harvest fields</li> </ul>
Mossi → Fulani	<ul style="list-style-type: none"> <li>● Labour</li> <li>● Sale of cereals, foodstuffs and tools</li> <li>● <u>Dolo</u></li> </ul>
Fulani ↔ Mossi	<ul style="list-style-type: none"> <li>● Demonstrations of animal traction, veterinary issues and vaccinations, with extension agent</li> <li>● Participation in village meetings</li> </ul>
Fulani → Nuni	<ul style="list-style-type: none"> <li>● Cattle guarding</li> <li>● Sale of milk and meat</li> <li>● Dung</li> <li>● Gifts</li> </ul>
Nuni → Fulani	<ul style="list-style-type: none"> <li>● Labour</li> <li>● Sale of foodstuffs</li> <li>● Administrative control</li> <li>● Land</li> </ul>
Fulani ↔ Nuni	<ul style="list-style-type: none"> <li>● Some participation in meetings, more listening than voting or discussing</li> <li>● Participation in religious festivals and celebrations</li> <li>● Some skill sharing</li> <li>● Demonstrations of animal traction, veterinary issues and vaccinations, with extension agent</li> </ul>
Nuni → Mossi	<ul style="list-style-type: none"> <li>● Wives</li> <li>● Labour</li> <li>● Administrative control</li> <li>● Medicinal advice</li> <li>● Land</li> <li>● Sale of cereals, foodstuffs and tools</li> </ul>
Mossi → Nuni	<ul style="list-style-type: none"> <li>● Labour</li> <li>● Gifts</li> <li>● Sale of cereals, foodstuffs and some hardware</li> <li>● <u>Dolo</u></li> </ul>
Nuni ↔ Mossi	<ul style="list-style-type: none"> <li>● Skill sharing</li> <li>● Labour exchange sharing</li> <li>● Equal participation in men's and women's agricultural groups</li> <li>● Knowledge exchange</li> <li>● Religious ceremonies</li> <li>● Transport</li> <li>● Trade</li> <li>● Participation in decision-making concerning the use of currently (or about to be) used land, e.g. land around the dam, and the division and rationing of tasks, e.g. on the construction of the dam</li> </ul>

Source: Author's fieldwork, 1993-95.

Despite the apparently strong control and regulation that the Nuni chiefs have over Boutiourou's territory, there are some signs of traditional land-use irregularities. For example, to the east of the territory there are now some Mossi fields. The reasons for their presence are the same for intermingling of Nuni and Mossi fields in Lon; through increasing friendship and closeness of the Nuni chiefs are allowing some Mossi (their friends) to farm alongside them on new land or their old fallows. This may signal a leaking of the Mossi into new areas or may signal an ample amount of land that is available for farming and, through this, the subsistence networks and local economy is strengthened.

The level of cross-ethnic contact is, similar to Lon, very strong and each production system seems to complement the others. There is, however, a big difference in the spatial arrangements which reflects both a different approach to land management in the territories and also the duration of the immigrations.

The Nuni and Mossi communities have not merged together to the same extent as Lon, because of the separation of their living spaces. At Lon, the Nuni and Mossi are literally neighbours, in Boutiourou, there is a spatial distance between neighbourhoods. There is also less intermarriage between Nuni and Mossi, possibly because distinct groups with distinct identities still remain. However, despite this physical separation, there is a strong solidarity and cohesion between the Nuni and Mossi (see Table VI).

The village of Boutiourou has a more 'robust' production system than Lon which is due to a number of factors. A more abundant ecology, a strong cohesion and good leadership from the traditional Chiefs and a proximity to urban supply centres. Ethnic exchange entitlements are strong and seem to be improving with time. New production techniques, (e.g. cotton) have strengthened the farming system and the 'learning from each other' complements each separate farming system.

## CONCLUSIONS

It cannot be disputed that there has been significant change in the province of Sissili, both in social and environmental terms. There are also certain aspects to the overall production system which have stayed the same, such as the dominance of the traditional legal and administrative systems, but even these have slightly altered. With such dramatic influences that Sissili has experienced since the 1970s, it is perhaps more useful to talk about convergence and divergence.

Convergence is taken to mean the extent to which the characteristics of the three ethnic groups are merging, with specific reference to their farming systems. This process is a result of a diffusion of ideas because of the ethnic groups proximity to one another and realizations of the benefits of each characteristic that is 'copied' or blended into existing habits. Divergence relates to the specialization of the ethnic groups in contributing to the lifescape, i.e. the overall production system in the village territory which includes: the system of consumption; the exchange system; the living or residence system; the tenure system and the appropriation of land; the valuation system; the ecosystem; the politico-administrative system; and the communication system (UNSO, 1994).

Evidence of divergence can be seen in the level of inter-ethnic transfers in the villages. These transfers, which can also be called exchange entitlements, are evidence of specialization between ethnic groups which ensure livelihoods, i.e. everyone has a specific niche.\* The number of inter-ethnic transfers, or the complexity of the system, reflects the length of time the three groups have been cohabiting, their physical proximity and the pressure on resources. The number of ethnic transfers also, ironically, reflects the degree of convergence the groups have experienced, i.e. the new lifescape owes its resilience and stability to the presence of the interactions between all the groups. Like a natural rainforest ecosystem, its size and complexity contributes

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\*The idea of 'entitlements' was introduced by Sen (1982). Entitlements connects one set of ownerships (for example, labour or cash crops) to another (for example, staple foods) through certain rules of legitimacy (Swift, 1996). There are four types of entitlement: (i) entitlement to own what is produced; (ii) entitlement to own what is traded; (iii) entitlement to own one's own labour; (iv) entitlement to own through inheritances or gifts. Entitlements can be eroded, (which leads to vulnerability), protected, (which keep the status quo), or promoted which leads to development. In this case, entitlements to own what is traded and what is received as gifts, is being promoted in the inter-ethnic transfers, leading to local development.

to its stability and ability to withstand shocks. In human terms, this translates into how the entire lifescape minimizes risks and guarantees subsistence for all.

In terms of the case study villages, Lon has the most exchange entitlement because it has the longest history of immigration and has experienced the greatest pressure on resources (i.e. a relatively high population and soils of a low to medium potential), followed by Boutiourou, followed by Saboué, that has a very limited inter-ethnic transfer. In Saboué, it is again reflected by the length of time of migrant settlement in the area, but also because of the physical size of the territory and its abundance of woody biomass (which ensures soil fertility); there is little pressure on resources. However, there is still some divergence, i.e. ethnic specialization, which strengthens existing livelihoods. A greater divergence experienced in the village shows that the economy is becoming more complex; people are responding to the opportunities that become apparent with a richer ethnic group mix and their respective specialities.

The increasing complexity of the systems in relation to higher populations and pressure on resources has a number of implications, not least on sustainability. There are two dominant arguments on environmental sustainability in situations of demographic change; Boserüp and Malthus. Neo-Malthusians say that increased population pressure leads to degradation of natural resources; followers of Boserüp say that increased population leads to innovations in agricultural technologies and techniques which support the increased numbers. In this case, Boserüp's side is taken, with increasingly complex societal relationships illustrating the response to increased population. The local social systems have also been shown to be continuously changing and adapting, through negotiation, in response to other things, such things as Islamization, with the objective of ensuring a sustainable future. In the case of the future of villages in Sissili, using the example of Lon, it would seem that their sustainable futures are made up of a tricultural mix, the members of which have specialized functions which are a response to opportunity, rather than constraint.

If there were widespread environmental degradation it would be evident in arising conflicts, either environmental conflicts, e.g. soil erosion or a reduction of biomass, or social conflicts, between ethnic groups, especially between herders and farmers, as much of the Sahelian literature details. It is easier to detect social conflict, and, in the case study villages it is absent. The environment is managed at different levels. It is managed by the local chiefs, both immigrant and local, through their systems of land distribution based on need. This is achieved through negotiation with village elders, which, depending on the history and level of immigration, is carried out with local and immigrant. Then there is the head of the household who, acting as a manager of household resources (especially labour), attempts to ensure the sustainability of the resources he has available, the most essential of which is land. Finally, there is environmental management by men and women, who, having control over different resources, manage 'their' resources as productively as possible. It is evident that through the process of specialization and inter-ethnic transfer, more space is available to women to engage in more diverse activities, thus strengthening the household economy. Women have also responded to opportunity. Thus, the human agency in the villages has ensured against environmental degradation through negotiation, entitlement exchange and specialization.

To finally return to the forecasts of IBS and Agrotechnik, it is now possible to interpret them as initial statements of panic. Although there were relatively high rates of deforestation in the province, they were by no means indicative of a breakdown in environmental and social systems. Currently, there is a more productively managed provincial environment, and trees are now increasing in the landscape as people begin to plant trees in their farms and around their homes. There is no destruction of the environment as international organizations forecasted, neither is there a maintenance of the environment, as international organizations would prefer, but there is a building of the environment as local communities strive for their own sustainable development.

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