

West Africa Programme

# IUCN Sahel Studies

## Sahel — Sahel A Controversial Vision



Robert Denève  
October 1994

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# IUCN Sahel Studies 1995

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**Robert Denève**

**IUCN – The World Conservation Union  
1995**

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# FOREWORD

The IUCN Sahel Programme was established in 1987 with the aim of helping to identify natural resource management systems which allow for both higher production and better conservation.

The Sahel Studies, published in two volumes in 1989 and 1991, sought to depict the principal factors and characteristics which determine the conditions in which societies evolve in the Sahel.

This text was written over the past year. We felt that it would be interesting to allow it to reach a wider audience, because of the issues it raises.

The author suggests that production systems in the Sahel have reached and even exceeded their capacity to respond to the needs of a growing population. Productive land is fully occupied, and there is now a decline in production capacity (soil fertility, yield) whilst producers see no alternative but to over exploit remaining resources.

The author further suggests that development aid has only had a negligible impact on the trend to over exploit, since it has provided adequate responses neither to population growth, nor to the relative proportion of the population engaged in subsistence production and consumption, nor to production intensification through domestic- or export-market-related mechanisms.

The text does not claim to give the answers. It does, however, have the merit of analyzing the factors which motivate land use on the part of the rural population, thus analyzing the rural context for any policy or strategy which addresses natural resource conservation in the Sahel.

The opinions are those of the author.

The text was written thanks to support from the Norwegian Agency for Development Cooperation (NORAD).

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IUCN  
September 1994

# STRUCTURE OF THE REPORT

Part One summarises a theory which, the author contends, makes it possible to understand and explain the current degradation process: it thus provides the “theoretical background” or “frame of reference” for a “diagnosis” of the Sahel problem. Part One thus tries to answer the question “what is the principal cause of the Sahel problem?”.

To answer that question, explanations such as “bad government policy, bad resource management” must be put aside. For just as non-application of a remedy does not cause an illness, the non-application of (supposedly good) solutions is not the cause of degradation.

Part Two deals with attempts to stimulate development and surveys the most widely encountered types of project in the Sahel. The project types are only referred to so as to illustrate the strategies behind them. Project implementation aspects (organisation, management, contacts with populations, etc.) are only touched on occasionally, despite their importance for future success. The aim of this exercise is to illustrate the point that, if the analyses and “diagnoses” are invalid, the projects can make no substantial impact.

# **PART ONE**

## **ANALYZING THE SITUATION**



## INTRODUCTION

Until 1975 the term Sahel was only used to refer to the zone between the desert and isohyet  $+/-400$  mm (approximately isohyet 300 mm today).

Defined on the basis of physical characteristics (climate, vegetation), "the Sahel" covered the area of "large-scale pastoralism" and the extreme north of rainfed agriculture: Burkina Faso, for example, was not really a Sahelian country, since only the northernmost part (less than 10% of total territory) was considered as Sahelian.

After the great drought, 1969-73, the main donors approved additional "Sahel budgets", while previously absent donors (Swiss, Scandinavian, Canadian) came into the region.

Whereas drought was initially seen as a disaster for the northern pasturelands, nobody knew how to act or intervene to improve the situation for Sahelian livestock. Thus, as early as the 1970s, most available funds were diverted to the Sudano-Sahelian and Sudanian zones, in other words to the agricultural land of the "Sahelian countries", with only a small portion of the "drought budgets" finding their way through to the "northern Sahel", mainly for projects to supply pastures and villages with water and for farmland irrigation.

The allocation of "drought funds" finance to agricultural projects in the southern parts of Sahelian countries led to the word "Sahel" being used to designate regions further and further to the south.

Despite this "reallocation" of funds, available budgets were far in excess of the recipient countries' absorption capacity.

This in turn led to the creation of the Inter-State Committee to Combat Drought in the Sahel

(CILSS), whose main initial task was to help governments prepare "fundable" projects.

Today, the term "Sahel" is used to refer to all the CILSS member countries. The "Sahel" as a concept is rather more a political than a physical reality, and has shifted the terminology of aridity along the scale of climatic and vegetation zones: the Sahel is now semi-desert land, the Sudano-Sahel is now the Sahel, etc.

Of course the drier climate has helped to inflate the terminology of aridity, but it cannot stand as the sole explanation of the phenomenon, since rainfall over the last twenty years has only been roughly 20% below the figures for the previous thirty years, which were considered exceptionally wet.

Finally, the evident degradation of the natural vegetation and the decline in crop yields is the third factor which has pushed the term "Sahel" further south. However, the desertification process is only partly a consequence of a drier climate.

The "extended Sahel" does nevertheless cover a diversity of situations: rainfall between 100 mm and 1000 mm or more, differing topography, vegetation and production systems, etc.

Any analysis should therefore be preceded by a check on the geographical context it applies to.

The situation analysis presented here is based on the two main production activities in the region: rainfed agriculture and nomadic grazing which together provide a living for over 80% of the rural Sahelian population.

For the sake of clarity and in order to focus on the essentials, production systems in the mountainous regions (Aïr, Iforas...) have been left out of the analysis. Furthermore, areas subject to

flooding, as well as irrigated areas, which cover less than 1% of arable land and produce only 5% of food grown are only considered occasionally.

Since livestock and agriculture are dependent on agroecological potential, their spatial and seasonal distribution coincide to a great extent with known climatic and vegetation zones.

The northernmost limit of rainfed agriculture coincides approximately with isohyet 300 mm. To within a few dozen kilometres this limit can be shown as a line linking the following towns and villages: Kaedi, Hombori, Tahoua, Diffa, Ati.

This is not an absolute limit. For example, in Batha (Chad), rainfed agriculture stops at  $+/- 350/400$  mm, whereas in parts of Niger it can occur with mean rainfall figures of  $+/- 250$  mm, in areas where harvests can only be expected every other year.

In this report the term "farmland Sahel" indicates the whole area where rainfed grain is grown (millet, sorghum), with the most representative regions (rainfall 400-1000 mm) predominating where context does not allow for more accurate location.

During the rainy season nomadic grazing occurs in northern Sahel, to the north of rainfed agriculture. Here rainfall averages extend from 300 to less than 100 mm per annum with natural Sahelo-Saharan steppe vegetation (scrub, grassland) in the north, and wood and shrubland in the south.

After the rainy season, nomadic herds move south into agricultural land, sometimes entering regions with over 1000 mm rainfall, as in Chad<sup>1</sup>.

Migration typically takes place over several hundred kilometres.

In this document the terms "arid Sahel" and "northern Sahel" are only used to indicate the rainy season grounds of nomadic livestock, a vast region of pastureland, which, depending on the place and the year, covers a belt of land between 200 and several hundred kilometres wide between the desert and the rainfed agricultural land.

This zone is sometimes described as "pastoral Sahel" or "nomadic Sahel" as opposed to "sedentary or farmland Sahel".

In other words the sole criterion for distinguishing between "farmland Sahel" and "arid Sahel" is the presence or absence (due to aridity) of rainfed agriculture.

This distinction does not mean that there could be no grazing on agricultural land or no agriculture in northern Sahel.

Indeed, over the last twenty years, there has been a spectacular increase in livestock on agricultural land. The animal production system practised however, differs greatly from nomadic grazing, in that it is almost sedentary, moving only short distances, and the animals hardly ever leave the agricultural areas.

By the same token, agriculture has expanded considerably in the arid zone, again within the last twenty years. This, though, is always irrigated or recession agriculture, and therefore most frequently out-of-season.

The following two chapters contain an explanation of these recent developments.

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1 *There are exceptions to nomadic movement. This is the case for livestock on the right bank of the loop of the River Niger, where, after the rainy season the herds go north to the river, thus in some cases contrary to nomadic flows which are generally north-south.*

## RAINFED AGRICULTURE

In the absence of any reference to a specific area, or where the context does not allow for the location of the analyses contained herein, reference is implicitly made to the agricultural zone between isohyets 400-1000 mm, to the exclusion of irrigated areas and land subject to flooding.

This chapter can be more clearly visualised if the reader is familiar with one or more of the following regions:

- Mali, Kita and Baraoueli (between Segou and Koulikoro);
- all of Burkina between parallels 11 and 14;
- Niger, the right bank from Tera to Say and the Bosso and Maouri Dallols;
- Chad, southern Batha.

These are just a few areas with which the author is familiar, but the generalised approaches presented are intended to apply to the whole of "farmland Sahel".

### 1.1 The production system

All agriculture depletes the soil, and with a few exceptions (eg. land fertilised by annual flooding) it is impossible to till the same land indefinitely every year without using either active or passive fertilisation techniques.

Sahelian farmers are well aware of this. They have therefore always applied techniques to maintain fertility, mainly the use of animal manure and fallow periods of varying duration.

These techniques are, however, rapidly disappearing. They are now only used in an ever

diminishing number of regions which still have adequate resources.

As described here, these techniques form a part of the traditional production system which ensured high yields whilst allowing for satisfactory regeneration of soil fertility.

**Manure** is usually applied to fields close to the villages. Activities such as manure contracts were organised together with nomadic herders who came down to the Sahel farmlands each year to spend the dry season there.

**Short term fallow** is mainly used for more remote fields in the bush. There is no consensus on the average length of fallow periods or on the minimum duration required to ensure lasting soil fertility. There is, however, agreement that one field used to be tilled for 4-5 years and that to ensure satisfactory regeneration, fallow areas need to be 3-5 times as large as cultivated areas. It follows that the average fallow period used to last from 10 to 20 years, in other words, the time necessary for depleted land to produce abundant regeneration.

It must be pointed out, however, that the wetter the region, the faster the regeneration. More rapid regeneration is partially cancelled out, though, by the growing of more demanding crops (eg yam) in southern farmland Sahel.

Long term fallow used to be practised in conjunction with manuring, mainly on fields near the villages.

After manuring the fields for more than half a century, the village would move to nearby virgin land. This practice, which has almost died out (for want of available sites) was still frequent into the 1960s. It can thus be seen that hardly any villages

in the Sahel have been on their present sites for more than 70 years (except for political and religious centres).

The whole village did not always follow the migratory movement. Very often, new villages were created to settle chieftainship disputes among competing dynasties, as is recounted in the local oral traditions.

## **1.2 Historical background**

The grain-producing tradition in West Africa most probably first emerged in the Sudano-Sahelian region. The savannah has a sufficiently moist climate to ensure good harvests and the shrubland is sufficiently sparse not to make clearance work too heavy.

Agricultural activity obviously allows for greater population densities than wild harvesting or hunting, which is why the Sudano-Sahelian region has a long history of relatively high population density.

And yet, as the population increased, agriculture spread both north and south, as is still the case today. It may be estimated that over the last 40 years rainfed agriculture has moved between 50 and 100 kilometres further north, depending on the particular region, while rainfall has declined over the same period!

In the 19th century there was probably hardly any rainfed agriculture in Niger.

A presidential decree adopted in the early 1960s prohibits any rainfed agriculture north of the 15th parallel (Tahoua). Today rainfed agriculture reaches more than 50 km to the north of Tahoua, whereas rainfall there has declined from 400 to 350 mm.

## **1.3 Recent trends**

Since the northward spread of rainfed agriculture is more or less limited by isohyet 300 mm and since suitable farmland in the south is more and more densely occupied<sup>2</sup>, Sahelian farmers have been forced to reduce fallow areas to feed the growing population.

There is no certainty as to when this gradual nibbling away of fallow land began, especially since the start of the process differed from region to region. It probably began during the 1960s in Niger and Burkina, in the 1970s in Mali and more recently in Chad.

However the shortening of fallow periods sets off a very rapid process of environmental degradation. In fact, shorter fallow inevitably produces smaller yields, which in turn means that every year proportionally more land than the corresponding increase in the population has to be brought under cultivation.

This vicious circle (smaller yields, increase in cultivated land areas...) soon leads to almost all the farmland being sown each year.

At this stage there are several possible scenarios. Schematically, the most frequent cases encountered are either "low level equilibrium" or total "irreversible" soil depletion.

Movement in one direction or another depends on a series of factors: soil composition and mechanical characteristics, rainfall, etc.

Low level equilibrium leads to mediocre yields, sometimes down to less than a quarter of the initial yield, depending on the annual soil regeneration rate.

This scenario is more frequently met in the sandy northern regions than in the more clayey, ferruginous regions of central and southern farmland Sahel.

It should be borne in mind that there will be very few low level equilibrium sites which can be indefinitely cultivated year in year out, and that most such sites will finally become unproductive.

In most cases soil depletion occurs and land is thus lost for farm production. This is now happening on a large scale in several Sahelian countries. Thus, for example, in 1990, CRPA in Kaya (Burkina) estimated (oral communication) that in Bam and Sanmatenga provinces alone 9000 ha were destroyed and abandoned every year.

This has also occurred in the northern part of the Niger Dallols, which until the 1960s were known as "Niamey's granary", and which today cannot even produce enough food to feed themselves.

---

2 *Even in coastal countries primary tropical forest has almost disappeared.*

Thus, in farmland Sahel, new man-made deserts have been created through land clearance and soil depletion. These deserts are even worse than the Sahara, which is fertile and “only” needs water to grow. These new deserts are unrelated to encroachment by the Sahara, since they are separated from the desert by rangeland vegetation in the livestock country, often several hundred kilometres wide<sup>3</sup>.

Until the 1950s there was very little agriculture in the extreme north of Burkina, and the Réserve Partielle du Sahel was essentially grazing land. The area around Oursi lake is today completely bare of vegetation, a desert caused by 50 years of invasion and over exploitation by rainfed agriculture. Further north in Gourma, Mali, where there is not enough rain for agriculture, the natural vegetation is denser and in much better condition.

## 1.4 The situation today

Current estimates show practically no more fallow land remaining in Niger. In Burkina, the same can be said for about 50% of the territory; fallow land is still to be found over about 1/3 of the territory, but this is already too little to ensure long-term fertility, and only Comoé and Poni provinces (roughly 10% of the country) still have a few tracts of land in reserve.

For the time being the situation is more favourable in Mali, and, especially, in Chad.

Official statistics often contain impressive figures for fallow land. When checked, however, land recorded as fallow often turns out to be ruined, abandoned land which would need to be left alone for several decades or even centuries to become productive again.

This situation has brought about a chronic shortage of food crops in most parts of the Sahel.

Until the late 1960s, rural families possessed grainstores with enough reserves to see them through a year of bad harvest caused by a natural disaster. Today's harvests only cover about 3/4 of annual own-consumption needs, even in years with “normal” rainfall.

To tackle this structural shortage of grain, rural populations have taken a host of initiatives to try to boost production and/or to earn money to buy food or even production inputs (fertiliser, draught animals and implements...).

The principal responses have been:

- clearance of increasingly marginal land;
- clearance of lowlands for out-of-season farming;
- extension of traditional irrigation and recession farming along rivers and around pools;
- development of sedentary livestock raising;
- migration and exodus.

The **clearance of increasingly marginal land** has spread enormously in the last twenty years in most Sahelian countries. In Burkina, each year thousands of hectares are cleared on land which used to be thought unfit for farming (slopes, laterites, rocky ground...).

Until the early 1970s in Niger there were hardly any fields (and few villages) on the plateaux between the two Dallols and the plateaux along the left bank of the River Niger. Today there are fields and villages everywhere, and much of the plateau forest has already been cleared.

Such marginal lands are often very fragile and regenerate with difficulty. They often have to be abandoned after only a few years of exploitation.

Large-scale clearance of marginal land is certainly not a consequence of drought, because in case of drought, the last thing to do is to create fields on plateaux, slopes and other “bad” land!

**Lowland clearance for out-of-season agriculture** was extremely rare until the early 1970s. During the 1970s hundreds of lowlands were spontaneously cleared and a host of (mainly NGO) projects arrived with subsidies for wells used in market oriented gardens (manual or pumped irrigation). Towards the end of the 1970s, some governments elevated out-of-season farming to the status of “official” policy, leading in practice to the building of hundreds of minidams (Burkina) and the clearance of hundreds of lowlands (Niger).

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3 *Work by Professor Pehout, Bordeaux University, and CIRAD in Montpellier suggests that the Sahara may even be receding.*

Originally these micro-projects were intended for out-of-season market gardening, but the markets were rapidly swamped with vegetables and most lowlands were switched to subsistence staples (manioc, etc.).

Since in most cases farmers did not have sufficient manure (cf. chapter 10) or sufficient earnings (cf. chapter 4) to maintain lowland fertility over the years, this land was also soon depleted.

The result was that, from the second half of the 1980s, many lowlands (especially in Burkina and Niger) were soon depleted and abandoned, whether equipped with wells and minidams or not.

Although drought may have helped to encourage lowland exploitation it did not cause it. In fact lowlands have not been cleared in regions which still have sufficient fallow land (Chad and parts of Mali) but which have also experienced drought.

Together with lowland clearance, **traditional irrigation and recession agriculture** along rivers and around pools has spread in a spectacular way since the mid 1970s.

Originally the spread of traditional irrigation and recession agriculture was hampered by herders' rights of access. Such access is essential for large herds, not just for watering, but particularly for green pasture in the dry season (cf. 2.4).

However, subsistence farming and the spread of agriculture have enjoyed the support of the authorities. Agriculture's predominance has been underpinned by donors who, unaware of the consequences for herding, financed a host of farm irrigation projects to contribute to food self-sufficiency policies (cf. chapter 8).

The invasion of out-of-season pastures along rivers, around surface water points and on lowlands provoked and continues to provoke many bloody clashes between herders and farmers, and some irrigation development projects have had to be carried out under armed protection, as was the case in Timbuktu.

Together with the spread of agriculture in both time (out-of-season) and space, farming populations have developed **quasi-sedentary herding**, especially of small ruminants (but also cattle).

Herding allows land unsuitable for agriculture to be exploited and generates income which makes up for the shortfall in agricultural production. It

is therefore a system which adds value to resources which would otherwise be lost to human exploitation. Thus over the past 20 years livestock herding in agricultural regions has at least doubled, and depending on the region, it is now, together with exodus, the main source of cash earnings, at least outside cotton-growing areas.

This form of herding has often been accused of being the cause of environmental over exploitation and deforestation. It may be true that sedentary herds do more damage than nomadic herds (cf. 2.3), but it is no less true that grazing, and even overgrazing, are much less devastating than the creation of fields which destroy the environment to the extent of soil depletion. In fact, the clearance of plateaux, lateritic land, and such practices are in most Sahelian situations the only alternatives to migration.

This is why the spread of sedentary herding often precedes the clearance of marginal land, which proves yet again that Sahelian farmers know their environment perfectly and that, within their own limited means, they manage to make the best possible use of the resources available to them. Thus sedentary herding also helps to convey fertiliser, unfortunately in insufficient quantities (cf. 10), from the grazing lands to the fields, helping to slow down the depletion of cultivated land.

When the spread of agriculture and the development of herding no longer cover people's needs adequately, the only solution remaining is **migration and exodus**.

Temporary or seasonal migration to urban centres and coastal plantations is a means of obtaining income and while reducing pressure on the region of origin. While away from home, the migrant does not consume his community's food or other resources and in most cases sends money home to help buy extra food.

Frequently, however, the seasonal migration drags on and becomes permanent. For example, 40% of the population in southern Côte d'Ivoire originates from the Sahel (mainly Bambara, Dioula and Mossi), whereas 40 years ago there were hardly any Sahelian people in the south of the country.

In the last few years, however, coastal countries have also started to run out of space, and more and more governments are turning people back to the Sahel and trying to curb migration.

The international coffee and cocoa crisis has also

caused people to start returning to their homes. Since the region of origin quite obviously does not have the wherewithal to meet everyone's needs, migratory flows have started again, but to other points of destination: today the south of the Sahelian countries and the north of the coastal countries are being overrun. Thus for example in Burkina, in less than 20 years, the Mossi, practically none of whom previously lived in Sissili, now constitute almost half of the population in that province.

Similarly, the last census taken in Burkina (1985) revealed hardly any increase in population in the Centre-North and North-West provinces since the 1975 census, which means that every year more than 2% of the population had left the area!

In Niger, where there are no more "reception areas", classified forests and natural reserves have been invaded by agriculture and herding.

Thus the slogan "Back to the land", based on the idea that urban drift was caused by the attraction of the towns (Pull), has been unable to stem the tide of exodus caused by the fact that survival in the countryside is impossible (Push).

## **1.5 Impacts**

The spectacular spread of cultivated areas, the increase in domestic livestock, clearance of lowlands, over exploitation of soils to the point of depletion and abandon, have clearly caused massive deforestation and started the desertification process.

This has led to an increase in runoff rates and reduced the quantity of water feeding the water tables.

Thus throughout the Sahel new surface water points are appearing, flooding at high water periods is more violent and lowland forests which were never flooded before are now being flooded, despite the decline in rainfall. This is being caused by watershed deforestation.

This has also led to a drop in water tables which in turn may dry out whole forests, sometimes several dozen kilometres away from the points where the water permeates the ground.

Deforestation has also probably had an even greater impact on lower water tables than the lack of rain since even in wet years water tables have continued to fall.

Finally the invasion of river banks and surface water sites by agriculture has drastically reduced the presence of herds on marshlands, thus causing a significant reduction in numbers of fish, which thrive on animal droppings.

Another consequence of the "shrinkage" of available vital resources is the emergence of fiercer competition for resource control, especially for still fertile land.

Over the last 20 years conflicts over land have mushroomed and almost all Sahel counties have embarked on "land and agrarian reforms". The reforms are continually being reformulated, but rarely applied on account of their political ramifications.



## 2

# NOMADIC HERDING

Nomadic herds have always made seasonal incursions into farmland Sahel, sometimes as far as the Sudanian regions. In Chad, for example, Batha herders move from the fringes of the desert in the rainy season to southern Chad in the dry season.

In geographical terms, “pastoral Sahel” will only be used to designate the region between the desert and the northern limit of rainfed agriculture, whereas in economic terms, that is as a production system, it refers to nomadic, or large-scale, grazing.

This chapter can be more easily visualised if the reader is familiar with the animal husbandry systems of central-southern Mauritania, Batha in Chad and the lake district in the central delta in Mali.

### 2.1 The nomadic production system

The basic principle of extensive livestock raising is that it works as a wild harvesting system using animals as intermediaries.

In all the world’s semi-arid regions vegetation is too sparse for direct human exploitation and domesticated animals act as fantastic self-propelled wild harvesting and processing machines for vegetable proteins which would otherwise be lost to human consumption.

Nomadic movement is often perceived as flight from arid zones in dry seasons.

This is only a very partial explanation, and cannot in any case be applied to domestic water supplies or water for herds, since well networks in the drier

Sahel, with few exceptions, perform very well and their productivity could be increased without too much difficulty if the need were to arise.

There are really many advantages to nomadic activity, over and above any “flight from water shortages”, since if aridity were the cause, the right question to ask would be “why on earth don’t these herders spend the whole year in the south?”, like the quasi-sedentary herders, whose activities are spreading further within agricultural land (cf. 1.4).

The answer is that the further herds move to the north, the more pasture quality improves. This is because the limiting factor on natural pasture’s vegetable protein production is not water but soil fertility. Therefore, the drier the climate, although there is less biomass, protein content increases. Since an animal’s grazing capacity depends on the amount it can graze, pasture in the far north is richer than in the south.

The prime reason for nomadic movement is thus not the shift to the south but the search for good quality pasture in the north. Sahelian herders are fully aware that their herds gain most weight and vigour while in the northern pastures during the rainy season, as has been confirmed by the Central Niger Range and Livestock Project and the APPAM (Pastureland Improvement and Protection of Animals in Mauritania) project in Mauritania (1980 — 1982).

If, however, herds were to remain in the north all year round, livestock numbers would have to be considerably reduced. In other words, nomadic grazing can maintain many more head of livestock, which can graze most of the available forage in just a few months simply because survival pastureland is available in the south in the dry season.

The factor limiting the amount of animals which can be maintained by this mobile production system is the availability of either rainy season (steppe) pasture, or dry season pasture.

For livestock in the Sahel, it is generally accepted that the limiting factor is the availability of forage during the dry season in areas occupied by agriculture. This also allows some of the stock (milk cows, young calves) to spend the whole year in the far north.

Another advantage of nomadic grazing is that the south not only has low protein content pastureland (because of the overabundant biomass), but that the environment there is not a healthy one for livestock, especially during the rainy season, which increases production costs.

## **2.2 System efficiency**

Comparisons of productivity between livestock in the Sahel and ranches in Texas and Australia show that animal productivity per surface unit is 1.5-10 times higher in the Sahel than on modern ranches.

This can probably be explained by the fact that on modern ranches man intervenes to modify floristic composition in order to favour forage most suited to one animal type (which is tantamount to a monoculture) whereas in the Sahel pasture is successively grazed by cows, which eat the grass, goats, which crop the scrub, and camels, which browse the trees; this makes for optimum exploitation of natural vegetation, which draws on different strata of soil fertility.

The advantage of modern ranches, despite their lower productivity, is that they have vast tracts of grazing land which in the Sahel would have to provide a living for hundreds or even thousands of people.

The idea that animal production could be increased with a concomitant reduction in the number of head, thus reducing pressure on the environment is, with few exceptions, a misconception.

In fact, merely to meet basic needs, the overwhelming majority of herders have for several decades already been culling almost all nonproductive animals every year. Thus, contrary to what is often believed, the great livestock projects in Mauritania, Mali and Niger in the 1970s and 1980s were forced to the realisation that there were only very few adult males and old cows in

the herds, and that the herd exploitation ratios were generally very high, often threatening reproductive capacity.

The old colonial vision of the contemplative nomadic herder was put to rest a long time ago.

Sahelian livestock production is thus shown to be a high-performance system, with production levels close to the limits of physical capacity, in opposition to the very widely held view that herders in their ignorance are raising their animals in an irrational way and destroying the environment. Furthermore, all projects which have attempted to introduce "rational pasture management" have failed miserably, discovering that it is impossible to reduce pressure on the environment without reducing animal production.

## **2.3 Environmental impact of nomadic herding**

### **Overgrazing**

There seems to be no consensus on the criteria to be applied to describe a pastureland degradation process as irreversible.

Vegetation degradation in the Sahel is most frequently attributed to overgrazing and brush fires caused by nomadic grazing.

There is no argument that overgrazing occurs, but its impact is often exaggerated.

Intensive, repeated grazing of natural vegetation will obviously affect its floristic composition, biomass, etc.

In northern Sahel there are indeed bare areas, mainly around pastureland wells and villages, on steep sandy slopes, etc. but globally, at the macro-geographical level, natural vegetation in the arid Sahel is in better condition than in the areas where rainfed agriculture is dominant.

Most degraded sites are limited in area and result from an excessive daily inflow of animals (waterholes, rest areas, points of passage).

These are ecologically fragile sites, which cannot withstand the "animal density" made possible by the carrying capacity of the surrounding "production grazing lands". Furthermore, such bare sites rarely seem to be irreversibly degraded:

once a camp has been moved or a well closed, vegetation soon recovers, even after just one rainy season. Several of these sites even have surplus fertility due to the density of accumulated animal droppings.

Project APPAM in Mauritania thus discovered<sup>4</sup> that over an area of 4000 km<sup>2</sup> of grazing land (between Kiffa and Komkossa), less than 3% was stripped bare and only 5% showed signs of intensive degradation, despite the fact that the pasture was totally grazed every year and that, just a few years before, the region had been subjected to artificial over exploitation. Mali had several times over closed its border to nomadic animals entering from Mauritania. The result was that thousands of animals had been feeding in the region for several months and had been "artificially" fed and watered (water tanks, food supplements). In other words the region had for several years been subjected to the worst form of over exploitation. Despite this, vegetation was in a quite acceptable condition: animals were dying but the vegetation was not.

Since the relatively long reproduction cycle of perennial grasses is interrupted by overintensive grazing, the most visible symptom of overgrazing is the progressive replacement of perennial grasses by annual grass. However, this only seems to have a slight impact on pastures' primary productivity in proteins per hectare, although it does affect the distribution of available forage over time, more being available in the rainy season and even less in the dry season.

Thus there is no certainty about the impact of pastureland wells: if there are few wells, large bare areas will develop around them; if there are more wells there will be more, but smaller, bare areas and it will still be impossible to increase the number of animals on the surrounding pastures. Here again, the limiting factor is available grazing and only rarely water.

Everything seems to point to vegetation being more resistant than livestock to overgrazing.

Indeed, when everything has been grazed, animals have to leave or die, but this does not mean that vegetation has disappeared. There exists a sort of macroecological safety valve which prevents livestock from turning a region into a desert, and

which makes the over exploitation which leads to the soil depletion that can be seen in agricultural areas, impossible.

The safety valve only operates if food supplements are not brought in for livestock from "outside" the system. If animals receive such supplements, they may survive the over exploitation of the natural forage and continue grazing the vegetation beyond its regeneration capacity.

## Brush fires

There is unending argument about brush fires.

Some people believe that fires are a main cause of desertification and that they symbolise irrational, irresponsible resource management by the local population.

Others hold that fires do relatively little damage because vegetation has survived fires for centuries and is resistant to them: if it were not it would have disappeared long ago.

Fires undoubtedly do affect vegetation density and floristic composition. They seem, however, inevitable for populations living on natural resources.

Brush which never burns soon becomes impenetrable and can be exploited neither by man nor domestic animals. A well-controlled fire allows for a second growth of forage after the rainy season.

Thus brush fires produce considerable economic benefit and are a cheap way of keeping floristic composition and biomass under control.

Within the means available to the populations fires are thus a perfectly rational technique, which explains why official policies to combat brush fires (Mali, Burkina) only succeed in regions where there is nothing left to burn.

By way of conclusion it could be said that without livestock and without fires, vegetation (in this case primary vegetation) in the arid Sahel would obviously have a totally different aspect today.

There can also be no doubt that (over)intensive human activity is the cause of the advanced extinction of fauna in the region.

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4 *Rapport final du project APPAM - Phase ITC - International Training Centre, Enschede, Netherlands, 1982.*

And yet, in comparison with agriculture, damage caused by livestock is minimal. This is because agriculture is a much more intensive way of exploiting natural resources (repeated clearance, soil depletion).

This is why at the global, macroecological level, natural vegetation is in a much better condition in the arid Sahel than in the wetter agricultural regions where desertification phenomena are more widespread and especially more intensive.

When grazing, animals gradually reduce the source of their own survival and cannot survive once vegetation has disappeared.

This is why nomadic grazing can only cause more intensive degradation over fairly limited areas, within vaster pasturelands which cover basic food needs and allow livestock to remain in the overall area. Ecologically fragile or intensively exposed sites (slopes, waterholes etc) will clearly succumb but will generally not be irreversibly degraded.

The macroecological safety valve will only operate if livestock are not given any food supplements which allow them to survive after all the forage has been eaten. This frequently happens in agricultural areas, especially with smaller ruminants which feed on domestic and farm wastes and overgraze the environment to the extent that ligneous matter is unable to regenerate.

Quasi-sedentary herding can thus be seen to present a greater threat to the environment than the nomadic version.

## **2.4 The problems of nomadic herding**

Drought has often been put forward as the main cause of the misfortunes affecting nomadic herding during low rainfall years.

It must first be recalled that, even during years of severe drought, the problem is rarely one of finding enough drinking water, but rather of the available volume of forage towards the end of and after the rainy season.

For over 10 years it has been known that a shortage of rain IMPROVES pasture quality by reducing

the quantity of biomass. This finding was already published in the PPS<sup>5</sup> study in 1981, as related to vegetation growth, and it was later confirmed in the "Pastoral Development in Central Niger" project that during the rainy season in dry years herds gain more weight than in the rainy season of wet years.

These observations seem to contradict the enormous losses of livestock in the Sahel during the great drought of 1969—1973.

In fact during dry years, pasture biomass is reduced, which means that the move to the south ought to start earlier than "normal". At the same time, plant growth and thus harvests are also delayed at the points of destination, thus preventing the arrival of the nomadic herds. So most of the livestock died of hunger a few months AFTER the rainy season, on the fringes of the rainfed agriculture regions, "their stomachs full of water".

A typical example can be seen in what happened on several occasions to Mauritanian livestock on the border between southern Mauritania and Mali (+/- isohyet 400 mm), where many animals died for want of forage.

But other factors are involved.

The availability of forage in the agricultural south during the dry season has for a long time already been seen as the limiting factor (and thus as the "bottleneck") for nomadic herding. By clearing fallow and marginal land, invading lowlands and river banks, and developing sedentary herds, agriculture has gradually encroached upon most of nomadic livestock's dry season pastures.

Thus today there is hardly any nomadic movement to the Niger Dallols, whereas until the 1960s thousands of head spent the dry season in these valleys.

The territorial spread of agriculture has hampered nomadic movement and the large herds are increasingly being forced to spend the whole year in the northern part of the Sahel. This has also broken down the "livestock-agriculture partnership", which existed in the form of "manure contracts", and this in its turn has had harmful effects on agriculture.

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5 *La Productivité des pâturages sahéliens, F. W. T. Penning de Vries et M. A. Djitéye, PUODOC, Wageningen, Netherlands, 1982.*

Obviously, when confined to the north, livestock numbers had to be cut. Today there are not thought to be enough animals to fully exploit available rainy season resources on the desert fringes, which might be an explanation for the regression of the Sahara, noted in the latest research on the subject.

Drought, and the spread of agriculture preventing the movement of nomadic animals, are not the only causes of problems for nomads, because even the loss of half of their animals, in what people have claimed is a "plethoric and contemplative" way of herding, should not have driven the herders into food distribution camps or to swell the slums in the capitals.

Surveys carried out in 1975 in the Aïr (Niger) and in 1981 in Central South Mauritania have produced the hypothesis that, even in the '60s, herder population density was too high compared to the number of animals that could live off the available pastures.

Depending on the region, it may be estimated that even before the 1969-73 drought, almost a quarter of the herders in the far north were living at the expense of relatives who still had sufficient numbers of animals.

## 2.5 Herders' reactions

Since they had long realised that the time would come when there would not be enough pasture to go round, some herder groups started to settle their herds on agricultural land as long as fifty years ago.

This strategy was mainly adopted by the Peul, a landless people (except in Guinea and Mali).

Thus, all over farmland sahel, Peul villages were set up, twinned with the indigenous villages which had previously sheltered the Peul's ancestors when they passed through with their herds during the dry season.

This initial period of sedentarisation probably began at the same time as village farmers gradually abandoned their long fallow fields (cf. 1.1) and as firmer ties with a nomadic herder provided more secure supplies of manure to fertilise the fields around the villages. In exchange the Peul enjoyed priority over dry season pastures, which has always been the main concern of herders in the Sahel.

This type of sedentarisation continued on into the 1960s.

Later, especially since the 1969-73 drought, which sharply increased the growing imbalance between the pastoral population and pasture reserves, the herders in the arid Sahel reacted by:

- migrating further south;
- fighting more fiercely to control the arid Sahel pastures;
- developing out-of-season agriculture;
- drifting to the towns.

Under the combined effect of spreading agriculture and drought, many nomadic herders have, since the early 1970s, been continuing their southward movement into the "underpopulated" regions in the south of the Sahel countries and even into coastal countries.

This **migration** into the Sudanian regions is not a search for rainfall, because such regions are bad for livestock in that they are too wet and produce very poor quality pasture.

Nomads have moved this far because they have found no room elsewhere and, aware that the arid Sahel is overcrowded, many have preferred to stay even if all they can do is eke out a wretched semi-sedentary living with their animals.

The growing imbalance between pasture resources and population has provoked an increasingly fierce struggle among arid Sahel herders for **control over grazing land** (cf. 7.2). The struggle began as early as the 1950s and 1960s, but clearly worsened during the 1970s and 1980s.

One of the most obvious features of the struggle is that pastoral herders want nothing to do with "public" wells (financed by the state and international aid), which are systematically sabotaged when dug in production pasturelands (Mauritania, Niger, Chad).

By reducing the volume of available forage, the 1969-73 drought had sharply exacerbated the imbalance between resources and population. In order to survive, many herders resorted to **out of season agriculture**, either because they had lost their animals or because their better-off relatives could no longer afford to keep them.

Thus, since the mid 1970s, recession agriculture around surface water sites (both temporary and

permanent) and even gardening (on lowlands irrigated by "garden wells") have spread extensively, even reaching into the arid Sahel where, until the 1960s, agriculture was rare, practised only by "slaves".

Finally, many herders became destitute, and for want of livestock, were forced to leave the land. Thus, large numbers of Touareg beggars are to be found as far away as the large coastal towns.

## 2.6 Conclusion

Nomadic herding is a high-performance production system which is well suited to the region's agroecological characteristics and poses very little threat to the regional ecology. If herding had a major desertification impact the arid Sahel would in fact have turned into the Sahara a long time ago, because there is no evidence that there were notably fewer domestic animals in the region 50 years ago. On the other hand, there were only a third of the number of herders living off the same resource. They were therefore more wealthy and able to maintain slaves.

Large-scale herding in the arid Sahel faces three major problems, namely

- increasing difficulty in entering the farmland Sahel, where the spread of agriculture is making enormous inroads into dry-season pastureland;
- an excessive number of herders living off a livestock population which can in practice hardly be increased on the basis of available natural forage;
- problems in selling production in the large coastal towns which import large quantities of subsidised meat from the European Union and South America. It may however be expected that this practice will decline sharply before the end of the century.

Denser occupation of available land by agriculture in farmland Sahel on the one hand, and the growing imbalance between population and

resources in the more arid parts of the Sahel on the other hand have split nomadic grazing in two.

Some herders have moved into farmland Sahel where they both farm and raise animals in a more and more sedentary way. Others are stuck in the arid Sahel. Over the last thirty years major nomadic movements are gradually disappearing (except in Chad).

In the longer term there is however no doubt that herding in the arid Sahel will "pick up" again, since, as is the case in all the world's arid regions, meat production is the ideal agroecological activity for this type of environment.

To achieve this, solutions will need to be found to the dry season forage problem, and there has already been some movement in that direction. For example the price of rice stalks from irrigated land has increased more than fivefold over the 1980s and here and there irrigated land has been put back under forage. This is a function of the "economic law" which requires that production be in tune with the "comparative advantages" of the region.

The recovery in herding will not necessarily improve the populations' living conditions. This will only be possible with a drop in the number of herders in the region (this will be inevitable in the future) accompanied by the development of other economic activities.

The strongest will therefore be the first to benefit from herding's survival and ensuing revival. This explains the increasingly fierce struggle of more than twenty years' duration for control over Sahel pasturelands.

Little is known of this struggle, some forms of which are the growing sedentarisation of families (not herds), even in arid Sahel, the sabotage of public pastureland wells, the creation of small areas of enclosed farmland to keep competing herds away, etc. (cf. 7.2).

This is also why herding is increasingly dominated by those with enough means to buy forage supplements or enough power to monopolise dry season pastures.

### 3

## THE MAIN CAUSE OF THE SAHEL PROBLEM

Chronic food shortages and rampant environmental degradation in the Sahel are often explained away by “wrong development policy”, “archaic farming methods”, “anarchic herding”, “abusive wood felling”, etc. All the causes and explanations seem to suggest that things could be done differently to reverse the trends.

With reference to this type of “explanation” it is worth recalling that non-application of a remedy is not the cause of a disease. In other words, the non-application of (good or bad) solutions does not explain why the Sahel’s environment has degraded.

The “true” causes can be sought by trying to answer the question: “what has changed that has led production methods that have worked very well for centuries to start destroying the environment and no longer meet the basic needs of the population?” The most frequent answer to this question is: drought.

A distinction first needs to be drawn between aridity and the drying up of a climate.

Climate aridity is never a surprise. It is a known factor which, with other parameters, determines a region’s agro-ecological profile and on that basis the type of production activity to be undertaken there. Aridity is therefore not a problem, but a given fact providing comparative advantage for suitable activities (eg, meat production).

In other words, nobody goes to the desert for rainfed agriculture, nor to the tropical forest to raise livestock.

There still remains the drying up of the climate to be considered.

A whole host of figures, statistics, medium and short-term trends and causes of rainfall deficit have been published.

However, although there is no argument that a lack of rain reduces natural and cultivated plant growth and thus animal production as well, it must be acknowledged that no studies have been able to quantify the share of responsibility of rainfall shortages in degradation in the Sahel, and that little field research has addressed the subject. All too often degradation is implicitly understood as being an obvious consequence of a drier climate.

In fact, the more serious the study<sup>6</sup> the more it seems to minimise the impact of a drier climate, as compared with what public opinion thinks on the subject.

This is hardly surprising. The average rain shortfall over the last twenty years is roughly 20% as compared with 1930-65. If a few particularly dry years (which drag the averages down) are set aside, rainfall shortages per year since 1970 are not so bad compared to a period considered to have been wet.

Could this really be the reason for the environmental disaster unfolding before us?

Apparently both the scale and intensity of degradation are out of proportion to the possible impact of a shortage of rain. This presumption is supported by the realisation that regions which

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6 For example the *Pastoral Production (PPS) Study* which lasted from 1976 — 1981.

have hardly, if at all, been exploited by man have not suffered too much from drought.

Here are a few examples:

- Chad in general, especially around Lake Fitri where settlement is impeded by the presence of too many insects;
- Kita region in Mali, where because of the geological structure there is so little groundwater that very few villages have been established.

The easy explanations have to be abandoned, and the answer sought elsewhere.

If a drier climate were the main cause of chronic food shortage and environment degradation in the Sahel, a general shift of production activities to the south might have been expected. In fact, almost the opposite has occurred: there is less and less dry season pasture available in farmland Sahel, and agriculture has moved north, despite lower rainfall.

The increase in herding in farmland Sahel does not counter this general trend, since such sedentary herding is largely based on the exploitation of resources which were hardly ever exploited during the rainy season: plateaux, forests, land unsuited to farming, fallowland.

This fairly recent type of herding is a survival reaction on the part of peasant farmers suffering from a shortage of fertile land (cf. 1.4) or former nomads who have run out of space in the pastoral north.

It is in any case not a case of nomadic herding slipping southward because of the drier climate, because all specialists in pastureland (and therefore all herders) are well aware that the forage quality of natural vegetation gets worse the further south they go. Moving south is therefore only the last resort of the wretched.

So, the migrations described in paragraphs 1.4 and 2.5 should not be confused with movements that run parallel with rainfall curves, whose aim appears to be to follow the evolving climate, thus maintaining the same types of economic activities and production techniques (plant varieties, etc.).

These migrations cover hundreds of kilometres (down into the southern parts of coastal countries) where the migrants frequently end up in an environment which means an upheaval in their

production activities. They are not trying to escape drought, rather looking for fertile land or available space!

Like the northward move of agriculture and the drop in nomadic movement south, which are contrary to climatic changes, these phenomena can only be explained by denser populations, which double roughly every 25 years and whose density has reached or even exceeds the carrying capacity of the natural resources.

Of course droughts have helped to worsen the problems.

A severe drought can effectively wipe out a harvest, especially when flood water does not reach high enough to flood crops naturally irrigated by gravity. But for rainfed agriculture, which is by far the main activity in farmland Sahel, catastrophic rainfall deficits are fairly rare and generally very localised. This is even the case today, since farmers have adapted seed varieties to the drier climate. Furthermore, there have always been "bad" years, which is why in the past farmers produced harvests which covered 1.5 times the family's annual needs to see them through a bad year.

Less rain, then, somewhat slows down fallowland regeneration by reducing biological activity on the surface and underground. But, if there is enough available land, slower regeneration should cause no major problems.

If there were no shortage of land, the drier climate would only have a limited impact on agriculture.

Drought has even less of an impact on natural vegetation.

Since agriculture is in fact monoculture, it is more sensitive to climatic variations than natural vegetation, which has a broad floristic variety, and is therefore extraordinarily adaptable to climate fluctuations. Even if adaptation occurs through a change in floristic composition, to the detriment of the biomass, natural vegetation manages to make optimum use of soil fertility, even when there is a large rainfall shortage.

This does not rule out the possibility that rare climatic conditions can wipe out a whole forest, although it must be ascertained whether a lack of rain is the main cause for the drop in the water table. Here again it is quite likely that the increase

### *3. The main cause of the Sahel problem*

in runoff caused by large-scale land clearance will be far more decisive than the lack of rain.

Now that access to dry season pastures in farmland Sahel has become much more problematic for nomadic herds, the fact that a severe lack of rain has a lesser effect on natural vegetation will not prevent it having a disastrous effect on the pastoral economy.

The impact of drought has thus been greatly exaggerated, with clearance and over exploitation of the land by agriculture being by far the main causes of large-scale deforestation and desertification.

It is thus surprising that "desertification" of a cleared area of land, even in agricultural regions, is systematically blamed on "drought". Perceptions often work in reverse: a patch of land only needs to lose its vegetation for the conclusion to be drawn that drought is at work, on farmland with at least 300 mm of rain, when all that would be needed would be to fence the patch off to allow for surprising growth after just one rainy season!

This experience has already been repeated countless times by a host of projects, and should perhaps have led people to abandon preconceived ideas and look for other explanations.

Drought is just the "last drop which tips the scales": the real problem is that the scales are already about to tip, with everything pointing to the fact that, even without a drier climate, the Sahel would only take a few more years to reach just as serious a crisis. The proof is that the coastal countries, which have supposedly suffered less from drought, are facing problems which increasingly resemble those of the Sahel.

The response to this dramatic situation seems clear: more production is needed, with less pressure on the resource; in other words, agriculture has to be intensified.

Indeed, any overpopulation in relation to a resource is a relative function of the production system (technology) used: a wild harvesting and hunting economy only allows for a very low density, whereas herding, and more particularly agriculture, allow for higher population densities.

However, means are required if agriculture is to be intensified, and this is where the "economic environment" of the production system, or the macroeconomic structure within which agriculture functions, comes into play. This will be dealt with in the next chapter.



# 4

## ECONOMIC STRUCTURE

All agriculture depletes the soil, and (except for fallow land) only an intensification of production will help to maintain soil fertility and increase yields on the same farmland for several years at a stretch. In other words, only intensification will decouple production from natural resource regeneration capacity.

However, intensification requires means to finance input, equipment and investment.

These means have to be recurrent, meaning that they have to be generated by production itself, otherwise the methods used would not be viable.

In other words, over and above the immediate needs of the family, a producer has to be able to earn extra income to finance the more intensive production methods.

To this end, he must be able to sell most of his production, and this is precisely where the development process is stuck.

In Sahel countries, 80-90% of the population is rural and produces its own food, whereas less than 50% of the urban population has sufficient purchasing power to buy all the food the family eats.

This means that there are nine producers for every single potential customer and that the volume of demand (in terms of finance) for food only takes up 10% of production.

Obviously, in such conditions, the great majority of farmers cannot earn sufficient money to sustainably practice more intensive farming methods.

The situation is even worse than it first seems, since most of the "high income" urban population buys

more and more imported grain (rice, wheat), thus further reducing farmers' earning potential.

It follows that only a small minority of producers who have privileged market access and who manage to monopolise demand will earn enough to finance intensification of their production, and that most rural people are "doomed" to a life of subsistence production/consumption (dependent on natural regeneration cycles), not because they do not wish to sell, but because there is so little SOLVENT demand.

This explains the failure of all the farm credit schemes and the general bankruptcy of the "Agricultural Development Banks", which tried out mass rural credit campaigns (for fertiliser), or equipment credit schemes (for animal implements) for subsistence farmers, and which failed because the ordinary farmer is structurally unable to pay off his loans.

This also explains why feasibility studies (which are always positive on the basis of fictitious prices) have led to the establishment of a host of irrigated areas, which, again, always run at a loss and can only survive with structural subsidies.

In other words, low demand means that small farmers simply cannot afford to spend money on produce which they will for the most part have to consume themselves.

And yet, more and more small farmers are buying small amounts of fertiliser. In most cases, they are spending income from secondary sources (a few livestock, out-of-season gardening, sale of dead wood, earnings from work in towns) which they partly plough back into food production for own-consumption, since it is cheaper to buy a little fertiliser than to buy food. Self subsidy for

subsistence consumption is the name of this particular mechanism, which in many cases is merely an alternative to abandoning the land.

This mechanism creates no surplus which would allow for "investment" in more sustainable production systems.

The weak domestic market also explains why regions which export crops for earnings best resist famine. Cotton planters, for example, earn far more money than food producers, which allows them to intensify their own food production. This fact contradicts the theories which claim that famine develops following the introduction of cash crops to the detriment of food production.

Finally, low purchasing power explains the failure of food self-sufficiency policies. Famine cannot be beaten with a policy of production increases, because the hungry have neither food nor money, and thus areas with a food surplus are unable to produce more than they can sell or consume themselves.

In brief, internal food markets are insignificant compared with the means that would be needed to generalise agricultural intensification, and macroeconomic structure condemns rural masses to survival in a subsistence production/consumption economy dependent on natural resources.

The macroeconomic structure of the Sahel countries is thus fundamentally geared to own-production and consumption with the following basic features:

- food production (and security) at household/family level for over 80% of the active population;
- few market outlets for food, and hence a low monetary level in the economy;
- no opportunity for general introduction of farm production techniques requiring monetary expenditure.

The only way to escape this macroeconomic straitjacket is to develop added value and therefore jobs in non-farming sectors, because only the development of manufacturing and services can create purchasing power for agricultural produce and/or generate a surplus which can be used to subsidise intensification.

So, despite the enormous social and political problems it causes, urban drift is not the problem, but a part of the answer. Solutions must be sought by transferring a part of the economically active population from the country to other economic sectors.

The description contained in this chapter applies in particular to Burkina, Mali, Niger and Chad.

As coastal countries, Mauritania and Senegal partially avoid these economic constraints. The presence of the coast and of a city the size of Dakar, as well as iron ore mining provide these two countries with some "economic and monetary room for manoeuvre" that the other Sahel countries lack.

# 5

## CONCLUSIONS

It seems totally inadequate to define the Sahel and analyse its problems on the basis of its physical parameters alone (soil, climate, vegetation, etc.), since these factors only determine the agro-ecological profile of the region and are not in themselves an obstacle to development nor the cause of degradation. To state that aridity is the main obstacle to overcome is like claiming that development issues in Australia or Texas are similar to those in the Sahel! The difference lies in the fact that in the Sahel there is very little purchasing power and that the number of people living off a comparable resource base is extremely high. This means that production methods which are profitable in "developed" semi-deserts are not viable in the Sahel.

Basically, the Sahel's problems will not be solved by developing "arid region technologies" because the infernal cycle of environmental destruction by over exploitation of the soil takes place within the macroeconomic "context". The solution does not lie in fighting aridity, but in changing the macroeconomic context.

Schematically, the Sahel faces the following set of problems:

- An economy with over 3/4 of the economically active population producing food crops cannot decouple food production from natural soil regeneration.
- Dependence on natural regeneration capacity means that a ratio between area under cultivation and fallow land (usually at least 1:3) must be respected if the environment is not to degrade disastrously.

In other words, to maintain soil fertility over the years in a subsistence production/consumption

economy, population density must remain below the "carrying capacity" of the natural resources.

### 5.1 Carrying capacity

Carrying capacity as used herein refers to the population density which can live on a natural resource (arable or pastureland) with an exploitation intensity not exceeding natural regeneration capacity in order to ensure the resource's long-term productivity without using any input from outside the system.

Naturally, human population density estimated on this basis is lower than a hypothetical "absolute density", and lower also than other higher densities made possible by a host of factors such as trade, food aid, etc.

On the other hand, the carrying capacity definition used here allows for densities higher than environmental protection requirements in the wider sense of the term. Here, only the preservation of resources for man is being considered. If the definition were to include conservation of biodiversity (flora and fauna), allowable human density would be much lower.

The carrying capacity of a natural resource, exploited by a subsistence production/consumption economy is estimated on the basis of the following:

- the "original, natural" productivity of the resource (fertile land, undegraded pasture);
- absence of intensification techniques (ie. no external input);
- an exploitation intensity which does not in the long term deteriorate the resource.

Thus to estimate farmland carrying capacity we have assumed:

- Average yields of 600-900 kg/ha, more or less equivalent to virgin land productivity, but no longer corresponding to current yields, which are much lower;
- three to four times more fallow than cultivated land, a situation which no longer exists anywhere.

On this basis, the order of magnitude of farmland carrying capacity can be estimated in the following way.

Deducting losses during harvesting, transport and storage, and with minimum food security reserves, fertile land, depending on the region, can feed two or three people per cultivated hectare. Considering that three or four hectares of fallow land (or cultivable virgin land) are needed for every hectare under cultivation, on average each person needs about two hectares of cultivable land, corresponding to 50 inhabitants/km<sup>2</sup> of cultivable land to ensure long-term survival of the soil and to avoid famine during difficult years.

This is obviously only a rough estimate, which has to be fine tuned on the basis of more reliable figures and diversified as a function of local physical parameters (soils, rainfall, etc.).

The main problem in trying to apply this estimate to the various countries is that estimates of cultivable land are highly unreliable.

In **Burkina Faso** (274 000 km<sup>2</sup>), cultivable areas are estimated to be +/- 100 000 km<sup>2</sup>, which would give farmland carrying capacity of +/- 5 000 000 people.

Even if we add the carrying capacity of pastureland and fisheries, which are very low, it seems clear that with a population of about 9 000 000, Burkina is more than saturated, which explains degradation caused by the lack of fallow land, emigration to coastal countries, the development of sedentary livestock, seasonal migration, food shortages, etc. and the sharp increase in grain imports (wheat, rice) financed by livestock sales, gold prospecting, cotton, income earned away from the land, and international aid.

Thus, despite a relatively moist climate, Burkina experiences all the woes of the Sahel, added to which it is landlocked, making industrial development even more difficult.

**Niger's** carrying capacity situation is comparable to that of Burkina. From 1975 to 1985, uranium ore exports helped to absorb the consequences of exceeding carrying capacity. However, Niger has been kept back from the brink of disaster by the fact that over 2/3 of the population are directly or indirectly integrated into the economy of Nigeria which, with its population in excess of 100 million, is by far the biggest industrial power in West Africa.

Thanks to its central delta, **Mali** has a carrying capacity at least double that of Niger or Burkina. With +/- 10 million inhabitants, Mali is more or less in a state of equilibrium, but there is no telling for how long.

**Chad's** resources are comparable to Mali's. With about 6 million inhabitants, it should only reach saturation by 2010, provided that it does not become the target for mass immigration which is more than likely.

**Carrying capacity of pasture in the arid Sahel** can be estimated by multiplying the number of hectares of pasture one animal needs by the number of animals man needs to meet his basic requirements.

On this basis, (human) carrying capacity in northern Sahel must be about one person/km<sup>2</sup> of pastureland.

However, in pastoral regions, the carrying capacity concept does not have the same significance as in agricultural areas, since exceeding carrying capacity does much more harm to humans than to the environment. This is because livestock cannot manage to over exploit the environment with the same intensity as agriculture.

Pastoral populations in **Mauritania** are clearly no longer able to survive on herding alone. This fact, together with the climate, makes Mauritania a Sahelian country. The difference between Mauritania and the landlocked Sahel countries is precisely that Mauritania has the Atlantic coast (access to the sea, fisheries) and iron ore exports. The result is a GNP about double that of other Sahel countries, and that Mauritania thus has a head start in changing from a subsistence production/consumption to a monetary economy.

With a city like Dakar, **Senegal** (which is not strictly speaking a Sahelian country) is in a situation similar to that of Mauritania.

It must be realised that, as long as an economy

is dominated by subsistence production/consumption, natural resource carrying capacity has little room to adapt. Economists tend to consider that as long as production keeps up with or exceeds population growth there are no problems.

It apparently follows from this that famine can be avoided simply by increasing production. This is true as long as resources are plentiful, but when land becomes scarce and production has to be increased at the expense of soil degradation, there comes a time when production can go no higher and even has to decline as long as the macroeconomic context remains the same.

This hypothesis can be illustrated by what happened in Serer, Senegal, and in the Mandara Mountains in northern Cameroon, where the populations had managed to increase carrying capacity by intensive manuring and/or by soil and water conservation and soil protection and restoration projects. In both cases the systems broke down under excessive demographic pressure.

## 5.2 Future prospects

In the medium and long term, prospects are extremely grim, not only for the Sahel, but also for the whole of West Africa south of the Sahara. If present trends continue, environmental disaster and terrible famine seem inevitable.

To date, "drought" has masked the lack of resources in relation to the population. This will soon no longer be possible.

Factors which have helped to defer massive famine are:

- continuing migration;
- urban drift and urban development;
- commodity and cash crop exports;
- international aid.

For **migration** there are still a few "underpopulated brush areas" with fertile soil reserves. This is the case, for example, in Kita, Mali, south-western Burkina and several parts of Chad. These are almost always regions which are "protected"

from human settlement by problematic natural obstacles: a total lack of water in the dry season, insect infestation (Lake Fitri), etc.

This used also to be the case in the Volta valley regions, which, since the eradication of river blindness are now overpopulated and slipping into degradation.

There are less and less regions which can still absorb extra people.

Migratory movements towards coastal countries are meeting increasing problems. These countries too are also facing a population explosion and overload, both in the towns and villages, and there have been several cases of coastal countries turning migrant Sahelians back.

The spectacular development of the informal sectors of the economy in towns has partly helped to absorb **urban drift**. In fact this is the first sign that the economy is starting to diversify and is one of the rare factors pointing towards viable development. The informal sector only has a limited capacity to absorb labour, certainly not enough to reverse environmental trends.

**Commodity and cash crop exports** (iron and uranium ore, gold, cotton) help to finance food imports (mainly to supply towns) and fertiliser (for rural areas). However, following the slump in world prices, these sectors' ability to absorb the effects of overpopulation has been drastically weakened.

Finally, there is **international aid**, providing food and structural subsidies for food production and State services through a host of projects and special funds. However, since this aid does not manage to induce a process of self-development, it is actually consumed and recycled as "artificial" urban development which, in turn, depends increasingly heavily on the continued flow of aid. Thus, merely to maintain the status quo, international aid would have to double roughly every ten years<sup>7</sup>. Given the industrialised world's bleak prospects, aid will certainly be unable to keep up the pace. The consequences, especially in large towns, can easily be imagined.

So, on the whole, prospects are very grim, and it can be expected that desertification processes will

<sup>7</sup> Population increases of over 3% (over 7% in towns) and + / - 3% inflation would need an annual increase in aid of about 7%, thus doubling the volume every 10 years.

continue, and even that famine will occur more frequently.

Population increases leading to destruction of the biotope are incidentally not confined to the Sahel; all peoples on all continents have always experienced the same process: the phenomenon is universal.

Thus, for example, throughout the Middle Ages, Europe experienced a series of epidemics and famines, and in the 18th century was gripped by massive desertification caused by soil depletion. This in turn led to mass emigration to North America. The tide only turned after the Industrial Revolution, when soil fertility was gradually restored.

Today there are no more continents to conquer and there can be no doubting the relationship between rural overpopulation, urban congestion and growing political instability. Urban drift swells the population and most political disturbances are caused by urban youth.

As long as macroeconomic structures and demography remain unchanged, the situation cannot fail to worsen; nor will changes of government or regime do much to help.

### **5.3 Solutions**

To emerge from deadlock, two approaches are required: monetarising the economy by diversification and limiting population growth.

Nothing today seems to indicate that strong birth control policy will have any significant effect.

As for services (trade, tourism, administration, etc.), the Sahel has developed these sectors considerably over the last twenty years. It is not certain that stronger growth here would be a good thing, especially in the civil services, which are far too expensive for states to run, thus making any other public investment impossible.

The true driving force behind development will therefore have to be industry and export-oriented agriculture (cash crops) and livestock.

This will only be possible within an economic area encompassing at least the whole of West Africa, since, except for mining, industrial development will have the coast as its centre of gravity.

This development pattern suggests that substantial

migratory movement from the Sahel to coastal regions will have to continue and that there needs to be an intensification of trade between the Sahel and the coast.

To encourage industrial development, official development aid should concentrate on heavy infrastructure, energy, telecommunications.

International aid will need to be rechannelled, since the development of non-rural sectors will provide the best incentive for rural development. This view is confirmed by what happened in Côte d'Ivoire and Cameroon, where the development of non-rural sectors and cash crops (coffee, cocoa, etc.) helped intensification of subsistence agriculture (animal implements, fertiliser) to start up. Whereas, for want of outlets, aid poured directly into food production cannot trigger cumulative, sustainable self-development, and only makes the problem worse, since it leads to "cushioned" (subsidised) failures, which are recycled into artificial urban development.

### **5.4 Subjects for future study**

The central idea of this report can be expressed in the following two hypotheses:

1. In an subsistence production/consumption economy, satisfactory food production without deterioration in resource productivity is only possible with population density lower than or equal to natural resource carrying capacity.
2. When population density exceeds carrying capacity, the non-agricultural sectors must be developed to decouple food production from the rate of natural resource regeneration.

In order to invalidate or confirm the credibility of these hypotheses for the Sahel, the following additional studies, at least, need to be undertaken:

- the spread of areas under cultivation over the last 30 years.
- yield trends (by interviewing farmers). It should be emphasised that yield figures are not actually necessary for this study: it will be sufficient to obtain some idea of how cultivated areas per capita have evolved and of the extent to which harvests have covered the farmers' needs.
- a farm income survey, compatible with macroeconomic flows.

— a study on macroeconomic structures and flows, concentrating on volumes of money available to meet food needs and on rural incomes, especially on the basis of food sales.

Apart from these essential studies it would be highly desirable to study natural resource (land, pasture) carrying capacity, and the degree to which exploitation of these resources is saturated.

However it is particularly important to check on how areas under cultivation and yields have evolved over the last thirty years.

In a state of equilibrium, the increase in cultivated areas will approximately equal population increase.

If, however, carrying capacity is exceeded, the increase in cultivated areas should be a multiple of the increase in population to compensate for the drop in yields. It then follows that in a few decades almost all cultivable land areas would need to be cultivated every year, thus giving an increase of 300-500% (consuming all fallow land) and even

more if the clearance of increasingly marginal land is added in to the calculations.

This theoretical model contradicts official statistics which, for the period 1960-90 contain figures showing a 50-100% increase in cultivated land and more or less stable harvest yields (500-700 kg/ha).

On the other hand, this model is totally in tune with almost all interviews with farmers in Burkina and Niger conducted by the author between 1983 and 1992. All the interviews systematically and coherently suggest that between 1960-90, cultivated land increased by over 400% and that since 1960 yields have fallen to 1/3 or even 1/4 of the figure achieved at the time of independence.

Depending on the parts of the country studied, Mali only seems to be entering a state of disequilibrium.

Checking the trend in cultivated areas will only be possible with a sample of regions with sufficiently old aerial photographs and, of course, if enough old farmers can be found and interviewed.



## **PART TWO**

# **LEARNING FROM EXPERIENCE**



## INTRODUCTION

Those who have kept a careful eye on development aid to the Sahel over the last twenty years are aware that the overall result is rather meagre.

This may seem an overly negative judgement, but it must be acknowledged that despite a quarter-century of effort and billions of dollars of assistance, the situation seems to be getting worse rather than better.

There are so many reasons for failure, ranging from naive ideas about development, through conflicts of interest between decision-makers and socioeconomic groups right up to a lack of political will.

However, one of the main causes is the fact that interventions (projects, programmes, etc) intended to speed up a development process are in all probability much more complex and difficult to carry through successfully than they seem.

Thus for example, professional circles tend to believe that the application of technical solutions (generally from their own field of specialisation) is the hard core of development work, whereas experience has so many times proved that the simple transfer of a known technique is (almost) always a failure.

Even though the development of appropriate technical innovations is essential (and apparently quite difficult to achieve), it is only a small link in the chain of actions to foster development.

Others think that local community activity is the key, but they do not seem to know what the newly active communities are actually supposed to do.

These are just two examples among many, and

such simplistic attitudes will hardly solve extremely complex problems.

Development action comprises *inter alia* the following components:

1. A development CONCEPT invariably linked to value judgements, ideologies, etc... This aspect tries to answer questions such as: what is development, what is the role of the authorities, how can change be induced?
2. Identification and understanding of the problems to be resolved, based on an analysis of the local situation. This aspect comprises the selection and methodology of studies to be undertaken (quantitative/qualitative, sectoral/integrated, action-research), the choice of groups and persons to be consulted, and finally the structuring or ranking of problems to be solved.
3. Identification and choice of action to be taken. This includes the choice and methodology of decision preparatory investigation, as well as choice of priorities and planning for the utilisation of available means. This is also the stage for feasibility studies.
4. If necessary, prior to their mass dissemination, the development of (technical or other) innovations, in order to obtain a product that can be effectively disseminated and is economically viable.
5. Action implementation. This includes the installation of adequate structures and competent teams, the development of management and operational methods, as well as monitoring.

6. Result evaluation and feedback to all the other components.

Finally, particularly in the case of action which targets rural development, study of ways to approach the rural world, for each of the above-mentioned components. The approach to the rural world includes survey and interview techniques, extension services and methods, etc. and action-research.

The various aspects of development actions are not necessarily listed in strict chronological order, but are, rather, part of a process that each intervening agency is subjected to.

These actions thus form a chain, which is only as strong as its weakest link, and apparently there (almost) always is at least one link which snaps before tangible, durable results can be obtained.

It should be recalled that this report only deals with one link in the chain: identification and understanding of the problem to be solved (diagnosis).

The first part attempted to provide a summary analysis of the problems facing the Sahel.

The second part surveys the types of project which have most frequently been tried to stimulate rural development.

The aim of the exercise is to show that most projects (even when correctly executed) cannot make a substantial and lasting impact because they are based on an incorrect diagnosis of the problem to be solved.

In other words, things start to go wrong with the first link in the chain.

## 6

# LAND TENURE AND AGRARIAN REFORM

Most Sahel countries have been in the throes of land and agrarian reform for several decades. In the main, such attempts at reform are based on the conviction that producers have no security of tenure and that the lack of security is a structural obstacle to efforts to maintain soil fertility.

This is not too obvious, and to have a clearer picture of the situation, some idea of relevant custom is necessary.

It is clear that land ownership custom varies between regions and ethnic groups. There do however seem to be a few general principles common to agricultural communities in the Sahel and even West Africa.

### 6.1 The land regime in agricultural regions

Traditionally the concept of "land ownership" in the western sense of the term is unknown. A peasant farmer, for example, will find it difficult to imagine selling his land, especially to someone from outside the village. Who, anyway, would want to become the owner of a resource which, until a few decades ago, was plentiful (and even threatening), and which furthermore deteriorates with use? Land therefore was in divine hands.

What western observers refer to as "traditional right to the land" is in fact a "right to the fruits of labour", linked to the social status of the claimant of that right.

This right to the fruits of labour comprises two fundamental principles:

- the exclusive right of cultivation for the person who clears a plot of land;
- the right to harvest for the person who cultivates the plot.

The right to exploit a plot only lasts for as long as the traces of the clearing work done are visible: generally, when vegetation on abandoned fallow land reverts to "virgin brush", the clearer of the land loses his right to exploit it. So he was not the owner in the western sense of the term.

The right to the fruits of labour is also linked to the social status of the claimant of the right, since as tradition has it, "he who is owned does not even own the clothes he wears".

This means that in the villages, land tenure structure reflects social structure.

It follows that on some highly sought-after lands, (sometimes referred to as being in the chief's gift), the hierarchy of rights may be very complex. This is often the case for landed irrigated by high waters where, over time, the right of exploitation has been handed down throughout the hierarchy.

Management of resource exploitation and social structure are indeed closely linked.

With more abundant resources and more physical marks of exploitation on the land, social structure is more egalitarian, as is the case in forest areas. With rarer and more diffuse resources and less signs of exploitation marking the land, authority is stronger and society is more hierarchised (feudal), as in northern Sahel.

Just as the person who exploits the land is not the owner of the field, the village does not own its community lands; the limits of a community

correspond to the space occupied by the villagers, and thus to the limits of the chief's authority.

Limits between local communities are thus generally rather vaguely defined and may even overlap for various forms of activity (herding, farming), which is why attempts to formally delimit village communities sometimes require protracted negotiations (cf. chapter 11).

As available land areas shrink and as the struggle for control over resources spreads further afield, the concept of land ownership is evolving rapidly towards the western concept. This trend is particularly noticeable near the large towns, but is also moving into the countryside, especially in densely populated areas.

## **6.2 Agrarian and land reform**

It might be expected that custom makes for insecurity of tenure. However, the right of exclusive exploitation of the first person to clear the land is generally inherited and rarely called into question. Based on community consensus, custom in fact gives reliable security of tenure.

However, as a result of the general shortage of fertile land, the struggle for control over resources has intensified over the last few decades.

This makes things especially difficult for former "slaves" and migrants who almost always settle on land which is already "claimed", or which is located within a "native chief's sphere of authority". Given the scarcity of virgin land available for clearance, newcomers no longer manage to obtain long-term rights of exploitation, and often have to have their permission to till the land renewed every year. This is why newcomers are never allowed to plant trees, since they could then claim the right to the fruits of their labour throughout the tree's lifetime.

Thus official agrarian and land reform becomes

involved in the struggle for control of resources, often with the unavowed aim of facilitating the settling of an area by migrants from a dominant ethnic group.

These reforms thus intervene in power relationships between ethnic groups, which is one of the reasons why they never work and are always being revised.

Another factor hindering the implementation of the reforms is that the very concepts of "law" and "personal rights" do not correspond to rural people's sense of basic justice.

Rather than promulgating abstract regulations, it would be better to stimulate the *de facto* appropriation of land, by taking specific actions: one must learn to read before studying grammar.

This is what happens with soil and water conservation and soil protection and restoration projects. By analogy with the right to the fruits of labour, the building of anti-erosion embankments and the planting of trees which visibly delimit land areas consolidate land appropriation. This type of action is relatively successful because it is more often seen as a means to appropriate disputed resources than as a measure favoring soil conservation (cf. 10).

In the long term, true privatisation of the land will be inevitable, both to ease the struggle for control over resources (which would have been grounds for war in pre-colonial times) and to invest in the land.

Privatisation of land will only be possible if the great mass of small farmers are kept outside the process, as was the case in Europe during the period before the Industrial Revolution ( cf enclosure policy in the 18th century in Great Britain).

In the same vein, a more egalitarian distribution of land resources might even help to speed up resource degradation.

## VILLAGE AND PASTURELAND WELLS PROJECTS

The main types of well are:

- village wells and boreholes;
- pastureland wells and boreholes;
- market garden wells.

**Market garden wells** are used to water out-of-season crops, mainly on lowlands. The prospects for these projects were discussed in section 1.4.

Out-of-season crops may well help to combat famine, but it is no less true that the clearance and development of hundreds of lowlands have struck nomadic herding a serious blow, and have caused deforestation and soil depletion.

**Village wells** are located in or near villages and provide domestic water and drinking water for village animals. This well is typical of farmland Sahel, although there are also village wells in northern Sahel.

For many reasons pastoral wells in herding areas are located a long way from dwellings and camps. Domestic water supplies are brought in by donkey.

There is thus a clear distinction between village and pastureland wells.

In the hope of relieving the effects of drought, thousands of village wells and boreholes and hundreds of pastureland wells and boreholes have been sunk over the last twenty years.

### 7.1 Village wells projects

Sahelians are truly expert well diggers (if they were not, they would not be there), and during most droughts they have been able to find enough

domestic water. Their main concern is nearly always food security, since the thing most lacking during drought is not domestic water but harvest.

This is all the more true since all village water projects have planned the location of water supply points as a function of a theoretical standard water requirement per person. So, invariably, water supply points have been dug where the population density is highest, and where fertile land is most scarce.

Forgetting that farming is only possible with a permanent supply of water, nobody thought to create water supply networks to open up fertile land in under-populated areas.

Village water projects may indeed have helped to improve hygiene and somewhat relieved women of their water burden, but they have only had a marginal impact on development especially since communities which receive a new well every few years are less and less capable of digging and maintaining their own wells, even though they had always done so until the 1960s! This situation suits state-run "Water project offices" which have every interest in monopolising rural water supplies and the accompanying foreign financing.

The situation is totally different in the wetter southern regions.

In the Sudanian region, domestic water came from a host of perennial surface waterholes, and thus the local people were not familiar with well-digging techniques. With a generally drier climate, some of the previously permanent waterholes now dry up, causing the population major problems. Thus, contrary to popular opinion, rural water projects often have a more positive impact in the wetter southern regions than in the Sahel. This seems to

be a contradiction, but in fact the wetter the climate, the more problems there are in finding domestic water, also for reasons of hygiene.

## **7.2 Land status and pastureland water projects in northern Sahel**

To grasp the impact of water supply projects in the far north, account must be taken of the land regime in pastoral areas and of its impact on pasture management.

As in farming areas (cf. 6.1) there is no personal ownership of land areas or pastures.

In fact, in the absence of a claim over cleared land, land appropriation is even weaker than in agricultural regions, and here too, the bush (and therefore pasture) belongs to God.

Herders are thus in a situation where they have to compete for resources, and when there are serious problems of control over the resource base, the "normal" way of settling the dispute is to fight neighbours or intruders.

To master this potentially explosive situation there are two basic principles which govern land occupation to the north of the agricultural region.

The first is the principle of the **geographical scope of a Chief's authority**.

As in agricultural regions, this scope essentially corresponds to the area actually occupied by the members of a tribe or clan.

So, when the chief says "this land is ours", he means in fact "this is my people", and not "this land belongs to me".

Land areas are therefore run by a pyramid of spheres of influence, reflecting the vertical social structure.

This principle is all the more important in pastoral areas by dint of the stronger social hierarchy than in farming areas.

This is understandable, since in fact "culture" does not govern resource exploitation; the reverse is true. It is indeed reasonable to believe that it is precisely because resources in pastoral regions are scarce and because there are few physical signs (such as fields) to delimit territory that pastoral

societies have a more rigid hierarchy (are more feudal) than Sudanian societies.

The second principle is the **appropriation of the pastureland well**.

To manage the exploitation of pasture which nobody owns, the only way to exercise control over territory is through "ownership" of the well and the watering rights for the herds at the well.

In most cases, only clans who are a part of the group whose name is borne by the well have permanent watering rights. In some places, eg. in Batha, Chad, each authorised clan has its own well fork, and each family has its own dipper.

A passing herder cannot be refused access to the well. But, once his herd has drunk, grazed and rested for several days, he can be forced to leave by having access to the well refused. He cannot thus "settle down" by the well to exploit the surrounding production pasture.

So there can be seen to be two types of pastureland wells: appropriated wells in grazing lands, and "public" wells accessible to everybody along herding trails.

This very strict system means that, apart from wells situated on migration routes, Sahel herders want nothing to do with "public pastureland wells" in pasture production regions. For decades now, the great majority of wells dug by the state (using international finance) have been systematically rendered unproductive or useless by the local people.

It is amazing that neither governments nor donors seem to be aware of this fact, and that on the contrary, each mission and each study on pastoral water projects finds the dilapidated state of most of the older wells a good argument in favour of sinking new ones.

Obviously the shrinkage of available space for a growing population will hardly help to ease the struggle for control over pastures.

In many regions, herders have taken a whole set of actions with the principal aim of delimiting territory and keeping competitors (and their herds) out.

In this process of appropriation, farming and/or highly labour-intensive activities (small dams, out-of-season farming, flooded pasture regeneration)

are excellent methods, which explains why such projects are so successful in the arid Sahel.

Herders too consider that a free man's right to the fruits of labour is sacred.

This principle is, however, fraught with danger for large-scale herding in the Sahel, since it makes it

difficult to protect herding from the encroachment of agriculture. Herding in the Sahel has already lost most of its dry-season pastureland and it is quite likely that conflicts between northerners and southerners, which are rife in most Sahel countries, will be fed by these irreconcilable interests.



# 8

## FOOD SELF-SUFFICIENCY

Following the various famines which occurred in the last twenty years in the Sahel, most governments made food self-sufficiency a political priority.

This target is generally pursued through vast farm "modernisation" programmes: animal implements, fertiliser, rural credit schemes, etc.

The first part of this report attempted to explain why production techniques which need monetary input are only rarely viable for food production. It does not seem possible to avert famine by encouraging food production. What is the point of producing more in areas where there is a surplus if regions suffering shortages have no purchasing power?

The main beneficiaries of productivist policies seem to be urban wage earners, the clients of the politicians.

Two specific examples of production-driven policy are farmland irrigation projects and the promotion of draught animals and implements for agriculture.

### 8.1 Farmland irrigation projects

Despite ever positive conclusions (based on optimistic yield and price estimates) drawn in feasibility studies, practically none of the irrigated land areas created in the Sahel in the last twenty years have turned out to be viable.

Depending on the technique introduced (gravitational or pumped irrigation) and on the costs taken into consideration (with or without depreciation, with or without staffing costs), rice costs two to four times as much to produce as the

(protected) sale price and the price on the world market.

The difference between the selling price and the production price is almost entirely subsidised, directly or indirectly, by international aid.

It follows that it costs more to subsidise farmland irrigation projects than to provide food aid.

Here again, the main beneficiaries are the urban population, since these subsidies prevent small farmers from putting their prices up and thus reduce the value to farmers of any eventual surplus.

The main reasons for this general lack of profitability are:

- the low price of rice on the international markets;
- low local purchasing power;
- the Sahel's comparative disadvantage in any irrigated food production, especially for irrigation relying on pumping.

If import duties were introduced it would theoretically be possible to protect local production against world market prices. However, in order not to upset urban dwellers, governments push food prices down.

The disadvantage for pumped irrigation in Sahelian farming conditions comes from high evaporation rates and the low quality of soils, which require intensive fertiliser application. Irrigated rice production will therefore always cost more in the Sahel than in more humid areas.

Apart from continually running at a loss, farmland irrigation projects have other negative effects.

Almost all irrigated areas are installed on out-of-season pastures used formerly by nomadic herds, and this loss of land for herding has never been factored into the feasibility calculations for irrigation projects. And yet it is a well-known fact that each hectare brought under cultivation means that about ten hectares of rainy-season pasture cannot be grazed for lack of animals.

Furthermore, irrigated land attracts more people who, accompanied by sedentary livestock and rainfed agriculture, create rings of desertified land in proportion to the area irrigated. Thus, what was not true for pastureland wells in the far north turns out to be true for irrigated land.

Finally, it is obvious that such areas have to be protected from high water by dykes. This, though, speeds up soil depletion by depriving the land of natural fertilisers deposited by annual flooding.

## **8.2 Draught animals and technical innovations**

For the average peasant farmer, draught animals and implements require considerable investment, which can neither be financed nor be profitable without a cash crop which brings in substantial earnings. This is why the spread of animal implements over the last twenty years has followed on from the spread of cotton-growing, and why animal implement credit programmes which tried to promote their introduction for subsistence farming have failed.

The link between animal implements and cash crops has also been observed in Côte d'Ivoire and elsewhere in West Africa.

There is however a mechanism which helps in the adoption of animal implements for food production. This occurs when environmental degradation processes have already begun.

When fallow land becomes scarce and when yields begin to decline, more land per mouth to feed has

to be cultivated, and animals make work easier, especially since ploughing improves yield, at least for a few years.

Thus, as the environment degrades and food becomes scarce, the struggle to claim land grows fiercer, and a peasant with a draught animal has a powerful tool to appropriate "abandoned" land, or land only marginally suited to hand tilling.

However, since implements are expensive, and cannot normally be financed by selling off production (which is mainly for subsistence consumption), income will have to be found (with or without credit) from other activities, generally livestock.

This financial mechanism is a sort of "self-subsidy for subsistence consumption" which only the better-off can afford.

Thus the spread of animal implements for food production hastens the departure from the land of the poorest farmers. "Egalitarian development without tears" is still a far-distant dream.

After increasing for a few years, yields start to decline again. In other words, animal implements are tools which make it possible to continue to over-exploit and deplete land further with disastrous consequences.

This is what happened on the Burkina central plateau, where, during the 1970s, there was a boom in animal-tilled food crop production which in the 1980s entered a period of constant decline because of intensive large-scale degradation. This is also occurring in the Daopong region in northern Togo, where animal traction farming is nearing its peak.

This analysis in no way means that animal implements are bad as such. They may be very valuable where conditions allow for their use together with more intensive production (fertiliser), which is rarely the case for food crops in a macroeconomic subsistence production/consumption context.

## COMBATING VEGETATION DEGRADATION

The main actions directed against vegetation degradation are reforestation projects, the dissemination of improved cooking stoves and the "three campaigns" against brush fires, against stray livestock and against abusive wood cutting.

### 9.1 Deforestation for domestic energy

Several "macroenergy" studies have shown that there is not enough wood production in forest areas to cover the domestic energy needs of the population now or in the future. These studies gave rise to the conviction that the felling of standing timber for domestic energy was one of the main causes of deforestation.

These studies have been frequently contested on technical grounds: *inter alia* because they supposedly underestimated wood production in non-forest areas (fields, fallow land, villages).

One thing that is certain is that it is unrealistic to estimate fuelwood requirements on the basis of an invariable quantity per capita. In fact, per capita fuelwood consumption varies enormously depending on its availability. In other words, there is considerable flexibility in demand because people use alternative fuels (household refuse, farm by-products, etc.) and adapt cooking habits (less hot meals) when wood is scarce: it is wrong to claim that "people starve to death without fuelwood".

For example, along the river Niger, there are villages which have hardly used any fuelwood for several years, and some peoples eat ground grains raw.

This should not be taken to mean that there is no

energy crisis, and there is no doubt that wood production cannot meet "desirable" domestic energy consumption levels, at least in the long term. But to then conclude that domestic energy CAUSES deforestation is far too simplistic.

It must first be stressed that to date nobody has managed to prove that rural people cut down standing timber for domestic energy supplies. This is what people in offices imagine. "Traditionally" in the Sahel, standing timber is only felled for craftwork or for building: only dry dead wood is collected for energy.

Further, and more importantly, such a conclusion also fails to take account of the amount of fuelwood produced when land is cleared for farming.

**When there is a balance** between food production needs and the availability of arable land (fallow and virgin land), every year an area of fallow land equal to about 1/4 of the cultivated land has to be cleared, **plus**, at least, 3% of the area of cultivated land to cover the increase in population, that is, a total of about 30% of the cultivated land, corresponding to roughly 1/10 of a hectare per person.

This releases a quantity of wood which, depending on the volume of standing wood per hectare, meets fuelwood needs several times over.

Apart from the quantity of wood released by land clearance for farming, rural communities will still have available non-cultivable land (in typical cases twice the area of cultivable land) and fallow land (at least three times the area of cultivated land) for collecting dead wood.

Obviously in these circumstances (which were

typical until the end of the 1960s) availability far exceeds need, which is why almost all the cleared wood was destroyed (burnt) on the spot, and why standing wood was only felled to clear land, never for fuel!

When food needs and the availability of good land do not balance out (not enough fallow, and thus lower yields), food needs have to be met by clearing greater areas of land (fallow and marginal land), releasing at least the same quantity of wood per capita.

So fuelwood only runs out when there is little or no remaining land unsuited for agriculture and when there is nothing left to clear. In other words, the energy problem only arises when deforestation is already well under way and there is not much left to clear.

But when this happens, food is already short, and people tend to leave the area, thus reducing energy needs.

In other words, famine precedes the energy crisis, which does not cause deforestation but is the consequence of deforestation caused by the clearance of more land for farming.

And yet, tens of millions of dollars have been spent to finance projects which tried to fight desertification by planting wood for fuel.

It has incidentally proved impossible to encourage rural populations to maintain their participation in these projects, and with good reason. How can one expect to motivate a population threatened by famine and which is thinking of moving to more fertile land to plant trees precisely in the place they are thinking of leaving?

In other words, while there is food there is fuelwood, and when the food runs out, nobody worries about fuel. The increasing "motivational gap" between food security and energy concerns as the environment degrades also explains why the dissemination of improved cooking stoves has not been a success in rural areas, even after several years of extension services and awareness campaigns.

In fact, local motivation to plant fuelwood is only evident in circumstances where there is plenty of food and a lack of forest areas. This, for example, is the case in the middle of very large tracts of irrigated land, such as those managed by the Office du Niger in Mali.

The arguments presented above are not new to ecologists and foresters familiar with Sahel issues. The reservation most frequently expressed, however, relates to domestic energy supplies for the towns.

The following observations can be made with respect to the towns:

- a) towns only account for about 15% of the population of the Sahel;
- b) urban people who consume locally grown cereals have their fields somewhere out in the country. They therefore fit into the same farmland/fallow/clearance pattern as rural people;  
  
Only urban dwellers who consume imported cereals might create a demand for fuelwood in excess of the wood released by meeting food crop needs;
- c) No study has yet shown how much of the fuelwood for the towns comes from:
  - i) felled standing wood, and
  - ii) how much of this felled standing wood actually comes from outlying land areas cleared for farming and would in any case have been destroyed.

Here again, the usual idea that there is a direct link between forest productivity and urban domestic energy needs seems too simplistic to allow the conclusion to be drawn that there is a desertification effect.

It is nevertheless true that (in the absence of protected areas) towns are surrounded by a deforested area whose radius is proportional to the size of the population (with a few exceptions such as N'Djamena). The desertification impact of towns is, however, much more likely to be the result of denser farming activities than of fuelwood requirements.

## **9.2 The three campaigns**

### **Brush fires**

For brush fires, it should be recalled (cf. 2.3) that as long as brush keeps growing, fire is in many cases the only technique available to keep it under control. This is why the campaign against fires only

succeeds where there is no more brush to burn and why, as agriculture spreads further afield, brush fires will disappear on their own.

In addition, floristic composition in the Sahel has been selected and shaped by fires, which is a factor limiting the damage they do.

### **Stray animals**

Overgrazing, particularly by small ruminants, can seriously hamper woody biomass regeneration.

This occurs mainly in areas of quasi-sedentary herds where livestock also receive food supplements such as farm by-products and domestic scraps.

Overgrazing could be reduced by closing access to areas of grazing land on a rota basis. This would require the presence of drovers all year round, not just during the crop growing season as is now the case in farmland Sahel.

However, closing access in this way would inevitably reduce available grazing land and thus reduce animal production. In other words, exploitation pressure cannot be reduced without cutting animal production.

Any loss of animal production would probably be made up for by an extension of farming, which invariably has an even more negative impact on the environment.

Even so, the presence of drovers all year round and less grazing pressure (especially in farmland Sahel) are essential and, in the long run, inevitable objectives, although they do not seem to be possible in present conditions.

### **Against abusive felling**

The point has already been made that rural people only cut standing timber for construction purposes<sup>8</sup> and of course when clearing fields.

The campaign against abusive felling is nevertheless

difficult to wage. If abusive felling exists, there ought to be normal non-abusive felling, but neither farmers nor the forest and water rangers manage to draw the dividing line. The result is that rural people live in fear of receiving arbitrary fines for felling.

For example, the author personally witnessed a discussion in which a farmer was forbidden to recultivate old fallow land on the pretext that it had reverted to forest. Obviously, if this practice were to become the rule, it would force rural people to bring fallow land back under crops before regeneration (reforestation) were complete, thus hastening the desertification process.

### **Results of the campaigns**

The end result is that the three campaigns only make a marginal contribution to the fight against desertification, since they are based on a lack of understanding of resource exploitation mechanisms and rural production strategies.

A typical example of this lack of understanding can be seen in the closing of access to certain areas using fences.

In order to show rural people what vegetation could do if left alone, several projects established closed demonstration areas with fencing around them.

The impact on vegetation was invariably spectacular!

A few years later, when the demonstrative impact of these areas was assessed, it was found that farmers, especially the older ones, knew very well what such protected vegetation could become: it was just like the old fallow land! But they had also learnt that "without fencing, you can't do it any more".

So the opposite message to the one intended was conveyed.

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8 *Except in wetter regions (south of isohyet 1000 mm) where dead wood is often too damp and rotten to burn.*



# 10

## ACTION TO MAINTAIN SOIL FERTILITY

Attempts to intensify agriculture by modernising production were dealt with in chapters 4 and 8.

Referring to more accessible techniques, the principal actions to maintain or improve soil fertility are: Soil and Water Conservation/ Soil Protection and Restoration work (agroforestry) and the association of agriculture and livestock, mainly to ensure more intensive use of manure.

**Soil and water conservation** works (embankments, small dykes) are intended to reduce erosion and increase the amount of water permeating the soil. This work is particularly suited for the "treatment" of watersheds stripped bare by land clearance.

However, although their ecological effect is undeniable, their effectiveness for agricultural production is still an unknown quantity. Some specialists are even afraid that in the medium term, such work might have a negative impact on soil fertility, since by improving the soil's water balance, it increases yield, which might accelerate soil depletion.

**Soil protection and restoration** specialists (agroforestry, wind breaks, hedges) willingly admit that agroforestry still has little to offer to maintain soil fertility. Not even the trials and projects involving *Acacia albida*, which started up over twenty years ago, have provided conclusive results.

These actions are nevertheless undeniably successful. In Burkina, for example, where every year thousands of hectares are subjected to anti-erosion works under a host of different projects, they could even be said to spread spontaneously.

How can this success be explained?

Inquiries have shown that local motivation differs

greatly from the ecological aims pursued by the people who originally planned the work.

In Cap Verde, where anti-erosion dyke building is paid for by the metre, several members of the same family frequently seem to save up to buy a plane ticket to allow a brother to emigrate. The main interest, though, seems to be for receiving payment to clear the stones from future fields, which would have to have been cleared anyway.

In Burkina, where most donors now only finance tools and transport of materials, the success of soil and water conservation work is, apparently, to be situated in the context of the struggle to appropriate land.

By analogy with the right to the fruits of labour for the first person to clear the land (cf. 6.1), the building of anti-erosion embankments consolidates the claim over land of doubtful status (for example, fields abandoned by an emigrant).

The same seems to hold true for tree-planting projects, which all find it very difficult to ensure participation. Where plantation work can be used to help delimit "property", however, they enjoy rather more success.

The fact that such work is normally carried out on old land cleared a long time ago, or in dry creek beds which were never farmed before, strengthens this assumption.

So, although there is hardly any great enthusiasm among the people for the environmental impact such work has, these techniques tend to be assimilated for purposes which are just as valid, but which the project initiators were unaware of.

**Combining agriculture and livestock** and the use

of manure are themes frequently encountered in rural development projects.

It should first be recalled that this theme is nothing new for farmers who have for a long time manured their fields in partnership with nomadic herders.

Paragraph 2.4 explained why manure contracts have gradually died out.

Although there is no disputing the fertilising effect of manure, those who promote combined farming and livestock seem to forget that, to maintain fertility for several years with sustained yields, at least ten hectares of pasture for every hectare of

field are needed. This means that if this technique is to have a widespread, substantial and sustainable impact it can only be used in regions with a low density of farms and thus a very low population density.

Batha in Chad is a case in point, where villagers have been tilling village fields for over fifty years **WITHOUT** fallow land, but with intensive manuring. This system can only last as long as the rings of grazing land around the villages do not overlap, which is no longer the case, and so manure is becoming scarce.

## “RATIONAL” RESOURCE MANAGEMENT AND SUSTAINABLE DEVELOPMENT

Several projects originate from the (frequently implicit) conviction that rural people manage natural resources badly and that they destroy their environment out of ignorance.

During the 1970s, there were several “rational use of pasture” projects in the grazing areas of the northern Sahel, whilst in the 1980s the “Village management” projects and programmes were introduced in farmland Sahel.

The major livestock projects which tried to improve pasture production and management systems were all spectacular failures, so much so that today practically no such projects remain. They did, however, have the merit of demonstrating that traditional livestock breeding performs very well and that reducing pressure on natural vegetation, can only be achieved through lower animal production.

### 11.1 “Village management” projects

In farmland Sahel, “rational management” means setting up a system of exploitation to ensure continued productivity of the resource base.

The following principal actions are carried out to this end:

- delimiting the village territory;
- compiling a soil classification and use plan (pasture, crop types, etc.);
- disseminating “improved” production techniques (manuring, etc.);

- setting up an anti-erosion action plan (embankments, dykes, agroforestry).

Village delimitation is generally fraught with difficulty and often takes several months or even years of negotiation. However, in the longer term, this should not prove to be an insuperable problem and there is no doubt that delimitation will have to be done sooner or later.

As far as land use planning is concerned, it is noteworthy that the more the process it induces is iterative, (crop rotation, fallow lands), the closer it comes to what farmers have always done.

In other words, soil analysis in laboratories helps experts to understand what is happening in the field, but is rarely any more helpful in improving the situation than what farmers have known for a very long time.

“Improved” production techniques almost always include components which farmers cannot afford and which need continuous subsidies: fertiliser, fodder supplements for livestock, animal implements, etc... Therefore most of the techniques on offer cannot be applied widely and are thus not viable.

Anti-erosion projects are undoubtedly positive, even though little is known and there is still uncertainty about their impact on resource productivity, and investment has to be subsidised (cf. 10).

The “village management” approach is now fashionable. Although some components have a longer history (eg. anti-erosion embankments) field work is still quite recent and nobody yet knows how well it will work.

Here again, surprises and disappointment must be expected, since, as is the case for large-scale herding, it is more than likely that traditional farming performs much better than the outside world thinks.

In fact, hopes of success for this approach lie in two rather unrealistic ideas: rational resource management through a communal mechanism.

### **Rational management**

The idea of introducing "rational" natural resource management suggests that traditional management is archaic and that the peasant farmer destroys the environment out of ignorance.

In other words, the introduction of rational management would make more production possible and preserve resources.

Attempts to address this, through the preparation of exploitation plans to preserve long-term soil fertility, have met the following problems:

- the "rational" plan which preserves resources cannot produce the amounts of food needed for the survival of the present population.
- only the use of inputs from outside the village territory can ensure that these needs can be met, but the villages cannot produce a surplus to pay for such inputs.
- present land-use patterns constitute "optimal over-exploitation" which covers as many vital needs as possible whilst ensuring the slowest possible rate of resource degradation.
- factoring dynamic phenomena (crop rotation, fallow requirements, etc) into "rational" (scientific) land use brings it strangely close to what farmers have already been doing.

In other words, farmers destroy their environment, not out of ignorance, but simply because they can do nothing else with the means available to them.

These were the findings for an overpopulated region (Mossi Plateau in Burkina) where the only solution is to emigrate.

The thinking behind "rational village management" tends to be that farmers have the technical solutions but that their resource management is wrong. In fact the exact opposite is true, and the real problem facing rural

development projects is how to devise appropriate techniques which boost soil productivity and which the rural people can afford. Here, everything still remains to be done.

### **Community solidarity and management**

The "village management" philosophy often goes hand in hand with an idyllic vision of solidarity and "community development" in the villages.

This vision tends to neglect private interests, especially when people are competing to appropriate resources. Here again, a little more realism might be a good thing, since community decisions are generally only taken on issues which cannot be decided otherwise.

It must also be realised that just as the farmers do not (did not) really own their fields, the village does not really own its territory.

In this context it would be useful to know what the rights and duties (concerning fires, land clearance, grazing, etc.) of neighbouring villages and newcomers to the village are.

The reservations expressed above do not deny the usefulness of the village approach which attempts to geographically delimit resources and to arrive at an overall picture of the village as a framework for proposed actions (plantations, anti-erosion work, etc.).

So, although the village approach may not give much hope of more rational management, it is indispensable for planning development actions in general and physical infrastructure investments.

## **11.2 "Sustainable development"**

The latest concept to come into fashion is **sustainable development**. It is becoming so widespread that it seems that it was just waiting to be discovered, and that the degradation which we cannot fail to observe around us is simply the result of forgetting about and neglecting natural resources.

This may be the correct analysis of development in the industrial world over the last century, but it does not apply to agrarian societies which have always been dependent on natural regeneration of

## *11. "Rational" resource management and sustainable development*

resources. Although even until recently the bush was a threat to human communities, production techniques reveal detailed traditional knowledge of the environment and of what has to be done to obtain satisfactory productivity (fallow periods, manure, crop rotation, etc.).

Also almost all rural development projects have for a long time been trying to strengthen resource productivity and regeneration: anti-erosion dykes, manure, planting, closing access.

In fact the people who "discovered" sustainable development do not seem to have taken account of the tendency for development not to occur outside the limits of four factors, namely population, resources, technologies and means, and that, when population density exceeds carrying capacity, sustainable development is impossible without bringing in technical and financial means which can only be generated and released by a change in economic structure.



## SOCIO-POLITICAL APPROACHES

Apart from analyses which seek “material” (ecological, economic) explanations and which aim at physical developments, there are also analyses which relate to the immaterial aspects of development and the actions which try to induce it.

The main theories in this field are “Grassroots Development”, “Participation in Decision-making” and “Community Development”.

Obviously these theories are not specific to the issues in the Sahel, but since some of them sometimes play a prime role in the formulation of project design and strategies, they can hardly be ignored.

It should first be pointed out that these are all reactions based on ideologies or value judgements, not on an analysis of the situation on the ground.

### 12.1 Grassroots development

As opposed to solutions imposed from outside, (top down), there is a theory of development based on local incentive (bottom up).

Clearly, no development programme or project will succeed without firm and sustained motivation and commitment on the part of the target population.

However, there will not be any sustained local motivation to become involved unless action produces tangible benefit.

In the Sahel, this almost always means an improvement in food production, which is by far the most basic and widespread concern, whereas most projects pursue other aims such as

“environment conservation”, “modernisation” of production systems, etc.

But, to produce more on resources which are depleted requires technical solutions, and that is just what the local populations do not have, otherwise they would have put them into practice long ago.

As a result, grassroots development projects more often than not simply set up “peasant farm revolving funds”, which only go round in circles for want of viable solutions.

So, although local participation is essential for development, it is not the only requirement, since the final aim of development action is precisely to stimulate local action. If only finance is poured in, this reduces the local capacity for self-development.

The main contribution that local people can make to identifying and selecting action is to provide information on priority concerns and local know-how, but when technical solutions are being sought and developed, an outside contribution is most often essential.

The solution therefore lies in creating a dialogue between the local people and development workers. This will have implications for project planning and design (which will need to be much more flexible), for the way in which development workers approach rural people (research-action) and for staff quality.

Project planning, design and approach are subjects which are far too broad to be covered in this document.

As for staff quality, suffice it to say that staff are

less and less able to talk to rural people and to understand their problems.

There are too few national staff to allow the best people to be sent into the field. Furthermore, such people are more keen to work in towns rather than in the countryside, and more and more staff are of urban origin, and have lost the necessary contact with the rural world.

International staff are getting younger and their enthusiasm is often in inverse proportion to their experience, which is not a particularly helpful situation.

## **12.2 Groups and community development**

After discovering the wonders of "traditional solidarity", the proponents of community development place their hopes for a better future in the stimulation of the grassroots. To achieve this, they offer a panoply of training activities (literacy, accountancy) and hope that the "village group" will build on this and take responsibility for its own development.

Apart from the fact that, after decades of trying, it is still hard to find groups which function in reasonably well, this ideology confuses "solidarity" with "communautarianism", and takes "collective defence reaction" for "affirmative expressions of a collective will to initiate change and development".

"Traditional" community solidarity seems to have more to do with a need for social cohesion, where the individual gives way to the community, than with a deliberate commitment on the part of the individual to the common weal.

Most of the time, the individual distrusts his neighbour, and has no hesitation in tricking his "brother" for his own benefit whenever he gets a chance.

Social cohesion seems to be the result of a vital defensive reaction to a shared threat: a hostile environment, epidemics, dangerous neighbours...but it only rarely gives rise to new initiatives to take control of future development(s).

This does not mean that rural populations are steeped in fatalistic conservative attitudes opposed to any change. In fact, accessible innovations which produce tangible benefit are easily accepted and

spread spontaneously (bicycles, radios, wire, flip-flops), even in the absence of any project, and rural people's apparent fatalism is merely a form of wisdom which realises that innovations which can be acquired and which actually work are few and far between.

Furthermore, when a group does function satisfactorily and shows initiative, it is almost always dominated by a dynamic personality who has managed to reconcile his and his neighbours' interests.

Groups only rarely drive development because, with the fundamental problems facing Sahel communities, they too have no adequate solutions to offer.

The community development ideology tends to forget that the best way to breathe life into traditional societies is to introduce successful techno-economic "innovations", and that the creation of groups is only one way (and not necessarily the best way) of organising and managing activities.

Of course, some "innovations" such as irrigated areas need functional groups to be set up with specific tasks (water management, maintenance) but to hope to create multipurpose groups to carry out all sorts of development tasks is pure fantasy.

## **12.3 Emancipation and democratic change**

There are several trends among those who believe that social rigidities are the main obstacles to development. These trends include:

- emancipation of women and "slaves";
- support for democracy in politics at the national and local levels;
- support for agrarian and land reforms (cf. chapter 6).

These trends all point the finger of blame at traditional "feudal" societies and the "greed" of the powerful, in the belief that more democracy in decision-making, more emancipation and more "social justice" will induce a more dynamic approach and development.

This is not too obvious a conclusion. These values, however praiseworthy, may also be seen as

resulting from development rather than inducing it. Which came first, the chicken or the egg? Things have to be kept in the right order, without trying to make the egg lay the chicken.

Participation in decision-making assumes that there are decisions which depend on individual choice. It must be acknowledged, however, that in rural life, most important decisions are pre-ordained, known to everyone and based on "tradition". One does not choose one's job, nor one's crops, nor this nor that, and decisions which affect the community are often "unanimous", although not necessarily democratic, since unanimity is felt to be a sort of moral obligation.

Thus, very often, an innovation is either unanimously rejected or accepted, with changes seen more as the hand of fate rather than as deliberate choice.

The really discriminatory decisions are most frequently taken to solve leadership disputes. Of course, when power changes hands, privileges change clans without inducing development processes.

More social justice implies that there are things that could be redistributed, but in a subsistence production/consumption community with no market outlets (and therefore very little income) and with inadequate resources (and thus a chronic food shortage), the only thing that can be redistributed is poverty and hunger.

It is no accident that the more austere the environment, the more hierarchical the society will be, and it is quite possible that if resources were

redistributed in a more egalitarian way environmental degradation would be even more rapid.

However, with any project there are "means" which have to be shared out and managed. This is when conflicts start to break out in order to control the new means.

As is the case with humanitarian aid, people more frequently quarrel to control the means made available by the project rather than the sustainable results generated, because not many results are to be expected anyway: as soon as the flow of subsidies dries up internal conflict stops.

Thus, the proponents of democratisation tend to overestimate the technical and economic relevance of their actions, and explain away their setbacks as breakdowns in participatory mechanisms.

The real problem is how to find action which motivates local people, not because of the means brought into play, but because of the tangible benefits which are produced by viable means and methods. Here again, the previous chapters give grounds for believing that there is not yet very much to offer.

Unlike the "bottom up" thinkers, the supporters of democratisation are less opposed to outside interference since, to speed up the emancipation process, such interference even seems to them to be a good thing.

Such interference in what are basically endogenous processes remains morally very dubious.



## CONCLUSIONS

Readers will have realised that the author of this report believes that the overall result of development aid is disastrous.

This judgement obviously depends on the criteria one uses.

Sometimes, projects are considered a success simply because they manage to keep themselves going and/or install the "physical component" of the programme: digging wells, building small dams, planting trees, putting up fences, etc.

The fact that a few years later, when outside financial aid has stopped coming in, only dilapidated infrastructure remains, and little, if any, development impact is visible is not too problematic, since people seldom take an interest in forgotten projects.

The ultimate goal of triggering a sustained self-development process (without structural subsidies) seems completely out of reach.

It is even probable that the main impact of international aid is felt in its indirect effects, and that most of the means transferred are being "recycled" into the artificial inflation of the bigger cities.

Unfortunately an artificially swollen services sector is not a strong foundation to build the future on, because if it cannot be financed by locally generated added value and if public resources cannot afford it, the countries concerned come to depend increasingly on the international community, *inter alia* for the maintenance of social peace and political stability.

Stimulating development is not an easy task.

But, if at first you don't succeed, try, try and try again!

And, for Ibrahim: ouldanaakum el moulana.



# ANNEX 1

## SUGGESTIONS FOR RURAL DEVELOPMENT AID

It should first be recalled that until there are changes in macro-economic structures and population growth, any improvement in agricultural production will only slightly increase carrying capacity, and as a consequence, will only have a limited impact in time and will not contribute to sustainable development.

Nevertheless, the future must be prepared, and, whilst awaiting changes in macroeconomic structures, methods and techniques for rural development must be sought and made ready.

### **1. Agro-ecological conditions, production techniques and national policies**

One suggestion relates to the need to select the type of production to be supported as a function of the agro-ecological conditions in various regions.

Today, international aid finances meat production projects in coastal countries (Côte d'Ivoire, Togo) at the same time as irrigation projects for food crops in the Sahel. In both cases, the environment and climate are hostile to these types of production, which swallow up endless subsidies. Even worse is the fact that meat production in coastal countries takes away Sahel livestock's main markets. Since herders become poorer, finance is needed for food aid (drought!).

So, in the search for self-sufficiency, the international community finances food security three times over, and the problem would have been less important without any finance in the first place.

These projects have far more to do with

humanitarian aid than support for development. Techno-economic success is probably the best way of inducing a development process. What farmland Sahel most needs are accessible techniques which enhance soil productivity and improve yields.

This paper has suggested that in this essential area, development agencies and workers have few effective, viable products to offer. This is why they persist in their attempts to promote farm "modernisation", which will need subsidising for a very long time to come.

As for low input technologies which only need a few extra hands to work, there is still, amazingly, utter confusion both with regard to their technical efficiency and their economic viability.

It is therefore unfortunate that agronomic research centres continue investigating "modern" techniques and rather neglect to consider the means available to farmers.

A second recommendation therefore relates to the creation of a serious research programme to develop such techniques, especially looking into the conditions and circumstances for evaluating their operational relevance, both physical and economic. In other words, any applied research programme into farm techniques should start, not with a physical objective, but from the means already available to the targeted group of farmers.

One final suggestion concerns national policies which affect rural development. It is often much more effective to work on the conditions which combine to determine profitability than to intervene directly at the production level. For example, duty on food imports stimulates local production and releases resources for production

inputs. However, it is a fact that, globally, national policies favour urban dwellers to the detriment of farmers.

## **2. Some specific recommendations for rural development**

With a few exceptions, these recommendations draw on actions which have already been taken in existing projects.

- undertake soil and water conservation and soil protection and restoration work to develop watersheds, starting upstream.
- promote land (and pasture land) privatisation and village delimitation by, eg., subsidising the purchase of wire for fencing. This is already

taking place, even without project backing. However, the faster this can be done the better.

- campaign for the year-round supervision of domestic animals.
- stimulate cash crops and the concomitant intensification of food production.
- set up rural savings and loan banks.
- stimulate the development of non-farming activities in rural areas: facilitate access to tools, materials and credit.

Finally, install a water supply network as a function of available land resources. This is a very controversial proposal, because hard-line nature conservationists believe that such a network would lead to the destruction of the last natural vestiges in West Africa.

# ANNEX 2

## GENESIS THE SOURCES OF THE “CONTROVERSIAL VIEW”

The analysis presented in this report is the fruit of field work. It is neither a scientific nor an academic treatise.

The principal sources of the information which progressively helped these ideas to take shape were hundreds of interviews with farmers and herders conducted during long and short visits to the region over a period of 20 years.

The studies and work listed below are just some of the 50 missions and assignments the author has been involved in.

The findings accumulated during this work are only referred to in so far as they helped to form the “diagnosis” as presented.

1. Inquiries conducted over a six-month period within the “El-Meki Dam feasibility study”, Air, Niger (1975) reveal that even in the 1960s Air was in crisis because of overpopulation relative to pastureland available for raising camels.
2. The project on “Pastureland Improvement and Protection of Animals in Mauritania” (APPAM), phase III 1980-82, confirmed the ‘Sahel Production’ study (PPS) conclusions, namely that:
  - a) except in exceptionally low rainfall conditions, the factor which limits (protein) productivity of natural vegetation (pasture) is soil fertility and not rainfall.
  - b) rainfall fluctuations have a considerable impact on biomass volume, but only relatively little impact on plant protein production.

- c) except in exceptionally low rainfall conditions, pasture quality is better during dry years than in wet years.

Subsequently, the “Central Niger Range and Livestock Project” (1980-1984 USAID) indirectly confirmed these findings by discovering that during the rainy season in dry years, herds put on more weight and were more vigorous than during the rainy season in high rainfall years.

Project APPAM also showed that:

- it is not established that overgrazing causes desertification;
- nomadic grazing achieves high performance levels;
- pressure on the environment cannot be reduced unless animal production is cut back.

In the socio-economic field project APPAM was able to estimate that the project area (6000 km<sup>2</sup> north-east of Kankossa; Assaba) had too many herders for the available amount of pasture.

This relative overpopulation had given rise to the following phenomena:

- an increasing struggle for control over pastures;
- herders’ refusal to accept public wells in Djenke (area of no water);
- gradual sedentarisation of herders (starting in the 1970s);
- extension of rainfed and recession agriculture, which was practically nonexistent before 1960.

Finally the project estimated that the main obstacle to farming intensification was the low level of farmers' income due to the weak market caused in turn by low purchasing power.

3. The "Agricultural Diversification and Hedge Planting" project (D.A.H.V.), Ballegara, 1983, Niger Dallol Bosso, allowed a parallel to be drawn between the situation in livestock country (APPAM) and agricultural regions, namely, that overpopulation, in this case relative to available fertile land, results in the disappearance of fallow land, soil depletion, lower yields (even with good rainfall), the invasion of lowlands (and their gradual depletion), refusal of access to nomadic herders, etc.

These phenomena first appeared in the 1960s.

The project also noted the problems encountered in trying to sell off out-of-season vegetables, as well as how difficult it was to make a profit using production techniques requiring monetary expenditure.

4. The "Diagnostic Study on Peri-Urban Development in Divo", Côte d'Ivoire (1984) drew a parallel between northern Sahel, farmland Sahel and the situation in forest areas, namely that primary forests were disappearing because of land clearance for food crops.

This study also detected mass migration of Sahel people to the southern parts of Côte d'Ivoire (40% of the Divo population in 1984, with almost all arrivals after 1960).

5. The "Right Bank Reforestation" project, Tera, Niger (1985, '86 '88 and '89) bore out most of the above hypotheses and showed that for some years now, several riverside villages have hardly used wood for their domestic energy needs.

By setting up fenced areas, the project also revealed that agriculture is a more important factor for the disappearance of natural vegetation than a drier climate and/or overgrazing.

6. Project "Their Own Dam", Kita region, Mali (twice in 1986, and 1987) showed that:

- low local population density is due to the lack of a water table in the dry season because of the region's particular geological situation;

- following the seasonal drying up of former year-round surface waters, drought creates major problems for domestic water supplies;

- despite a drier climate the region still has much fallow land, abundant, thriving natural vegetation and high yields.

7. The prospective (1986) and identification (1987) study for a rural development programme for Batha, Chad, provided information on the agricultural production system based on intensive manuring (from sedentary herds) without fallow land. It also showed how precarious the system can be when the rings of grazed land surrounding villages start to overlap as population density becomes too high (cf. chapter 10).

Low population density around Lake Fitri is probably due to the presence during the rainy season of an unbearable quantity of insects. Thus, despite a drop in the lake's level, there is much plant and animal life, and yields exceed 1 tonne/ha on the rare floodplain fields around the lake.

8. The evaluation of the "Irrigated village fields" project (P.P.I.V.), Mopti (1986-87) made it possible to calculate that small pump-irrigated areas are not viable without structural subsidies. This fits in with a series of related studies.

9. The evaluation of the "Village Woodlands" projects in Burkina and the Segou region in Mali (both in 1988) showed that deforestation is not caused by fuelwood needs but by farmland clearance (cf. 9.1).

Gerald Foley had already published his article "Exaggerating the Sahelian Wood Fuel Problem" (Panos and Ambio, 1987) which cast doubt on the macroecological/energy studies which were at the origin of the ESMAP programme (UNDP/WorldBank) and of a host of Forestry for Energy projects initiated since the late 1970s.

These projects also verified and provided information on the disappearance of fallow land, lower yields, the clearance of increasingly marginal land, the abandoning of depleted and destroyed land, the development of sedentary livestock in farmland Sahel, trends in runoff rates as a function of the spread of land clearance, impacts on water table trends, etc.

10. Evolution in the "Sissili Community Development Project" Burkina, (1988) revealed the scale of migration from the Mossi Plateau to southern Burkina. This fairly recent trend developed considerably during the 1980s.

11. From 1989 to 1993, fifteen other missions checked, confirmed and completed these findings.

The following work should be mentioned:

12. In 1990, the environmental impact assessment of eight projects in Burkina financed by Netherlands Cooperation, as well as the study on "Prospects for Animal Implements in Burkina Faso" for the Caisse de Credit Agricole (1991, KFW finance) confirmed:

- the scale of internal migration in Burkina;
- the beginnings of movement away from certain regions which were settled after the eradication of river blindness in the 1970s;
- the almost total disappearance of fallow land from over 50% of the national territory;

- the impossibility of making a profit from use of animal-drawn techniques for food crops;

- the use of animal-drawn techniques to continue overexploitation of the soil.

13. The "Northern Pastoral Development" project study, Côte d'Ivoire (1990) and the "Animal-drawn techniques" study, Togo (1992) interviewed immigrant Sahel herders to elucidate their reasons for migrating and conditions for livestock in savanna regions.

This work also revealed that:

- raising livestock for meat does not correspond to the agro-ecological conditions in the region (hostile climate, poor-quality pasture);

- coastal countries are rapidly evolving towards a Sahelian situation where resources and space are becoming scarcer;

- macroeconomic development does make it possible to start intensifying farm-production techniques.

It goes without saying that these studies made use of existing and available documentation.



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