Food Markets in Burkina Faso

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December 2000
CDS Report No. 10
ISSN 1385-9218
Preface

The authors of the present CDS Research Report participate in the research programme "Food Security and Economic Development in Burkina Faso". In this programme researchers from the University of Groningen, the University of Ouagadougou and the National Institute for Environmental and Agricultural Research (INERA) in Burkina Faso participate (see the CDS Research Strategy Paper No. 1). In the framework of this programme research is undertaken in three domains:
- Macro-Economic Structural Adjustment Policies,
- Sustainable Rural Development and Food Security,
- Development of Small and Medium-Sized Enterprises.

The Centre for Development Studies of the University of Groningen, in co-operation with SOM (Research School: Systems, Organisation and Management, Groningen University) organised a workshop on April 15, 1999, to provide a platform for presenting research results for researchers participating in the sub-programme on the “Functioning of Food Markets”. The theme of the workshop was “The Functioning of the Food Market in Burkina Faso”.

After the fruitful discussions in the workshop, the authors revised their papers. The final texts of three papers are published in this research report. The first paper, by Clemens Lutz, Arno Maatman and Caspar Schweigman, gives an overview of the issues involved in the debate on "Food Security and Food Markets". The discussant for this paper was Marcel Spijkerman (Agricultural Economics Research Institute, the Netherlands). Subsequently two PhD students present their research on the grain market. Boubié Bassolet (Faculté des Sciences Economiques et de Gestion, Burkina Faso) presented the paper "Le Marché de Céréales au Burkina Faso". His paper was commented by Ruerd Ruben (Wageningen Agricultural University, the Netherlands). Finally Arjan Ruijs (University of Groningen) presents the paper "An Agricultural Trade Model for Burkina Faso", co-authored with Caspar Schweigman, Gnanderman Sirpé and Clemens Lutz. The discussant was Kees Burger (Free University). We would like to thank the discussants and the participants of the workshop for their useful comments, which were very helpful for improving the papers.

The papers presented in this CDS Research Report provide a good overview of recent research in the functioning of food markets in Burkina Faso.

Groningen,

Clemens Lutz
## Table of Contents

### Rural Household Food Security in semi-arid West-Africa
Clemens Lutz, Arno Maatman and Caspar Schweigman

1. Introduction 7
2. Food Security; some notions introduced 9
3. Food Security Strategies of the Rural Poor 11
4. Food Allocation by the Market 14
5. Alternative Initiatives to improve the Food Situation 18
6. Perspectives of sustainable agricultural Intensification 20
7. Consequences for Food Security Policy 21

References 25

### Organisation et efficacité du marché céréalier au Burkina Faso
Boubié Bassolet

1. Introduction 29
2. Cadre théorique et méthodologique 31
   2.1 L’économie néo-institutionnelle: concepts théoriques 31
   2.2 Les critères de performance des marchés céréaliers 33
   2.3 La méthode d’analyse de l’étude 35
   2.4 Les sources de données 37
3. Environnement institutionnel et structure des marchés céréaliers 38
   3.1 L’évolution de la structure des marchés de céréales 38
   3.2 Les sources et la distribution de l’information des marchés céréaliers 43
4. Comportement des acteurs de la commercialisation des céréales 46
   4.1 Les périodes de vente des producteurs 46
   4.2 Le comportement de stockage des commerçants 48
   4.3 Les coûts de transformation et de transaction des céréales 49
5. Efficacité économique des marchés ou de la commercialisation des céréales 55
   5.1 L’efficacité temporelle de la commercialisation des céréales 55
   5.2 L’efficacité spatiale de la commercialisation des céréales 64
6. Conclusion 68

Références bibliographiques 71
Modelling cereal trade in Burkina Faso: the impact of transport costs on trade flows.

Arjan Ruijs, Caspar Schweigman, Clemens Lutz, Gnanderman Sirpé

1. Introduction  73
2. Spatial Equilibrium Models  74
   2.1 Consumer, Producer and Trader Strategies  76
   2.2 Spatial Equilibrium on n Markets, Multi-period Model  82
3. Spatial Equilibrium models to analyse cereal flows in Burkina Faso  88
   3.1 Empirical Evidence of Supply and Demand  88
   3.2 Trade Costs  95
   3.3 Cereal Demand Functions  96
   3.4 Cereal Supply Functions  97
4. Discussion of Model Results  98
5. Conclusions  103
References  104
Appendix  108
Rural household food security in semi-arid West-Africa

Clemens Lutz, Arno Maatman and Caspar Schweigman

1. Introduction

This paper discusses the constraints and opportunities for food security of rural households in vulnerable regions in semi-arid West Africa. The resource base that provides their food entitlements is weak: they face unfavourable agro-climatic conditions, scarcity of fertile soils and a lack of viable economic opportunities. The paper focuses on two issues: food security strategies and characteristics of the food and related markets (agricultural inputs, labour, land, capital). As a result of structural adjustment policies and relatively good weather conditions during the ‘90s food security is getting less attention than needed. In order to be able to accommodate less favorable circumstances in the near future, the rural sector needs a committed government that creates an enabling environment and, in particular, encourages market development and local initiatives to attenuate the threat of food insecurity. This article makes a plea for larger public and private investments in the rural sector of the West-African economies.

Poverty at household level is a major constraint for achieving food security in the rural areas in semi-arid West-Africa2. Food entitlements are scarce and

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1 Clemens Lutz, Lecturer in Marketing, Faculty of Management and Organisation, University of Groningen, The Netherlands.
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fluctuate heavily from one year to another. In bad years most rural households are ‘deficit producers’ and their failure to earn sufficient off-farm income makes them to live below the poverty line. They are food insecure, i.e. they run a high risk of not having access to enough food for a healthy life. For example, the FAO estimated that 37% of the population in Sub-Saharan Africa were chronically undernourished in the period 1988-1990. Their vulnerability is the result of unfavourable agro-climatic conditions, scarcity of fertile soils, lack of viable economic opportunities and incidentally major social and political disruptions. Despite the fact that this issue is on the policy agenda for a long time the problem persists. As a result, continuous soil mining or minor ‘shocks’ may create major disruptions in the production system. The plea for sustainable development sounds nice but is still out of reach for many rural communities.

Assessment of food (in)security and of perspectives to improve food entitlements requires a multidisciplinary approach as it depends on biophysical, socio-economic and political systems in a large sense. Production and exchange of food depend not only on food requirements and on the quality and quantity of production factors at the disposal of households or rural communities, but also on cultural values, political stability and economic opportunities. It is not our intention to provide a complete list of factors that determine food security. This paper focuses on two issues related to production and exchange decisions of the rural poor: their food security strategies and some characteristics of the food, agricultural inputs, land, labour and capital markets. No blueprint exists for policies to achieve food security. On the contrary, these policies should be based on careful assessments of the constraints and the perspectives of rural development, taking into account the spatial and temporal dimensions of local food systems and inter-household differences with respect to food entitlements. This paper

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2 In accordance with Sanders et al. (1996) we define the semi-arid region as the area with mean annual rainfall between 500 and 1000 mm (which corresponds approximately to an average growing period of 90 to 179 days). Limited annual and highly variable rainfall severely limits agricultural production in these regions, together with low soil fertility levels. Cropping systems are dominated by millet and sorghum cultivation.

3 Country assessments of poverty have been undertaken during the last decade, with technical and financial assistance of the World Bank. Sijm (1997) discusses some results of these studies for Ghana, Tanzania, Mali and Malawi. Respectively 36%, 55%, 47% and 51% of the population in these countries live below the poverty line. It is also shown that the rural population is relatively over-represented in this group. In a recent critical review of 23 poverty assessment reports of Sub Sahara countries (Hanmer et al., 1996) it has been concluded that more than 75 per cent of the poor live in rural areas in all but two of the countries.

4 FAO has defined chronically undernourished people as "those people with food energy consumption averaged over a year inadequate to support more than light activity and maintain body weight". This definition excludes productive manual labour (see FAO/WHO, 1992 and Sijm, 1997, p. 67, for further discussion of this standard).
does not plead to postpone action, but to defer from ineffective top-down approaches. It emphasises the different levels of policy-making, and the need to involve stakeholders (farmers, traders, project officials, extension agents, etc.). Finally, it nuances the regularly acclaimed recipe of ‘market liberalisation’ to improve food security in these regions. To which extent the private market can indeed contribute to food security is one of the crucial questions for the coming decade.

In the next section of this paper the concept of food security is discussed. The third section focuses on strategies of the rural poor to earn a livelihood from the resource base at their disposal. Section four presents the rural market as an allocation mechanism. Subsequently some local initiatives to improve the food situation are discussed. In section six we discuss briefly the perspectives of sustainable agricultural intensification. Finally some conclusions for food security policy are drawn.

2. Food Security; some notions introduced

Food Security is defined in the World Bank report on Poverty and Hunger as follows: ‘Access by all people at all times to enough food for an active and healthy life’ (World Bank, 1986). Enough food is defined on the basis of a minimum consumption norm: a standard for the minimum average daily per capita energy intake. This nowadays widely accepted definition of food security contains at least two crucial elements:

- the availability of food on the household level, through own production and marketing channels (e.g. buying on the local market);
- the accessibility of food for individual households, resulting from exchange entitlements.

\[ FAO \text{ uses the 1.54 Basic Metabolic Rate (BMR) as a minimum standard (see FAO/WHO 1992). The factor 1.54 allows only for light activity. It is the energy expenditure of an individual while in a fasting state and lying at complete rest. The standard used by the World Bank (1986) is a minimum energy intake of 2070 or 1840 calories per capita per day (respectively 90\% and 80\% of FAO/WHO minimum requirements).} \]
Food Security and Food Entitlement

During the 1970s, when serious concern arose with regard to cereal imbalances in Sahel countries, the term food security was hardly used at all. It certainly did not have the connotation of food shortages at the household or individual level which it has today. Food security had a supply-oriented meaning. Its assessment was usually based on a comparison between national food needs over the season (year) based on the standard developed by FAO/WHO (see footnote 4) for minimal food requirements per adult, and a national estimate of net food availability. Efforts of food donors and governments focused on the national food supply and in particular on the establishment of security stocks.

Evaluations of food policies have shown that aggregated food-availability statistics are quite uninformative about the causes of hunger. Except for civil wars and during years of extreme drought, availability of food (on the national level) is not the constraining factor for household food security (Sen, 1981). However, a large part of the rural households in the vulnerable regions of semi-arid West-Africa is chronically food insecure (FAO/WHO, 1992). A household has several ‘entitlements’ at its disposal which can be used to produce or buy goods and services. The bundle of entitlements consists of various components and vary among households: income from employment; the assets owned; the food produced for home consumption. Although good harvests attenuate the threat of food insecurity for many of the poor, it does not necessarily provide all of them with the required food entitlements.

Chronic and transitory food insecurity

The World Bank (1986) introduced a distinction between chronic and transitory food insecurity. Chronic food insecurity refers to a persistent inadequate diet caused by the inability to acquire food; transitory food insecurity refers to a temporary decline in a household’s access to enough food. It results from a shock in food production or household income - and in its worst form it produces hunger: famines. Although both types of food insecurity are linked and not always easy to distinguish, this classification has important consequences for the policy instruments to be developed (Drèze and Sen, 1989). In the context of famine prevention the crucial need for timely intervention often calls for a calculated reliance on relief agencies to supplement existing distributional mechanisms. Combating chronic hunger requires quite different and more permanent actions at the household level.
3. Food Security Strategies of the Rural Poor

The food entitlements of the rural poor differ among individual households and from one zone to another. Rainfall, population density and infrastructure vary considerably within the semi-arid region of West-Africa, and determine both major constraints and options for rural development. Food entitlements differ also between households of the same sub-region. Kinship relations, and the domestic development cycle of farm-households were - and still are - important factors which explain differences. Processes of individualisation further increase the differences in food entitlements between households.\(^6\) The following two examples serve to illustrate the wide variety of situations.

- In the northern areas of the semi-arid region of West-Africa (sahelo-sudanian zone), food entitlements of households are largely based on livestock, and millet-cultivation. Millet is cultivated on small plots, which receive relatively large doses of organic manure. Average levels of food crop production of the (semi-)nomadic population in these regions are well below subsistence requirements. Livestock production depends on the fluctuating availabilities of fodder and water resources in the dry season. In bad years, animal densities are reduced through strategies of destocking (sales of animals) and by increased movements of herds to the southern regions. Besides, income from petty trade, non-livestock trade, artisanal (weaving, making of baskets etc..) and other local non-farming activities and seasonal migration is used to buy additional food crops. Many households have developed important networks to diversify their sources of income (cf. Reardon and Matlon, 1989). The resulting set of food entitlements makes them food secure. However, the mobility of the pastoralists and their herds becomes increasingly constrained, as both human and animal densities rise in the southern areas.\(^7\)

- In the densely populated areas of the sudanian zone (700 - 900 mm), as for instance on the Central Plateau in Burkina Faso, food entitlements are predominantly based on food crop production (millet, sorghum, maize). In normal years, food production is generally sufficient to meet

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\(^{6}\) The process of individualisation refers both to a weakening of the socio-economic ties between households of the same extended family (clan, hamshed), as to the weakening of customary family authorities (see e.g. Kohler, 1971, Marchal, 1983). Migration, increased market-integration, and the persistence of a 'survival'-economy are often claimed to be the dominant forces behind these processes of individualisation.

\(^{7}\) Another factor is the development of horticulture on the low-lying soils around dams and water reservoirs (carried out immediately after the rainy season).
subsistence requirements. However, in the most vulnerable areas or in bad years, poverty is widespread and household food security is seriously threatened. Revenues from cash-crop production, livestock sales and local non-farm activities (e.g. processing) are generally insufficient to provide the required food entitlements. Agricultural productivity is very low in these regions. Present yield levels are obtained largely at the expense of the fertility of land. Fallow periods are shortened or have disappeared, and agriculture is extended into marginal areas (rangelands) without sufficient measures to restore soil nutrient levels. Animal husbandry is very much constrained by the limited availability of fodder resources (decrease of rangeland area, limited availability and competitive use of crop residues) and labour.

Food security strategies depend on the local situation farmers are facing. They also differ from one year to another. Strategies are characterised by rationing and destocking of animal herds in ‘bad’ years; in better years, farmers invest in food security stocks, livestock and other activities (e.g. Toulmin, 1995, Gué, 1996). Over time, food security strategies have changed, among others as a consequence of increasing population pressure on land. In the densely populated zones of the Central Plateau of Burkina Faso over the years several distinct phases can be distinguished:

- **Shifting cultivation**: the traditional agricultural system of shifting cultivation, based on the natural regeneration and maintenance of the original vegetation (fallow periods of 10 to 15 years, after 3 to 5 years of cultivation).

- **Expansion of cultivated areas**: the growth of the rural population causes an extension of cultivated areas in “virgin” areas and, more and more, a decrease of fallow periods, thus creating an agricultural system based on (semi-)permanent cultivation with relatively short periods of fallow, next to some permanently cultivated fields. The increased cultivation of cash-crops (cotton in colonial times, groundnuts thereafter) also induced an increase in area cultivated per active member (see Hart, 1982).

- **Extensification of cropping practices**: as the fertilisation measures (fallow, organic manure) and intercropping and rotation patterns are not sufficient to compensate for the extraction of nutrients from the cultivated soils, soil fertility declines. In order to cope with the decrease of soil fertility levels, more land (in terms of ha/active member of the household) is cultivated, often at the expense of more intensive methods of land preparation, sowing and weeding. This extensification of
cropping systems (cf. Marchal, 1983) is only aggravating the phenomena of soil degradation, and contributes also to an increased competition between cropping and livestock systems, and in particular between sedentary farmers and (semi-)nomadic pastoralists.

- **Marginalisation, migration and farmers’ initiatives**: the decrease of labour productivity (as a consequence of soil degradation, and the scarcity of new arable lands) stimulates farmers to look for other opportunities to invest their own labour: livestock, non-farming activities\(^8\) and migration. The diversification of revenues is an important strategy to balance crop production deficits. However, since the local possibilities to diversify are limited, a large and growing number of households becomes increasingly dependent on revenues from seasonal migration and income transfers from migrated parents. A large number of households finds itself in such a situation, having less and less access to sufficient food. Some of them, in particular the younger heads of a farm-household, take the decision to emigrate to higher potential zones in the sub-humid regions; others try, often with the help of extension services or rural development projects, to increase agricultural production and to restore soil fertility through the adoption of soil and water conservation methods.

Not all these changes in food security strategies were directly related to just rural population density. Some other important factors are: the progress of islamic religion, climatic cycles (‘good’ rainfall years in the ‘60s, droughts in the early ‘70s and ‘80s) and the influences of colonial and post-colonial policies. Moreover, changing food security strategies themselves affect rural society, the organisation of labour, the intra-household relationships and the inter-household economic relationships, and tend to induce further changes. Seasonal migration, which is part of the food security strategies of a large number of households in the semi-arid region, is a good example of this. Its effects go far beyond the short-term food security situation of these farm-households, as it strongly influences ‘traditional’ relationships in the rural areas from which they migrated (Mabogunje, 1990).

Gender relations are of particular interest here. It is difficult to generalise about the evolution of gender relations, as there are large differences from

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\(^8\) Non-cropping activities have been important in every different phase described here. However, livestock-production and other important income-earning activities (such as trade) were in the first phases only allowed on a limited scale. Capital accumulation through these kind of activities was often restricted to some households with substantial status. Nowadays, a growing number of households and individuals are practising livestock and trade to counterbalance decreasing and variable crop harvests.
one region, class or ethnic group to another. However, in almost all regions of semi-arid West-Africa, women have - often successfully - tried to diversify their incomes, through animal husbandry, horticulture, trade, etc. These new sources of income are needed to counterbalance the decrease of crop production from their small individual fields⁹. In some regions the crops cultivated on the individual plots have changed too, from cash-crops (groundnuts) and sauce-plants, to cereals; different reasons may explain for this change: a decreasing ratio of the producer-prices for cash-crops and the consumer-prices for cereals and/or an increase of women’s responsibilities to provide food for the family from their own individual granaries.

4. Food allocation by the market

Many policy-makers and researchers tend to view sedentary rural households in the semi-arid tropics as almost exclusively dependent on their own cereal production to ensure household food security. Rural markets are seen as primary markets that drain surpluses to urban deficit markets. Various recent research results have undermined this view and show that many farm households are net buyers of substantial food quantities (see Reardon et al., 1989 and 1992). Revenues from livestock and non-farm activities provide an important part of the necessary food entitlements for the rural population. Despite the growing importance of markets for the distribution of food, a major limitation should be stressed. The market is only operational if consumers have sufficient purchasing power. Implicitly, market advocates presuppose that consumers have the food entitlements at their disposal, which ignores the problem that many households lack these assets.

The rural economies are increasingly monetized and nowadays food markets play a crucial role in food distribution. Petty trade and processing activities are an important income source for many women. Remuneration is often low, but it is attractive when no other opportunities exist. Properly functioning markets will serve both the producers at the one end of the marketing chain and the consumers at the other end; market failures or missing markets will affect opportunities for producers, as well as food availability for consumers. Opinions on the functioning of food markets have shifted over the years.

⁹ Peulh-women are the major exception here. Generally they do not cultivate, not even on the ‘common’ fields of their husbands.
During the 1960s the debate stressed “market failures”, in line with the desire of newly independent states to plan economic development. Subsequently, interventionist policies were developed to correct for these failures. The 1970s have shown that many of the so-called “market failures” were only replaced by ”government failures”. In line with these experiences, structural adjustment policies in the 1980s and 1990s advocated market liberalization, which put to an end the interventionist policies of many governments. However, several market imperfections persist.

*Seasonal and spatial arbitrage with imperfect information*

Food production is not synchrone with food consumption. In the semi-arid areas of West-Africa, producers have only one harvest a year, while consumption is continuous. Moreover, harvests are regularly threatened by climatic hazards. This seasonal aspect may cause substantial price fluctuations, as storage costs are important (due to storage losses and to capital needed to finance the stock) and information on local supply and demand conditions is imperfect. Efficient temporal arbitrage is important for food security. However, most traders operate with small funds while most farmers have little withholding capacity (Saul, 1987). Imperfect credit and insurance markets and imperfect information hamper the functioning of seasonal arbitrage.

In the same vein, we observe that the place of food production often does not correspond to the place of food consumption. The food chain is complex as many food producers are constrained by variable seasonal agro-ecological conditions and appear to be net food buyers. This implies that local supply and demand conditions vary between years and within years. Moreover, after a bad year production in neighbouring regions will be affected as well (Snijders et al., 1988) and arbitrage over long distances may be necessary to provision consumers. Adequate information on local market conditions is a prerequisite for successful traders, but difficult to obtain in most of these countries as the telecommunication infrastructure is imperfect and information depends on personal networks of individual traders.

On a perfect market, "(....) prices convey information from households to firms concerning what consumers want, and from firms to households about the resource costs associated with consuming each commodity" (Stiglitz, 1994:8). However, one of the major constraints which hampers the functioning of the rural markets is imperfect information on the potential market opportunities. Traders are reluctant to share their information with
competitors. Due to seasonality in production, food trade is a volatile business. Some information simply does not exist due to uncertainty in the production process. Other sources of information may exist but are not always accessible for all traders and farmers. Moreover, official regulations are not transparent and their implementation is arbitrary. The existence of oligopolistic markets often seems to be based on the possibility for certain wholesalers to detain specific information. In practice we observe that traders stick to their individual marketing networks which are nested in particular geographical regions.

Thin markets

The thinness of the food market is another feature that explains the high costs related to market transactions. Most producers are peasants who are to a high degree self-sufficient with regard to cereals and are incidentally buying/selling their deficit/surplus in the market. The grain stock is perceived as a liquid source that may be used for urgently needed household necessities. The problem for the market is that most of these transactions concern small and highly variable quantities, scattered all over the country’s territory. The average retailers’ turnover, per market day, is often less than 100 kg, while the major group of small-scale wholesalers may collect at most 1000 kg. This fragmented structure further inflates transaction costs: the assembly of cereals becomes a labour-intensive activity. The upshot is that gross as well as net marketing margins are high. The development of a personal network of trade agents and farmers may provide traders the necessary information on potential suppliers. However, the elaboration of such a network presupposes the availability of sufficient working capital and takes time, which constitutes an entry barrier for potential competitors.

In order to evade the high transaction costs, farmers may increase the number of non-market transactions and consequently aggravate the thinness of the market. Cereals can be exchanged within the family and some services and goods can be paid in kind. Matthews (1986) formulated this problem as follows: "Family production tends to make for high production costs because it restricts exploitation of scale economies and may create mismatches between talents and occupation. On the other hand it tends to reduce transaction costs, because if instead you have a lot of dealing with strangers you have to devote more resources to checking up on their personal characteristics and safeguarding yourself against opportunism". If transaction costs are high, it will decrease the competitiveness of farmers and, consequently, they may decide to withdraw from the market (see de Janvry et al., 1991). The food
security of farmers that do not have other food entitlements will be at stake if production falls short. This situation is quite common for the farmers in densely populated areas of the sudanian zone as mentioned in section 3.

**Markets and Famines**

Various authors who have studied food insecurity and hunger situations, have particularly discussed the relationship between famines and markets (Ravallion, 1987; Drèze and Sen, 1989). They have documented situations where market failures, thin markets and missing food markets have made hunger and famines more severe. Markets work badly during famines when scarcities are exacerbated by panic buying and excess hoarding. The food insecurity is aggravated by the seasonality of food production which makes that food demand is highest during the hungry season, whereas the availability of food stocks is at its lowest level. Consequently, governments should be alert and in drought prone areas policies are necessary to attenuate the problem of transitory food-insecurity.

**Missing or Incomplete markets**

In all countries in sub-saharan Africa, the set of commodity markets is highly incomplete. Imperfections in three related commodity markets, providing essential services for cereal trade, hamper the functioning of the food market and increase the transaction costs:

- Transport services are only limitedly available. A small group of large-scale wholesalers have their own transport facilities, but the majority of small-scale traders depend on public transport facilities, which are mainly oriented toward the urban centres. During rainy seasons large rural areas may even become inaccessible. Consequently, the transport of commodities is less flexible than required for optimal trade flows.
- Credit facilities constrain the commercial activities of traders and farmers, in particular the storage function. The formal financial sector does not provide credit for trade activities and even if credit facilities do exist, most traders and farmers lack the necessary collateral (see Zeller et al., 1997).
- Finally, an insurance and futures market accessible to individual traders and farmers almost does not exist. Hedging against price fluctuations is impossible. Only recently some experiences can be observed (see below). However, the institutional structure necessary to guarantee the
enforcement of contracts between individuals is weak, often resulting in the non-existence of this market.

5. Alternative local initiatives to improve the food situation

During the last 20 years a growing number of farmers have taken new and promising initiatives to master the situation again. These activities include among others:

• activities on the farm-household level: improvement of strategies to reduce risks of low yields by careful choice of different varieties and of intercropping and rotation patterns, and by timely land-preparation and sowing; adoption of low external input methods to restore soil fertility and water management methods to improve hydrological capacities of soils; use of animal draught power for land preparation and weeding; agroforestry and the integration of animal husbandry and crop production; investments in non-farming activities (trade, processing);

• ‘collective activities’ by farmers’ groups: village cooperatives working together on the construction of small water-reservoirs, anti-erosive measures and horticulture; exchange of information between farmer groups; education and information activities; establishment of cereal banks with the aim of building up reserve stocks to strengthen food security in the village and to improve the local distribution and marketing system.

They have taken up the twofold challenge: survival in the “hungry season” and the transformation towards a more sustainable agrarian system. Some of these initiatives are almost entirely based on strategies of ‘self-reliance’. However, others do rely directly or indirectly on market-exchanges. These initiatives can be individual or collective; the latter, often structured by ‘new’ forms of agrarian institutions, aim to improve access to product- and factor-markets (in particular food, finance and inputs) for some group of relatively ‘isolated’ farmers. Cereal banks are a good example of the latter. They substitute to a certain extent for market-exchanges, but at the same time they play a key-role in improving access of farmers to rural markets.
Cereal Banks

Cereal banks are a type of organisation that may challenge the existing market structure (Saul, 1987; Yonli, 1997). They concern a communal village organisation that coordinates the marketing and storage of cereals. In general, cereals are bought in harvest time and sold during the lean season to members of the community. The idea behind this structure is that farmers in the rural areas are obliged to sell a part of their production just after the harvest in order to settle debts and other financial obligations. The same farmers have to buy during the lean season to supplement the cereal deficit. Put differently, they sell low and buy high. The difference between these prices may be important when farmers in the dry regions are concerned. In these regions cereals have to be imported over large distances. Rural population density is low, meaning that the market is thin. Large-scale traders are not interested in provisioning these regions, and supply may even be lacking. Under these circumstances a farmers’ organisation (cereal bank) may be useful; there are opportunities to beat the market. However, it should be noted that many cereal banks, established during the last decade, failed. Often, the objectives were too ambitious and organisational problems were frequent.

Cereal auction market (futures market)

A more recent initiative in Burkina Faso is interesting in this respect: the development of a cereal auction market. In 1991 the auction started as an experiment, with the aim to facilitate the exchange between farmers’ organisations, in particular cereal banks. Nowadays also private traders are participating in this market. Yonli (1997) indicates that the auction facilitates the functioning of cereal banks as it may provide the structure to link directly surplus and deficit cereal banks and, consequently, limit transaction costs. Moreover, the auction may introduce a futures cereal market as contracts can be concluded for delivery at a certain time, which may result in an effective instrument to protect farmers against price changes.
6. Perspectives of sustainable agricultural intensification

The initiatives of the rural populations in the semi-arid regions of West-Africa to increase agricultural productivity are almost exclusively based on new or improved methods of low-external-input agriculture. The importance of these methods is not contested here, often they succeed to increase applications of organic manure, and to finetune low-cost technologies to fight erosion, to improve the use of crop residues, etc. (Prudencio, 1983, Dugué, 1989, Rochette, 1989). However, the margins to increase agricultural productivity in the longer run without the increased use of ‘external’ inputs are small (Maatman et al., 1996, 1998). Agricultural production systems based on an efficient combination of low-cost water conservation methods and modest applications of chemical fertilizers (rock phosphate, imported complex fertilizers) seem to be the only realistic option to increase agricultural productivity substantially, and to maintain - or even to restore - soil fertility (eg. Sanders, 1996). The adoption of ‘external’ inputs, and in particular of chemical fertilizers, gives rise to considerable financial risks. These financial risks are determined by:

- the prices farmers have to pay for the ‘external’ inputs;
- the availability of credits to buy ‘external’ inputs;
- the agricultural technology - and knowledge about technological options;
- the prices farmers receive for their agricultural produces.

Most farmers in the semi-arid regions are unwilling to buy ‘external’ inputs, as a consequence of uncertain supply, the absence of local credit systems and -last but not least - unfavourable and fluctuating output prices. We recall that non-market exchange of labor, land, capital and agricultural products by means of socio-familial networks are predominant characteristics of these farm-households, as is their dependence on low cost agricultural methods and the production for self-sufficiency. Some actions that may decrease the financial risks are:

- finetuning of technological options (optimal choices of chemical fertilization according to climatic zone, soil type, and crops cultivated, complementary measures of soil fertility management and of water harvesting) through research and extension;
- improving the accessibility, both geographically and financially, of ‘external’ inputs, for example through the development of infrastructure
(roads, facilitation of storage, transport and marketing of inputs) and of appropriate credit systems;
• development of market outlets for agricultural commodities and the reduction of transaction costs.

Decisions about the adoption of chemical fertilizers ultimately depend on the comparison of costs and benefits with other economic opportunities of the farm-household. These alternative options include investments in other local non-cropping sectors, (seasonal) migration and ‘insurance’ strategies to cope with crop production risks and to decrease food insecurity (security stocks of cereals, animal stocks, social relations).

The adoption of alternative methods of soil fertility management depend to a large extent on the degree of control individual farm-households exercise on the lands they cultivate, i.e. on the system of land-use rights. Land-use rights can differ much between households, and even between different fields of the the same farm-household. When land-use rights are very insecure, this may prevent the farmer to invest in soil fertility improvement (for example the plantation of trees, application of chemical fertilization). Such investments may be forbidden, or they may not be profitable in the very short term. Land-use rights are in particular insecure for young farm-households, for ‘immigrated’ farmers, for pastoralists who have settled down at the border of a village, and for women within the farm-household. The development of ‘alternative’ social structures of land-use management, reinforcing the responsabilisation of rural populations to manage their own natural resources (also with respect to the rangelands, the use of forest lands, and of water resources) are important conditions for every sustainable rural development.

7. Consequences for food security policy

In our view, there is a strong need for flexible ‘learning’ and decentralised approaches to rural development. Such approaches imply that decisions can be finetuned to the specific circumstances of the region, and - more important - that these can be negotiated thoroughly with all different stakeholders: farmers, traders, project officials, extension agents etc. Choices have to be made and should be based on a careful assessment of the constraints and potential of different (sub-)regions, and of different types of farm-households (ethnic groups, sedentary farmers/pastoralists, “immigrants”
and local inhabitants, etc.). For example, in the most northern zones of the semi-arid regions agricultural intensification is not the best option, investments should focus on livestock development, rangeland management, non-farming incomes and should support migration. In the more southern areas, intensification of agriculture could be an option.

An important lesson that we draw from this paper is that the successful implementation of food security policies requires a strong government, an efficient market and a vivid civil society:

- The government remains to be an important actor. The weak resource base of the rural population in vulnerable regions justifies the need for food security policies. These policies should be developed on a national and local level. We also showed that the market requires a strong government to control for market failures and to reinforce market institutions. At the same time we acknowledged that many governments failed to play their role in the past. Food security cannot be “planned”, even if policies are decentralised and executed by (sub)regional government agencies. Governments should focus on the task that other parties do not assume: the creation of an enabling environment. The constraints and options for the rural populations are very diverse. One way of dealing with this kind of heterogeneity is to opt for a “multipurpose enabling approach” including “education, training, health, infrastructure, the promotion of grass-roots organisations, responsive research institutions and increasing options for women, youth, ethnic groups and low castes” (de Janvry and Sadoulet, 1993, p. 43-44).

- The market proved to be an important instrument to distribute food. However, we also stressed that market incentives can fail. Perfect markets do not exist - not in the semi-arid regions of West-Africa, nor elsewhere. Transaction costs are particularly high and provide good reasons for why markets ‘fail’ in semi-arid West-Africa. Farming systems striving for self-sufficiency (based on family labor, non-market exchange and management of land and other natural resources through kinship relations) can be more efficient than, or supplement, market institutions. The challenge therefore is to deal with both market and non-market exchange in food security policies.

- Civil organisations at the intermediate level are crucial for the food system. These organisations may improve the management of natural
resources, or increase the knowledge of agricultural techniques and also play an important role if market or government failures occur. Grass-root organisations may provide a solution for some of the market failures (e.g. farmers’ organisations for cereal banks and rural credit, the distribution of land rights). These organisations should be challenged to beat the market. At the same time, these organisations may provide a countervailing power towards the (local) government. There is more room for these organisations to raise issues of mismanagement, or government failures in general, than for individuals.

We conclude that under the actual conditions households in the semi-arid regions of West-Africa face a considerable risk of food shortages, while environmental degradation severely threatens the prospects in the longer run. One thing is clear, there is no easy way out. The perspectives depend on the creative initiatives of the rural populations, and the support they get from their governments and markets. Finally, we acknowledge that only a change in agrarian institutions is not a panacea. Processes of social change seldomly have only winners. Specific policies, e.g. the provision of food entitlements, are needed for marginalised groups. More should be done to help farmers in these regions to break through the vicious circle of poverty, overexploitation of natural resources and environmental degradation:

- First, as we have stated above, sustainable rural development in these regions requires considerable investments - at least in the short term - to stop the degradation of natural resources and to restore degraded soils (at least when we accept that mass-migration to the sub-humid guinean zones is not a realistic option\(^{10}\)). Public investments are necessary to help farmers improving their soils.

- Second, food security and rural development in the semi-arid regions crucially depend on economic progress on a larger (geographic) scale, and in particular on industrial development and agricultural intensification in the ‘higher-potential’ sub-humid regions. Both industrial development and agricultural intensification in the better endowed sub-humid regions create additional (non-local) income-earning opportunities. This could stimulate seasonal and permanent migration from the semi-arid regions, and hence lead to higher non-cropping incomes and to less environmental pressure. Moreover, industrial development could stimulate farmers to intensify

\(^{10}\) Which does not exclude the idea of stimulating migration, e.g. from the northern sudanian zones to the better endowed southern regions.
agricultural- and non-agricultural production, to increase the marketing of food crops and/or other commodities and to buy inputs ("growth-linkages").
References


