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WEST AFRICA'S SUBSISTENCE FARMING

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Subsistence farming strongly dominates agriculture in West Africa and undermines its future. The poor natural resource base and unfavourable socio-economic and policy environments impede the development of more sustainable, more productive and remunerative production systems. Presently, efforts are concentrated on small-scale irrigation, however, to ensure food security, alleviate poverty and stop environmental degradation and desertification; soil improvement should come into focus. Adoption of integrated soil fertility management technologies requires thorough improvements of the market and policy environments. Both input and output markets must be more competitive and transparent for growth; regional cooperation is a supplementary requirement. Governments should move from the role of actors to that of facilitators to create an enabling environment for farmers to invest in their soils and for the private sector to invest in market development. A whole series of responsibilities remain or must be developed. Besides favourable macro-economic policies, infrastructure development and research and extension, such responsibilities include general access to market information, quality control for inputs and products, and reinforcement of farmers' organisations and private sector associations. Small holders and marginal lands have to be protected against the risks of market privatisation and liberalisation.

Introduction

“Subsistence farming” is described in the dictionary as “a system of farming that provides all or almost all the goods required by the farm family without any significant surplus for sale”, or “a system of farming producing a minimum and often inadequate return to the farmer”. Both definitions generally imply that the financial resources are lacking to buy the external inputs required for agricultural intensification. This is undoubtedly the case in West Africa, one of the poorest regions of the world, where a larger part of the population still relies on agriculture and where opportunities for well-paid off-farm employment are limited.

West Africa is further characterized by a very poor resource base of agriculture, as a result of poor soils combined with harsh climates. There are two other populated regions in the world, Patagonia and Australia's Northern Territory, where sustainable natural availability of nitrogen (N) is also only 15 – 20 kg/ha/yr. However, while these regions must feed one or two persons per square kilometre, West Africa must feed an average 30 - 40 per square kilometre (Breman, 1990a).

This paper does not treat a limited and well-defined case of subsistence farming. By dealing with West African subsistence farming in general, a whole range of determinants can be treated, to help formulate conditions and actions for change. These actions are identified on the basis of exceptions that prove the rule of an extensive and stagnating agriculture. Therefore, even Africa as a whole will be in the picture, treating exceptions to the rule that the “Green Revolution”, which boosted food output elsewhere several decades ago bypassed Africa (Breman & Debrah, in press).

I. West Africa's subsistence farming

An agricultural society without food security

Despite the poor natural resource base and widespread poverty, about 150 million people are still involved in farming in West Africa. The average annual population growth is in the order of 3%, but urbanisation leads to an increase in rural population ranging between 2 and 3% per year.

Food security is one of the most urgent issues facing Africa today. The African agricultural sector is stagnant, and food production, which is mainly subsistence-oriented, lags behind the already low growth of agriculture in general. Sub-Saharan Africa has the lowest land and labour productivity rates in the world, with annual growth of cereal yield averaging only 10 kg/ha/yr, which corresponds to about 1% growth. Reckoning growth in area harvested as well, total food production increases annually by about 2%, less than the population growth rate of 3% (Pardey et al., 1995). As long as agricultural growth in sub-Saharan Africa remains below the population growth of 3%, food security is wishful thinking. If Africa seeks to rely on agriculture for economic development, 4% - 7% annual growth is required, amounting to average annual cereal yield increases 3 - 6 times the current 10 kg/ha level.

Cereal yield increases in the order of 10 kg/ha/yr are also typical for West Africa, and suggest a strong dominance of extensive subsistence agriculture. In the absence of detailed synthesis concerning subsistence farming in West Africa, rough estimates have been made to characterise the sector. Two types of information served the goal: average fertiliser use per hectare versus recommended fertiliser use, and average yields versus yields in regions with intensifying agriculture. Subsistence farming concerns 85% - 90% of the farmers. In normal years, food production is close to demand, but widespread poverty and local droughts or other plagues cause problems for part of the population. In normal years, subsistence farmers have their share in feeding the urban population (about 40%), but the 10% - 15% commercial farmers may already produce more than half of the food for the cities.

Incomes from farming, even in normal years, are not high enough to provide for housing, health, clothes and schooling. Because off-farm employment is relatively scarce and poorly rewarded, access and use of external agricultural inputs is very limited; West African fertiliser use –for example- will not reach the continent's average of 10 kg/ha/yr of nitrogen, phosphorus and potassium (NPK). This is more serious in view of the fact that temporary or permanent male migration is an important source of additional income. It undermines the sustainability of intelligent indigenous production systems, which have in general a high labour requirement. A whole series of alternatives attempt to compensate for the lack of external inputs, but nutrient and organic matter balances of farming systems become increasingly negative (Hilhorst and Muchena, 2000; Henaio & Baanante, 1999).

The situation is most alarming for subsistence farmers: they have limited access to external inputs and to internal inputs as well. Whereas commercial farming is progressively practiced on private land, subsistence farming is mostly carried out on common, state owned or even hired land. Even where land tenure rules and legislation create a relative protection for subsistence farmers, better-endowed farmers are in a more favourable position. Because they are better equipped, e.g. with ploughs and bullocks, they can cultivate more land. Larger numbers of livestock bring higher amounts of organic matter and plant nutrients in form of manure from the common pastures to their fields.

This process is still reinforced by hired labour, enabling the storage of straw from their own fields and fodder from common land at the farm before free grazing is allowed in the dry season.

The arid and semi-arid zone

The role of livestock in arable farming is relatively recent and of growing importance. Besides traction and transport of organic matter and nutrients to farms and fields, as mentioned, it forms a savings account and a buffer against crop production fluctuations (de Grandi, 1996). Before the drought of the seventies, mobile pastoral animal husbandry was the dominant farming system for semi-arid and arid West Africa, arable farming dominated sub-humid and humid regions. The raising of livestock in the Sahel was based on the very productive semi-nomadic "transhumance", and one may wonder if it could be called subsistence farming (Breman & de Wit, 1982). For several Sahelian countries, livestock was the first or the second source of export earnings.

Drought and overpopulation brought a profound change. Arable farming progressively occupied the dry season pastures, and the "transhumance" more or less collapsed. Pastoralists settled and were obliged to farm besides exploiting the relics of their herds. Arable farmers, faced with increased land shortage and progressively shorter fallow periods, were obliged to keep livestock to maintain and increase crop production (Breman et al., 1990). It cannot be stressed enough that this form of sedentary agro-pastoral animal husbandry is much less productive than the former transhumance. Nevertheless, with increasing herd size, crop production and farming systems' resilience are improving. Besides the possession of animals and herd size, herd composition is a criteria to distinguish subsistence farming from commercial farming: small ruminants gradually replace cattle from richer to poorer farmers.

The humid zone

The above-described situation is typical for the Sahel and the sub-humid Soudanian Savannah. Maintaining livestock in the humid Guinea Savannah and in the rain forest zone has always been difficult and human pressure has been low until recently. Diseases such as sleeping sickness and river blindness are the main reason for both. The resilience of farming systems in humid West Africa may be somewhat higher than in the drier zones, thanks to more above- and belowground organic matter. Perennial plant life, with its high biomass and soil organic matter accumulation potential, is relatively rare in drier West Africa. The reason is the extreme aridity of the long dry season; nowhere else in populated parts of the world are found such high levels of potential evapotranspiration as in the Soudanian Savannah and the Sahel (Breman & de Ridder, 1991).

In the past, farming systems in humid West Africa were mainly based on perennial crops. Only in relatively limited areas, the plantation systems dominated (e.g. rubber, oil and coconut palms). However, even cash crops, like cocoa and coffee, were and are mainly produced by small holders. Root crops like cassava and sweet potatoes are produced for food, and subsistence farmers primarily concentrate their efforts on such crops.

Commercial deforestation and by the slash-and-burn farming practice have seriously undermined the resilience of the humid zone. The population pressure increased not only by birth, but also by migration from the sub-humid savannah that became overpopulated early due to its aptitude for farming. The most rapid population growth took place in the coastal zone, where imports and exports lead to rapid urbanisation (Cour, 2001).

Progressive deforestation and overexploitation of agricultural land are leading to decreased soil cover by perennial plants and decreasing soil organic matter content. Consequently, violent rains increasingly cause soil losses by run-off and leaching of soil nutrients. The perennial crops no longer produce enough and annual cereals, maize and rice, are of growing importance. In view of conservation, they more easily feed the urban population than root crops do. Even the importance of livestock is rapidly increasing in the humid zone: deforestation decreases the habitats of tsetse flies and reinforces the effect of drugs against sleeping sickness. In other words, differences with farming systems of the drier zones are diminishing.

II. Strengths and weaknesses of the farming system

North-South transect

In spite of diminishing differences among West Africa's subsistence farmers, the North-South transect still has a rather clear zoning. South of the Sahara desert, remnants of the former efficient "transhumance" are still present; their productivity is seriously hindered by the lack of dry-season rangeland in flood plains and in the sub-humid savannah. Sorghum and millet are the main crops in the southern part of the semi-arid zone; in the sub-humid savannah, maize increasingly replaced them. Maize also dominates the humid savannah and is accompanied by cassava and rice, which occupies the inland valleys. If in any way possible, crop farmers in the last three zones also keep some livestock; crop-production is increasingly agro-pastoral. In the humid forest zone livestock is still rare; root crops there dominate over maize, rice and certain tree crops.

Strengths

The described systems have a series of strengths in common. Originally, at least, it concerned environmentally well-adapted indigenous systems, exploiting the natural resources in a clever way. The Sahelian transhumance was more productive than livestock rising in comparable regions of the USA and Australia (Breman & de Wit, 1982). The Acacia Faidherbia parklands of the savannah are among the most effective agroforestry systems, and the forest gardens are jewels of complexity (Breman & Kessler, 1995). Mixed cropping ensures resilience beside production: where in drier West Africa N is the most limiting factor biological N-fixation is exploited, while in the humid region, with phosphorus (P) as the most limiting factor, mycorrhiza associations are frequently found (Breman & van Reuler, 2002).

Increasing rainfall, from North to South, accompanied by increasing soil organic matter and nutrients content, leads to an increasing carrying capacity of the natural resources. Subsistence farming, without the use of external inputs, is able to feed through animal husbandry alone and in a sustainable way about 1 person per square kilometre at the Sahara border to 7 in the humid savannah. Based on crop production alone, 10 persons per square kilometre can be fed in the Southern Sahel, and this number increases to about 40 - 50 in the humid savannah and forest zone. Integrating crops and livestock leads to an increase of the carrying capacity with about 10% (Breman & Sissoko, 1998; Mazoyer & Roudart, 2000).

Degree of strengths

In attempting to identify general policies and actions that can trigger change. This paper stresses commonalities of subsistence farmers more than differences. For effective implementation, however, it is necessary to account for differences.

Two degrees of strength are of utmost importance; both concern the degree of moving away from the traditional well-adapted indigenous systems. Systems can simply drift away because of resource degradation and the accompanied dissociation of social structures, including families (labour migration). Production systems can also actively move into the direction of intensification. In the first case, access to external inputs will generally decrease; in the other case it will improve.

This second case concerns the sliding transition from subsistence to commercial farming. The first case is not without interest for potential intensification. In spite of the fact that more sustainable production systems can theoretically be better grafted on intact production systems, several observations exist that the environmental and social degradation that accompanies population growth can in time lead to positive changes. It is the growing domestic market that finally triggers change (e.g. Tiffen et al., 1994; Wiggins, 1995; Cour, 2001).

Internal weaknesses

Crop-livestock integration enables farmers to exploit natural resources to the bottom. It became necessary, both in the Sahel and in the sub-humid savannah, where the population pressure already exceeded by far the carrying capacity. In time, the system will undermine itself if it does not succeed in increasing the use of external inputs (Breman, 1990b). Other subsistence farming is also unsustainable where overpopulation occurs. Using average population density, this is the case, as just indicated, in the whole semi-arid and sub-humid zone; it is also the case in the so-called "coastal growth poles" (Cour, 2001). At present, the main still sustainable subsistence farming can be found in the humid or Guinea Savannah.

Where overpopulation leads to overexploitation of the natural resources, subsistence farming gradually loses the strengths described. Environmental degradation and labour migration weaken the labour intensive and intelligent indigenous systems. Migration of farmers under population pressure does the same, because the ancestral knowledge and experience does not suit other agro-ecological zones. This threatens in particular Sahelian farmers moving north, into regions where frequent droughts are an even bigger threat. It also will hinder farmers moving from the sub-humid into the humid savannah, where topsoil erosion and leaching require permanent soil cover, a practice not known from the sub-humid savannah.

Common weaknesses are numerous: limited production surpluses for sale, limited access to credit, to input and output market, and to knowledge, unsecured land use rights, limited intellectual involvement of women, etc. An overall unfavourable socio-economic and policy environment aggravates this while farmers are still poorly organised, which limits their influence on their own future (Breman & Debrah, in press; Debrah & Nederlof, 2002).

In West Africa limited production surpluses for sale, being the main characteristic of subsistence farming is caused by poor natural resource base of agriculture and overpopulation (see above). It is interwoven with several other limitations, such as limited access to credit, to input markets and to land. These limitations have also an independent base, the inadequate agricultural and economic policies of the countries (Breman & Debrah, in press).

Besides national differences, the countries have a whole series of communalities. They will be presented in a rough and simplified way. For details numerous studies are available, like, for example, Breman et al. (1990) for Sahelian animal husbandry, Debrah & Dahoui (2001) for arable farming in Burkina Faso, IFDC (2000) and partners for input markets in sub-Saharan Africa, World Bank and partners for soil fertility improvement (Anon., 1997), and the World Bank (1995) for structural adjustment.

External weaknesses

After independence, Governments continued to behave like colonial powers, being more of an agricultural actor rather than a facilitator. This led to the continuation and creation of export oriented parastatals, a public input sector, heavily subsidized external inputs and credits, and favouring consumers over producers. Examples of the latter are:

- free access to cheap food from the global market;
- massive food imports in case of disasters;
- formal and informal charges, e.g. related to trade, transport and distribution, causing high input and low output prices at the farm gate.

This has led to heavy public debts that are at the basis of structural adjustment programmes of economies, promoting privatisation and liberalisation of the markets. Until today, three main reasons make these programmes much less effective than expected:

- It has been insufficiently realised that often neither input nor output markets are very attractive for private investments (e.g. Sissoko, 1998; Breman, 2002).
- Structural adjustment programmes have not been accompanied by projects, which interest and support the private sector to fill the gap created by Government retreat (IFDC, 2000).
- Government retreat is often still incomplete, and undisclosed interests hinder the development of competitive and transparent markets.

Therefore, the private sector did not really take over Government's responsibilities, access to credit and inputs often decreased, and farmers do not invest in more sustainable production systems (e.g. Sissoko, 1998; Debrah & Dahoui, 2001; IFDC, 2001 & 2002a).

Under such conditions, even commercial farmers –not to mention subsistence farmers- have limited chance to improve their farming systems, producing marketable surpluses in a competitive way. The situation is still worsened by external forces, from outside West Africa. Governments cannot really take a stand, because regional cooperation is still in its infancy. Only last year, the francophone countries, united in the UEMOA, adopted the principles of a common agricultural policy. ECOWAS, covering all West African countries, is just starting the process that should lead to it.

These external forces concern the complex factors behind prices of inputs and commodities on the world market. Fertiliser prices are an interesting example: During the 1970s in the Sahel, it was hardly economical to produce beef using fertilised fodder crops. However, whoever decided to do so had to use grasses plus NPK instead of leguminous fodders plus P, because of the cost:benefit ratios (respectively 1.8 and 1.4). During the 1980s, fertiliser use for beef production was not feasible at all (cost:benefit ratios below 1). During the 1990s, however, it became interesting when leguminous fodders plus P was chosen as technical option. The cost: :benefit ratio became 3.3 against 1.1 for grasses plus NPK (Breman & Sissoko, 1998).

Primarily dumping of European meat on the West African market mainly caused the bad potential for intensive beef production in the 1980s. After the drought of the 1970s, this practice was the final blow to the once productive semi-nomadic transhumance (Ruben et al., 1994). Today, the protectionism of the USA, Europe and China regarding their cotton farmers threatens cotton-based production systems in the region (e.g. Mazoyer, 2001a).

Variability of weaknesses

In spite of crucial commonalities among subsistence farmers, several degrees of weaknesses should be considered. A first case has already been treated under “degrees of strength” above: progressive impoverishment of agriculture’s resource base and the rural society by overpopulation will progressively accentuate the minimum and often-inadequate return to subsistence farmers.

Two cases regarding the quality of the natural resource base should be distinguished. In case of very poor resources, overpopulation can occur at an extremely low absolute population pressure. In such cases, the stimulating effect of a growing domestic market (see above under strength) will not occur, and degradation may lead to definite resource destruction and desertification. Only in cases where overpopulation occurs at relatively high absolute population pressure, the degradation of resources and rural societies may turn into regeneration through agricultural intensification under growing market demand and increasing purchasing power (Wiggins, 1995). However, it is expected, that commercial farmers will benefit from these opportunities and that subsistence farmers will increasingly join the mass of unskilled urban labour.

An additional variable of weakness concerns the proximity of regions with comparative advantages for intensification and of markets, their importance and purchasing power. The larger is the distance, the more disadvantaged farming.

A final variable concern the progress regarding structural adjustment made by governments. As will be shown below, the accessibility of external inputs seems to be related positively to serious privatisation and liberalisation.

III. Challenges and opportunities

Why the “Green revolution” bypassed Africa

Worldwide, the “Green revolution”, based on the use of external inputs, has shown an average annual yield increases of 75 kg/ha for cereals. Africa’s present average is about of 15 kg/ha; in sub-Saharan Africa, West Africa included, this does not exceed 10 kg/ha. This is just above the typical slope of yield increases for extensive agriculture under human pressure, which showed all over the world an average annual yield increase of 7 kg/ha before external inputs were available or accessible (de Wit, 1986). FAO statistics suggest that food-secure countries spend more than \$5 per capita on inorganic fertilizers; only two sub-Saharan countries reach this level, and most spend (much) less than \$1 per capita (Soh, 1998).

The Green Revolution that helped boost yields on other continents never reached Africa. In 1960, differences in fertilizer use between developing regions were limited: e.g. 5 kg/ha in Africa compared with 10 kg/ha in India and China. By 1995, fertilizer use had increased by only 60% in Africa, whereas it had increased 1,100% and 2,300% respectively in India and China. The number of tractors and the acreage under irrigation followed similar trends.

In Asia, cereal production increased from 231 to 274 kg per capita between 1970 and 1995, and total fertilizer use on all crops increased from 0.005 to 0.019 kg per capita. During the same period, African cereal production per capita decreased from 166 to 137 kg, whereas total fertilizer use remained negligible at less than 0.005 kg per capita (CGIAR, 2000; Soh, 1998).

Understanding why the “Green Revolution” bypassed Africa should precede the identification of challenges and opportunities. Besides the unfavourable socio-economic and policy environment described above, Africa is at a comparative disadvantage due to its poor natural resource base for agriculture: poor soils combined with harsh climates. The poor quality of African soils is the most important limiting factor for agriculture, even in regions like the drought-prone Sahel (Penning de Vries & Djitéye, 1982; Breman & de Ridder, 1991).

The overexploitation of natural resources, the main cause of the negative balance of plant nutrients, worsens the problem of poor resource base. In addition to having the lowest yields, Africa has the highest nutrient-depletion figures with a negative nutrient balance of about 60 kg/ha (Henao & Baanante, 1999). Overpopulation as such is not necessarily a problem; it can also be part of the solution (see chapter II). However, the resource base of West Africa and other African regions is so poor that overpopulation occurs at low absolute population density. Average African population density is less than 30 people per square kilometre, compared with several hundred in Southeast Asia. Intensification of agriculture and the increased use of external inputs are required at a moment when most production is still subsistence-oriented, and infrastructure, distribution, and transport systems development is limited. Road density in Africa, for example, is only one-tenth of that in Southeast Asia during its Green Revolution in the 1980s. Making matters worse is a low input efficiency, caused by the same unfavourable agro-ecological conditions described above, slow development of domestic markets and purchasing power, and limited employment outside agriculture. Thus, the extremely low use of external inputs and the slow transformation from self-sufficiency to market-oriented production are explained by the low efficiency of agricultural inputs, the high price of inputs at the farm gate, and the low price of agricultural products, all linked to the poor natural resource base for agriculture. The paradox of African agriculture is that agricultural development is inhibited at once by overexploitation of the land because of “overpopulation,” and by poor market development because of “under population” (Breman & Debrah, in press)

Exceptions that prove the rule

African agriculture is not extensive and stagnating everywhere. A whole series of exceptions exists where the "Green revolution" changed the face of African agriculture and where dynamics are visible. Examples are presented, using an increasingly stronger “zoom”.

- There are three main regions where fertiliser use is above the average 10 kg/ha/yr of plant nutrients (Henao & Baanante, 1999). It concerns Northern Africa, the West African cotton belt, and a band of countries from Eritrea to South Africa, the East African Highlands and sub-tropical Southern Africa.
- In countries with almost exclusively small holders, small farm sizes go hand in hand with low fertiliser use. In Ethiopia and Uganda, for example, farm sizes are 1 - 2 ha, and average fertiliser use is, respectively, 7 and 1 kg/ha/yr. In South Africa and Zimbabwe, small holders exist besides commercial farmers. The latter have average farm sizes of about 150 ha, the first 1 - 2, as in the former countries. Their fertiliser use is, however, 75 and 50 kg/ha in South Africa and Zimbabwe, compared with hundreds of kg/ha for commercial farmers.

- Over the last 40 years, the contribution of agriculture to West Africa's gross domestic product (GDP) decreased from 80% to 50%. In the mean time, food production for own consumption decreased from 65 to 50% of the overall contribution to the GDP, export-oriented production was maintained at 10%, and production for the domestic and regional market increased from 15% to 40% (Anon. 2001).
- In Burkina Faso, livestock density increases with the cultivated area; in provinces with only 5% of cultivated land, 1 tropical livestock unit (TLU) has more than 10 ha of land, where 35% or more is cultivated, 1 TLU lives on 3 ha. However, in provinces with high fertiliser use, livestock densities are lower than average at a certain percentage of land under crops; fertilisers and manure appears to be complementary (Bremen, 2002).
- In Mali, sorghum, millet and groundnuts show an average annual yield increase of 10 kg/ha. However, since the structural adjustment, rice yields increase with the rate of the "Green revolution" (about 75/kg/yr), and maize yields increase at 25 kg/ha/yr. Maize is mainly grown in the cotton belt, and cotton is also a crop that is produced in a rather intensive manner. The cotton price appears inversely proportional to the intensity of maize production.
- In West African peri-urban agriculture, vegetable production is increasingly intensive; high amounts of both organic and inorganic sources of nutrients are used (e.g. Kouvousou et al., 1998). In a wider circle around cities, cereal production is also increasingly intensive (Wiggins, 1995; Manyong et al., 2002; Anon., 2002b?).
- At the farm level, using the relatively good conditions of compound fields, fertiliser appears to be more efficient than on the more depleted bush fields; a bag of urea may lead to a twice as high yield increase (IFDC, 2002b).

Challenges and opportunities

Two sources have been used to define enabling agro-ecological and socio-economic conditions for intensification of agriculture, opportunities for subsistence farmers to become progressively market-oriented. The first source being exceptions that prove the rule of an extensive and stagnating agriculture, and the second, 15 cases of African agricultural analysed by Wiggins (1995) regarding change. Table 1 summarises the results.

Table 1. Conditions favouring the use of external inputs in sub-Saharan Africa

Agro-ecological environment

- favourable climate
- soils with good storage capacity for nutrients and water
- irrigation systems;

Socio-economic and policy environment

- access to domestic, regional or international markets
- high population density and growth
- good transport and distribution systems
- enabling policy environment for private initiatives
- peace and stability
- favourable input and output prices.

“Relative” or “relatively” can be used to describe all conditions, and not all conditions have to be fulfilled to trigger change. The presence of and access to important markets with high purchasing power seem to be the most important conditions.

High population pressure and growth, and relatively good transport and distribution systems generally accompany these conditions. This combination of conditions can even lead to the creation of the second most important condition, a favourable agro-ecological environment. The almost sterile marine sand around Lomé is made productive through high amounts of compost, manure and inorganic fertiliser, for quality food for the city and spices for export to France (Kouvounou et al., 1998). High investment in irrigation is another reaction to market opportunities. However, more often it is an answer to drought and hunger from governments and donors.

An enabling policy environment can be rather well defined: farmers must be incited to invest in their land and the private sector to invest in input and output market development. Therefore, governments should act more as facilitators rather than actors, while they must favour producers above consumers (Anon., 1997; IFDC, 2000). In this context, general public support for agricultural development concerns infrastructure development, market information, research and extension, etc. Specific support is also required and has to target farmers and the private market sector. In both cases it should concern institutional reinforcement of the stakeholder groups.

Opportunities for farmers

Input subsidies have been proven more detrimental than effective for triggering agricultural intensification in Africa (e.g. IFDC, 2001; Debrah & Dahoui, 2001). The most interesting alternative in the West African context appears to be the promotion of integrated soil fertility management. It integrates the use of locally available soil amendments and external inputs, fertilisers in particular. It leads in time to higher efficiency of inputs, e.g. of fertilisers, water and labour; the economic feasibility of using external inputs is improved. It has a comparative advantage for small holders and marginal land. Promotion involves two forms of specific support related to land tenure and soil amendments. The first support is obvious; farmers only invest in their land if land use rights are better secured. The use of soil amendments must be supported during a transition period, which is long enough to make the use of external inputs economically attractive. It always concerns organic matter and often sources of phosphorus and sometimes lime (Breman & Sissoko, 1998; Anon., 1997; IFDC, 2002b).

Subsidising soil amendments can be regarded as a public investment that is at least as useful as small-scale irrigation. For West Africa's cotton belt, estimated investments are about US\$ 550 - 750 per ha, compared with US\$ 4000 - 8000 per ha for small-scale irrigation. Its economic benefit is certainly not inferior to that of small-scale irrigation (Breman, 2002). The support is required in case use of inorganic fertilisers is not attractive (enough); in most of West Africa, continuing soil mining seems to be economically more attractive for the short term. Subsistence farmers do not have the opportunity to consider a longer term (Sissoko, 1998). Supporting judicious use of organic matter is recommended and possible all over the region. In view of mineral resources, supporting the use of phosphate rock and lime can be considered in several West African countries (Anon., 1997; Kuyvenhoven et al., 1999). As long as the use of soil amendments is not supported, promotion of integrated soil fertility management will only be effective where conditions for intensification are rather favourable (table 1) and where the use of inorganic fertiliser is at least rather attractive. Strategic site selection will have to precede participatory development, validation and introduction of integrated soil fertility management packages (Schreurs et al, 2002).

Opportunities for the private sector

Structural adjustment has not yet led to increased availability and accessibility of external inputs in sub-Saharan Africa.

The poor resource base of African agriculture, negatively influencing input efficiency, is only one explanation (Breman, 2002). Lack of accompanying measures, inciting the private sector to accept former government responsibilities regarding market development, is another bottleneck (IFDC, 2000). Countries where structural adjustment created a fertiliser market without government intervention, had during the 1990s a six times higher fertiliser use consumption than countries having government intervention. And a completely privatised large Malian irrigation scheme showed a faster agricultural development than does the Malian cotton belt with its partially dismantled cotton parastatal. A serious problem in the region is hidden interventions, linked with undisclosed interests. The best support that governments can provide is to ensure market transparency and competition. Regional cooperation can contribute to it and solve the problem of thinness of national markets and making the region able-bodied in the global context (Mazoyer & Roudart, 2000; Mazoyer, 2001b).

Increased use of external inputs through private-led market initiatives appears indispensable for agricultural change in Africa. Retreating governments should become concerned about accompanying risks for small holders and the environment. It is presumable that the enabling policy environment described above will favour both commercial farmers and subsistence farmers under conditions summarised in table 1 (regions with situation I; see the paragraph below). Combining it with integrated soil fertility management will strongly enlarge such relatively favourable areas (regions with situation II). However, more permanent government support will be indispensable for subsistence farming on marginal land (regions with situation III). Such support should not be regarded as subsidising agriculture, but as effective investments targeting desertification control and protecting regions that are more productive. The complexity of paying effective attention to the environment and development requires a new approach (Breman, 2002; Sayer & Campbell, 2002).

West African challenges and opportunities

Based on market attractiveness (Cour, 2001), relatively good agro-ecological conditions and inherent crops with comparative advantages, a scale of decreasing opportunities exists for agricultural intensification, through more sustainable systems. There are parallel opportunities for subsistence farmers to become increasingly market-oriented, if they are able to prevent commercial farmers from taking over their land. Table 2 presents the areas with decreasing opportunities. The four distinguished zones (first column table 2) are more or less comparable to what Cour (2001) calls the coastal and Sahelian growth poles, the coastal hinterland and the Sahelian fringes. The names chosen for the table have a more agro-ecological significance.

The first two zones have approximately an equal potential; chances for export are bigger in the first zone, but the agro-ecological conditions are clearly better in the second. In all the zones, there is a variation of potential, only in two cases have they been made explicit (presence of large cities and specific opportunities in the Sahel). A particularity of the third zone (hinterland) is the relatively low demographic pressure. The chances for subsistence farming to survive still without access to external inputs are the best for this zone.

IFPRI produced recently estimates of future African markets. It is their expectation that growth will concern in the first place domestic markets (\$ 6 billion/yr). Traditional export markets are second (\$ 0.4 billion/yr), directly followed by non-traditional export markets, like fish, fresh fruits, vegetables and flowers (\$ 0.36 billion/yr).

Regional markets come on the last place (\$ 0.06 billion/yr); multiple trade barriers limit the size and potential for expansion (Hazell, 2003). The figures between brackets present the expected annual market growth for Africa as a whole.

Table 2. The major agricultural zones of West Africa.

zones	products	attractiveness external inputs ¹⁾	potential ²⁾
coast ³⁾	export crops (coffee, cocoa, etc.; fruits and vegetables), quality food for urban population and root crops	I – II	+++ - ++
dry savannah ³⁾	export crops (cotton); quality food for urban population; cereals and legumes for domestic and regional markets; livestock for domestic and export markets	I – II	+++ - ++
humid savannah	non-perishable export crops (cotton); root crops, cereals and legumes for the coastal zone and the regional market	II	++
Sahel	cereals, legumes and animal proteins for local consumption; rice for domestic market ⁴⁾ ; livestock for domestic market ⁴⁾	III	(+) ⁴⁾

¹⁾ decreasing attractiveness of external inputs going from I to III; in I external input use already economically favourable, in II after introduction of integrated soil fertility management; in III only with permanent support for the purpose of desertification control (see paragraph above); ²⁾ decreasing potential with decreasing number of +; ³⁾ with increasing distance from important cities and harbours, the potential decreases and the role of perishable crops is decreasing; ⁴⁾ small niches with potential, where, respectively, irrigation is economically feasible or dry season fodder situation can be improved thanks to linkages with such irrigation schemes or with production systems in the Sahelian growth poles.

The interest of the private sector to invest concerns the first two zones, particularly when the use of external inputs is already economically feasible (zones with situation I; see table and related paragraphs). The private sector can easily be interested in zones with situation II, in case governments and donors actively promote integrated soil fertility management and invest in soil amendments. After a transitional period, the private sector will become the main actor, as in zones with situation I. Niches with situation II exist inside zones with III as dominant situation. The role of the public sector vis-à-vis the private sector must remain rather important in the last zone.

It is obvious that the policy environment can reinforce or weaken the indicated development potential. Countries with already transparent and competitive markets have better chances than others. The same is true for countries such as Burkina Faso, Ghana and Mali which have a national soil fertility action plan, provided these plans are implemented.

IV. Action plan

Chapter III presents the opportunities for agricultural intensification based on more sustainable production systems. It should be a challenge for the stakeholders, farmers, the private and the public sector to translate the opportunities into reality. West African governments and the international community have special responsibility to ensure that subsistence farmers will also benefit, thus making their systems progressively market-oriented.

Table 3 summarised the actions to be taken, without once again specifying the differences between zones, etc. The international community is not specifically mentioned, it should support the priority needs enumerated in the table (ODI, 2002).

Table 3. Synthesis of actions to be taken for agricultural development based on more sustainable production systems

Farmers

- improving their organisations, making them more representative and strong enough for effective dialogues with the public and the private sector;
- invest in land, enriching their production systems with integrated soil fertility management technologies.

Private sector

- improving their associations, making them more representative and strong enough for effective dialogue with public and farmers;
- invest in input and output market development, ensuring competitiveness and transparency, and respecting quality standards both for inputs and outputs;
- pin-point the first need, inorganic fertiliser, as part of a complete package of external inputs and including extension activities;
- exploit strategic site selection (table 1).

Public sector

- moving from the role of actors to that of facilitators for agricultural development, favouring producers over consumers;
- create an enabling environment for farmers to invest in their land, through the overall agricultural and economic policies;
- develop integrated soil fertility management investment projects beside those on small-scale irrigation, including improved land use security and support of using soil amendments;
- create an enabling environment for private market development, supporting the private sector effectively in a transition period, ensuring market competitiveness and transparency;
- create and improve market information systems, support and improve agricultural research and extension;
- moving faster towards regional cooperation and integration;
- minimize the risks for small holders and marginal land, and protect productive regions against the internal threat of environmental degradation and against the external threat of desertification.

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