



Interpreting Changes from the 1970s to the 1990s in African Agriculture Through Village Studies

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Summary. — Assessments of the performance of agriculture in sub-Saharan Africa are typically based on official production statistics at national level. Between the early 1970s and the mid-1990s these often show alarmingly poor rates of growth. But there are good reasons to doubt the statistics and their interpretation. An alternative is to examine the record from the village level upward. This paper looks at the evidence from 26 case studies of change between the mid-1970s and the mid-1980s at the district or village level. These suggest less cause for alarm than the national statistics. They confirm that access to markets is essential for agricultural development—the single biggest idea in the policy reforms of the 1980s, but they also underline the importance of the detail of policy—in remedying failures in product, capital and insurance markets and in public investment in technology. © 2000 Elsevier Science Ltd. All rights reserved.

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1. INTRODUCTION

This paper reviews some key issues arising in African agricultural development over the last quarter century. It does so by first reviewing the officially-reported data for countries and the region which play such a key role in shaping appreciations of African food and farming by governments and aid donors. Given the limitations of these data, the second part of the paper reviews published studies of change at provincial, district and village levels to build a picture of processes from the micro level.¹ In the conclusions policy implications are discussed.

2. THE VIEW FROM THE NATIONAL DATA

Africa south of the Sahara² remains a predominantly rural and agricultural land. Of the 538M citizens in 1993–95 (all data come from FAO unless otherwise stated), more than 70% lived in rural areas. The vast majority of the rural population earn their main living from the land: 70% of the economically active population was reckoned to depend primarily on farming in 1993–95. As many 50M households may be farming, tilling over 130M ha as arable fields, tending 14M ha of permanent crops, and making use of 740M ha of pastures.

African farming is typically small-scale (rarely do crop farmers cultivate more than 10 ha, the median is probably under 5 ha), carried out by peasant households with the majority of the labor provided by resident members. Most tools used are hand-held, although in some areas animals are used for ploughing and carting. Tractors are rare. Purchased external inputs—fertilizer, crop protection chemicals, improved seeds—are used by a minority of farmers and even then sparingly. Only a small fraction of the land is irrigated: less than 5M ha, of which more than 3M ha of lies in just two countries—Madagascar and the Sudan. Most crop production is thus highly vulnerable to the vagaries of rainfall and to other natural hazards such as pest and disease attacks.

By value, crop production at around 75% of estimated total value of output dominates over livestock production. At the heart of the crop economy lie food crops: out of the 131M ha tilled in the early 1990s, 44M ha were planted to cereals, and another 13M ha to roots and tubers.³ The proportion of arable land planted

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to food crops has been rising over the last three decades.

Despite the central importance of farming for rural livelihoods and national development, it seems that African agriculture has failed to fulfil expectations over the last quarter century (and indeed, for most countries, since independence). The growth of agricultural output has failed to match plans, hopes, and population growth. Figure 1 shows the production index for agriculture per person for 1965–95. This appears to indicate a record of failure with marked decline over 1970–84. Graphs such as this have provoked widespread dismay and talk of “crisis”.

While there is nothing to celebrate in this data, a few points need to be borne in mind before hands are wrung. First, the data base is weak. Most of the data reported to the FAO by national ministries of agricultural are at best informed guesses, since few countries have been able to carry out sample surveys regularly and still less conduct farm censuses. Production moreover may be underestimated.⁴ Officials estimating production tend to concentrate on the main staples and the export crops. Any increases in production of less visible crops—for example, fruits and vegetables, or cassava—may be underreported. Similarly if more of the marketed surplus is channeled toward regional centers and does not pass through central markets or sea ports, output may be underes-

timated. If there are parastatal marketing boards with monopsonistic powers, as there were in much of the region until the reforms of the mid- to late-1980s, then production flowing in parallel channels may be underrecorded. In some cases the continuance of food aid shipments and donor funds would provide an incentive to report production shortfalls.

Moreover, data for the whole of sub-Saharan Africa are typically reported with little attention to which countries dominate the data bases. As Table 6 shows, the bulk of the region's production of the main food crops comes from a handful of countries. Just 10 countries⁵ produce more than three-quarters of the total, and of these the first five produce almost 60%. Nigeria alone produces more than one-third of the calorific value of cereals and roots and tubers. Nigerian national statistics on farming have been notoriously unreliable. Between countries there is much variety in the records which is lost in the regional data.

Second, Figure 1 is deliberately drawn to show small movements as large. For the 30-year period, farm production per capita falls by all of 15%—hardly a catastrophic decline, and well within the range of errors in the data. Given how small the movements are, they are sensitive to droughts affecting more than one country—see for example the data for the years 1984 and 1992 when harvests were hit by drought in eastern and southern Africa.

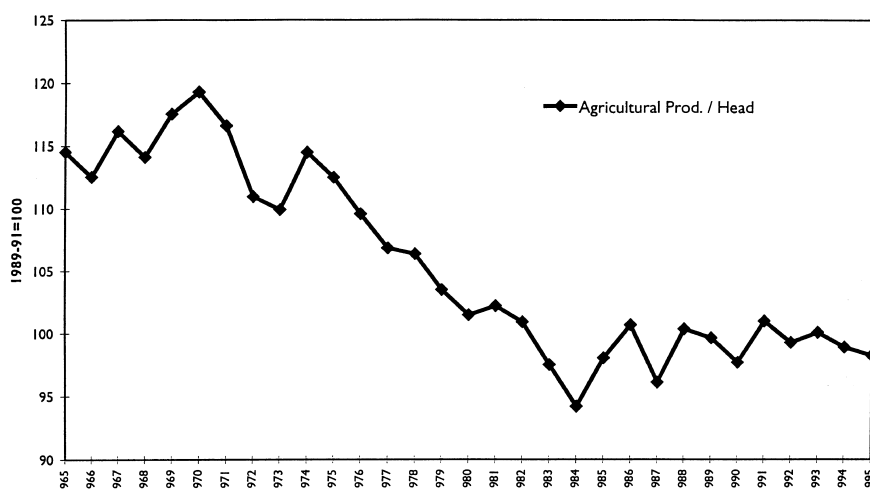


Figure 1. Sub-Saharan Africa: index of agricultural production a head. (Source: FAO, *State of Food & Agriculture, 1996.*)

Moreover, such indices are based on values of farm production and these vary according to changes in world prices. Some of the decline seen during the 1970s may reflect little more than falling world prices after the boom times for primary commodities of 1972–74. During the 1980s devaluations of currencies have lowered the dollar value of estimated national agricultural output. Block (1995) has recalculated these and sees larger increases during the 1980s than appear when looking at the usual indices.

Third, the decline has been relative to a rapidly growing population of around 3% a year from the mid-1970s to the mid-1990s. Farm output has not declined absolutely. Indeed, compared to the slower growth of the rural population (around 2.2% a year mid-1960s to early 1990s), recorded farm output has, by and large, kept pace. The failure to produce food in Africa is, above all, a failure to provision the cities (Jaeger, 1992; Morgan & Solarz, 1994). But this has not necessarily meant food scarcity in the town and still less urban hunger: what has usually happened is that imports have filled the gap. Thus, Africa south of the Sahara imported 2.5 M tons of the main food import, cereals, in the mid-1960s, but almost 12 M tons by 1993–95—see Table 8. This may seem alarming, but it is only 22 kg or

so per person a year—scarcely more than one large sack of grain for every household a year. The problem is less one of food shortage, than of using scarce foreign exchange (US\$ 2,889M in 1993–95) to import what it should be possible to produce in Africa (just 270 kg more grain from each hectare of cereals currently planted would meet the shortfall).

The other major point in the statistical record is the recovery of the indices since the mid-1980s. Since then agricultural production seems to have matched the growth of population. This is reflected in the slowdown in the growth of cereal imports. Of the 10 largest farm economies in the region, six were importing fewer cereals in 1993–95 than in the mid-1980s.

This hesitant recovery seems at first sight to suggest that the insistence of the World Bank and other major donors on economic reform, adjustment and liberalization—which should have removed in large part the negative protection of African farming—has paid off. If adjustment were having a marked impact, however, it would be on the internationally traded commodities. Yet the record of some of the major traded cash crops from the mid-1980s to the mid-1990s has not been good. None of the major exported products of the region—coffee, cocoa, cotton—show production growing faster than population (see Table 9). Nor

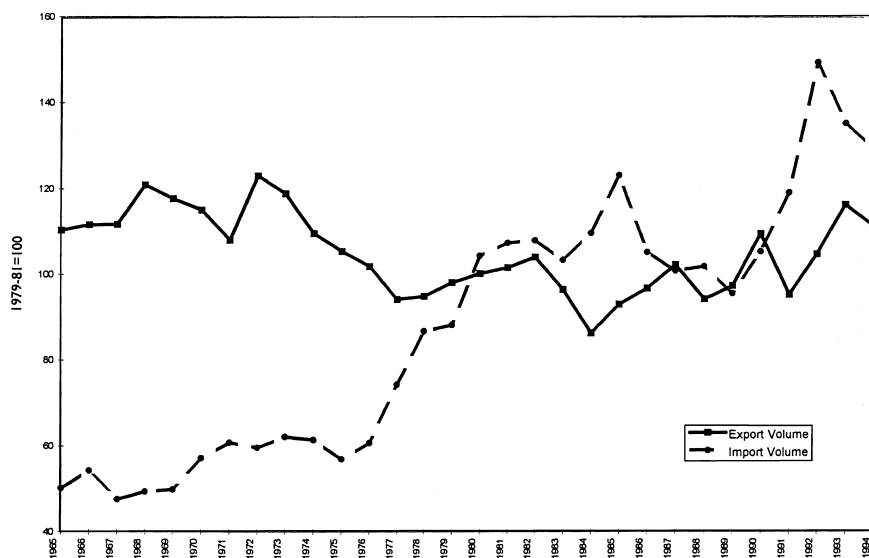


Figure 2. Sub-Saharan Africa: indices of agricultural trade. (Source: FAO, *State of Food & Agriculture*, 1996.)

does it seem that exports of nontraditional farm products have flourished. ⁶ While the index of volume of all exports has risen, it has done so at under 2% a year on average (see Figure 2).

3. THE STORY FROM THE VILLAGES

Case studies have been collected to investigate changes taking place in the apparently most blighted decade for African farming in recent times: that between the mid-1970s

and the mid-1980s. These were found by using databases of published material, principally that of CABI, ⁷ focusing initially on ten countries and later widening the search to include all the countries of West Africa. This produced a surprisingly small number of usable cases, ⁸ just 26 in all (see Table 1). To these can be added other insights from studies at the village level which were not complete enough to add to the list.

What do these stories from provinces, districts and village tell us? There is a bewil-

Table 1. *The case studies*

Case	Main sources
Awka-Nnewi, Anambra State, Nigeria	Okafor (1993) and Okorji and Obiechina (1990)
Bignona and Oussouye, lower Casamance, Senegal	Linares (1992)
Boromo, Guinean zone, Burkina Faso	Matlon (1991), Reardon and Bigsten (1990) and Vierich and Stoop (1990)
Chivi, Zimbabwe	Scoones <i>et al.</i> (1996)
Dagaceri, Birniwa District, Kano State, Nigeria	Mortimore (1989)
Djibo, Sahelian zone, Burkina Faso	Matlon (1991), Reardon and Bigsten (1990) and Vierich and Stoop (1990)
Ibarapa District, Oyo State, Nigeria	Guyer (1989, 1992) and Guyer and Lambin (1993)
Imo State, Nigeria	Goldman (1993), Martin (1993)
Iringa Region, Tanzania	Birch-Thomsen (1990), Boesen and Ravnborg (1992), Friis-Hansen (1988), Nindi (1988) and Rasmussen (1985)
Kandjadja village, Mansaba sector, Guinea Bissau	Rudebeck (1988, 1990)
Kano close-settled zone, Nigeria	Mortimore (1993)
Kusasi, Ghana	Webber (1996) and Cleveland (1991)
Lower Machakos District, Kenya	Tiffen, Mortimore and Gichuki (1994)
Lower Sokoto Valley, NW Nigeria	Adams (1987, 1988, 1993), Swindell (1986), Swindell and Mamman (1990) and Swindell and Iliya (1992)
Manyra Krobo District, Southeast Ghana	Amanor (1994)
Mbozi District Tanzania	Bantje (1986) and FSG (1992)
Mid-Machakos District, Kenya	Tiffen, Mortimore and Gichuki (1994)
Middle Senegal Valley, Senegal	Bloch (1993), Diemer, Hall and Huibers (1991), Jamin and Tourrand (1986), Lecomte (1992), Niasse (1990, 1991), Park (1993) Sow (1983), Tourrand and Ndiaye (1988) and Woodhouse and Ndiaye 1991a,b)
Namu District, Benue Valley, Nigeria	Netting, Stone and Stone (1989), Stone, Netting and Stone (1990)
Northern Province, Zambia	Allen (1987), Bolt and Holdsworth (1987), Francis (1988), Francis and Rawlins-Branan (1987), Holden (1993), Moore and Vaughan (1987), Ndiaye and Sofranko (1988), Pottier (1990), Sano (1990), Seur (1990) and Sichone (1990)
South Nyanza District, Kenya	Kennedy (1989) and Kennedy and Cogill (1987)
The Gambia	Baker (1992, 1995), DeCosse (1992), Haswell (1991), Mills, Keboy and Boughton (1988), Osborn (1990), Posner and Gilbert (1989) and Webb (1992)
Upper Embu District, Kenya	Haugerud (1983, 1988, 1989)
Upper Machakos District, Kenya	Tiffen <i>et al.</i> (1994)
Yako, Sudanian zone, Burkina Faso	Matlon (1991), Reardon and Bigsten (1990), Vierich and Stoop (1990)
Yensiso, Amanase, Sekesua, Ghana	Gyasi <i>et al.</i> (1995) and Gyasi and Uitto (1997)

dering amount of detail (more can be found in Wiggins, 1995; Wiggins & Gadbois, 1995; Wiggins, 1998). The single most striking finding from the cases is that the gloomy picture from the national statistics is often contradicted by field accounts of small (and not so small) booms in producing food crops for national and subnational markets, and of peasants coping with difficult conditions. Rarely if at all do the cases reflect a countryside in dire straits, on the verge of famine and environmental catastrophe as is sometimes claimed.⁹

In comparing the studies, use was made of the framework employed by Snrech (1995) who, reviewing cases in West Africa, saw two factors as affecting change in that region: market access and pressure on natural resources. From this he produced the scheme shown in Table 2.

This is a satisfying scheme in that it captures variables of prime interest to both natural and social scientists. Pressure on resources invites considerations of agro-ecological potential and carrying capacity, while market access brings in the demand for farm produce and the influence of economic policy on such demand. Theoretically it comes close to the ideas of Boserup (1965, 1987) who argued that initially at low population densities, farmers would produce extensively for their own subsistence and would have little interest in intensifying their production. As population builds up and pressure on the land mounts, fallows shorten until a crisis of weeds and declining soil fertility arises to force intensification through working harder and longer in the fields. At the same time, towns grow, distances to market shorten, and roads improve thus effectively raising farm-gate prices of marketed surplus and reducing the farm-gate cost of purchased inputs. This allows farmers to intensify to their advantage. Her theory thus corresponds to the top left and bottom right-hand quadrants of the Snrech

chart. That the chart has two other quadrants recognizes that some situations do not easily enter Boserup's account (although she was well aware of these possibilities).

This scheme has been used to classify the case studies. In doing so, the weakness of such frameworks readily becomes apparent: the good access-poor access and high pressure-low pressure dichotomies of what are in reality continuous variables may allow us to think through stereotypical cases, but fail us empirically since some cases inevitably lie in the middle of the range and cannot easily be assigned to one category or another. In the absence of reliable guidance to define degrees of access and resource pressure corresponding to one category or another, a further category in the middle was created to accommodate the in-between cases.

"Market access" is here taken to represent the levels of farm-gate prices for output received by farmers. These prices reflect both physical access to the market and the costs of transport, and the prices prevailing in the markets to which they ship produce—largely a function of the size of the center, incomes of the populace, and the availability of competing supplies, moderated by the existence of market imperfections and the effects of government policy on any of the variables mentioned.

Pressure on natural resources is seen as a combination of rural population density, the terms of access to such resources (land tenure), and the quality of the resources in terms of rainfall and soils.

Making qualitative judgements based on the information summarized in appendix tables so as to categorize the cases yields Table 3.

The cases cover most circumstances, although there are three cells with single entries and one with none, which prevents a view of the full range of possibilities. Out of this variety, there are some recognizable trends.

Table 2. *Probable direction of agricultural and rural development in West Africa, according to market access and pressure on natural resources^a*

	Poor or risky access to market	Strong access to market
Weak pressure on natural resources	Extensive crop production, or emigration, livestock important	Large-scale mechanized farming, capital-intensive (e.g., cotton pioneer zones)
Strong pressure on natural resources	Subsistence production, labor intensive, low returns, strong emigration	Intensification by labor or capital, depending on the pre-existing conditions

^a Source: Snrech (1995).

Table 3. *Market access, pressure on resources, and agricultural response*

	Low pressure on natural resources	Medium pressure on natural resources	High pressure on natural resources
Good access to markets	<i>Successful extensive development:</i> Northern P., Zambia Iringa, Tanzania Mbozi, Tanzania Ibarapa, Nigeria	<i>Successful intensification and extensification:</i> South Nyanza, Kenya Boromo, Burkina Namu, Nigeria <i>Successful intensification:</i> Mid Machakos, Kenya <i>Problematic intensification:</i> Yensiso, Amanase, Sekesua, Ghana	<i>Successful intensification:</i> Upper Machakos, Kenya Upper Embu, Kenya Kano CSZ, Nigeria <i>Problematic intensification:</i> Lower Sokoto Valley, Nigeria <i>Failing intensification:</i> Imo State, Nigeria Awka-Nnewi, Nigeria
Medium access to markets	<i>Coping with problematic farming:</i> Lower Machakos, Kenya	<i>Coping with problematic farming:</i> Chivi, Zimbabwe Yako, Burkina Lower Casamance, Senegal <i>Failing or highly problematic agriculture:</i> The Gambia Middle Valley, Senegal Upper Manya Krobo, Ghana	
Poor access to markets	<i>Struggling for subsistence:</i> Djibo, Burkina	<i>Struggling for subsistence:</i> Dagaceri, Nigeria Kandjadja, Guinea-Bissau	<i>Failing intensification:</i> Kusasi, Ghana

(a) *The importance of market access*

First, without good access to markets, agricultural development is problematic. At best, farmers find ways to cope. Indeed, in almost all of the cases of medium or poor access to markets, off-farm work becomes critical to underwriting the village livelihoods. Given that the farm economy generates few multipliers in such cases—little surplus to process and trade, few inputs bought to be provided, low cash incomes to spend on local goods and services, then it is inevitable that the off-farm work involves migration. Migration, however, deprives the community of labor and thus stymies almost any agricultural development worth mentioning.¹⁰

What makes for good market access in these cases can be proximity to large urban centers—the case in all of the five densely-settled (more than 300 persons per km²) cases, or the presence of large companies prepared to buy locally (South Nyanza, Boromo), or governments setting pan-territorial prices for crops such as maize which effectively annuls the costs of physical remoteness (as in Zambia and Tanzania in the late 1970s).

Successful agricultural development can be based on more intensive use of land or by extending the area tilled—either by bringing

new fields into cultivation or reducing fallow lengths. It is no surprise to find that the choice here seems to correlate in every case with the pressure on resources: intensification is limited while there is still the opportunity to plant more fields.

The literature frequently reports the alacrity with which farmers will seize on to market opportunities. In West Africa, the violet onions of the Maggia valley of Niger produced for the Nigerian market, pumpkins from villages in North Bank Division of the Gambia shipped to Dakar, early yams from selected areas of northern Côte d'Ivoire for the markets of Abidjan, tomatoes from villages in Brong for Kumasi—the list is long. One recent case from the 1990s reports how settlers have opened up 6k ha of irrigated rice in the Sourou valley of south-east Mali within a mere five years, using indigenous techniques and resources (Woodhouse, Chenevix-Trench & Tessougué, 1997). In many of these cases, the marketed crop is not one of the long-standing exported “cash crops”—although cotton, coffee and sugar feature in five cases. More striking is the vitality of marketing to meet the demands of the region's towns and cities.

That market access seems a critical precondition to successful farming seems at first to support the World Bank and other donors who

during the 1980s stressed the costs arising from the disincentives of “negative protection”—that is, depressing prices paid to farmers. The costs were probably real enough, but removing negative protection does not necessarily ensure agricultural growth. Of the 15 cases of good access to market, in 11 cases some success was achieved—but that leaves four problematic cases.

The two cases from southeastern Nigeria are bewildering: in the midst of a region undergoing rapid urbanization, with a dense network of roads, and in the 1970s at least awash with oil wealth, we learn of farming in crisis. What seems to set these cases apart from the other cases with good market access is the agro-ecology: the leached forest soils seem to become exceptionally infertile while the lack of livestock in the system deprives farmers of manure. Faced by the daunting labor of composting, most young men opt for the towns and leave their small farms as gardens for the women to tend.¹¹ One other factor at work here seems to be the lack of a reliable well-rewarded cash crop, though it seems that oil palm, an obvious candidate, was poorly paid owing to parastatal inefficiencies (and the strength of the petro-Naira during the 1970s). Similar arguments, although not to the same degree, may apply to the southern Ghanaian case. The case of the Sokoto valley was unusual in that a dam had reduced the supply of flood irrigation waters to farmers downstream.

(b) *What of cases without good access to markets?*

The other 11 cases without good market access divide ecologically into cases of farming in land made marginal by their low or erratic rains (seven of the cases) and those in areas where drought is less of a menace. The dry margins of crop farming present formidable challenges to farmers. There is some room for maneuver by policy choice—contrast, for example, the account of modest progress in farming in Chivi, Zimbabwe with the despair of Kusasi, Ghana. The former has received some sympathetic attention from government agencies since independence in 1980, the latter less so.

The other four cases present variations on themes of failed public policy—and just plain circumstance. Kandjadja is a village in a country that in the period reviewed was recovering from the war of independence, with scant resources. Bereft of decent road access

and minimal state services, the villagers could do little other than subsist. In Many Krobo, the farm communities had fallen victim to the attraction of other areas, ecological challenges which defeated most external agencies, and government neglect of roads. The lower Casamance suffered from relative neglect by a state none-too-anxious to assist communities seen as rebellious. That leaves the case of the Gambia. Here farming has faced the obstacles of worsening rainfall which has created an ever-greater threat of the rains ending early, falling returns to the main cash crop of groundnuts, and the attractions of leaving the village for jobs in the towns. None of these hurdles is that high, yet only a few farmers have seen their way into intensified farming for the market, even in those parts of the country where market access might better be termed “good” rather than medium.

For economists anxious to establish the primacy of impersonal and objectively measurable variables in explaining patterns of economic activity, it is uncomfortable to admit that at the margin variables such as skills, social capital and temperament seem to divide communities between those which enthusiastically pitch into expanded farming, resolving problems with energy and imagination, (e.g., Namu, Machakos, Mbozi) and those where it seems that problems lead many erstwhile farmers to seek livelihoods outside of agriculture (e.g., the Gambia).

4. CONCLUSIONS AND DISCUSSION

Two results stand out from this review. First, without some market opportunity, farmers are not going to develop their farming in ways which enhance their incomes or contribute significantly to national development goals. Second, lands marginal for cropping owing to their susceptibility to drought do not present either many or promising opportunities for agricultural development.

Where does this leave us regarding policy? Facilitating access to markets is clearly a necessary condition if not sufficient to achieve agricultural growth. The principle may be clear enough, but the detail is less obvious, but equally important. The list of “don’ts” is reasonably well known (don’t maintain grossly overvalued exchange rates, don’t restrict private trading, don’t try to fix maximum prices for basic foodstuffs, don’t tax export crops at

exaggerated rates, etc.), the “do’s” less so. Whilst the agenda of investing in roads and their maintenance, providing market information, and stimulating the growth of competitive private sector trading may be clear, the role of larger-scale enterprise is a murky area. In five of the case studies, a critical factor in success was the operations of large-scale marketers—in three cases the maligned parastatals, in the other two cases big private companies (one of them a privatized state enterprise). The horrors of monopsonistic and monolithic bureaucracies, insensitive and inflexible, excessively costly to run, may be real but should not blind us to economies of scale (and scope) which exist with processing, storage, and transport. Expecting crowds of newly-respectable small-scale traders to fill the gap is probably naive. Jayne and Jones (1997) report how the liberalization of grain markets in eastern and southern Africa has been at best a half success. The gap left by the retreat of the parastatals has not been adequately filled.

Moreover, if access to market were much or all of the story, then all farmers in any given locality should be able to benefit. But do they? Social differentiation among the peasantry is no longer a fashionable area of inquiry,¹² so case studies published during the last decade tend to be weak on such differences. What is reported, though, confirms our worst fear: differences are substantial. When and where farm economies blossom, it seems that that the great bulk of the marketed surplus comes from a small fraction of the farmers. For example, in the early 1990s half the sales of maize in Chivi were made by just 10% of farmers, whilst 40% hardly ever sold any maize (Scoones *et al.*, 1996).

Differences in African farming are not usually the result of lack of access to land and other natural resources—land hunger arises in perhaps half a dozen of the cases, and even then is a muted theme (compared to its role in Asia and Latin America). What does divide farmers is their differential access to capital and labor, and the associated ability to bear risk. Capital rarely comes from formal lending; so most farmers have to depend on informal financial systems, and, above all, on their savings. These in turn can often be traced back to nonfarm earnings, the proceeds of a successful temporary stay in a city, or recruitment to a government job.

Even when there is some liquidity, investing in farming can be risky—the weather usually sees to that, and any price fluctuations in free markets merely compound the hazard. In the marginal drylands, risks are difficult to reduce, no matter how carefully the portfolio of crops is selected. For example, in the Sahel of northern Burkina Faso, Carter (1997) reckons that households have a 15% chance, or higher, of failing to meet subsistence requirements in any given year. With no insurance on offer and difficult access to credit, risking pitifully small sums (\$100 can buy enough fertilizer, seed or additional labor to make a substantial difference for a low-input smallholder) against not-so-bad odds is simply unacceptable for the majority of farm households.¹³

It is thus not surprising to find how interested farmers are in schemes where liquidity is provided up front by an external intermediary which also absorbs the risk of not recovering the investment should the harvest fail. Ironically, just at the time the role of parastatals in east and southern Africa in fulfilling these functions has fallen out of favour, anglophones have discovered the success of a similar model operating to promote cotton production in francophone West Africa.¹⁴ Similarly, contract farming is touted in some quarters as a private sector alternative that captures the economies of scale and scope mentioned earlier. Contract farming arranged by large companies works in some cases (see, for example, Porter & Phillips-Howard, 1997), but how to operate such schemes without falling prey to monopsony power or to the laxity which lack of competition may allow is not clear. Indeed, successful contract farming may depend more upon on the margins prevailing in particular commodity chains, rather than any particular organizational merit.¹⁵

So far it has hardly been necessary to bring technology into the discussion. Most changes in farming, however, require suitable techniques. True as this may be, in the cases reviewed technology rarely drives changes. Usually opportunities arise through the market, and then farmers (or at least those farmers with liquidity and resources) look to their stock of knowledge to help them react. Attempts by external agencies to push change by introducing techniques to raise productivity of some farm enterprise, irrespective of the market and

the returns to the enterprise, have almost always foundered.

The price of innovation is not always apparent to promoters. Labor costs, exposure to risks, implications for land rights—one or other of these often causes attempts to make radical changes to farming systems fail. Most technical change seen has been incremental: new varieties of existing crops are introduced, new crops are planted on old fields and tended pretty much as the previous crops, fields once hoed by hand now get scratch-ploughed by a donkey, existing crops receive fertilizer, water once lifted by shadufs is raised by a diesel pump, etc. New ways are fitted into existing patterns of farming, access to land and water, and household organization.

The challenge for formal research and extension is to be able to track changes in conditions for farmers and to offer them “menus” of appropriate innovations as and when appropriate. Of course, having the appropriate innovations to hand means, in an ideal world, having worked on techniques for many years in advance of the demand. Picking such winners requires fine judgement, not to mention a little luck.

The environment has also not been mentioned so far, and for a good reason. While any change in the economy and society of rural Africa has some kind of environmental impact, it is far from clear that such changes are anything like as deleterious as some may imagine and still less so “unsustainable.” The argument that much of rural Africa is subject to calamitous rates of erosion, deforestation, loss of biodiversity, etc. rests on a thin body of evidence. That slim body has, during the 1990s, been matched by a series of “counternarratives” of cases that suggest that accepted accounts of environmental degradation are mistaken (Fairhead & Leach, 1995; Mortimore, 1989; Scoones *et al.*, 1996). Indeed, there are other cases where intensified farming leads to environmental improvement (Tiffen, Mortimore & Gichuki, 1994). While environmental impacts need to be assessed, it is not clear that current models of agricultural development need radical change. That does not mean that there are not strong reasons to seek to develop techniques which hinder erosion and conserve soil and water, or to look to ways to manage commons (especially those affecting ranges and trees) in ways which remove externalities and encourage stakeholding in the future of such

resources. But such measures can be incorporated within existing schema.

A final area of discussion that deserves mention, is that of the rural nonfarm economy. Little is known about this, although there is a rapidly growing literature and an embryonic set of ideas (see Delgado, 1994; Reardon, Taylor, Stamoulis, Lanjouw & Balisacan, 1998). Exploring ways to create synergy between this and farming promises to complete an important part of the jigsaw of rural development.

To recapitulate, where does this leave policy for agricultural development in Africa south of the Sahara? Since structural adjustment and economic liberalization of the 1980s, there are no “big” ideas in agricultural policy. The present challenge is to attend to the detail, some areas of which have been sketched out above, thus:

- How do we facilitate access to markets and marketers? What makes for efficient and competitive marketing systems? For market intermediaries, how do scale and scope economies trade off against monopoly?

- What is to be done about liquidity limits and risk? What is the scope for developing systems of financial intermediation and insurance in rural Africa? Is this best done through specialized agents and organizations, or should we look for economies of scope in larger organizations?

- How do we make best use of scarce funds for research and extension? How do we track what farmers are doing, and how do we pick winners for the future?

- To what extent, and in which conditions and cases, must we forego options, with attendant opportunity costs, so as not to incur even greater environmental losses?

- How do linkages between farming and the rural nonfarm economy operate? Do particular forms of agricultural development help or hinder such multipliers?

The answers to these questions are not easily provided by recourse to deductions from grand (or not-so-grand) theory. Providing reliable guides in these five areas will require a great deal of careful empirical study. That is perhaps the main challenge facing social scientists concerned with rural Africa for the first decade of the 21st century.

NOTES

1. This paper builds on previous reviews of case studies, see Wiggins (1995) and Wiggins and Gadbois (1995).
2. In this paper sub-Saharan Africa includes all the countries of Africa except the five North African states, but omits South Africa, partly since FAO statistics have until recently excluded that country.
3. This does not mean that all of the other 74M ha were planted to other crops: most of the remainder will be arable lying fallow.
4. For doubts about farm statistics for the region, see Berry (1986), Dommen (1988), Guyer (1984), Jaeger (1992), Raikes (1988) and Schatz (1986).
5. Nigeria, Congo DR, Ethiopia, Tanzania, Sudan, Ghana, Madagascar, Kenya, Uganda and the Côte d'Ivoire.
6. The exceptions seem to be tobacco and forest products.
7. Commonwealth Agricultural Bureau International which abstracts a wide variety of published sources in the field of agriculture and food. Also used were IBSS and ISS which document the social science literature.
8. It is suspected that some useful studies have never been formally published and have remained as the "grey" literature of consultancy and donor reports.
9. That said there is at least one clear bias in the case studies: only one comes from countries where there has been substantial conflict—which thus omits countries such as Sierra Leone, Liberia, Chad, Sudan, Ethiopia, Somalia, Angola, Rwanda and Mozambique.
10. Migration is expensive in travel and accommodation. It is typically raises labor burdens on women and children remaining back in home areas. It also carries social costs in the division of families and the temptations of alcohol and the flesh for migrant men. When there are jobs to be had by migration which pay so much better than farming at home, the gains may outweigh the losses: otherwise it can become a desperate business (see Watts, 1983; Mortimore, 1989 for comments about the pain of dry season migration for Hausa farmers and Cleveland (1991) on the costs of migration from Kusasi, Ghana).
11. Okorji and Obiechina (1990) comment that while in the 1980s women were prepared to put up with heavy work burdens, future generations of young women who have had secondary schooling may not.
12. During the 1970s and early 1980s vigorous debates over peasant differentiation took place (see, for example, early volumes of the *Journal of Peasant Studies*). There is nothing comparable today. The exception arises in gender studies of male-female differentiation.
13. But then again, the same \$100 invested in cattle trading or stocking a street-corner store, entails less risk, possibly better returns, and fewer days sweating in the fields.
14. Cotton farming in the guinea savannah of West Africa has seen a five-fold increase in production since the 1970s, promoted through the nationalised subcomponents of the old Compagnie Française de Développement des Textiles (CFDT).
15. In eastern and southern Africa, there is widespread admiration for one of the crop parastatlsas—the Kenyan Tea Development Authority. Has this been notably better run than its problematic cousins, or has it just been that the tea price has been generous enough to reward all in the chain?

REFERENCES

- Adams, W. M. (1987). Approaches to water resource development, Sokoto Valley, Nigeria: the problem of sustainability. In Anderson, D., & Grove, R., *Conservation in Africa: people, policies and practice*, Cambridge: Cambridge University Press.
- Adams, W. M. (1988). Irrigation and innovation: small farmers in the Sokoto Valley, Nigeria. In J. Hirst, J. Overton, B. Allen & Y. Byron, *Small-scale agriculture*. Commonwealth Geographical Foundation and Department of Human Geography, Canberra.
- Adams, W. M. (1993). Development's deaf ear: downstream users and water releases from the bakolori dam Nigeria. *World Development*, 21 (9), 1405–1416.
- Allen, M. (1987). Questioning the need for seasonal farm credit-cases from Northern Zambia. *Agricultural Administration and Extension*, 25, 25–36.
- Amanor, K. S. (1994). *The new frontier. Farmer responses to land degradation: a West African study*, London and Geneva: Zed Books, London in association with UNRISD, CTA, NL.

- Baker, K. M. (1992). Traditional farming practices and environmental decline, with special reference to The Gambia. In Hoggart, K., *Agricultural change, environment, and economy*, London: Mansell.
- Baker, K. M. (1995). Drought agriculture and the environment: a case study from The Gambia West Africa. *African Affairs*, 94, 67–86.
- Bantje, H. (1986). *Household differentiation and productivity. A study of smallholder agriculture in Mbozi District*, Research Paper No 14. Dar Es Salaam, Tanzania: Institute of Resource Assessment, University of Dar Es Salaam, Tanzania.
- Berry, S. (1986). Social science perspectives on food in Africa. In Art Hansen & D.E. McMillan, *Food in sub-Saharan Africa*. Boulder, CO: Lynne Rienner.
- Birch-Thomsen, T. (1990). Agricultural change-prospects for the future: a case study from the Southern Highlands of Tanzania. *Quarterly Journal of International Agriculture*, 29 (2), 146–160.
- Bloch, P. (1993). An egalitarian development project in a stratified society: who ends up with the land? In T. J. Bassett & D. E. Crummey, *Land in African agrarian systems*. Madison, WI: University of Wisconsin Press.
- Block, S. A. (1995). The recovery of agricultural productivity in sub-Saharan Africa. *Food Policy*, 20 (5), 385–405.
- Boesen, J., & Ravnborg, H. M. (1992). Peasant production in Iringa District, Tanzania. *CDR Project Paper* 93.1. Koebenhavn, DK: Center for Development Research.
- Bolt, R., & Holdsworth, I. (1987). Farming systems economy and agricultural commercialization in the south-eastern plateau of Northern Province, Zambia. *ARPT Economic Studies No. 1*, Kasama, NP, Zambia: ARPT.
- Boserup, E. (1965). *The conditions of agricultural growth: the economics of agrarian change under population pressure*. London: Earthscan.
- Boserup, E. (1987). Agricultural growth and population change. In J. Eatwell, M. Milgate & P. Newman. *The new Palgrave: dictionary of economics*. London & Basingstoke: Macmillan.
- Carter, M. R. (1997). Environment technology and the social articulation of risk in West African agriculture. *Economic Development and Cultural Change*, 45, 557–590.
- Cleveland, D. (1991). Migration in West Africa: a savanna village perspective. *Africa*, 61 (2), 222–245.
- De Cosse, P. (1992). Structural change in Gambian agriculture: stagnation or silent transformation? Mimeo, Banjul, The Gambia: USAID.
- Delgado, C. L. (1994). Africa's changing agricultural development strategies: past and present paradigms as a guide to the future. *Food, Agriculture and the Environment Discussion Paper* 3. Washington, DC: IFPRI.
- Diemer, G., Fall, B., & Huibers, F. P. (1991). Promoting a smallholder-centred approach to irrigation: lessons from village irrigation schemes in the Senegal river valley. *Irrigation Management Network Paper* No. 6. London: Overseas Development Institute.
- Dommen, A. J. (1988). *Innovation in African agriculture*. Boulder, CO: Westview Press.
- Fairhead, J., & Leach, M. (1995). Relics of colonial science: rethinking West Africa's forest-savanna mosaic. from the draft of *Challenging received wisdom in African environmental change policy*, Melissa Leach and Robin Mearns.
- Food Studies Group, Oxford, UK & Dept of Rural Economy, Sokoine University, Morogoro, Tanzania (1992). *Agricultural diversification and intensification study: Final Report* (vol II on farming systems in Tanzania).
- Francis, P., & Rawlins-Branan, M. J. (1987). The extension system and small-scale farmers: a case study from Northern Zambia. *Agricultural Administration and Extension*, 26, 185–196.
- Francis, P. (1988). Ox draught power and agricultural transformation in Northern Zambia. *Agricultural Systems*, 27, 35–49.
- Friis-Hansen, E. (1988). Villagization and changes in Tanzania farming systems—a case study. *Eur. Assoc. Dev. Res. and Training Inst. Bulletin*, 1 (1), 71–99.
- Goldman, A. (1993). Population growth and agricultural change in Imo State, southeastern Nigeria. In B. L. Turner II, Hyden Goran & Kates Robert W. *Population growth and agricultural change in Africa*. Gainesville, FL: University Press of Florida.
- Guyer, J. (1984). Women's work and production systems: a review of two reports on the agricultural crisis. *Review of African Political Economy*, 27/8, 186–190.
- Guyer, J. I. (1989). Women's farming and present ethnography: thoughts on a Nigerian re-study. In *19th Annual Hans Wolff Memorial Lecture*. Bloomington IN: Indiana University.
- Guyer, J. I. (1992). Small change: individual farm work and collective life in a western Nigerian savanna town 1969–88. *Africa*, 62 (4), 465–489.
- Guyer, J. I., & Lambin, E. F. (1993). Land use in an urban hinterland: ethnography and remote sensing in the study of African intensification. *American Anthropologist*, 95 (4), 839–859.
- Gyasi, E. A., & Uitto, J. I. (1997). *Environment biodiversity and agricultural change in West Africa*. Tokyo, New York and Paris: United Nations University Press.
- Gyasi, E., Agyepong, G. T., Ardayfio-Scandorf, E., Enu-Kwesi, L., Nabila, J. S., & Owuso-Bennoah, E. (1995). Production pressure and environmental change in the forest-savanna zone of southern Ghana. *Global Environmental Change*, 5 (4), 355–366.
- Haswell, M. (1991). Population and change in a Gambian rural community, 1947–87. In M. Haswell & D. Hunt, *Rural households in emerging societies: technology and change in sub-Saharan Africa*. Oxford: Berg.
- Haugerud, A. (1983). The consequences of land tenure reform among smallholders in the Kenya highlands. *Rural Africana*, 15–16, 65–89.
- Haugerud, A. (1988). Food surplus production, wealth, and farmers' strategies in Kenya. In R. Cohen, *Satisfying Africa's food needs*. Boulder, Co: Lynne-Rienner.

- Haugerud, A. (1989). Land tenure and agrarian change in Kenya. *Africa*, 59 (1), 61–90.
- Holden, S. T. (1993). Peasant household modelling: farming systems evolution and sustainability in northern Zambia. *Agricultural Economics*, 9, 241–267.
- Jaeger, W. K. (1992). The causes of Africa's food crisis. *World Development*, 20 (11), 1631–1645.
- Jamin, P. Y., & Tourrand, J. F. (1986). Evolution de l'agriculture et de l'élevage dans une zone de grands aménagements: le delta du fleuve Sénégal. *Le Cahiers de la Recherche Développement*, No. 12, Décembre, 21–34.
- Jayne, T. S., & Jones, S. (1997). Food marketing and pricing policy in Eastern and Southern Africa: a survey. *World Development*, 25 (9), 1505–1527.
- Kennedy, E. T., & Cogill, B. (1987). Income and nutritional effects of the commercialization of agriculture in southwestern Kenya. *IFPRI Research Report No. 63*. Washington, DC: IFPRI.
- Kennedy, E. T. (1989). The effects of sugarcane production of food security, health, and nutrition in Kenya: a longitudinal analysis. *IFPRI Research Report No. 78*. Washington, DC: IFPRI.
- Lecomte, B. (1992). Senegal: the young farmers of Walo and the new agricultural policy. *Review of African Political Economy*, 55, 87–94.
- Linares, O. (1992). *Power, production and prayer: the Jola of Casamance, Senegal*. Cambridge: Cambridge University Press.
- Matlon, P. (1991). Farmer risk management strategies: the case of the West African semi-arid tropics. In D. Holden, P. Hazell & A. Pritchard, *Risk in agriculture: proceedings of the 10th agriculture sector symposium*. Washington, DC: The World Bank.
- Martin, S. (1993). From agricultural growth to stagnation: the case of the Ngwa, Nigeria, 1900–80. In B. L. Turner II, Goran Hyden & Robert W. Kates *Population growth and agricultural change in Africa*. Gainesville, FL: University Press of Florida.
- Mills, B. F., Kebay, M. B., & Boughton, D. (1988). Soil fertility management strategies in three villages of eastern Gambia. *Research Paper 2*. The Gambia: Department of agricultural Research, Ministry of Agriculture.
- Moore, H., & Vaughan, M. (1987). Cutting down trees: women, nutrition and agricultural change in the Northern province of Zambia 1920–86. *African Affairs*, 86 (345), 523–540.
- Morgan, W. B., & Solarz, J. A. (1994). Agricultural crisis in Sub-Saharan Africa: development constraints and policy problems. *The Geographical Journal*, 160 (1), 57–73.
- Mortimore, M. (1989). *Adapting to drought: farmers famines desertification in West Africa*. Cambridge: Cambridge University Press.
- Mortimore, M. (1993). The intensification of the peri-urban agriculture: the Kano close-settled zone, 1964–1986. In B. L. Turner II, Goran Hyden & R. W. Kates, *Population growth and agricultural change in Africa*. Gainesville, FL: University Press of Florida.
- Ndiaye, S., & Sofranko, A. J. (1988). Importance of labor in adoption of a modern farm input. *Rural Sociology*, 53 (4), 421–432.
- Netting, R. M., Stone, M. P., & Stone, G. D. (1989). Kofyar cash-cropping: choice and change in indigenous agricultural development. *Human Ecology*, 17 (3), 299–319.
- Niasse, M. (1990). Village irrigation perimeters at Doumga Rindiaw, Senegal. *Development Anthropology Network*, 8 (1), 6–11.
- Niasse, M. (1991). Production systems in the Senegal Valley in a no-flood context Senegal. *Development Anthropology Network*, 9 (2), 12–20.
- Nindi, B. C. (1988) Issues in Agricultural change: case study from Ismani, Iringa Region, Tanzania. In D. W. Brokensha & P. C. Little, *Anthropology of development and change in East Africa*. Boulder, Co: Westview Press.
- Okafor, F. C. (1993). Agricultural stagnation and economic diversification: Awka-Nnewi Region, Nigeria, 1930–80. In B. L. Turner II, Goran Hyden & Robert W. Kates, *Population growth and agricultural change in Africa*. Gainesville, FL: University Press of Florida.
- Okorji, E. C., & Obiechina, C. O. B. (1990). Implications of overdependence on women's labor for food production in a traditional farming systems of Anambra State Nigeria. *Culture and Agriculture*, 40, 7–11.
- Osborn, T. (1990). Multi-institutional approaches to participation technology development: a case study from Senegal. *Agricultural Administration (Research and Extension)*. *Network Paper 13*, London: Overseas Development Institute.
- Park, T. K. (1993). *Risk and tenure in arid lands. The political ecology of development in the Senegal River basin*. Tucson & London: University of Arizona Press.
- Porter, G., & Phillips-Howard, K. (1997). Comparing contracts: an evaluation of contract farming schemes in Africa. *World Development*, 25 (2), 227–238.
- Posner, J. L., & Gilbert, E. (1989). District agricultural profile of Central Baddibu, North Bank Division. *Gambia Agricultural Research Papers, Working Paper 2*. The Gambia: Ministry of Agriculture.
- Pottier, J. (1990). Village responses to food marketing alternatives in Northern Zambia: the case of the Mambwe economy. *Paper delivered to Workshop held at African Studies Center, Cambridge, March*.
- Raikes, P. (1988). *Modernising hunger: famine, food surplus and farm policy in the EEC and Africa*. London: Catholic Institute of International Relations & James Currey.
- Rasmussen, T. (1985). The Green Revolution in the Southern Highlands of Tanzania. *CDR Project Paper Center for Development Research Denmark*, No A.85.7.
- Reardon, T., & Bigsten, A. (1990). Income diversification of rural households in the Sahel. *Rural Development Studies*, 70–75.
- Reardon, T., Taylor J. E., Stamoulis, K., Lanjouw, P., & Balisacan, A. (1998). *Effects of nonfarm employment on rural income inequality in developing countries: an*

- investment perspective. Symposium Paper for the Agricultural Economics Society Annual Conference, Reading UK, March.
- Rudebeck, L. (1988). Kandjadja Guinea-Bissau 1976–86. Observations on the political economy of an African village. *Review of African Political Economy*, 41, 17–29.
- Rudebeck, L. (1990). The effects of structural adjustment in Kandjadja Guinea-Bissau. *Review of African Political Economy*, 49, 34–51.
- Sano, H.-O. (1990). *Political economy and agrarian change in Zambia: the case of Northern Province*. Paper delivered to Workshop held at African Studies Center, Cambridge, March.
- Schatz, S. P. (1986). African food imports and food production: an erroneous interpretation. *Journal of Modern African Studies*, 24 (1), 177–178.
- Scoones, I., Chibudu, C., Chikura, S., Jeranyama, P., MacLaka, D., Machanja, W., Mavedzenge, B., Mombeshara, B., Mudhara, M., Mudwizo, C., Murimbora, F., & Zcrezeza, B. (1996). *Hazards and opportunities. Farming livelihoods in dryland Africa: lessons from Zimbabwe*. London: Zed Books.
- Seur, H. (1990). *The introduction and diffusion of agricultural innovations in Chibale chiefdom, Serenje District, Zambia-peasants, policy, and the plough*. Paper delivered to Workshop held at African Studies Center, Cambridge, March.
- Sichone, O. B. (1990). *The motive forces of development: views from an Isoka village*. Paper delivered to Workshop held at African Studies Center, Cambridge, March.
- Snrech, S. (1995). Les transformations de l'agriculture ouest-africaine: evolutions 1960–1990. Défis pour l'avenir. Implications pour les pays sahéliens. *Mimeo (Sahl (95)451)*. Paris: Club du Sahel, December.
- Sow, A. (1983). Les contraintes au développement de la petite exploitation agricole dans la moyenne vallée du fleuve Sénégal. *Études No RRD.19*. Geneva: Division de l'étude du développement, UNESCO.
- Stone, G. D., McC Netting, R., & Stone, M. P. (1990). Seasonality, labor scheduling, and agricultural intensification in the Nigerian Savanna. *American Anthropologist*, 92, 7–23.
- Swindell, K., & Mamman, A. B. (1990). Land expropriation and accumulation in the Sokoto periphery, northwest Nigeria 1976–86. *Africa*, 60 (2), 173–187.
- Swindell, K., & Iliya, M. A. (1992). Accumulation, consolidation and survival: non-farm incomes and agrarian change in northwest Nigeria. *Working Paper No. 6 of The Project on African Agriculture*. New York: Social Science Research Council.
- Swindell, K. (1986). Population and agriculture in the Sokoto-Rima basin of North-West Nigeria. *Cahiers d'études africaines*, No. 101-2, XXVI-1-2, 75–111.
- Tiffen, M., Mortimore, M., & Gichuki, F. (1994). *More people, less erosion. Environmental recovery in Kenya*. New York: Wiley.
- Tourrand, J. F., & Ndiaye, M. (1988). Innovations techniques en milieu paysan dans le delta du fleuve Sénégal pour l'alimentation du cheptel. *Cahiers de la Recherche Développement*, 17, 47–53.
- Vierich, H. I. D., & Stoop, W. A. (1990). Changes in West African savanna agriculture in response to growing population and continuing low rainfall. *Agriculture, Ecosystems and Environment*, 31, 115–132.
- Watts, M. (1983). *Silent violence: food, famine, and peasantry in Northern Nigeria*. Berkeley, CA: University of California Press.
- Webb, J. L. A. (1992). Ecological and economic change along the middle reaches of the Gambia river 1945–1985. *African Affairs*, 91 (1108), 543–565.
- Webber, P. (1996). Agrarian change in Kusasi, North-East Ghana. *Africa*, 66 (3), 437–457.
- Wiggins, S., & Gadbois, M. (1995). What do we know about change in the agricultural and rural economies of West Africa? A review of changes since the early 1970s. *Paper for ASA Conference*, September 1–3, University of Central Lancashire.
- Wiggins, S. (1995). Changes in African farming systems between the mid-1970s and the mid-1980s. *Journal of International Development*, 7 (6), 807–846.
- Wiggins, S. (1998). African farming seen from village studies: changes from the 1970s to the 1990s. Paper for the ASA-supported Conference on: Africa and globalisation: towards the millennium, University of Central Lancashire at Preston, UK, April 24–26.
- Woodhouse, P., & Ndiaye, I. (1991a). Structural adjustment and irrigated agriculture in Senegal. *Irrigation Management Network Paper No. 7*. London: Overseas Development Institute.
- Woodhouse, P., & Ndiaye, I. (1991b). Structural adjustment and irrigated food farming in Africa: the “disengagement” of the state in the Senegal River Valley. *Working Paper No. 5 of The Project on African Agriculture*. New York: Social Science Research Council.
- Woodhouse, P., Chenevix-Trench, P., & Tessougué, M. (1997). After the Flood: local initiative in using a new wetland resource in the Sourou Valley, Mali. *The Geographical Journal*, 163 (2), 170–179.

FURTHER READING

- Adams, W. M. (1991). Large-scale irrigation in northern Nigeria performance and ideology. *Transactions of the Institute of British Geographers NS*, 16, 287–300.
- Adams, W. M., & Mortimore, M. J. (1997). Agricultural intensification and flexibility in the Nigerian Sahel. *The Geographical Journal*, 163 (2), 150–160.
- Al Hassan, R., Kydd, J., & Warner, M. (1996). Review of critical issues for natural resources in Ghana's Northern Region. *Briefing Paper 4*, Research project 'The dynamics of smallholder agriculture in the Guinea savannah zone of West Africa, with particular reference to Northern Region Ghana' (NR Policy Research Continuum, R5584CA), Wye College, UK.
- Andersson, J. A. (1996). Potato cultivation in the Uporoto mountains Tanzania. An analysis of the social nature of agro-technological change. *African Affairs*, 95, 85–106.

- Ariyo, J. A., & Ogbonna, D. O. (1992). The effects of land speculation on agricultural production among peasants in Kachia local government area of Kaduna State Nigeria. *Applied Geography*, 12, 31–46.
- Awumbila, M., & Momsen, J. H. (1995). Gender and the environment: women's time use as a measure of environmental change. *Global Environmental Change*, 5 (4), 337–346.
- Bassett, T. J. (1993). Introduction; the land question and agricultural transformation in sub-Saharan Africa. In T. J. Bassett & D. E. Crummey, *Land in African agrarian systems*. Madison, WI: University of Wisconsin Press.
- Bassett, T. J. (1988). Development theory and reality: the World Bank in northern Ivory Coast. *Review of African Political Economy*, 41, 45–59.
- Bates, R. (1981). *Markets and states in tropical Africa*. Berkeley, CA: University of California Press.
- Becker, L. C. (1990). The collapse of the family farm in West Africa? Evidence from Mali. *Geographical Journal*, 156 (3), 313–322.
- Berry, S. (1993). *No condition is permanent. The social dynamics of agrarian change in sub-Saharan Africa*. Madison, WI: University of Wisconsin Press.
- Berry, S. (1997). Tomatoes, land and hearsay: property and history in Asante in the time of structural adjustment. *World Development*, 25 (80), 1225–1241.
- Bingen, J., Carney, D., & Dembelé, E. (1995). The Malian union of cotton and food crop producers: its current and potential role in technology development and transfer. *Agricultural Research and Extension Network Paper*. London: Overseas Development Institute.
- Binns, T. (1996). People environment and development in West Africa. *Geography*, 81 (4), 361–407.
- Binswanger, H., & Pingali, P. (1989). Technological priorities for farming in sub-Saharan Africa. *Journal of International Development*, 1 (1), 46–65.
- Borton, J., & Clay, E. (1988). The African food crisis of 1982–86: a provisional review. In D. Rimmer, *Rural transformation in tropical Africa*. London: Belhaven.
- Bryceson, D. F. (1996). Deagrarianization and rural employment in sub-Saharan Africa: a sectoral perspective. *World Development*, 24 (1), 97–111.
- Bush, R. (1997). Africa's environmental crisis: challenging the orthodoxies. *Review of African Political Economy*, 74, 503–513.
- Carney, J., & Watts, M. (1990). Manufacturing dissent: work, gender and the politics of meaning in a peasant society. *Africa*, 60 (2), 207–241.
- Chaléard, J.-L. (1989). Risque et agriculture de plantation: l'exemple des cultures commerciales développées dans le département d'Agboville (Côte d'Ivoire). In M. Eldin & P. Milleville, *Le risque en agriculture*, Paris: Editions de l'ORSTOM, Institut Français de Recherche Scientifique pour le Développement en Coopération.
- Chaléard, J.-L. (1996). Les mutations de l'agriculture commerciale en Afrique de l'Ouest. *Annales de Géographie*, 105 (592), 563–583.
- Collinson, M. P. (1989). Small farmers and technology in Eastern and Southern Africa. *Journal of International Development*, 1 (1), 66–82.
- Collion, M.-H., & Rondot, P. (1998). Partnerships between agricultural services institutions and producers' organisations: myth or reality? *Agricultural Research and Extension Network Paper No. 80*, London: Overseas Development Institute.
- Dei, G. J. S. (1991). The re-integration and rehabilitation of migrant workers into a local domestic economy: lessons for endogenous development. *Human Organization*, 50 (4), 327–336.
- Delgado, C. L., Hopkins, J. C., Kelly, V. A., Hazell, P. B. R., Alfano, A., Gruhn, P., Hojjati, B., & Sil, J. (1994). *Agricultural growth linkages in sub-Saharan Africa*. Washington, DC: IFPRI.
- Eyoh, D. L. (1992). Reforming peasant production in Africa: power and technological change in two Nigerian villages. *Development and Change*, 23 (2), 37–66.
- Eyoh, D. (1990). National policy versus local power: the Lafia Project in Nigeria. *Canadian Journal of African Studies*, 24 (2), 216–234.
- Fairhead, J., & Leach, M. (1996). Enriching the landscape: social history and the management of transition ecology in the forest-savanna mosaic of the Republic of Guinea. *Africa*, 66 (1), 14–36.
- Faussey-Domalaïn, C., & Vimard, P. (1991). Agriculture de rente et démographie dans le sud-est Ivoirien. Une économie villageoise assistée en milieu forestier péri-urban. *Revue Tiers Monde*, 32 (125), 53–114.
- Funna, S. M. (1987). Sierra Leone: economic structure and recent performance. In A. Jones & P. K. Mitchell, *Sierra Leone Studies at Birmingham 1985*. Birmingham, UK: University of Birmingham.
- Gilbert, E. (1990). Non-governmental organisations and agricultural research: the experience of The Gambia. *Agricultural Administration (Research and Extension) Network Paper 12*, London: Overseas Development Institute.
- Goldman, A., & Smith, J. (1995). Agricultural transformations in India and Northern Nigeria: exploring the nature of green revolutions. *World Development*, 23 (2), 243–263.
- Gyasi, E. (1994). The adaptability of African communal land tenure to economic opportunity: the example of land acquisition for oil palm farming in Ghana. *Africa*, 64 (3), 391–405.
- Jabbar, M. (1993). Evolving crop-livestock farming systems in the humid zone of West Africa: potential and research needs. *Outlook on Agriculture*, 22 (1), 13–21.
- Jones, S. (1996). Farming systems and nutrient flows: a case of degradation? *Geography*, 81 (4), 289–300.
- Kelly, V., Reardon, T., Diagana, B., & Abdoulaye, F. A. (1995). Impacts of devaluation on Senegalese households: policy implications. *Food Policy*, 20 (4), 299–313.
- Kennedy, E., & Cogill, B. (1988). The commercialisation of agriculture and household-level food security: the case of southwestern Kenya. *World Development*, 16 (9), 1075–1081.
- Kimmage, K., & Adams, W. M. (1992). Wetland agricultural production and river basin development in the Hadejia-Jama'are valley Nigeria. *The Geographical Journal*, 158 (1), 1–12.

- Kimmage, K. (1991). The evolution of the wheat trap: the Nigerian wheat boom. *Africa*, 60 (4), 471–501.
- Le Roy, X. (1989). Fragilisation de systèmes de production par l'introduction de cultures de rapport, Nord Côte d'Ivoire. In M. Eldin & P. Milleville, *Le risque en agriculture* (pp. 453–462). Paris: France; Editions de l'ORSTOM, Institut Français de Recherche Scientifique pour le Développement en Coopération.
- Linares, O. F. (1996). Cultivating biological and cultural diversity: urban farming in Casamance Senegal. *Africa*, 66 (1), 104–121.
- Low, A. R. C. (1994). Environmental and economic dilemmas for farm-households in Africa: when low-input sustainable agriculture translates to high-cost unsustainable livelihoods. *Environmental Conservation*, 21 (3), 220–224.
- Mackintosh, M. (1996). *Gender class and rural transition: agribusiness and the food crisis in Senegal*. London: Zed Books.
- McMillan, D. E., Sanders, J. H., Koenig, D., Akwabi-Ameyaw, K., & Painter, T. M. (1998). New land is not enough: agricultural performance of new lands settlement in West Africa. *World Development*, 26 (2), 187–211.
- Mosley, P. (1993). Policy and capital market constraints to the African Green Revolution: a study of maize and sorghum yields in Kenya, Malawi and Zimbabwe, 1960–91. *Discussion papers in development economics*, Series G, Vol. I (6). Reading, UK: Departments of Economics and of Agricultural Economics and Management, University of Reading.
- Nyerges, A. E. (1996). Ethnography in the reconstruction of African land use histories: a Sierra Leone example. *Africa*, 66 (1), 123–144.
- Okoth-Ogendo, H. W. O. (1993). Agrarian reform in Sub-Saharan Africa: an assessment of state responses to the African agrarian crisis and their implications for agricultural development. In T. J. Bassett & D. E. Crummey, *Land in African agrarian systems*. Madison, WI: University of Wisconsin Press.
- Ouedraogo, R. S., Sawadogo, J.-P., Stamm, V., & Thiombiano, T. (1996). Tenure agricultural practices and land productivity in Burkina Faso: some recent empirical results. *Food Policy*, 13 (3), 229–232.
- Painter, T., Sumberg, J., & Price, T. (1994). Your terroir and my 'action space': implications of differentiation, mobility and diversification for the approche terroir in Sahelian West Africa. *Africa*, 64 (4), 447–464.
- Pingali, P., Bigot, Y., & Binswanger, H. (1987). *Agricultural mechanisation and the evolution of farming systems in sub-Saharan Africa*. Baltimore, MD: Johns Hopkins University Press.
- Porter, G. (1994). Food marketing and urban food supply on the Jos Plateau Nigeria: a comparison of large and small producer strategies under SAP. *Journal of Developing Areas*, 29, 91–110.
- Porter, G. (1996). SAPs and road transport deterioration in West Africa. *Geography*, 81 (4).
- Posner, J. L., Kamuanga, M., & Sall, S. (1988). Production systems in the lower Casamance and farmer strategies in response to rainfall deficits. *Michigan State University International Development Paper 20*, East Lansing: Michigan State University.
- Poulton, C., Dorward, A., & Kydd, J. (1998). The revival of smallholder cash crops in Africa: public and private roles in the provision of finance. *Journal of International Development*, 10 (1), 85–103.
- Rasmussen, T. (1986). The Green Revolution in the Southern Highlands. In J. Boesen, K. Havnevik, J. Koponen & R. Odgaard, *Tanzania. Crisis and struggle for survival*. Uppsala: Scandinavian Institute for African Studies.
- Reardon, T. (1991). Income diversification of rural households in the Sahel. Mimeo.
- Reardon, T. (1995). Sustainability issues for agricultural research strategies in the semi-arid tropics: focus on the Sahel. *Agricultural Systems*, 48, 345–359.
- Reardon, T., Kelly, V., Crawford, E., Diagona, B., Dioné, J., Savadogo, K., & Duncan, B. (1997). Promoting sustainable intensification and productivity growth in Sahel agriculture after macroeconomic policy reform. *Food Policy*, 22 (4), 317–327.
- Samuels, F., & Leplaideur, A. (1991). with the collaboration of Barbara Harriss (1991). Changing agrarian structure and petty commodity production in the Northern Region of Ghana. DCV/Labo *Agro-Economie No. 24* Programme riz, Institut de Recherches Agronomiques Tropicales et des cultures vivrières. Montpellier: CIRAD.
- Sandford, S. (1983). *Management of pastoral development in the Third World*. New York: Wiley.
- Savadogo, K., Larivière, S., & Martin, F. (?>é au Burkina Faso). Stratégies des ménages ruraux en matière de sécurité alimentaire dans un contexte d'ajustement structurel: le cas de la province du Passor. *Economies et Sociétés*, 22 (3–4), 145–166.
- Savadogo, K., Reardon, T., & Pietola, K. (1994). Mechanization and agricultural supply response in the Sahel: a farm-level profit function analysis. *Journal of African Economies*, 4 (3), 336–377.
- Schroeder, R. A. (1993). Shady practice: gender and the political ecology of resource stabilization in Gambian garden/orchards. *Economic Geography*, 69 (4), 349–365.
- Schroeder, R. A. (1994). Contradictions along the commodity road to environmental stabilization; foresting Gambian gardens. *Antipode*, 27 (4), 325–342.
- Sinclair, A. R. E., & Fryxell, J. M. (1985). The Sahel of Africa: ecology of disaster. *Canadian Journal of Zoology*, 63, 987–994.
- Smith, J., Barau, A. D., Goldman, A., Mareck, J. H. (1993). The role of technology in agricultural intensification: the evolution of maize production in the Northern Guinea Savannah of Nigeria. *Economic Development and Cultural Change*, 42 (3).
- Stiles, D. (1995). Desertification is not a myth. *Desertification Control Bulletin*, No. 26, 29–36.
- Swift, J. (1996). Desertification: narratives, winners and losers. In Melissa Leach & Robin Mearns *The lie of the land. Challenging received wisdom on the African environment*. Oxford James Currey Heinemann.
- Thomas, D. (1997). Desertification: the uneasy interface between science, people and environmental issues in Africa. *Review of African Political Economy*, 74, 583–589.

- Tiffen, M. (1992). *Environment, population growth and productivity in Kenya: a case study of Machakos District*. Paper presented to the Annual Conference of ESRC Development Economics Study Group, University of Leicester, March.
- Tosh, J. (1980). The cash-crop revolution in tropical Africa: an agricultural reappraisal. *African Affairs*, 79 (314), 79–94.
- Turner II, B. L., Hyden, G., & Kates, R. (1993). *Population growth and agricultural change in Africa*. Gainesville, FL: University of Florida Press.
- Van der Ploeg, Jan, D. (1991). Autarky and technical change in rice production in Guinea Bissau: on the importance of commoditisation and decommoditisation as interrelated processes. In M. Haswell & D. Hunt, *Rural households in emerging societies: technology and change in sub-Saharan Africa*. Oxford: Berg.
- Wiggins, S. (1999). Setting the scene: recent change in West African farming and natural resource management. In Roger Blench, *Natural resource management in Ghana and its socio-economic context*. London: Overseas Development Institute.
- McClintock, J. (1993). *Trees and economics in the Sahel. A case study of two Senegalese villages*. Report of McNamara Fellowships Program. World Bank: Economic Development Institute of the World Bank.
- McIntire, J., Bourzat, D., & Pingali, P. (1992). *Crop-livestock interaction in sub-Saharan Africa*. Washington, DC: World Bank.
- McMillan, D. E., & Meltzer, M. I. (1996). Vector-borne disease control in sub-Saharan Africa: a necessary but partial vision of development. *World Development*, 24 (3), 569–588.

APPENDIX A. THE CASE STUDIES IN SUMMARY CATEGORIES

See Tables 4 and 5.

APPENDIX B. STATISTICS

All data taken from FAO sources, either FAOSTAT or State of Farming and Agriculture 1996. 'Sub-saharan Africa' includes all countries less the five North African states and South Africa. Data for Ethiopia in the 1990s represent the whole of the former area of the country, including that portion now independent as Eritrea (see Tables 6–9).

Table 4

Case	Outcomes and processes			Markets and access	
	Farming and output	Social dimensions	Environmental notes	Distance and transport	Prices and price policy
Northern Province, Zambia	Increased area sown to HYV maize, plus use of fertiliser and ox traction. Decline in millet production	Minority of farmers provide the bulk of the increase output. Poor and young women farmers fail to take advantage	Concern over permanent cultivation of poor soils-declining soil fertility and rising soil acidity	Remote area, 500 to 800 km from main markets	Pan-territorial prices for maize and fertiliser hold sway before adjustments. Subsidy on fertiliser
Iringa, Tanzania	Maize area expanded with ox traction, use of HYV seeds and fertiliser. Less cassava and sorghum	Poor work for the better-off	Soil fertility falls	Remote area, 500 km from main markets	Pan-territorial prices for maize and fertiliser hold sway before adjustments. Subsidy on fertiliser
Mbozi District, Tanzania	Greater area tilled, more use of oxen, more growing of maize, beans and coffee. Less millet and cassava	Older men have better access to land than the young	Soil fertility under threat	Remote area, 800 km or more from main markets. Road access much improved during the 1970s	Pan-territorial prices for maize, fertiliser (?), plus fertiliser subsidy (?)
Lower Machakos District, Kenya	Increased area a cultivated, especially of maize. Ox traction, manuring	Area of settlement within the last 30 years by people from wetter areas	Fears of falling soil fertility	Quite remote; 300 km to main market, but good road access	Parastatal marketing
South Nyanza District, Kenya	Contract growing of sugar introduced, using additional land to grow sugar under company control	Only one third of farmers awarded contracts	Growth of small business locally	Quite remote, but good access to sugar factory	Sugar price protected and rising
Middle Machakos District, Kenya	Intensification of farming with more maize, cotton, fruit and milk produced. Ox traction, manuring, terracing, use of Katumani maize			Good access: under 200 km to main markets, good roads-improved during the 1970s	(Cotton production highly sensitive to prices paid)
Upper Machakos District, Kenya	Great intensification of farming with coffee, fruit and (export) vegetables, dairying		Signs of less erosion, more conservation, soil fertility maintained, more trees planted	Good access: 100 km or less to main market on tarmac roads	Much depends on world price of coffee

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Table 4—continued

Case	Outcomes and processes			Markets and access		
	Farming and output	Social dimensions	Environmental notes	Off-farm economy	Distance and transport	Prices and price policy
Upper Embu District, Kenya	Some continuing intensification of coffee and dairying	Only one-quarter of farmers doing well: the rest merely subsist	Trees planted, terracing.	Off-farm rural economy the focus of business interests	Good access: main markets within 150 km, good roads	Much depends on world price of coffee
Djibo, Sahelian zone, Burkina Faso	Expansion of area, reduced fallowing, use of short-season varieties, some investment in irrigated gardens		Lower rainfall, reduced fallowing, lower soil fertility, reduced yield potential: but adoption of soil and water conservation methods	25% of income comes from local off-farm work: artisan work, commerce, services, building, trading livestock	Remote from main markets	Problem of seasonal gluts in fruit and veg. markets
Yako, Sudanian zone, Burkina Faso	Expansion of area, reduced fallowing, use of short-season varieties, some investment in irrigated gardens. More cotton		Lower rainfall, reduced fallowing, lower soil fertility, reduced yield potential: but adoption of soil and water conservation methods	45% of income from non-farm sources	Medium access to markets	Problem of seasonal gluts in fruit and veg. markets
Boromo, Guinea zone, Burkina Faso	Expansion of area, reduced fallowing, use of short-season varieties, some investment in irrigated gardens. More cotton (25–35% of area tilled) and use of fertiliser on cotton		Lower rainfall, reduced fallowing, lower soil fertility, reduced yield potential: but adoption of soil and water conservation methods	38% of income from off-farm, food processing, cottage industry, commerce	Medium access to markets.	Problem of seasonal gluts in fruit and veg. markets
Bignona and Oussouye, lower Casamance, Senegal	Movement from rice and groundnuts towards vegetables. Locals build dams to hold rainwater	Political unrest	Less rainfall, increased salination and abandoned rice fields; more cultivation on upland fields	Increased craft and pottery sales, salt collection; but reduced tourism	Medium access to markets. Road building	Higher rice prices as subsidies removed on imported rice

Ibarapa District, Southwest Nigeria	Farms become more specialised to produce for the market tomatoes, cassava, peppers. Increased area tilled and higher yields. Use of hired tractors	No major changes yet seen	Growth of local towns	Good access to large cities, roads built during the 1970s	Prices sustained by booming urban demand
The Gambia	Farming suffering from a loss of labour as men (and strange farmers) seek off-farm jobs. Donkey traction to allow areas tilled to be maintained. Rice cultivation faces challenge of shorter rainy season and salt intrusion. More fruit, veg, cassava	Reduced fallows, lower soil fertility, less rain, salination of rice fields	Buoyant off-farm opportunities.	Good access to markets, better roads	
Dagaceri village, Kano, northern Nigeria	Extensive increases in cropping, loss of groundnuts, loss of draught stock to drought	Less rain since 1970, falling soil fertility owing to reduced fallows	Better access to towns	Medium: improved by roads, grain prices up	
Middle Valley of the Senegal, Senegal	Introduction of pumped irrigation by parastatal allows more cropping and the cultivation of rice, tomatoes and potatoes	1988 dam altered river regime, made floods less prevalent	Locally little	Medium to remote	Rice price paid over the odds in remote locations
Namu District, Benue Valley, Middle Belt, Nigeria	Settlers moved into favoured area and grew more yams, cassava, millet, sorghum, cowpeas and raised pigs with significant sales	Hierarchical society, unequal access to irrigated land	Of little attraction compared to farming	Medium, but roads built giving access	Buoyant for yams

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Table 4—continued

Case	Outcomes and processes			Markets and access		
	Farming and output	Social dimensions	Environmental notes	Off-farm economy	Distance and transport	Prices and price policy
Lower Sokoto Valley, Sokoto, northern Nigeria	Dam building leads to loss of flood water and thus less fadama farming, but some expansion of sorghum, millet and other cash crops on rainfed. Some use of diesel pumps on the fadamas	Prosperity for those with capital and connections	Bakolori dam stemmed flood waters	Opportunities in towns	Medium to good	Urban demand for vegetables and other crops
Kano close-settled zone, Kano, northern Nigeria	Intensification of farming, trying to maintain livelihoods of a rising population with land scarcity and react to market opportunities. Some investment in diesel pumps for fadama irrigated farming		Drier conditions, Little sign of serious soil erosion	Expanded with commuting into Kano possible	Good.	
Imo State, eastern Nigeria	Area expanded by reduced fallowing, falling yields despite use of composting and manuring but little use of chemical fertiliser. More cassava, less yam or cocoyam	Burden of farming falls on women	Reduced soil fertility as fallows shorten	Town jobs attractive to men.	Good: many large towns close at hand	
Awka-Nnewi, Anambra State, eastern Nigeria	Area expanded by reduced fallowing, falling yields despite use of composting and manuring but little use of chemical fertiliser. More cassava, less yam or cocoyam	Burden of farming falls on women	Reduced soil fertility as fallows shorten	Town jobs attractive to men	Good	

Kandjadja village, Mansaba sector, Guinea-Bissau	Expansion of fields and rebuilding of cattle herd after war. More animal traction	Village elites in control		Medium: main road improved in the later 1980s	Falling real price for groundnuts
Upper Manya Krobo District, southern Ghana	A neglected former pioneer zone, with falling yields per ha (60% fall in maize yield over 10 years)	Some landlordism	Desiccation occurring, cause unknown; some reports of falling soil fertility; loss of forest trees, savanna grass invasions	Medium to poor, but quality of roads falling to poor maintenance	
Yensiso, Amanase, Sekesua, southern Ghana	Loss of forest, continuous cropping (fallows reduced to 1-2 years), decreasing yields despite use of chemical fertiliser and improved varieties. Cassava and legumes the main crops, most sales are food to Accra-Tema		Falling soil fertility, some reports of ever-more erratic rains	Good: 100 km or less to Accra, tarmac roads	
Kusasi, Upper East Region, northern Ghana	Areas tilled increasing and fallows in decline. Some adoption of ox traction. Use of fertilisers whilst price subsidised, now less rare. Yields falling, encourages clearance of bush	Women often left to manage farms by migrant men	Soil erosion and desertification widely alleged	Remote: 500 km or more to markets	Few crops offer an attractive return
Chivi District, southern Zimbabwe	Area of increasing fields and rising yields with HYV maize replacing millet and sorghum. Some farmers have taken up fertiliser. Ox traction widely in use		Degradation in patches, if at all. No sign of crop yields falling	Medium to remote	During the early 1980s govt offers pan-territorial price for maize

Table 5

Case	Other issues	Pressure on natural resources			Capital, input supply, risk			Technical innovation and knowledge			Labour		
		Population density (per sq. km)	Access rules	Quality of NR	Capital	Input supply	Risk	New techniques	Education and social capital	Demand	Migration	Off-farm opportunities	
Northern Province, Zambia		Low: 5-10	Collective	Rain 1100-1600 mm, soils sandy, acidic and leached	From mine earnings, from official credit schemes	Organised through cooperatives	Mainly from weather.	Min Agric runs 'lima' programme to promote improved seed and fertiliser use		Heavy demand for weeding. Key issue	Some men absent in mining and in cities	Few local opportunities	
		Low: 21	Collective	Rain>1000 mm; Soils varied	Official loans for inputs		Mainly from weather	Government promotes package for improved maize seed and fertiliser use	Public investment in primary schooling	Weeding a bottleneck		Few local opportunities	
Mbozi District, Tanzania		Low: 35	Collective.	Rain 1250 mm; Soils poor	Limited: coffee sales provide cash		Mainly from weather	Government promotes package for improved maize seed and fertiliser use. Coffee ideas from parastatal	Public investment in primary schooling		In-migration into area	Few local opportunities	
		Low: 30-75	Individual freehold (?).	Rains 500-700mm; Soils poor	Remittances a key source.		High: drought a constant threat	Settlers use ideas learned in wetter zones	Heavy private investment in schooling by parents		Migration reduces male labour	Few local opportunities.	
South Nyanza District, Kenya		Medium: c 150	Individual farms (?)	Rains 1760 mm.	All extra costs funded by the company	All extra inputs provided by the company	Low: prices set and known. Much technical supervision	Company sets technology and monitors					

Middle Machakos District, Kenya	Medium: 75-200	Individual farms	Rains 700-800 mm	Medium: drought a threat	Katamani maize, row weeding acquired from public extension services	Heavy private investment in schooling by parents	Increasing in the rural economy
Upper Machakos District, Kenya	High: 230-400	Individual farms	Rains 800-1100; Soils fertile volcanic	Low: but variable grain prices make farmers reluctant to give up fields of maize and beans, despite lower returns	Ideas from both public and private sources	Heavy private investment in schooling by parents	High
Upper Embu District, Kenya	High: 350+	Individual farms	Rains: 1250 mm; Soils good volcanic	Increasingly supplied by private dealers	Off-farm earnings provide funds	Ideas mainly from public sources	High
Djibo, Sahelian zone, Burkina Faso	Low: 41	Collective (?)	Rains: 450-475; Soils poor	Capital invested foremost in off-farm businesses	Drought a severe threat	Heavy private investment in schooling by parents	Increasing in the rural economy
Yako, Sudanian zone, Burkina Faso	Low: 67	(Tight access)	Rains: 550-650 mm; Soils poor	Drought a threat	Fertiliser on cotton: comes from cotton companies	Remittances critical for economy	Remittances critical for economy

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Table 5—continued

Case	Other issues	Pressure on natural resources			Capital, input supply, risk			Technical innovation and knowledge		Labour		
		Population density (per sq. km)	Access rules	Quality of NR	Capital	Input supply	Risk	New techniques	Education and social capital	Demand	Migration	Off-farm opportunities
Boromo, Guinea zone, Burkina Faso		Low: 25–86	Differential access to land: later arrived groups have access only to worst land	Rains: 675–775 mm. Soils good								
Bignona & Ousouye, Casamance, Senegal	Government constructs anti-salt dams for rice production	Low: 90 (?)		Rains: 800–1100 mm. Soils good				Rice milling machines introduced. Closure of regional development agency reduces services to farmers				
Ibarapa District, Southwest Nigeria		Low: 40–65		Rains: c 1300 mm; Soils varied								Contractors prepared to harvest and process produce if labour short

The Gambia	Medium: 70	Collective	Rains: 800-1100 mm; Soils varied	Some use of remit- tances	Drought and variable rains	Short season variety seeds from traders and research system	Some use of contra- ctors for fruit and cassava harvest- ing	Men seeking town jobs	Buoyant
Dagacri village, Kano, northern Nigeria	Medium: 60-85	Collective (?)	Rains: 600; erratic; Soils medium to poor	Off-farm earnings provide some	Drought and variable rains	Acquisition of shorter-variety seeds from the north through local networks	Greater needs for weeding and hoeing	Men typi- cally mi- grate out in the dry season to find jobs	Few
Middle Valley of the Senegal, Senegal	Low: 50 (?)	Collective (?)	Rains: 250-500 mm. Soils medium to good	Parastatal provided credit for pumps, diesel and inputs	Drought affects rainfed fields	Technical packages introduced by parastatal extensionists	High	Men typi- cally mi- grate out in the dry season: makes dry-sea- son irri- gation v. difficult	Few locally
Namu District, Benue Valley, Middle Belt, Nigeria	Medium: 100	Collective (?)	Rains: 1150- 1250 mm; Good soils	Few external inputs used	Low	Largely from farmer-to-farmer exchanges, and accumulated experience of the Kofyar	Experi- ence of collective work gangs		
Lower Sokoto Valley, Sokoto, northern Nigeria	Medium to high: 120-250		Rains: 700-900 mm. Soils poor to medium			Pumped irri- gation and new maize seeds	Less dry season work on the fadama		

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Table 5—continued

Case	Other issues	Pressure on natural resources			Capital, input supply, risk			Technical innovation and knowledge			Labour	
		Population density (per sq. km)	Access rules	Quality of NR	Capital	Input supply	Risk	New techniques	Education and social capital	Demand	Migration	Off-farm opportunities
Kano close-settled zone, Kano, northern Nigeria		High: 300–500	Individual (?)	Rains: 820 mm; Soils sandy and poor	Limited access			Some from the ADP				Work in Kano
Imo State, eastern Nigeria		High: 430–520		Rain: 2000–5000 mm; Soils sandy and poor		(Little use of fertilizer)						
Awka-Nnewi, Anambra State, eastern Nigeria		High: 400–500		Rain: 2300 mm; Soils sandy and poor								
Kandji-adja village, Mansaba sector, Guinea-Bissau	Retreat of state. Govt programmes conspicuous by their absence.	Low: 70		Rain 900 mm (?)								

Upper Manya Krobo District, southern Ghana Yensiso, Amanase, Sekesua, southern Ghana	Medium: 55-120	Some landlor- dism	Rain: c1500 mm	Increasing variability of the rains	Largely indige- nous: ideas from outside rarely useful	Weeds in fallow pushes up need for labor	Young leaving the area	Few
	Medium: 160	Some only have access to land through tenancy- 38% share- crop, 17.5% rent.	Rain: 1260 mm					In local towns and in Accra.
Kusasi, Upper East Region, northern Ghana Chivi District, southern Zimba- bwe	Medium: 146	Collective	Rain: c 950 mm; Soils often poor	Drought a threat	Govt and NGOS have introduced ideas, including short-season varieties		Men leave area to work in South	Few
	Low: 45	Collective	Rains: 550 mm; Soils var- ied some poor san- dy soils, others clays	Drought a serious threat	From government services comes seed/fertilizer package	Switch to maize saves labor	Men leave to work in towns	In distant towns and cities

Table 6. *Sub-Saharan Africa: production of the main vegetable foodstuffs, 1992-95^a*

	Average cereals production, 1992-95, kt	Average roots and tubers production, 1992-95, kt	Calorific value of main vegetable foodstuffs, 1992-95	Population, 1992-95, k	Kcal/person/ day, 1992-95
<i>Kcal per kg</i>	<i>3,500</i>	<i>1,200</i>	Trillion Kcal		
Nigeria	20,057	54,181	135	106,895	3,466
Congo, DR	1,686	19,988	30	41,906	1,954
Ethiopia	7,374	2,019	28	40,087	1,930
Tanzania, United Rep	3,891	7,324	22	28,439	2,159
Sudan	4,376	156	16	27,010	1,572
Ghana	1,582	8,289	15	16,701	2,540
Madagascar	2,656	3,281	13	14,084	2,574
Kenya	3,113	1,628	13	26,857	1,311
Uganda	1,922	5,077	13	20,280	1,732
Côte d'Ivoire	1,548	4,782	11	13,552	2,255
Burkina Faso	2,503	79	9	9,910	2,448
Niger	2,213	257	8	8,703	2,535
Mali	2,204	32	8	10,302	2,061
Mozambique	738	3,688	7	15,342	1,251
Cameroun	1,016	2,241	6	12,703	1,347
Zimbabwe	1,683	156	6	10,868	1,532
Malawi	1,417	548	6	10,664	1,443
Benin	633	2,333	5	5,168	2,659
Zambia	1,105	648	5	9,066	1,404
Chad	912	554	4	6,100	1,732
Angola	349	1,989	4	10,478	943
Senegal	988	69	4	8,006	1,212
Guinea	732	765	3	6,406	1,488
Togo	510	868	3	3,949	1,960
Burundi	275	1,381	3	6,119	1,173
Rwanda	199	1,530	3	7,655	906
Sierra Leone	470	203	2	4,351	1,189
Central African Rep	100	835	1	3,196	1,159
Somalia	266	43	1	9,037	298
Congo	27	698	1	2,480	1,030
Liberia	69	495	1	2,894	790
Eritrea	175	109	1	2,578	789
Guinea-Bissau	185	65	1	1,039	1,913
Mauritania	184	5	1	2,190	814
Gabon	26	393	1	1,266	1,218
Lesotho	137	59	1	1,970	764
Namibia	72	190	0	1,481	888
Gambia	99	6	0	1,061	914
Swaziland	79	8	0	821	958
Botswana	40	9	0	1,423	286
Comoros	21	63	0	619	655
Equatorial Guinea	0	82	0	384	702
Reunion	16	16	0	639	323
Cape Verde	11	6	0	376	320
Mauritius	2	19	0	1,098	74
Sao Tome Principe	4	10	0	129	541
Djibouti	0	0	0	562	0
Seychelles	0	0	0	73	0
Grand total	67,661	127,171	389	516,908	2,064
South Africa	10,201	1,367	37	40,114	2,550
Provided by top ten countries (less RSA)	48,205	106,724	297	335,810	
Share of top 10, %	71	84	76	65	

^a Source: FAO, SoFA (1996).

Table 7. *Indices of agricultural and food production for sub-Saharan Africa^a*

	Average values				Average annual growth rates			
	1965–67	1975–77	1985–87	1993–95	65/67– 75/77	75/77– 85/87	85/87– 93/95	65/67– 93/95
<i>Agriculture</i>								
Nigeria	54	57	73	128	0.68	2.46	7.28	3.16
Congo, DR	54	69	88	106	2.58	2.47	2.26	2.45
Ethiopia	74	79	92	111	0.67	1.50	2.38	1.45
Tanzania	54	71	93	98	2.74	2.72	0.68	2.14
Sudan	64	93	105	122	3.72	1.26	1.94	2.33
Ghana	70	79	90	133	1.26	1.31	5.00	2.33
Madagascar	65	80	94	103	2.05	1.69	1.11	1.65
Kenya	42	63	87	99	4.02	3.31	1.74	3.11
Uganda	60	94	83	111	4.57	–1.20	3.68	2.22
Côte d'Ivoire	37	62	88	106	5.27	3.53	2.32	3.80
Sub-Saharan Africa	60	74	88	111	2.09	1.79	3.00	2.24
South Africa	66	81	91	94	2.06	1.21	0.33	1.26
<i>Agriculture per capita</i>								
Nigeria	104	86	82	114	–1.87	–0.40	4.14	0.34
Congo, DR	111	108	101	90	–0.25	–0.68	–1.41	–0.74
Ethiopia	135	115	104	97	–1.65	–1.01	–0.78	–1.17
Tanzania	113	110	105	86	–0.30	–0.46	–2.55	–1.00
Sudan	122	135	115	113	0.98	–1.59	–0.27	–0.30
Ghana	131	118	101	118	–0.98	–1.53	1.90	–0.36
Madagascar	131	126	108	90	–0.44	–1.53	–2.20	–1.34
Kenya	98	103	99	88	0.43	–0.38	–1.41	–0.39
Uganda	119	135	92	97	1.32	–3.83	0.70	–0.72
Côte d'Ivoire	92	103	100	93	1.13	–0.30	–0.99	0.01
Sub-Saharan Africa	116	110	99	99	–0.55	–1.11	0.08	–0.57
South Africa	120	114	100	86	–0.53	–1.29	–1.90	–1.19
<i>Food production</i>								
Nigeria	54	57	74	129	0.64	2.58	7.21	3.18
Congo, DR	53	67	88	106	2.51	2.66	2.48	2.56
Ethiopia	74	78	92	107	0.56	1.61	2.01	1.35
Tanzania	50	69	93	97	3.29	3.03	0.62	2.43
Sudan	61	91	103	125	4.09	1.34	2.40	2.62
Ghana	70	78	90	131	1.19	1.39	4.80	2.28
Madagascar	64	78	94	104	2.03	1.85	1.29	1.75
Kenya	45	65	87	99	3.73	2.98	1.58	2.84
Uganda	51	91	81	109	5.86	–1.10	3.80	2.74
Côte d'Ivoire	35	59	87	112	5.46	3.93	3.28	4.29
Sub-Saharan Africa	59	73	88	112	2.12	1.83	3.11	2.30
South Africa	63	80	91	96	2.49	1.30	0.62	1.53
<i>Food production per capita</i>								
Nigeria	103	85	83	114	–1.89	–0.28	4.08	0.36
Congo, DR	109	105	100	91	–0.33	–0.50	–1.21	–0.64
Ethiopia	135	113	104	96	–1.76	–0.90	–0.89	–1.20
Tanzania	104	107	105	85	0.22	–0.15	–2.60	–0.72
Sudan	115	132	113	115	1.34	–1.51	0.18	–0.01
Ghana	131	118	102	116	–1.06	–1.45	1.70	–0.42
Madagascar	129	123	107	91	–0.46	–1.37	–2.01	–1.23
Kenya	105	107	99	88	0.15	–0.71	–1.55	–0.65
Uganda	102	131	90	96	2.57	–3.71	0.80	–0.22
Côte d'Ivoire	86	98	99	98	1.34	0.09	–0.06	0.49
Sub-Saharan Africa	115	110	99	100	–0.50	–1.07	0.18	–0.51
South Africa	114	112	100	87	–0.12	–1.21	–1.61	–0.94

^a All indices to base 1989–91 = 100.

Table 8. *Sub-Saharan Africa, cereals imports, 1965-67 to 1993-95*

Cereal imports	Averages				Annual growth rates				Population, 1992-95, k	Cereals imports, 93-95, kg/person
	1965-67	1975-77	1985-87	1993-95	65/67-75/77	75/77-85/87	85/87-93/95	65/67-93/95		
<i>Imports (MT)</i>										
Nigeria	187,544	948,095	1,449,510	1,163,034	17.59	4.34	-2.71	6.73	106,895	11
Congo, DEM R	181,094	391,291	438,510	317,930	8.01	1.15	-3.94	2.03	41,906	8
Ethiopia (former area)	35,108	121,429	681,761	852,889	13.21	18.83	2.84	12.07	40,087	21
Tanzania	76,572	259,200	269,103	250,597	12.97	0.38	-0.89	4.33	28,439	9
Sudan	149,711	128,376	890,889	725,898	-1.53	21.38	-2.53	5.80	27,010	27
Ghana	98,777	134,094	172,898	411,197	3.10	2.57	11.44	5.23	16,701	25
Madagascar	52,592	90,969	197,199	135,292	5.63	8.04	-4.60	3.43	14,084	10
Kenya	108,656	46,131	237,865	668,086	-8.21	17.82	13.78	6.70	26,857	25
Uganda	49,238	11,344	17,750	62,090	-13.65	4.58	16.94	0.83	20,280	3
Côte d'Ivoire	144,322	178,796	650,702	612,804	2.17	13.79	-0.75	5.30	13,552	45
Rest of SSA	1,433,974	2,404,318	4,673,871	6,360,153	5.30	6.87	3.93	5.46	-337,211	-19
Sub-Saharan Africa	2,517,588	4,714,043	9,680,057	11,559,970	6.47	7.46	2.24	5.59	-1,402	-8,248
South Africa	583,921	190,232	834,124	2,085,668	-10.61	15.93	12.14	4.65	40,114	52
<i>Imports (\$1000)</i>										
Nigeria	20,857	296,759	379,245	322,631	30.41	2.48	-2.00	10.28	106,895	3
Congo, DEM R	19,474	97,073	91,353	102,583	17.43	-0.61	1.46	6.11	41,906	2
Ethiopia (former area)	3,241	18,753	167,699	190,006	19.19	24.49	1.57	15.65	40,087	5
Tanzania	49,372	46,640	49,257	53,950	-0.57	0.55	1.14	0.32	28,439	2
Sudan	14,009	22,401	161,808	139,960	4.81	21.86	-1.80	8.57	27,010	5
Ghana	15,127	31,280	35,561	88,948	7.54	1.29	12.14	6.53	16,701	5
Madagascar	7,915	27,242	40,659	35,616	13.16	4.09	-1.64	5.52	14,084	3
Kenya	9,680	8,293	34,207	120,935	-1.53	15.22	17.10	9.44	26,857	5
Uganda	5,909	3,629	4,168	16,084	-4.76	1.40	18.39	3.64	20,280	1
Côte d'Ivoire	16,407	40,717	134,164	168,819	9.52	12.66	2.91	8.68	13,552	12
Rest of SSA	117,561	568,844	1,072,699	1,647,309	17.08	6.55	5.51	9.89	-337,211	-5
Sub-Saharan Africa	279,553	1,161,631	2,170,820	2,886,841	15.31	6.45	3.63	8.70	-1,402	-2,060
South Africa	46,650	55,252	146,244	373,427	1.71	10.22	12.43	7.71	40,114	9

Table 9. *Sub-Saharan Africa, production of major cash crops, from 1965-67 to 1993-95*

	Average production, kt				Average rate of change, % a year			
	1965-67	1975-77	1985-87	1993-95	65/67-75/77	75/77-85/87	85/87-93/95	65/67-93/95
<i>Cocoa</i>								
Nigeria	230.00	194.00	124.33	131.67	-1.69	-4.35	0.72	-1.97
Congo, DR	4.67	5.00	5.67	7.00	0.69	1.26	2.68	1.46
Ethiopia	0.00	1.00	1.67	1.33		5.24	-2.75	
Tanzania, United Rep								
Sudan								
Ghana	407.00	333.67	208.33	278.33	-1.97	-4.60	3.69	-1.35
Madagascar	1.00	1.33	2.33	4.00	2.92	5.76	6.97	5.08
Kenya	0.00	0.00	0.00	1.00				
Uganda								
Côte d'Ivoire	139.67	255.67	610.00	824.33	6.23	9.09	3.84	6.55
Rest of SSA	160.00	145.00	180.33	130.00	-0.98	2.20	-4.01	-0.74
Sub-Saharan Africa	942.33	935.67	1132.67	1377.67	-0.07	1.93	2.48	1.37
South Africa								
<i>Coffee</i>								
Nigeria	3.00	3.00	1.33	3.00	0.00	-7.79	10.67	0.00
Congo, DR	57.67	87.67	94.67	69.00	4.28	0.77	-3.88	0.64
Ethiopia	145.00	180.33	175.67	410.00	2.20	-0.26	11.18	3.78
Tanzania, United Rep	57.67	51.67	53.00	43.67	-1.09	0.26	-2.39	-0.99
Sudan								
Ghana	5.00	4.67	1.00	3.33	-0.69	-14.28	16.24	-1.44
Madagascar	70.33	85.00	80.67	78.67	1.91	-0.52	0.40	0.40
Kenya	48.00	82.33	104.33	82.67	5.54	2.40	-2.87	1.96
Uganda	157.33	164.00	157.00	187.67	0.42	-0.44	2.26	0.63
Côte d'Ivoire	202.00	289.67	270.67	365.33	3.67	-0.68	3.82	2.14
Rest of SSA	374.33	289.33	291.00	221.67	-2.54	0.06	-3.34	-1.85
Sub-Saharan Africa	1120.33	1237.67	1229.33	1055.00	1.00	-0.07	-1.89	-0.21
South Africa								
<i>Cotton (lint)</i>								
Nigeria	48.00	64.33	33.67	110.00	2.97	-6.27	15.95	3.01
Congo, DR	7.00	17.00	26.00	26.00	9.28	4.34	0.00	4.80
Ethiopia	7.00	18.67	20.67	14.67	10.31	1.02	-4.20	2.68
Tanzania, United Rep	72.33	54.00	61.33	58.00	-2.88	1.28	-0.70	-0.79
Sudan	163.00	165.33	170.33	89.33	0.14	0.30	-7.75	-2.12
Ghana	0.00	3.33	2.33	22.67		-3.50	32.87	
Madagascar	2.33	11.67	15.00	12.00	17.46	2.54	-2.75	6.02
Kenya	4.00	5.67	10.00	4.00	3.54	-10.82	0.00	0.00
Uganda	79.33	23.67	10.67	11.67	-11.39	-7.66	1.13	-6.62

Table 9—continued

	Average production, kt			Average rate of change, % a year				
	1965-67	1975-77	1985-87	1993-95	65/67-75/77	75/77-85/87	85/87-93/95	65/67-93/95
Côte d'Ivoire	6.33	27.00	87.67	106.67	15.60	12.50	2.48	10.61
Rest of SSA	162.33	273.00	432.33	562.00	5.34	4.70	3.33	4.54
Sub-Saharan Africa	551.67	663.67	870.00	1017.00	1.87	2.74	1.97	2.21
South Africa	15.00	26.67	45.67	21.67	5.92	5.53	-8.90	1.32
<i>Oilseeds, total</i>								
Nigeria	1508.67	1102.00	1312.33	1757.67	-3.09	1.76	3.72	0.55
Congo, DR	292.67	329.33	347.67	429.67	1.19	0.54	2.68	1.38
Ethiopia	99.00	108.67	119.00	151.00	0.94	0.91	3.02	1.52
Tanzania, United Rep	95.00	103.67	122.67	130.00	0.88	1.70	0.73	1.13
Sudan	250.33	468.67	285.00	349.00	6.47	-4.85	2.56	1.19
Ghana	85.67	110.33	160.00	217.00	2.56	3.79	3.88	3.38
Madagascar	17.67	26.33	31.00	30.67	4.07	1.64	-0.14	1.99
Kenya	16.33	21.67	22.33	33.33	2.87	0.30	5.13	2.58
Uganda	93.00	93.67	64.33	106.67	0.07	-3.69	6.52	0.49
Côte d'Ivoire	41.67	199.33	329.00	373.33	16.94	5.14	1.59	8.15
Rest of SSA	1440.00	1656.33	1546.33	1621.00	1.41	-0.68	0.59	0.42
Sub-Saharan Africa	3940.00	4220.00	4339.67	5199.33	0.69	0.28	2.28	1.00
South Africa	141.67	219.33	194.33	222.33	4.47	-1.20	1.70	1.62
<i>Sugar</i>								
Nigeria	12.00	36.00	49.67	33.33	11.61	3.27	-4.86	3.72
Congo, DR	36.33	54.33	65.00	85.00	4.11	1.81	3.41	3.08
Ethiopia	75.33	136.33	191.00	152.00	6.11	3.43	-2.81	2.54
Tanzania, United Rep	76.00	104.33	101.33	118.33	3.22	-0.29	1.96	1.59
Sudan	40.67	138.33	516.33	519.67	13.02	14.08	0.08	9.53
Ghana	0.67	12.67	0.00	0.00	34.24			
Madagascar	103.67	117.33	103.00	84.67	1.25	-1.29	-2.42	-0.72
Kenya	46.00	184.33	400.67	387.33	14.89	8.07	-0.42	7.91
Uganda	139.33	17.67	5.33	68.67	-18.66	-11.29	37.63	-2.50
Côte d'Ivoire	0.00	20.67	130.00	124.67		20.19	-0.52	
Rest of SSA	1625.67	2028.67	2583.00	2325.67	2.24	2.45	-1.30	1.29
Sub-Saharan Africa	2155.67	2850.67	4145.33	3899.33	2.83	3.82	-0.76	2.14
South Africa	1453.00	1975.67	2254.33	1502.33	3.12	1.33	-4.95	0.12