

The Royal African Society

Drought, Agriculture and Environment: A Case Study from the Gambia, West Africa

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Source: *African Affairs*, Vol. 94, No. 374 (Jan., 1995), pp. 67-86

Published by: Oxford University Press on behalf of The Royal African Society

Stable URL: <http://www.jstor.org/stable/723914>

Accessed: 20-03-2017 20:47 UTC

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DROUGHT, AGRICULTURE AND ENVIRONMENT: A CASE STUDY FROM THE GAMBIA, WEST AFRICA

KATHLEEN M BAKER

THE TROUBLES OF the agricultural sector in Africa are widely acknowledged in the literature, but as to the nature and causes of the problems there is little consensus. The wealth of evidence and the breadth of opinion on constraints on African farmers is testimony to this. Mortimore demonstrates how factors such as drought have wrought havoc for the Nigerian farmer, while Timberlake and Blaikie drawing examples from different parts of Africa have argued that ecological problems now affecting farmers are the product of bad political and managerial decisions.¹ Bates too has shown the adverse impact of ill-conceived political decision-making on the agricultural sector.² The importance of indigenous expertise in coping with difficult environments has been demonstrated by Richards, Mortimore and Adams,³ and after the historic neglect of the African smallholder in agricultural policy, the World Bank has accepted that development schemes should increasingly involve indigenous expertise as one means of stimulating growth in the agricultural sector.⁴ Causal explanations for the crisis in agriculture must inevitably vary owing to differences in the location of research, in levels of generalization—from the continental scale to the case study—and in the approach of researchers from different disciplines and with different objectives. This makes generalization about changes in agriculture both difficult and dangerous and so it became the aim of two field visits to The Gambia, in 1990 and 1991, to investigate more closely the nature and causes of change in farming—and to establish if indeed there had been any change. Information on changes in agriculture are, in theory, available from

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1. Michael Mortimore, *Adapting to Drought* (Cambridge University Press, 1989) Lloyd Timberlake, *Africa in Crisis: the causes of environmental bankruptcy* (Earthscan, London, 1985). Piers Blaikie, *The Political Economy of Soil Erosion in Developing Countries* (Longman, London, 1986).

2. Robert H. Bates, *Markets and States in Tropical Africa* (University of California Press, Berkeley, 1983).

3. Bill Adams, *Wasting the Rain* (Earthscan, London, 1992). Paul Richards, 'Farming systems and agrarian change in West Africa', *Progress in Human Geography*, 7 (1983). pp. 1–39. Paul Richards, *Coping with Hunger* (Allen and Unwin, London, 1985). Mortimore, *Adapting to Drought*.

4. World Bank, *Sub-Saharan Africa: from crisis to sustainable growth*, (World Bank, Washington DC, 1989).

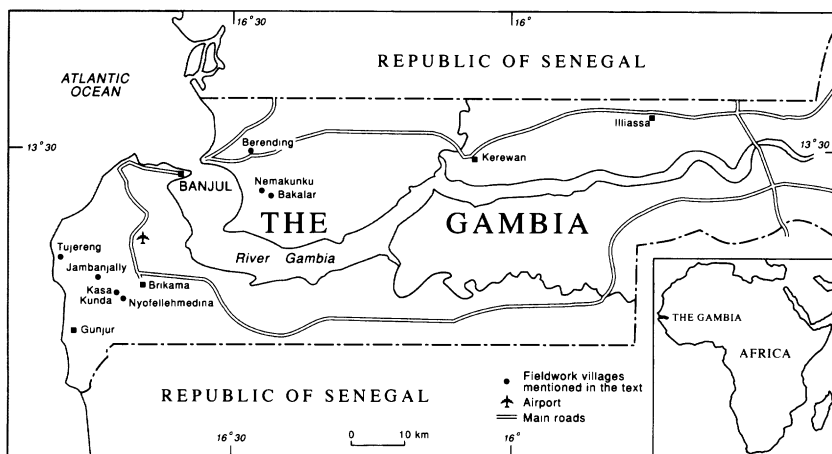


Figure 1. *The Lower Gambia showing the location of fieldwork villages*

aggregated statistics which provide information at a national level. In the case of The Gambia, the data tended to conflict, blurring what was taking place rather than clarifying the nature and extent of change. In contrast to the situation in many West African countries, The Gambian economy, under the cloak of a Structural Adjustment Program which commenced in 1985, grew at 5.5 per cent per annum from 1986–88 and growth has continued in subsequent years although the level has varied.⁵ This growth was attributed largely to the agricultural sector, the main component of the economy which contributes between 20 and 30 per cent to GDP. Agriculture's share of GDP fluctuates according to world prices and the weather.⁶ At the same time, The Gambia's import of foodstuffs remained high, suggesting that domestic agriculture was not meeting food needs, and furthermore its dependence on overseas development assistance, much in the form of food aid, has virtually doubled in the past decade.⁷ The aim of the fieldwork was therefore to discover what was happening at 'ground' level and so the study focussed on seven selected villages (Figure 1) all of which were in the lower reaches of The Gambia.

The greater part of the information cited in this paper was collected during two visits of a month each to The Gambia in March/April 1990 and 1991. It would have been preferable to spend much longer in the field, but this was not possible. Over the two years, visits were made to seven villages, four in the Western Division (Jambanjally, Tujereng, Nyofellehmedina and Kasa Kunda), and three in the North Bank Division

5. Economist Intelligence Unit, *The Gambia, Guinea Bissau, Cape Verde: Country Profile 1992–93* (Business International, London, 1992).

6. Economist Intelligence Unit, *The Gambia, Guinea-Bissau, Cape Verde*.

7. Economist Intelligence Unit, *The Gambia, Guinea-Bissau, Cape Verde* (Economist, London 1990).

(Berending, Bakalar and Nemaakumku). These were chosen specifically because of contacts within the villages who ensured that the visits ran smoothly.

After the aim of the village visits had been made known to each *Alkalo*, Head Man, we were introduced to senior male members of the village and in each case a discussion ensued about the nature of farming systems and changes that were being experienced. We spoke to at least one wife of each of the elders—normally a wife that had been sent for. Sometimes the meetings with wives were on an individual basis, sometimes they were in groups. There were advantages and disadvantages to both types of meeting. Individually, women were more likely to speak their minds on certain personal issues which gave greater insight into the workings of local society, but where meetings were in larger groups, women tended to cover a wider variety of subjects. The women were usually more elusive than the men and general discussions were held in the vegetable gardens in each village as this was a place where women spent a great deal of their day. It was evident that there were many demands on their time and in every village it was felt that much more time should have been spent with the women and their children. We spoke to farmers who cultivated some of the largest areas in each village, and to those who cultivated some of the smallest. In every case the *Alkalo* indicated which were the appropriate farmers and while his selection was probably biased, it was accepted, nevertheless, out of politeness and gratitude for the assistance that we were being given. We spoke to farmers who had been to secondary schools and we spoke to farmers who were considered 'progressive' by the group of elders. These farmers were in every case among the first who had come to meet us and were the ones who conducted us on tours of the village, explaining variations in the environment. We spoke to a very few people who now spent most of their time in Banjul and returned to the village periodically to maintain a plot of cassava. We spoke to the school master where there was one and we tried to speak to extension workers and aid agents working in the villages. Only in the North Bank Division were we able to speak to the extension worker who at the time lived and worked in one of the villages visited, and who also worked in the other two. Most of the time in the field was spent in the villages though meetings were also held with officials from the Department of Agriculture in Banjul including members of the Soil and Water Management Unit, and with officials from major non-governmental organizations (NGOs) including Action Aid, Cafod, UNDP and VSO all of whom were generous with their help in the field.

It cannot be claimed that the information collected was without bias among the people interviewed, but every attempt was made to minimize bias by talking to as wide a range of people as possible in the time

available. Also, because of the time constraint it was not possible to spend time with people in the field throughout the year, but this was an unavoidable drawback in the approach. Neither can it be claimed that the villages were representative of The Gambia as a whole as conditions in the upper reaches of the River are very different from those in the lower River.⁸ In spite of all these shortcomings, it was felt that the village studies yielded much valuable information, even if it was location specific.

The interviews or discussions were structured, but at the same time informal—much along the lines of those used in rapid rural appraisal.⁹ This approach was preferred as it did not restrict those being interviewed from widening the discussion, often to more relevant areas; it allowed material introduced by respondents to be explored, and it was sufficiently flexible to incorporate changes into the line of questioning and discussion as the field work progressed. As a result the overall picture of farming obtained from each village was broadly comparable, but visits to Tujereng and Jambanjally which were among the earliest villages to be visited provided ideas which were subsequently developed in other villages, such as the three on the north bank and the two on the south bank. Owing to the nature of the approach, which attempted to build up a picture of change in farming, the size of the data base was fairly limited. Although discussions were held with men and women from 52 compounds, directly comparable data were limited as questions were not identical in every village.

Gambian farming—a summary

Before embarking on a discussion of the nature and likely causes of change in Gambian farming systems, a very brief background to the smallest country on mainland West Africa and to the broad characteristics of farming there is necessary. The country is a narrow strip of land, rarely more than 30 km in width, which extends, approximately 650 km inland, straddling the reason for its existence, the River Gambia. The product of an agreement during the colonial era, Gambia's borders reflect how little thought was given to the economic viability of the country being created and to the political problems its location might cause: apart from dividing ethnic groups, The Gambia more or less divides the north of Senegal from the south. Situated in the savannas in the transition zone between the Guinea and Sudan savannas, Gambia has a single period of rainfall and receives around 800–1100 mm of rain from June/July to September/

8. J. L. A. Webb, 'Ecological and economic change along the middle reaches of the Gambia River 1945–1985' *African Affairs* 91, 365 (1992), pp. 543–565.

9. International Institute for Environment and Development (IIED), *RRA notes* (IIED, London, 1988).

October.¹⁰ Maximum rainfall may reach 900 mm in the north-east of the country and as much as 1400 mm in the south-west. The remaining months are virtually dry. The bulk of farming is rainfed and thus confined to the wet months. For the rest of the year agriculture is of secondary importance to other non-farm activities. In spite of this, the economy is heavily dependent on the agricultural sector, in particular the export of groundnuts, and despite efforts to diversify the economic base by promoting cotton and rice production, fishing and tourism,¹¹ things have remained remarkably constant in the independence era with groundnuts and groundnut products accounting for some four-fifths of domestic exports in most years.¹²

Basically three types of farming can be identified in The Gambia: first, on the land close to the river it is normally women who cultivate rice. Here the water-table is high and the clay soils may have a relatively high organic content and a high cation exchange capacity in their surface horizons though there is considerable variation.¹³ Essentially, rice is grown in two locations: first, in the swamps bordering the river and its tributaries wet rice is grown in the areas flooded by run-off from the uplands and some seepage from the river. Second, rainfed rice is cultivated on the uplands slightly further away from the river where the water-table does not reach the surface. The classification of rice ecologies in The Gambia is extremely complicated and may vary from year to year according to variations in rainfall and the extent of flooding.¹⁴ In these riverine areas women also grow vegetables in both the wet and the dry seasons.¹⁵ The potential contribution that the swamps could make to The Gambia's agricultural production has been recognized and since the 1950s swamps have figured more prominently in government strategies for agriculture. Second, there is dryland farming which dominates in areal terms and is the domain of the men. Webb notes that this distinction between the areas cultivated by men and women is typical particularly of

10. H. Ellenberg, A. Galat-Luong, H. von Maydell, M. Muhlenberg, K. F. Panzer, R. Schmidt-Lorenz, M. Sumser and T. Szolnoki, *Pirang Ecological investigations in a forest island in The Gambia*, (Stiftung Walderhaltung in Afrika, and Bundesforschungsanstalt für Forst- und Holzwirtschaft, Hamburg, 1988).

11. T. M. Sallah, 'Economics and politics in The Gambia', *The Journal of Modern African Studies*, 28, 4 (1990), p. 645.

12. Arnold Hughes, 'Economy' section of 'The Gambia', in *Africa South of the Sahara 1993*, (Europa, London, 22nd edition, 1992) pp. 379–380.

13. H. Ellenberg *et al.* *Pirang*. Peter M. Ahn, *West African Soils*, (Oxford University Press, 1970).

14. Ken Swindell, 'African imports and agricultural development: peanut basins and rice bowls in The Gambia, 1843–1933', in Keith Hoggart (ed.), *Agricultural Change, Environment and Economy. Essays in honour of W. B. Morgan*, (Manell, London, 1992), pp. 159–179. Webb, 'Ecological and economic changes', p. 547.

15. Judith A. Carney, 'Peasant women and economic transformation in The Gambia', *Development and Change*, 23, 2 (1992), pp. 67–90. Hazel Barrett and Angela Browne, 'Environmental and economic sustainability: women's horticultural production in The Gambia', *Geography*, 76, 3 (1991), pp. 241–248.

TABLE 1
Cereals in store

Households interviewed no.	per cent of total	Supply of cereals in store (no. of months)
8	15.4	4 months +
28	53.8	1-3 months
16	30.8	<1 month
52	100.00	

Source: K. M. Baker, (1990/91) Field work in The Gambia.

the Mandinke although 'it is as characteristic of the ecozone as it is of the ethnic group'.¹⁶ Dryland farming takes place on the uplands, away from the River where the watertable is well below the surface, where soils tend to be sandy, low in organic content and cation exchange capacity, and poorer in quality than some of the riverine soils. Here millet, sorghum, some maize and an abundance of groundnuts are the chief crops cultivated. Third, there is animal husbandry which is far less important than it is some 50 km further north in Senegal.¹⁷ Not all families own cattle, though every household interviewed owned some animals, mainly goats and chickens. The majority of the people in the villages visited were Mandinke, though the cattle tended to be look after by the few Fula who lived in the villages. Where there were no Fula, the cattle were entrusted to one or two Mandinke men.

Local opinions on causes of change in farming

The initial aim was to discover whether farming was progressing, reflecting the recent growth in GDP. Every person interviewed claimed that life was tougher now than ever before in living memory, not really surprising as few farmers in the world will ever admit to conditions being good. While the farmers interviewed agreed that this was so, their main argument was that the villages were now more short of food than at any other time in living memory (Table 1).

The protracted drought which began in 1968/69 was cited by every farmer interviewed, both men and women, as the cause of their most pressing problems. It also became evident that drought was having adverse indirect effects on farming. Other factors were perceived as being the cause of problems too, but none was deemed as significant as the drought: economic pressures provoked by Structural Adjustment, rural-urban migration, growing population pressure and an education system that took children away from farming were all important too. So too was

16. Webb, 'Ecological and economic change', p. 547.

17. Kathleen M. Baker, Field research in Senegal and The Gambia, 1983.

the adherence of some farmers to traditional techniques no longer suited to the nature of the farming system. Drought, however, always headed the list of problems for farming and other factors were considered of secondary importance. The rest of this paper is therefore devoted to the ways in which protracted drought has brought about change, not only to farming systems, but to the physical environment as well.

The impact of drought

According to respondents in the study villages the drought has persisted since the late 1960s but within this period conditions have been very varied. The early years of the 1970s and the 1980s were the worst conditions that many people interviewed had ever experienced. These severe drought periods contrasted with some of the intervening years when the rains had been relatively good and crop production successful. In spite of the fluctuations, farmers stressed that the rains were now less favourable for agriculture than they had been in the 1950s and 60s. This was in agreement with findings by Nicholson, Farmer and Wigley and Moron,¹⁸ though specific changes not evident from macro-level climatic data were also noted by the farmers in the study villages; there had been a decline in the amount of rainfall; the rains were even more erratic in their distribution, and the rainy season had contracted to such an extent that in the western part of The Gambia it was now about one month shorter than it was two decades ago. Although no recorded data were available to substantiate this, farmers, extension workers and government officials in the Department of Agriculture in Banjul all confirmed that this was so. It is notable that a similar decline in the length of the growing season has been recorded in Northern Nigeria.¹⁹

The effects of drought on women's farming

Because farming activities are so clearly divided between those of women and of men, the impact of drought will first be considered on women's fields, and then on men's fields. The most important aspect of women's farming is rice. Rice is not only a major element in the diet, but has long been an important source of income for women as many would sell a part of their rice harvest in order to buy other consumer goods. Since the drought began in the late 1960s, respondents indicated that the rice harvest

18. Sharon Nicholson, 'Sub-Saharan rainfall in years 1976–80: evidence of continued drought', *Monthly Weather Review*, 111 (1983), pp. 1646–1654. Graham Farmer and T. M. L. Wigley, *Climatic Trends for Tropical Africa, a research report for the Overseas Development Administration* (Climatic Research Unit, School of Environmental Sciences, University of East Anglia, 1985). Vincent Moron, 'Guinean and Sahelian rainfall anomaly indices at annual and monthly scales, 1933–1990', *International Journal of Climatology* 14, 3 (1994), pp. 325–341.

19. E. O. Oladipo and J. D. Kyari, 'Fluctuations in the onset, termination and length of the growing season in Northern Nigeria', *Theoretical and Applied Climatology*, 47, 3 (1993), pp. 241–250.

in the study villages had fallen by approximately half which meant that villages have had to buy in rice, and women have had to try to supplement their incomes from other sources. This agrees with the view of Webb that swamp rice production in the lower valley has been all but eliminated.²⁰

Drought has hit rice production in two main ways. First, reduced rains have resulted in reduced run-off from the land. Dry-season river flows have decreased markedly and wet season flood peaks have also declined thereby reducing the area potentially cultivable with wet rice.²¹ This is a favourite crop as it yields approximately 25 to 30 per cent more per unit area than does upland rice although labour demands of the latter are less. As a rule rice seedlings destined for the swamps, or flooded areas, are raised in nurseries and then transplanted into the swamp areas. When ripe the paddy is harvested and if water levels are sufficiently high, the plants grow up again producing a second, though smaller harvest. Upland rice is broadcast, not transplanted, and yields only one harvest. Some of the land once sown with wet rice now grows upland rice, but the shorter and more erratic rains have frequently inhibited the development of upland rice crops over the past twenty years or so and yields have frequently fallen below expectations. As a response to lower yields, women have changed the varieties of rice they grow to quicker maturing varieties. Prior to 1968 almost all the rice sown in the villages took around 120 days to mature. The truncation of the rainy season, or at least the increased unpredictability of the rains at both the beginning and the end, has led to the cultivation of varieties which mature in only 90 days. These varieties are available from several sources: local aid agencies, the extension services, and some have been brought by farmers from the Casamance of southern Senegal and even from Guinea Bissau. These short cycle varieties generally yield less than the slower maturing varieties and their production potential has been further limited by the vagaries of the climate.

A second and far worse problem which has hit wet rice cultivation has been the spread upriver of saline water from the Atlantic.²² In the 1950s and 1960s when the rains were more reliable and abundant, the annual flood levels were higher and the saline water which had moved upriver in the dry season when river levels were low, was washed down by the floods from July to October. Reduced rainfall along the course of the river which rises in Guinea has meant that the floods have been lower and the saline

20. Webb, 'Ecological and economic change', p. 564.

21. S. S. Amara, 'Secular changes in rainfall and runoff over The Gambia River basin', Paper presented at the Institute of British Geographers' Conference, Royal Holloway and New Bedford College, University of London. January 1993; and S. S. Amara, '*Environmental change and flooding in The Gambia river basin*', unpub. PhD thesis, University of Reading, 1993.

22. Government of The Gambia, USAID, other NGOs and voluntary organizations, *National Natural Resources Policy, The Gambia*, draft document, Banjul, unpub. February, 1990.

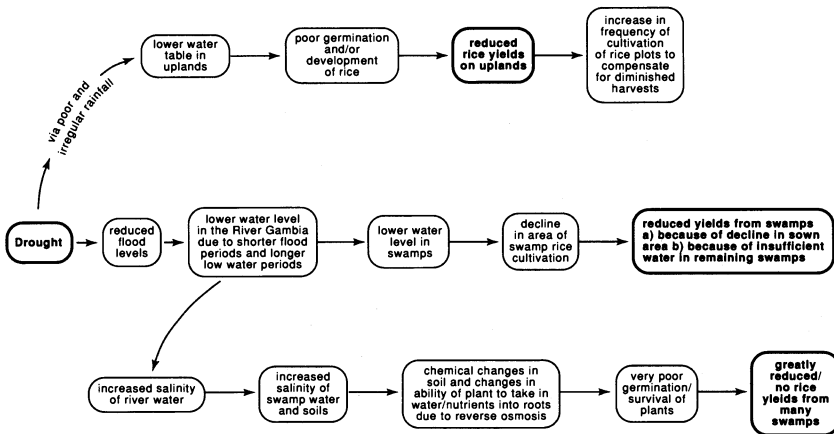


Figure 2. *Some effects of drought on swamp and upland rice cultivation*

water has managed to push well upriver to km 136.²³ In the study villages large areas of swamp now grow nothing and are virtual salt deserts where women pick up caked, dried salt from the surface to sell in local markets. There are some havens where wet rice may still be grown, on inlets where local communities have been sufficiently successful in keeping the salt at bay by building dykes, though more often than not these efforts have not proved particularly successful. Figure 2 summarizes the impact of drought on rice production in the study villages.

As a substitute for the much reduced rice crop, vegetable gardening, another concern of women, has been strongly promoted by aid agencies, including the World Bank, the European Community, the United Nations, and a whole host of non-governmental aid organizations. Formerly, vegetables were confined to the compound and grown chiefly in the wet season when water was plentiful. As with rice, they were an important supplement to the diet, and surpluses were taken to local markets. Encouragement from aid agencies has led to the establishment of large, communal gardens where vegetables are grown in both the wet and the dry seasons. The location of these communal gardens is usually different in the wet and dry seasons. Wet season gardens are further away from the river and its tributaries, but still where the water-table is easily reached by well diggers. In some cases aid agencies had supplied permanent wells in these locations which meant that cultivation could continue here throughout the year. Dry season gardens are usually on land as near to the river as possible where the water table is high. Problems of salinity have forced some communal yards to move back from the flood plain as was the case in Nemakunku. In some gardens such as the EC assisted garden at Pirang

23. Webb, 'Ecological and economic change', p. 564.

which is run partly by Voluntary Service Overseas (VSO), a sophisticated water supply system has been installed which has made the drawing of well water much easier and has significantly reduced the distance women have to carry water to no more than about 50 metres. In addition, advice and assistance are given with seed selection and with cultivation techniques. Although such levels of sophistication were not be found in the seven villages visited, nonetheless, Nyofellehmedina, Jambanjally and Tujereng all had permanent wells in the wet season gardens, the product of aid initiatives, while in the villages on the north bank wells in the vegetable gardens were all still hand dug.

The aim of promoting vegetable growing has been to improve the local diet and also to provide women with an alternative and perhaps additional source of income. A common view held by World Bank, UN and other NGO officials in Banjul was that if women earn money, their children benefit from it.²⁴ (This subject was the basis of animated discussion in the villages with women agreeing that this was so, and men arguing furiously that any additional income earned by women went not to the children, but on clothes and make-up). This was not the focus of the study in the villages though an attempt was made to assess whether the emphasis on vegetable gardening promoted so strongly by the aid agencies and condoned by the government, was justified.

Clearly, the increased use of vegetables in the local diet should be beneficial to health and with the availability of dry season vegetables—and a far greater range of vegetables than in the past, it was an acknowledged benefit. Vegetables also contributed significantly to women's income, though how much they contributed was not discovered. However, women felt that they had been drawn into increased vegetable cultivation by the aid agencies, and over half considered it a short term palliative to overcome losses from rice. If the climate were to change and women could again grow enough and sell enough rice, intensive vegetable gardening would probably not receive the attention from the women that it does at present.

Gardening was not popular: first, because vegetables could not substitute for rice in the dietary sense. Second, while aid agencies had assisted with the production of improved vegetables, virtually no attention appeared to have been devoted to their marketing. Gluts were common and there was no scope for processing. Aid agencies appeared to be giving little help in this area, but Comic Relief through Village Aid has just initiated some very small vegetable processing projects, though not in the villages visited.²⁵ Third, and perhaps the main complaint from the women was that vegetable gardening was extremely labour intensive. Unlike rice, vegetables needed

24. Personal communication from officials at the World Bank office, Banjul, 1990, 1991.

25. Personal communication from member of Comic Relief.

constant attention. They had to be watered every morning and evening, weeded and manured regularly. Animal manure was the chief type used and women spent a considerable amount of time collecting this in baskets. Another acute problem that affected all vegetable gardens in all the villages visited was attack from animals. Traditionally, animals are herded only in the wet season when the countryside is cultivated. In the dry season the animals kept in the village are let out each morning and spend the day foraging. In the evening most return to the village of their own accord, but if they do not, boys from the village go out looking for them. In their daily search for food in the semi-arid landscape, leafy vegetable gardens are a great attraction, and unless fenced with barbed wire, a persistent bovine or goat can break or eat through any fence made of local raw materials. Mandinke men refuse to employ boys to take the animals away from the villages during the dry season with the results that some women have to stay on the vegetable garden from dawn till dusk, to guard against attack from animals. All this on top of housework, child rearing, what is left of rice cultivation and a variety of other activities. Without a reliable and a good market for vegetables, the return on labour was deemed to be not worthwhile, but in spite of this most women continued with vegetable gardening as there were so few alternatives which assured them a return.

Women also supplemented their incomes from a variety of other sources, the need for financial self-reliance being of crucial importance in a Muslim society where divorce is common and women are frequently left destitute. At least one woman in every household interviewed bought peanuts from her husband or from the other men in her family which she then shelled and sold in the local market. One-fifth of the women interviewed now made peanut butter for sale in local markets. Another lucrative operation which two or three families in each of four villages visited had undertaken was soap making. For this, bar soap bought in the market was melted down and mixed with washing soda and the mix was set in tins—the one pound corned beef tins were the preferred kind. There was a good market in the villages for locally made soap, particularly in the wet season when clothes became muddy. Most women at some time in the year collect bush products, fruits of trees such as the Grey Plum, *Parinari excelsa*, the Gingerbread Plum, *Parinari macrophylla* and the Locust Bean, *Parkia biglobosa* which are enjoyed by families and have considerable market demand. Work by Madge in The Gambia provides details on the extensive collection and use of local products.²⁶ Over half the women interviewed spent more time collecting bush products for sale at local markets than they did a decade ago. They also stressed that it took longer

26. C. Madge, 'Money, medicine and masquerades, women, collecting and rural development in The Gambia', unpub. PhD thesis, University of Birmingham, 1990.

to find the fruits, leaves and other products they wanted as the area of bush land had been so severely depleted over the past 20 to 30 years. From the limited period of fieldwork it is not possible to state with any accuracy how much more time women spent collecting bush products. That women are able to make up a significant part of their lost earnings from rice by vegetable gardening and from other activities is testimony to their skills and resourcefulness. However, it must be noted that most of the major changes in their lives have been precipitated by the drought and the activities they have come to depend on are now peripheral to farming.

An additional point concerning Gambian women which is not related to the drought, but which is of relevance is that most appear to be totally opposed to the use of mechanized farm equipment. In this respect they differ markedly from women in other parts of West Africa. Much effort has been made by NGOs to encourage women to use mechanical equipment, but in vain. Action Aid for example trained several women to use ploughs and mechanical weeders. They seemed enthusiastic, but when asked to encourage village women to adopt the new technology, there was absolutely no uptake of such innovation and no explanations were given. Even the women who had been trained returned to their traditional methods. One cynical extension worker suggested that if the women showed their competence in ploughing for example, they could end up working on the men's rainfed plots as well. This was their method of resistance. Discussions with women on this issue were unsatisfactory. Of 18 women with whom this issue was raised, 14 stated that they did not need machinery in their vegetable gardens and argued that it would be of little benefit to them and would not ease their workload. Von Braun and Webb also noted women's low use of productivity-increasing implements and suggest the need for improved access to credit for women.²⁷

The effect of drought on men's farming

Turning now to men's farming on rainfed land, drought has had a very different but no less marked set of effects. The environment has not been completely devastated for crop production in the way that much of the wet rice land has, but the changes in farming practices that drought has stimulated are almost certainly adding to problems of environmental degradation. For the most part, men cultivate millet and sorghum and the chief cash crop, groundnuts. Poor and erratic rainfall in many years since 1968 has brought about reduced yields and often shrivelled seeds. Germination rates in the following year—particularly of millet and sorghum—tend to be poor because of the poor quality of the seed. Success of the crop is frequently further hindered by erratic and poor

27. J. von Braun and P. J. R. Webb, 'The impact of new crop technology on the agricultural division of labour in a West African setting', *Economic Development and Cultural Change*, 37, 3 (1989), pp. 513–534.

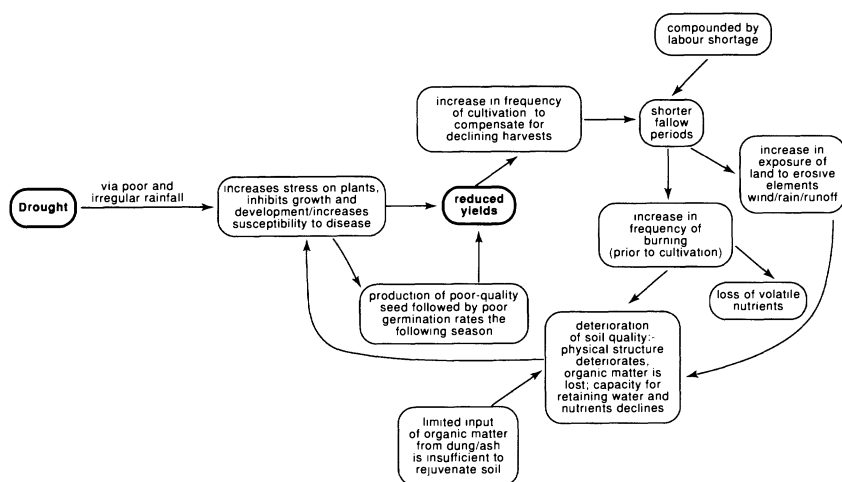


Figure 3. Some effects of drought on dryland cultivation

rainfall. Reduced rainfall has also led to some replacement of varieties of sorghum by the millets which are generally more tolerant of drier conditions (Figure 3). But there has also been a trend towards replacing millet with groundnuts. Increasingly, millet harvests were being ruined by the parasitic weed *Striga* and so planting too large an area with millet could result in neither food nor income. A similar trend has been identified by the Schoonmaker Freudenbergers in Senegal.²⁸ If, on the other hand, the groundnut harvest was good, then lucrative prices in some years, a result of the Structural Adjustment Programme, meant that rice could be purchased. Millet was to be found in the market place at these times, not because it was in surplus, but because it was being sold by people who had no other source of income and who would almost certainly go hungry in a very few months' time.

As with rice, the shorter rainy season has led to the adoption of varieties of both cereals and groundnuts which mature in 90 days instead of in 120. The flavour of the quicker maturing varieties is said to be inferior, and this was noticeable even to the author's untrained palate in the case of peanuts. Furthermore, yields from quicker maturing strains of rice, the millets and groundnuts are by as much as one-third lower than their longer maturing equivalents. Many of the varieties which mature in 120 days have been saved in the village, but one cereal once common in The Gambia and known as *findo* was declining in all the study villages and was about to be lost in Nyofellehmedina. Yields had been so poor that no farmer

28. M. and K. Schoonmaker Freudenberger, *Fields, fallow and flexibility: natural resource management in Ndam Mor, Fademba, Senegal*, IIED Drylands paper no. 5 (IIED, London, 1993).

interviewed had sufficient *findo* seed to plant a field the following year, and several argued that even if they had, with the current climatic conditions, it simply was not worth planting. There was no sentimentality about conservation of a disappearing variety. Human survival was of paramount importance.

Farmers in every village highlighted labour shortage as a major problem. In the past hiring labour was a common occurrence and was made easier by strange farmers who would be given a piece of land to cultivate in exchange for labour.²⁹ But strange farmers were rare visitors now and it was alleged that they went instead to urban areas where the returns from informal sector activities were greater than returns from farm work. Rural-urban migration had also reduced the availability of farm labour which was now both limited and very expensive. To get someone to do a day's ploughing, complete with plough and oxen cost about Dalasi 125–150 (approximately £10–15 and even labour for weeding was dear at around D10 per person per day. Labour also have to be fed and supplied with kola nuts and cigarettes. This was no real problem when village food supplies were plentiful, but now is a major strain on the system. Mechanisation was the desired alternative but most claimed that resources available were insufficient for essential implements such as ploughs and weeders. Levels of mechanisation were far higher on the north bank and local farmers attributed this to the proximity to Senegal, a source of such innovations. With further questioning, it emerged that falling yields on the farm and the need to buy food had been a contributory factor to migration particularly of young males to urban areas. Drought cannot be blamed entirely for migration, other factors are involved including the desire of many young folk for adventure. Interviews clearly revealed, however, that most migrants had gone in search of work in order to earn money to buy rice that the villages could no longer produce. Migration was thus part of a survival strategy rather than for capital accumulation.

The vast increase in population was something that seemed to have occurred virtually unnoticed in the villages. When asked about family members now and approximately 20 years ago, it clearly emerged that whereas in the past 25 per cent of the population were children, now the proportion was around 50 per cent. Most people were interested in this revelation, but no one considered the growing population a major pressure on village resources and perhaps as a contributory factor to migration. In every village migration had been considerable with the exception of Nyofellehmedina. This village had been established by Muslim clerics, *marabouts*, some 35 years ago, and the Islamic influence was still very strong. It was this aspect which apparently discourage people from

29. Ken Swindell, 'Family farms and migrant labour; the strange farmers of Gambia', *Canadian Journal of African Studies*, 12, 1 (1978), pp. 3–17.

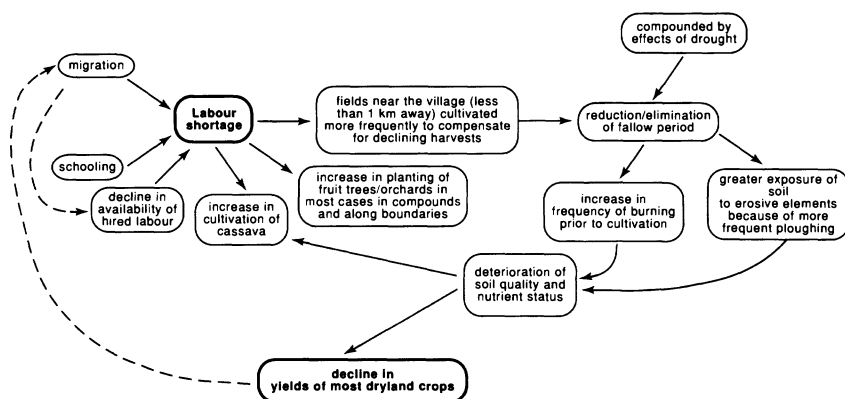


Figure 4. Some effects of labour shortage on dryland cultivation

migrating and so the labour problem was not quite as acute here as elsewhere though remittances from those who had migrated were always welcome.

It thus emerged from the field work that drought was contributing to migration which in turn contributed to the problems of village farming. (Figure 4). The majority of the migrants appeared to be younger men, and without them, the bulk of the dryland farming fell on the older men, some of whom were over seventy. There was a general reluctance among these older men to walk too far to their fields and as a result, fields closest to the village, generally no more than one kilometre away, tended to be cultivated every year. Formerly, the system, characterized by low inputs particularly of fertilizer, had been sustainable. Four or five years' cultivation had been followed by a fallow period of at least five or six years during which time the land recovered some of its fertility.³⁰ Now, most of the dryland fields nearest the village were being cultivated virtually every year with millet and groundnuts being rotated on an annual basis. Because of the shortage of funds only seven of the farmers interviewed used fertilizer and no one used pesticides. Fertilizer was available from local cooperatives, but farmers simply did not have the money to buy it. The use of animal dung was limited, first because most people did not have sufficient cattle to tether on their land to increase the manure input, and second, because hiring cattle to tether on the land was allegedly well beyond the purse of most farmers. This was given as the sole reason for not manuring the fields. Although such answers must always be treated with some scepticism, millet yields of 1–1.25 tonnes per hectare equivalent from

30. P. H. Nye and D. J. Greenland, *The soils under shifting cultivation*, Commonwealth Bureau of Soils Technical Communication, no. 51, 1960. C. C. Webster and P. N. Wilson, *Agriculture in the Tropics* (Longman, London, 1966).

the fields in question suggested that farmers were telling the truth and that no significant energy subsidy was being used on these fields. The main input was this dung from itinerant cattle—far from the amount necessary to manure the fields properly, and it was no surprise that yields had declined by about 0.5 tonne per hectare equivalent over the past decade. It would seem that the soil had become increasingly impoverished as more was extracted from the land than was returned to it.

Things were made worse by the traditional practice of burning the field before it was ploughed. In most of the fields which were cultivated every year there was little weed growth, 20–30 per cent cover at most. Trees and shrubs of any size were largely absent on these fields, a subject which was taken up for discussion in Nyofellehmedina. Here five progressive farmers argued that while cutting had taken place in the past, over the past 10–15 years fire had been important in further reducing the tree population. They accepted that many savanna species were fire tolerant, but if fires were too frequent, even fire tolerant species found it difficult to re-establish themselves and in consequence, died out. When this argument was put to six older farmers who were very much in favour of burning, particularly late stage burning, they accepted that this might have been so, but remained adamant that the advantages of burning far outweighed any disadvantages. Burning may be advantageous when vegetation is abundant and when burns are well spaced, but where the land supports relatively little growth, it further exposes the soil surface to the erosive power of the elements. This was the view of the progressive farmers both within Nyofellehmedina and in the other villages. Burning was a highly controversial issue and farmers spoke of how it was being discouraged by extension workers. Problems caused by burning were highlighted in literature circulated by village extension workers.³¹ While most of the older farmers could not be dissuaded from using fire every year, some of the more progressive farmers interviewed, 17 in all, were well aware of the damage that annual burning was doing in this particular environment. In spite of their reluctance to use fire, every one of these cultivators had had experience of their fields being burnt by fires set by other people which had got out of control.

New possibilities for dryland farms

In response to the direct and indirect pressures caused by drought—essentially declining yields from the millet and groundnut fields and acute labour shortages provoked by drought in combination with other factors, farmers were seeking alternative methods of farming on dryland fields. Their first choice was increasing mechanization which would allow them to

31. *Senelaa*, Leaflet circulated to extension workers allegedly from the Department of Agriculture, Banjul, to increase expertise in the field, February/March, 1991.

open up more land. However, resources available for this were even fewer in the villages on the south bank than those in the North Bank Division. Here on the North Bank, most farmers in the three villages visited had access to simple ploughs, and a 'guesstimate' from the village headman in Berending indicated that there were four weeders in the village. The proximity to Senegal, where mechanization is more advanced than in The Gambia, was the reason given for the North Bank's apparent progressiveness. In the villages on the south bank, most of the land was prepared by hand and farmers were anxious to mechanize. Ploughing was much less labour demanding than preparation by hand, and even with ox-drawn ploughs young boys (however reluctant to assist) could help with land preparation whereas digging or hoeing the field by hand was too heavy for young boys under about 12 years of age. Although every farmer who cultivated the dryland fields was keen to mechanize as far as possible, some of the older men argued that it would still be barely worthwhile cultivating this land as they did not have the labour to weed or harvest the crop. And even if these tasks could be accomplished by machinery, then they still had the problem of bird scaring as harvest approached. The children normally helped with this, but on the fields further away from the village, without constant supervision, their commitment was in doubt. The younger men were not so pessimistic in their outlook and welcomed the idea of greater mechanization.

Because of the constraints on millet and groundnut cultivation, and because of the shortfall of rice which increasingly had to be bought, farmers had turned to other alternatives to supplement their cash needs. Millet and groundnuts still dominated, but there was also a noticeable increase in the planting of fruit trees. This was being encouraged by government extension workers and by aid agencies but farmers gave confident assurances that they had thought of the idea long before, arguing that planting fruit trees had begun as much as 20 years ago when the drought began to take hold. That the idea was not a new one, and that it had come from the local community was one that seemed very important to farmers in Nyofellehmedina. Few have the resources to plant orchards (only six men out of the 52 compounds had orchards), but most had planted a few fruit trees, mainly oranges and mangoes along field boundaries and in the villages, both for the fruit and for aesthetic reasons. However, the water-table has now fallen so low that even orange trees are dying. Mangoes are being encouraged because of their greater tolerance to drought. There is a local saying that when mangoes are destroyed by drought there is little hope for farming. Apart from the environmental benefits of fruit trees the labour input is low and there is considerable market demand for the crop. Contractors come south from Dakar, the capital of Senegal, and buy the entire orange crop

from each village. This involves farmers in very little work particularly if part of the deal is that the contractors harvest the crop as well. Apart from being worthwhile financially, fruit growing is one way round labour shortages.

Another alternative which is developing rapidly is cassava. Cassava has long been grown as a back garden crop, and was formerly, a relatively small part of the diet. Some nine or ten years ago all the cassava in the area—in all seven villages visited, and beyond—was struck by blight, possibly a mosaic virus, and wiped out. The crop was not grown for three or four years since when it has returned and increased very rapidly in importance. Many still grow it as a compound crop, but increasing numbers are growing it as a field crop, instead of millet or groundnuts. However, there is always the underlying fear that the blight which struck some years ago will strike again. If they could be sure it would not, several farmers stated that they would rather grow cassava than groundnuts.

Cassava's new found importance lies largely in increased demand for cheap food in the urban areas, and Dakar is a massive market for the crop. The subject has not been researched, but it seems likely that Structural Adjustment Programs and the accompanying urban hardship could in part be responsible for the high demand for a cheap food such as cassava. Whatever the reason, as with the fruit crop, contractors come south from Dakar, harvest the cassava crop for the farmers, leave them with cuttings for the next crop and transport the harvested crop to market. This leaves the farmer with the relatively undemanding tasks of ploughing the land, planting the cuttings and weeding the crop from time to time. Tolerance to drought and poor soils, low labour requirements and a good market makes cassava a very attractive crop. With job losses in Gambia's urban areas at least two migrants have already returned to each village in the last two years. Unaccustomed to working on the land, these people have found cassava a viable alternative to millet and groundnuts. In villages such as Tujereng and Jambanjally, relatively close to Serrekunda and Banjul, there is a significant population of weekend farmers, people who work during the week in the urban areas of Serrekunda or Banjul, they may be civil servants, teachers, or they may be more heavily involved in the informal sector. For these people, cassava is a convenient crop because it requires so little attention. Attempts to discover the returns on cassava as compared with groundnuts, for example, were not altogether successful, but the quality of the fencing surrounding cassava fields—strong hardwood posts and abundant barbed wire—revealed the importance of the crop to the owners. Theft of cassava by both monkeys and humans is allegedly a major problem and so cassava plots are as near to the compound and the village as possible so that they can be protected.

Some conclusions

With such changes in cropping patterns it is no real surprise that villages have to buy food. Clearly the quantity of cereals in store (Table 1) was not an adequate measure of how well farmers are doing. It was evident that drought had caused many problems and brought about many changes. It was also clear that one response to drought and other difficulties was the increased production of cash crops, revenue from which could be used to buy supplies of rice. It is possible that changes such as these—partly a response to drought and partly a response to increased prices following the introduction of Structural Adjustment—have occurred throughout The Gambia. If this is the case, then these changes could have resulted in the increased production of export crops (mainly groundnuts). From statistics reflecting this trend, it could be suggested that increased output is representative of growth in the economy, but from evidence cited above this has not been the case in the study villages. Clearly macro-level data mask many issues.

It was evident from the field work that men had been more successful in circumventing the problems caused by drought than had women. This is not because men are more able than women, nor because women are less willing to change. It is not a sexist argument, merely an observation. Women were much harder hit by the drought than were men as rice growing has been so severely devastated by the saline incursion up the Gambia River, an indirect effect of reduced rainfall. While aid has helped with the focus on vegetable gardening, the benefits would be greater if year round markets were assured. Scope for the development of small-scale preserving industries could help considerably and there are hopes that this will come. Although drought has devastated former wet rice lands, and although resources are currently insufficient to reverse the process it is possible that the situation could still improve. A similar situation occurred when drought struck earlier in the century, around 1914/16.³² After several wet years following this drought, the salt water in the swamps was replaced with sweet water and they were once again usable for rice cultivation. Most women interviewed were optimistic that conditions would improve and alternative measures adopted for supplementing both diet and income were thus endured because of their temporary status. However, there was no real basis for their optimism.

The drylands away from the river have not suffered from the drought to the same extent as the swamps, but the changes that have taken place as a result of the direct and indirect effects of the drought could ultimately prove as environmentally damaging as on the wetlands unless there are changes in land management. Farmers are normally ecologically aware.

32. D. P. Gamble, *Contribution to a Socio-economic survey of The Gambia*, London, Colonial Office, 1949.

They have to be if they, and generations after them are to continue cultivating the land. The sustainability of any agroecosystem depends on the input more or less balancing the output. What we are witnessing in these dryland areas is a growing imbalance as fallows are eroded and land is cultivated every year with no energy subsidy to compensate for intensified cultivation. Although the shortage of land was usually more apparent than real, nevertheless, the land immediately around the villages was suffering severely. The rapidly increasing adoption of cassava could exacerbate the problem of soil impoverishment as cassava is reputed to drain the soil of its nutrients.³³ Not a single farmer interviewed was aware of the effects of cassava cultivation on the soil, or indeed of its low nutritional value.

Most farmers were aware that they were overcultivating the land, but, short of money, short of labour and frequently artificially short of land, few had any ecologically-sound alternatives to offer. No strategies were offered for land improvement. Green manuring is not favoured, simply because of the unfamiliarity of the system; labour is not available for composting; animal manure is too expensive for the majority and is in short supply and purchasing inorganic fertilizer was well beyond the purse of almost every farmer. If the fall in farm output, aggravated by the drought is to be reversed, dryland farmers need assistance to pursue some form of soil improvement strategy. Finding methods of soil improvement acceptable to local people and appropriate to the environment is an area where local people and foreign experts could work together, combining knowledge, skills and resources in the search for practical solutions.

33. F. R. Irvine, *West African Crops*, vol. 2 (Oxford University Press, 1969).