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THE AFRICAN EXPERIENCE

DROUGHT AND FAMINE IN THE DRY ZONE

RANDALL BAKER

This paper concerns the changing climate in the semiarid regions of Africa and the technological response to it. Often the central issue in physical and social change in Africa seems to be interpreting a sketchy but rapidly evolving base of “evidence” and trying to decide the process that the evidence would suggest is at work. This is a far from easy task, requiring inspired guesswork as much as proof, but clearly it is absolutely central to formulating an appropriate policy response.

One thing is indisputably clear: the circumstances in the semiarid belt stretching from Senegal to Ethiopia and to places in eastern and southeastern Africa have reached catastrophic human proportions. No one who looks at television or reads a newspaper can fail to have noticed that. Furthermore, because of the catastrophic level of human suffering our attention not unnaturally is focused on

relief and the immediate problems of keeping alive a large number of people on the edge of extinction. But this crisis-management approach, usually associated with natural disasters such as floods, famines, and earthquakes, presupposes that we are coping with an anomalous and sudden visitation and that, if we can carry the population through the immediate disaster, there is a reasonable chance that they can reestablish something resembling a “normal” life again. What has concerned many writers about Africa is the almost unbroken persistence of drought since 1968 and of dry conditions for the last twenty-five years (Lamb, P. J. 1982; Nicholson 1983) and the fear that there is an underlying natural or human-induced process at work preventing a return to “normality.” Nicholson (1983) examines the possibilities of changed surface conditions intensifying and prolonging the drought. Hence the authorities would have to plan for a worsening situation in the long term. Indeed, the absence of much attention to the drought in the early 1980s might suggest that people are adapting to it or that it has become accepted as “normal” even though conditions have rivaled those in the depths of the early 1970s.

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But complicating matters even beyond this “will it get better or not?” level of debate is the other question of “what is causing the present crisis?” There are those who suggest that we are dealing with an aberration in the global atmospheric circulation, causing a failure in the essentially monsoonal rain systems of these areas. Some of these workers postulate a long-term (two hundred-year) cyclical phenomenon reaching its trough around the year 2025 (Lamb, H. H. 1983). Others suggest that evidences of earlier droughts of similar intensity indicate that this one is nothing too far out of the “ordinary” and that our expectations may be too much influenced by a wetter phase during the 1950s (Kerr 1985). Of course, the fact that there are many more people around today still drawing their subsistence from the natural environment than there were during those earlier occurrences—though many of them have been driven away between 1968 and now—may make the impact of the drought that much more terrible. But it does not make it in any way a fundamentally different process. Then there are those, perhaps best exemplified by Kenneth Hare in his paper to the United Nations Conference on Desertification held in Nairobi in 1977, who say there is no evidence to “prove” climatic change, which is not the same thing as saying that it is not happening.

So one group says there is a major systemic climatic change process, another says it is just more of the same (drought is “normal”), and a third group says we cannot prove anything. Of course, choosing among these theories for Africa is severely constrained by the short period of time for which data have been collected. There are almost no reliable records of climatic phenomena in the semiarid region much before 1900, and indeed much later in many places. Thus much of the “evidence” is of a secondary nature (lake levels, tree rings, varves, and the like) and this gives rise to internecine disputes in the scientific community on the nature of evidence and the confusion of cause and effect.

The school of thought encouraged some-

what by Hare’s often misinterpreted “not proven” verdict has focused on the issue of mismanagement. Briefly, this theory states that the combination of growing human and animal population (Worldwatch Institute 1985 puts the blame squarely on this factor); the expansion of people into marginal and fragile environments such as woodlands, hillslopes, and river margins; inappropriate technology (such as the mouldboard plow used in Dust Bowl days); and the colonial and postcolonial preoccupation with monocultures of export crops have all contributed to create a severe ecological imbalance leading to land exhaustion, degradation, and erosion. On the one hand, it is said, this can lead to the appearance of “desertification” in much the same way that a worsening climate can. Furthermore, the degraded state of the environment means that when droughts come along, as they usually do in the semiarid belt, then their impact will be that much greater because there is less intrinsic resilience in the system to withstand them. Secondly, they argue, largely with the aid of computer models of the atmosphere, that the mismanagement of the land can, in itself, lead to climatic change resulting from increased albedo (Charney 1975), or dust in the atmosphere (McLeod 1976), or a reduction in soil moisture reducing the release of latent heat to the atmosphere (Walker and Rowntree 1973) and preventing the “triggering” effect of the moisture-laden air masses passing over the savannas and Sahel from the coast. Scientists label such relationships the bio-geophysical feedback effect.

Although some writers (Kerr 1985) boldly dismiss the mismanagement argument simply on the basis of the scale of the present drought and its extent in Africa, it is quite possible that what we are dealing with is a combination of climatic phenomena and mismanagement, but what we cannot be sure about is whether the climatic circumstances are part of a long-term deterioration that would seriously reduce the options open to the policymakers. They, like much of the scientific community, are extremely confused by the conflicting “evi-

dence," or the "Information Crisis," as I termed it (Baker 1976a). On the one hand, the climatic-change argument is attractive because it absolves policymakers from any shadow of blame or responsibility and renders the whole thing, in the language of insurance policies, an act of God. But clearly assembling and unscrambling the evidence is important whether one is thinking of rehabilitation or retreat. Norman Rosenberg demonstrates the rise in temperature associated with, possibly, the increase in CO₂ in the atmosphere and goes on to explore the various, sometimes conflicting, consequences this might or might not have for the granary of much of the world, the Midwest (Rosenberg 1986). How much greater then is the difficulty of extrapolation of effect or response in Africa with much poorer data, a monsoonal system, far fewer options, and a base of very little capital to insulate the grower?

Technological adaptation and innovation in the Great Plains area is reviewed, but with very little predictive extrapolations, by the Office of Science and Technology (OTA 1983). Technology can be a very wild card indeed. Major studies of the Great Plains fifty and twenty years ago, respectively, assumed that there was little or no further potential for irrigation in the Great Plains (Great Plains Committee 1936; Ottoson, et. al. 1966). They could not have foreseen the tremendous advances in center pivot irrigation which now supplies water to the majority of the Nebraska corn crop. On the other hand, much of the water technology translated from the United States to Africa in the 1960s and 1970s is thought to have helped induce overgrazing and widespread land destruction. Similarly, the enormous effort in genetic research in grain crops, widely associated with the "Green Revolution" and India's progress toward self-sufficiency in food production, has not found its parallel in Africa. There the millets and sorghums remained largely neglected, primarily because they were not part of the colonial cash crop package. At the same time, work advanced on cocoa, coffee, and cotton. But

the crops that kept many Africans alive, especially in the semiarid regions, remained virtually untouched. There has not been a similar green revolution for Africa and indeed one would be difficult because of the cost of irrigation, pesticides, fertilizer, and hybrid seed for some of the poorest and least commercialized farmers in the world. The reasons why a food revolution of Asian proportions has not occurred in Africa have recently been outlined, and there is a reluctance to suggest the same sort of technological breakthrough in the African situation (Norman 1985). The conceptual difficulties of coping with the African dilemma are clearly very great indeed, especially as so much attention has to be directed instead towards simply staying alive.

THE CLIMATIC CHANGE ARGUMENT

Research work on climatic change in Africa is still in its infancy and investigations are revealing not only new insights into the possible underlying processes but also into the historical precedents for the incidence, extent, and severity of drought. These trends have been reviewed by Nicholson (1983). Apart from the sources provided by oral tradition, which are bound to be anecdotal and difficult to verify, workers have had to rely on such secondary evidence as the observable record of changes in the level of basins of inland drainage like Lake Chad. Writers and travelers in the nineteenth century, notably David Livingstone, wrote frequently of Africa "drying up." On a more rigorously scientific basis, the study of lake margins combined with oral tradition (migrations, famines, etc.) suggests at least two other periods of drought comparable in intensity to what is happening now; the first was between 1736 and 1758 and the second between 1820 and 1840. At least two other incidences of major drought have been recorded this century, the last being in the 1940s. However, on the evidence available, it would seem that the past fifteen years or so (since 1968) have been the worst in about one hundred and fifty years. In some ways the

wetter years of the 1950s appear exceptional. Since only six of the twenty or so recording stations were established before 1940, the overall record may be distorted by that of the 1950s.

Of course, it is possible only to compare on the basis of observable effect because a record of precipitation does not exist. This comparison is a problematic exercise since factors other than the direct impact of a shortfall in precipitation can influence the parameters used as a guide. Overgrazing can cause species changes in grasslands just as can intensifying aridity; inland drainage basins can be affected by factors relating to land use in the catchment area, such as a change in crop type or in land use intensity. Clearly a study of process is made very problematic when the evidence is subject to so many possible influences. Similar difficulties face workers like Hubert Lamb, who not only have to rely on secondary data, but also upon the use of intercontinental extrapolations into very different climatic systems from studies—made usually in the temperate zones—as and where the data sources may be found.

Recent research, which is attempting to correlate precipitation patterns directly to observable phenomena elsewhere, has suggested two possible areas of causality in relation to Africa. The first of these links the changes in the incidence of the El Niño current in the Pacific with rainfall in the southeastern part of Africa. Thus a colder than normal Pacific brings wetter conditions to the area. Alternatively, for the six-thousand-mile stretch of semiarid Sub-Saharan Africa in the north, there exists the possibility that changes in surface temperature over the Atlantic south of 10°N is in some way associated with changes in the rainfall conditions in the Sahel famine belt. All this, of course, begs the broader question of what brings about these fluctuations in the spatial distribution of ocean temperatures, but at least the confirmation of some causal link would provide the scientific community with a predictive tool.

We are still left, however, with the additional problem of how far drought is an unavoidable consequence of uncontrollable natural forces and to what extent it is aggravated or accentuated by the land-using or atmosphere-modifying activities of man. There remains the almost certain prospect that the present run of dry years—and the last two years have been the driest of this century—will come to an end and more humid conditions will return (Lamb, P. J. 1982). But we still do not know whether these dry cycles are superimposed on some more profound longer cycle, or whether man is playing an active role in directly or indirectly accentuating the local or regional impact of the climatic function through dust or albedo factors (Quirk 1977; McLeod 1976; Charney 1975). Even for one of the most thoroughly researched countries on earth, the United States, Rosenberg (1986) is able to show the considerable uncertainty surrounding the possible consequences of atmospheric warming over the Great Plains and beyond. Waggoner (1984) is relatively optimistic about adaptation to weather changes in the U.S. as science and technology keep pace. Leading scientists are now engaged in acrimonious debate concerning the incidence of, and possible consequences of, the “greenhouse effect” of CO₂ buildup in the atmosphere. It is not difficult, therefore, to sympathize with the dilemma facing policymakers in Africa who, even with the best will in the world, are trying to plan in the midst of the most profound uncertainty. They, in contrast to their American colleagues, face the terribly pressing problem of applying much more uncertain knowledge to a situation where the consequences of change are much more immediate and disastrous to the human population.

HISTORY, TECHNOLOGY, AND SOCIETY

The North American Great Plains is an area that has been subject to relatively recent colonization. In this regard there appears to be some similarity with the African continent,

which was subject to the main thrust of colonialism (rather than colonization) at roughly the same time. But there the comparison more or less ends, and it is extremely difficult to extrapolate data from the Great Plains to Africa. Although it is possible to point at events during the Dust Bowl era in America and perhaps see certain superficial similarities in the degradation and breakdown in semiarid Africa today (e.g., the wholesale migration of people, soil erosion, the role of technology, etc.), there are some very basic underlying differences. These may be briefly summarized as follows:

The strong role of the subsistence sector in much of semiarid Africa;

The lack of a viable alternative for employment in other sectors of the economy;

The lack of any substantial research base for the major subsistence crops supporting the people;

A situation of severe capital constraint on the part of most farmers and governments in the region;

The different historical experience: the superimposition of one culture, economy, and technology on top of another rather than the wholesale displacement that took place in Australia and North America.

During the relatively recent colonial experience that affected virtually all the countries in semiarid Africa (including, indirectly, Ethiopia), profound changes were made in the relations between man and the environment. These territories "paid their way" within the colonial system by producing cash crops in a relatively unprocessed form for export. This commercial strain was grafted onto, rather than replacing, the existing "traditional" farming systems. Indeed, the colonial authorities required the maintenance of subsistence farming as a device to subsidize production costs and to obviate the necessity for social support payments. Thus colonialism created a demand for additional land almost overnight. Further-

more, it introduced monocultures of often very demanding crops. The French West African empire was very systematically divided into production zones for cotton, groundnuts, and so forth. The introduction of taxes payable in cash ensured that the indigenous population participated actively in this drive.

On the research front, the efforts were concentrated almost entirely on proving the productivity and quality of the cash crops. Institutes for research on specific crops proliferated, an example being the Imperial Cotton Research Institute in Uganda. However, there was no parallel line of major research into the principal food crops like the millets and sorghum or into the animals that keep alive the majority of the population in the dry zone. Speaking at a Washington meeting in January 1985, Edmond Hartmans, director of the Nigeria-based International Institute for Tropical Agriculture, stated: "Research in food production in Africa started around 1970. We shouldn't be surprised that we are only now beginning to see results" (Norman 1985). In contrast, the record of research into tropical cash crops goes back to the eighteenth century.

Much of the doomsday literature on Africa—such as the recently syndicated cartoon showing the countries of Africa named "West Ethiopia, East Ethiopia, Emerging Ethiopia"—could be replicated by turning back to the writings on Asia, particularly India, in the early 1960s. Indeed, the full Malthusian catastrophe for India of a population outstripping its food-producing capacity was predicted to occur right about now. Instead, the picture is very different. In Asia the rate of growth of food production during the period 1965–75 increased about 20 percent and eliminated both the massive food imports under the PL480 plan and commercial purchases. In 1985 Pakistan became an exporter of grain. This was largely due to the development of the "Green Revolution" dwarf hybrids of wheat, rice, and maize and the associated fertilizer/pesticide/irrigation package. It is true that much has been written about the socially disruptive

impact of this technological change, but we cannot escape the undeniable fact that, for the moment at least, dire human consequences have been avoided. How does this dramatic success relate to Africa?

Over roughly the same period that the hybrids were being extended at almost unbelievable speed in Asia, food production in Africa was barely able—or in many cases was unable—to keep up with the rate of growth of the human population. So why was there no green revolution for Africa? The reasons are many. First, the Asian dilemma overshadowed what was happening in Africa so that most of the research and extension was focused there. Next, as far as Africa's staple grains are concerned there was almost no research base to build on. Such as it was, research focused essentially on luxury exports to earn foreign exchange. The African countries, facing recent declining terms of trade, the impact of oil shocks, and the growing expectations of the politically volatile urban power groups, felt obliged to continue this colonial preoccupation with those commodities that earned money abroad. Also, it is difficult to raise funds for research and development work on crops that essentially have an economic rather than a financial return, however important they may be to the food security and general well-being of the population.

In addition, other factors result in local complications in effecting an African green revolution. First, the infrastructure for seed multiplication (since hybrids cannot reproduce themselves) is weak or absent, which makes the distribution of the innovation each year particularly difficult. Second, farmers who intend to consume the end product rather than put it into the commercial market have no means to pay for such seed. Third, in many countries the state-controlled pricing system for that portion of the crop entering the market is used as a device to "tax" the countryside to subsidize food for the urban population, including workers. Such a system, in effect, for example, in Mali until recently, serves as a major disincentive to the grower.

Fourth, in many countries agriculture simply has been and is a neglected sector. Examination of the expenditure patterns of governments in the region shows that often as little as 10 percent of state resources are devoted to this sector, even though 75 percent or more of the population are engaged in agriculture.

So the economic, social, and political bases in Africa are often too weak for the sorts of changes outlined by Rosenberg in his review of technological advances in the Great Plains. The effort is only now beginning. Members of the Organization of African Unity meeting in Lagos toward the end of the last decade predicted that attention must be focused on a greater drive toward food security in Africa. However, this effort, still in its infancy, takes time. Some progress may be charted, such as the development of a hybrid sorghum combining strains bred in Nigeria and at the Texas A & M University that offers the prospects of higher yields in the Sudan and elsewhere. But all this will require a major concerted effort partly because the delivery system will be that much more difficult in Africa. Indeed, the new sorghum strain is attractive largely because the gains may be achieved without irrigation and the prospects for irrigation in Africa are seen as much more problematic than in the Punjab or elsewhere in south and southeast Asia.

One additional problem is the attitude toward research on the part of government officials. So much research in Africa, like water development in semiarid regions, has had perverse results when implemented that government officials are often frustrated at the gap between research and implementation. One often hears the cry for no more research and a lot more action. It is clear that the research effort in Africa has often been characterized by the following:

Concentration on export crops;

The research station mentality producing answers too often without researching the real questions ("top-down" approach);

The very late start in researching food crop hybrids; and

The lack of a systems approach to production problems at the farm level and to overcoming the observable constraints, including such things as infrastructure and credit.

Over the last decade we have seen the growth, often under the aegis of the Consultative Group for International Agricultural Research (CGIAR), of research centers such as the one mentioned above in Nigeria and the International Livestock Center for Africa in Ethiopia, Kenya, and Mali. However, it is one thing to effect research on an integrated basis or on production systems; it is quite another matter to translate that research into action when the organs of government are essentially divided into sectors and uncommunicative. Unfortunately, governments all too rarely research themselves. Thus the administrative dimension remains weak, and yet it may be the key to any successful transformation. Since it is this very government structure that defines the need for and requests technical assistance, the problem is extended beyond the boundaries of national policymaking. These issues were discussed in 1979 by UNESCO in a review of its scientific contribution to the development of the arid zones, and I have elsewhere presented a hypothesis with regard to the role of administrative structure in tackling global problems that I term the "Administrative Trap" (Baker 1976).

THE WAY FORWARD

Clearly the way forward is far from easy since it is beset with a combination of scientific uncertainties and polemical assertions of rightness by the various apologists; systemic constraints in the decision-making structure; and a very late start in developing the indigenous technological base to provide food security. The Lagos meeting suggests some realization on the part of the governments of the need for a change of direction away from the colonial structure. However, this realization produces immense problems for those governments

because of their tremendous dependence upon foreign exchange to fuel the models of development they have adopted, which in turn rely so much on imports for modernization. Sadly, the reality is that the rural majority does not have the political clout of the concentrated urban minority and so Lipton's "Urban Bias" prevails, though not necessarily for the reasons he posits (Lipton 1977).

Time is a precious commodity since it is needed to confirm the various hypotheses regarding climatic change; to investigate how land use aggravates the effects of drought; to develop the strains and packages of a new green revolution for Africa; and to overcome the calamitous effects of the last fifteen years. Once it is possible to move away from the relief and crisis-management approach that prevails at the moment, then we must hope that the momentum will not be lost simply because things appear to be "getting better." It is well known that policymakers have a fairly short-term time horizon, even if they have not been elected to office. Indeed, as J. K. Galbraith observed, "In the long term we are all dead." The African situation, with its heavy Malthusian overtones, may unfortunately relate more directly to that observation than to any other. Still, everyone was saying the same thing about India in the 1950s and 1960s and we should derive some hope from that. It is quite clear that none of the compilers of definitive reports on the Great Plains could have predicted the wild card of technological change nor the changing role of grain exports from the Great Plains. But to hope for an Asian happy ending in Africa is more like an act of faith than a prognostication of science.

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