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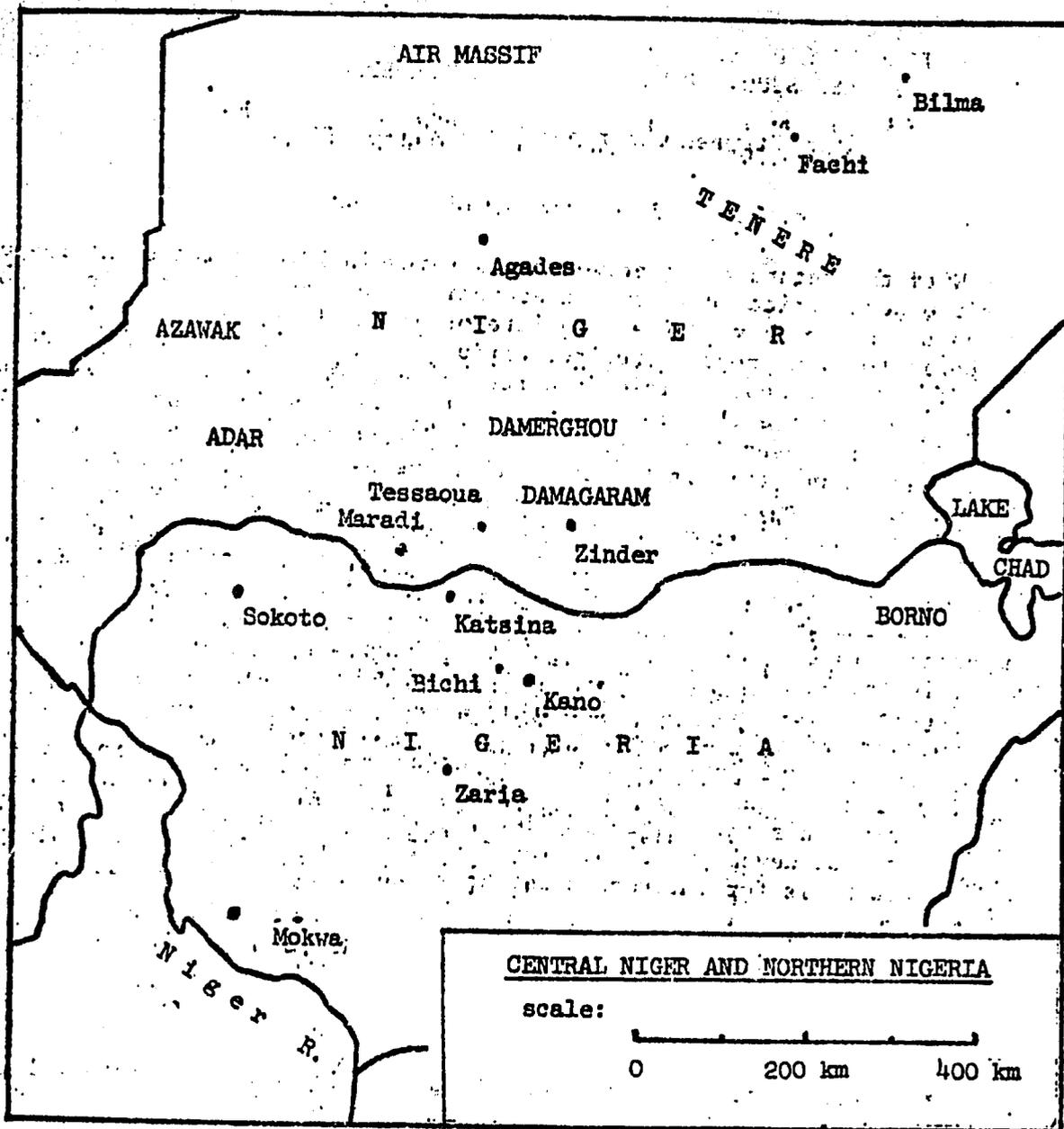
DROUGHT AND THE DEVELOPMENT OF SAHELIAN ECONOMIES:
A CASE STUDY OF HAUSA-TUAREG INTERDEPENDENCE*

By Stephen Baier and David J. King**

With the return of relatively good rains in 1974 in the countries of Sahelian West Africa, development economists, aid agencies, and local governments can look beyond the immediate problems of drought relief; they can begin to plan programs for reconstruction and development. Unfortunately the development policies and reconstruction programs now being considered have little chance of success. Planners are ignoring the cultures, economies, and bases for survival of the desert-edge peoples. In order to understand why this is the case, it is necessary to examine not only the age-old mechanisms of survival in the Sahel, but also the assumptions of the development planners. Proposals for development policies have grown out of the debate as to whether the problems of desertification associated with the drought have been man-made or are consequences of a natural phenomenon--climatic change. This debate obscures a neglected issue of extreme importance in the formulation of policy for the future. The basis for survival in the Sahel was interdependence between desert and savanna, pastoral and arable, herder and farmer. A case study of the area which is now Niger and northern Nigeria demonstrates that the pre-colonial economies of the Hausa and Tuareg functioned as two interdependent sectors within a regional economy, interacting across the ecological frontier at the desert edge. By examining this interaction in detail, it is possible to devise an illustrative set of development policies for Niger and Nigeria which would provide a new basis for interdependent Hausa and Tuareg livelihoods.

*The historical information in this article draws upon material in a forthcoming study entitled, "The Desert-Side Economy of the Central Sudan," International Journal of African Historical Studies 8, no. 4 (1975), authored jointly by Paul Lovejoy of York University, currently a visiting professor at Ahmadu Bello University, Zaria, Nigeria, and Stephen Baier.

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Climate and Land Use.

The Sahelian drought first received world attention in the late spring of 1973, primarily as a result of publicity about urgent needs for relief supplies to feed and support two groups of peoples. Sedentary farmers and their families, dependent on their grain crops, were destitute as a result of crop failures following several successive years of drought. Semi-nomadic pastoral groups were also in need of aid as a result of devastating losses of animals because pasture almost disappeared in the desert fringe as a result of drought conditions.

With the return of relatively good rainfall, the critical question for development planners and policy makers is whether sedentary farmers and nomadic herdsmen should be encouraged to return to livelihoods

similar to those which they followed before the present drought. If this is the case, then development programs would have to include measures to provide farmers with seed, fertilizer, and other resources needed to re-establish their crops and to sustain them until the first harvest provides for their future livelihood. For the nomads, programs for the restocking of herds, as well as veterinary and other services to protect these herds, would be needed. Such programs might well involve an even longer period during which the nomads would remain dependent upon relief and other support.

Development proposals have centered around the debate as to whether the collapse of the livelihoods of Sahelian peoples is a direct consequence of particularly severe and prolonged but cyclical drought conditions, or a result of land use practices inappropriate to the fragile ecological balance of the Sahel, a maladjustment which only became fully evident under drought conditions. Most observers realize that these two factors are interrelated and that to some extent both are contributory causes, but points of view diverge widely on the relative importance of worsening climate and poor land use practices as causes of the recent tragedy.

Undoubtedly the Sahel has been in a prolonged period of severe drought. Although meteorological data have not yet been fully examined, it is clear that rainfall was much lower in the period 1969-1973 than in recent decades, especially the 1950s and 1960s. If the recent drought was no more than a severe case of cyclic drought, then re-establishment of the pre-drought economies, perhaps with some built-in provision for drought relief such as a grain storage program, would be appropriate. If planners view the basic relationship between men and land as one which damages the ecological balance and progressively undermines the possibility of survival in the future, they must come to a different conclusion.

Changing ecological conditions are the basis for the argument that the collapse of the livelihoods of the pastoral peoples of the Sahel is a consequence of poor land use. During the drought the desert has commonly been described as creeping--hardly the right word for a movement covering up to 30 miles a year or more on a 2,000 mile front--southwards. Planners who stress the importance of the man-made causes of the drought blame the deaths of large numbers of cattle and other animals on insufficient pasture rather than the lack of water during the drought. They admit that the deterioration of pasture lands was related to the drought, but they view overstocking and overgrazing of the land as the fundamental causes of the recent tragedy. This is a plausible argument, given the long-term growth of Sahelian herds based on the provision of water and increasingly effective veterinary services after the late 1940s. Also cited by proponents of this argument is the enclosure of 5,000 acres of range land at Ekrafane, Niger, easily picked out from the surrounding countryside by remote sensing techniques, and viewed as a contrasting example of what "good" pasture management, that is, less intensive and controlled grazing, has achieved even during the drought period. But advocates of less intensive grazing than is normally the case in the Sahel are begging the question, for such land use practices would be possible only if a large proportion of the population of the area did not have to live from the land.

The debate about the importance of land use practices is not easily resolved, and some of the arguments advanced about land use are less than convincing. Frequently cited, for example, is the rapid growth of herds in the early 1960s, an increase said to have placed accelerating pressure on pasture land just before the drought. But those familiar with the Sahelian livestock industry will realize that the first accurate cattle census, done in the mid-1960s in conjunction with the first complete campaign to vaccinate against rinderpest, raised figures for cattle populations from as much as 40 percent over previous estimates. Therefore much of the growth in the 1960s is more apparent than real. Another argument is that travelers in the Sahel in the nineteenth century reported luxuriant vegetation in areas which today are barren. Recent research, however, suggests that the nineteenth century was a period of favorable climate in comparison with both the eighteenth and the twentieth centuries (see below), so that desertification in the last hundred years may be as much the result of changing climate as of poor land use practices.

The interrelated arguments about climate and land use on the local level are no less complicated when considered in the context of worldwide climatic change. The research of some meteorologists, including Reid Bryson of the Institute of Environmental Studies, University of Wisconsin-Madison, indicates that changes in weather patterns in the Sahel may be part of a more permanent southward shift of the monsoon belt in the northern hemisphere. This suggests that the Sahel might suffer recurrent failures of the summer rains for at least several decades, with minor fluctuations. The argument, briefly, is that the increase in carbon dioxide in the atmosphere increases the surface-to-upper-atmosphere temperature gradient. The increase in particulate matter in the atmosphere decreases this gradient but does so far more at the polar regions than at the equator, hence increasing the equator-to-pole temperature gradient at the surface. The increase in these two temperature gradients provides the basis for a southward drift of the monsoon belt and thus a substantial reduction in the rainfall along the northern fringe of this belt.

The research of the meteorologists also suggests that climate is dependent on human activity in another sense.¹ While the level of particulate matter in the atmosphere does vary cyclically, primarily in relation to the amount of volcanic activity, increasing amounts of particulate matter in the atmosphere are the direct result of human activities: industrial pollutants, dust from mechanized agricultural practices. And--surprisingly--at least as important are dust and ash resulting from the increased prevalence of slash and burn agriculture and increasing numbers of domesticated animals. Climatic changes themselves may be in part a consequence of changes in land use practices occurring when overgrazing leads to a loss of soil structure and the subsequent increased amounts of dust in the atmosphere.

1. Reid A. Bryson, "Climatic Modification by Air Pollution, II: The Sahelian Effect," Institute for Environmental Studies, Report 9 (Madison, Wis., August 1973).

The resolution of this complex debate has important implications for development and reconstruction policies. However, irrespective of whether the debate can be resolved or how it is resolved, attention must be given to one issue which has been largely ignored: the livelihoods, and consequently the land use practices, of both the nomadic Tuareg herdsmen and sedentary Hausa cultivators were formerly interdependent. The disintegration of this long-standing symbiotic relationship may be as critical in explaining the present problems of Sahelian peoples as either climatic change or changing land use practices. Development policies which do not recognize and attempt to devise arrangements to restore this mutual interdependence are likely to yield disastrous results in the event of further severe drought.

The Hausa-Tuareg Economy

A close examination of the pre-colonial economy of the area which is now Niger and northern Nigeria reveals that the southern Sahara and adjacent areas of the savanna were so closely integrated as to constitute a single economic region. This region was subdivided into areas of local specialization, with the desert sector supplying animals and other products of the arid lands and providing specialized personnel experienced in craft production and trade. The savanna in turn supplied grain and local manufactures. More importantly, the savanna served as a haven for the people of the desert in times of drought.

The Tuareg secured a living from the harsh desert environment by specializing in animal husbandry. The basis of their economy was pastoral nomadism, an extreme form of adaptation to an arid environment where scant rainfall was highly variable in both space and time. The seasonal pattern of the rains along the desert fringe, with precipitation from May to September but normally concentrated in July and August, necessitated seasonal transhumance. During the short rainy season the desert supported a large population, and the pastures of the Air Massif, where rainfall was greater than in the surrounding countryside, were sufficient for a large contingent of the Air Tuareg, as well as others from the south and west, to make the trek across the dunes of the Tenere in late October and early November. At Fachi and Bilma, two oases on the trans-Saharan route north of Borno, they traded grain for salt and dates. With the return of the salt caravan in December, most Air Tuareg left for the south, selling salt, dates, and animals along the way, and pasturing animals they were breeding. Many moved as far south as Sokoto, Katsina, and Kano during the dry season, while others used pastures farther north, just within the sedentary states of the Sahel. With the beginning of the rains in May or June, they left for the north, since the excessive dampness of the savanna at this time of year endangered the health of their camels, and the return of land to cultivation hindered the free movement of the herders. In addition, they were drawn to the vast areas of rainy-season pasture in the Sahel and southern desert.

This pattern of migratory transhumance, dictated by the needs of the herds, also provided a framework for trade. Mobility and military prowess enabled the Tuareg to dominate the fertile regions of the Sahel and savanna. Nevertheless, they relied on trade because they needed grain to supplement their diets of milk and meat, especially in the hot, dry months when milk from the herds was insufficient. Millet consumption averaged as high as

150 kg. per person per year, a quantity representing an aggregate demand much greater than could be supplied by the scattered and highly unreliable grain production of the Air and desert oases. The concentration of Tuareg population along the southern fringes of the desert placed most people in close proximity to farming villages and savanna markets. For the Tuareg of the Air, Tegama, Damerghou, Azawak, and Adar, this meant the area centering on the Hausa states. In addition to the trade in salt, dates, and animals, another important supplement to Tuareg income came from escorting and providing transport services for trans-Saharan caravans, which also followed the rhythm of seasonal transhumance.

One particularly important aspect of Tuareg investment in the savanna was the operation of farming estates throughout Katsina and Kano emirates in the south and everywhere in the Sahel, including Damagaram, Damerghou, Maradi, Adar, and Tessaoua. The observant traveler Heinrich Barth, who visited or passed by many of these estates in the 1850s, found it "astonishing how much property is held in these fertile regions by the Tawarek of Asben [Hausa for the Air Massif]"² Tuareg families held rights to widely scattered villages, so widely scattered as to prevent their political consolidation. One important Tuareg leader, for example, owned a village in Damerghou, the Sahelian region south of the Air, and controlled other villages near Zinder and Tessaoua.

The principal obligation of the residents of Tuareg-owned estates was to pay their nomadic patrons an annual tribute in grain, which supplemented the grain the Tuareg acquired by trading. In addition, they had to provide food and lodging for the nomads as they passed through each year, and probably helped with the herding as well. Estates located along the north-south corridors of transhumance and trade provided a far-reaching network of resting places for Tuareg patrons in good times and places of retreat when the desert was uninhabitable.

Besides grazing sites and numerous estates, the Tuareg network in the savanna included urban communities of brokers, landlords, and craftsmen. These diaspora communities formed the core of an elaborate commercial infrastructure which permitted nomads to move freely throughout the savanna, exchanging desert products for grain and local manufactures. All savanna towns had immigrants from the north who provided accommodation, banking services, brokerage, and storage facilities for the Tuareg as they passed through. Diaspora communities included craftsmen and other immigrants from the north, for the Tuareg invested heavily in the craft production of the savanna. In Zinder, for example, Tuareg merchants financed leather workers and tanners by providing the raw materials they needed for production and paying for production.

The economy of the area centering on the Hausa states complemented that of the desert. In the savanna the basis of the economy was the availability of land and opportunities to grow grain and other crops. The

² Barth, Travels and Discoveries in North and Central Africa (New York, 1857), I, p. 481.

concentration of agricultural populations and their proximity to strong currents of trade from the desert presented a host of opportunities in non-agricultural occupations as well, such as commerce, service industries, and local cloth and leather manufacturing. A key factor in the prosperity of the arable regions, especially those on the fringe of the Sahel, was the ready market for any grain produced in excess of the needs for local self-sufficiency.

The picture which emerges from much recent research on the economic history of this region is that the majority of people produced goods or foodstuffs destined for sale. The desert-edge economy was market-oriented, not in some peripheral way--as stereotypes of pre-colonial Africa would suggest--but to a very important degree.

Adjustments to Drought

The seasonal pattern of Tuareg transhumance and the trade network associated with it not only formed a link between the economies of the desert and savanna but also functioned as a safety valve for desert peoples during drought. Interdependence enabled them to survive by migrating to the far southern end of the network, to limit losses in the herds by pasturing animals in the south, and to rebuild their resources after a period of temporary sedentarization.

The recent drought was the latest in a series of climatic cycles which have affected the Sahel over the centuries. Although the historical record is just beginning to be explored, some information is already available. Paul Lovejoy of York University has worked out a chronology of major droughts based on the Arabic language chronicles of Kano, Agades, and Borno.³ These chronicles mention an eleven-year drought in the middle sixteenth century, an eleven-year famine at the turn of the seventeenth century, a seven-year drought some time between 1690 and 1720, a major drought in the 1740s or 1750s, and another in the 1790s. The nineteenth century is remarkable for the absence of any severe, multi-year droughts, and only one drought of a single year's duration is reported in travelers' accounts. The impression that this was generally a period of favorable climate is confirmed by research on the level of Lake Chad, which was at a high in 1874, a level not regained in the twentieth century. A series of years of below-average rainfall after the turn of the century culminated in another major drought in 1913.

Periodic drought necessitates adaptation, and the principal survival mechanism has been for the people of the desert to leave for the south. Whenever water and pasture became scarce, Tuareg fled to the far southern end of the network, stopping along the way at estates and farming villages under their control. During severe droughts estates in the extreme south were the most valuable, since they were least affected by drought. Here Tuareg could claim a share of the grain reserves of the people under their

3. Lovejoy and S. Baier, "The Desert-Side Economy of the Central Sudan," forthcoming in the International Journal of African Historical Studies, 8, no. 4 (1975).

control, and the presence of the nomads constituted a serious burden when grain surpluses were marginal. The reaction of Tuareg dependents to food shortages may have been similar to that of their sedentary neighbors, who entered long-distance trading networks extending toward the forest, exchanging animals and other trade goods for food traditionally eaten in times of hardship, such as locust beans.

Sometimes Tuareg remained in the savanna only for one or two years, returning to the desert when the herds were large enough to be capable of supporting their families. But in the case of prolonged disturbance, such as the drought of 1913 and the fighting associated with the revolt of 1916, the "spill over" from the desert was permanent. In the area near Zinder, over one-fourth of the population consists of recently sedentarized nomads.

When normal conditions returned, wealthy Tuareg left the southern estates and headed north. They recruited followers by offering them loans of animals, loans which permitted those whose own herds were still small to return to the desert. As opportunities in the north improved, farmers from the sedentary states moved up toward the desert edge and established tributary relations with nomads. This is exactly what happened in Damerghou in the nineteenth century, when the area was repopulated with immigrants from Katsina, Gobir, Daura, and western Borno. These farmers lived in villages near Tuareg estates. Although they were not technically under the control of the Tuareg, they paid an annual tribute in millet just like their neighbors on the estates. The principal difference was that the immigrants did not have to accommodate Tuareg patrons as they passed through.

An extremely important factor in the recovery of the desert-side economy after drought was a shift in the terms of trade in favor of pastoral products. Comparisons of relative prices before and after the drought of 1913 and ensuing political disturbances illustrate how this readjustment operated. By 1920 scarcities of salt, beasts of burden, and slaughter animals were such that all these commodities were much more expensive in terms of millet than they had been before the drought. By selling desert products herders could obtain from five to twenty times as much millet as they were able to buy before the drought. (See table.) Because of this major change in the terms of trade for millet, many were able to resume nomadic life with smaller herds than normally would have been necessary.

Terms of Trade of Pastoral Products for Millet

	Ratio of price of three-year-old export steer to price of millet (1903=1.00)	Ratio of price of average pack camel to price of millet (1908=1.00)	Ratio of price of salt, by weight, to millet (1903=1.00)
1903	1.00		1.00
1908	.26	1.00	
1909	.48	1.54	
1920	4.25	23.50	5.11

Source: Stephen Baier, "African Merchants in the Colonial Period: A History of Commerce in Damagaram (Central Niger), 1880-1960" (Ph.D. diss., Univ. of Wis.-Madison, 1974), p. 120.

The Decline of Regional Interdependence

The economies of the desert and savanna continue to be closely integrated, but the desert no longer plays as important a role in the economy of the savanna as it once did. This change is partially explained by the crisis in the desert economy which followed the imposition of colonial rule. In the beginning two factors were instrumental in the decline: the first was the end of the trans-Saharan trade, as the completion of the railway to Kano opened up export routes to the south; the second was French hostility toward the Tuareg. By requisitioning large numbers of Tuareg camels, the French were able to administer the Tuareg lands they occupied, while also undermining the ability of the nomads to mount an effective resistance. In 1913, the year of the drought, requisitions reached crisis proportions when the French occupied the Tibesti Massif. Camel losses from both sources undermined the basis of the desert economy--animal husbandry, the salt and animal trades, and income from providing transport services. Revolts broke out in the Air, Azawak, and near the Niger Bend. The French finally put down the last of the resistance in the Air Massif in 1918, but the revolt and the effects of its repression seriously compounded the pre-existing crisis and prolonged it for many years. A large proportion of the Tuareg of the Air remained in Nigeria until the mid-1920s, a fact which suggests that they could still call upon the hospitality of their sedentary dependents and continued to have access to southern pastures or land which they farmed temporarily.

Trouble at the northern end of the network was paralleled by developments in the savanna, as the grain-producing estates of the fertile regions gradually slipped from Tuareg control. Little detail is available on this process in Nigeria, but events near Zinder, where numerous estates and villages of newly sedentarized Tuareg were located, are probably representative. Here the French authorities, mindful of the threat to their rule posed by the nomads, systematically transferred the right to tax the inhabitants of estates from nomads to the sedentary political hierarchy. In some cases they allowed newly sedentarized Tuareg to pay taxes to Tuareg chiefs, but this was the exception rather than the rule. It is also important to note that these Tuareg chiefs, at least partially sedentarized themselves, were appointed by the French and were unable to act independently of the French. In the 1920s most nomadic Tuareg retained only nominal ties with the people they formerly controlled or taxed. Nomads occasionally visited farming villages but rarely stayed overnight, received no grain, and were unable to stay for extended periods of time in case of drought. As time passed even nominal ties grew weaker still. The pastoral economy functioned well in times of prosperity, but when pasture recently became inadequate, the people of the desert no longer had a refuge.

Recommendations

Development and reconstruction policies based on the presumption that the problems of the Sahel were caused by a severe but cyclical drought and can therefore be resolved by a restoration of pre-drought economies are unlikely to be successful. Failure will become apparent in the event of further drought, when the lack of assured access to southern pastures will again prevent the Tuareg from making adjustments to drought.

Even less appropriate is an emphasis on measures to impose "improved" land use practices involving the enclosure of pasture land in southern Niger with or without attempts to sedentarize the Tuareg. Enclosure without Tuareg participation would eliminate whatever access to southern Niger pasture that remains. Enclosure with Tuareg participation would necessitate reduced herd sizes to match carrying capacities of enclosed land and would also waste the scarce resource--pasture available in the desert fringe in the rainy season. Moreover, it would require the imposition of a new way of life on the Tuareg, one they would probably consider unacceptable.

Whether or not desertification is a consequence either of climatic change or of land use practices, it is essential that some new basis of assured access to southern pasture be found for the Tuareg. If future droughts are not to be disastrous, then the Tuareg must have access to lands which in the colonial past became part of Nigeria. This is particularly essential if drought proves to be a recurrent phenomenon.

1. No Encroachment on Existing Dry-Season Pasture

Enclosures of pasture or arable land in southern Niger will seriously interfere with the pattern of seasonal transhumant migration which permits the exploitation of the arid lands. Herders move south in the dry season to use uncultivated land or land which is under cultivation in the rainy season but lies unused after the harvest. They often contract for rights to allow herds to graze on crop residues in exchange for the manure which the animals leave in the fields.

2. Access to Pasture During Droughts

Given the long history of climatic cycles in the Sahel, drought is likely to recur. Although the re-establishment of pre-colonial forms of interdependence is clearly impossible, it is possible to plan new bases for survival.

The existence of large areas of sparsely populated land in Nigeria's Middle Belt suggests one possibility. Given the problems of trypanosomiasis (a type of sleeping sickness) and other animal diseases, breeding enterprises are not likely to be successful, but disease control measures during the dry season are both technically feasible and cost-effective. In addition, the cost of disease control is likely to be lowest when drought conditions are worst. Nigeria may well have to establish more "fattening" enterprises on Middle Belt pasture lands--enterprises modeled on the one which has already been established at Mokwa. If these enterprises were to have reserve capacity built into them, they would be able to handle herds from the extreme north during droughts. They would provide the necessary outlet for animals being culled from herds both in Niger and Nigeria, and they would prevent the usual precipitous drop in cattle prices during drought, a drop so harmful to the interests of the herders. The costs of maintaining such reserve pasture capacity could be offset either by a premium on the charges for irregularly used pasture rights or by a discount on the price paid for fattening stock as compared with the price paid for stock accepted on a regular, contractual basis.

Nigeria's interest in aiding Niger's livestock industry lies in the huge and growing demand for beef in southern Nigeria. Nigeria's own livestock industry has long been inadequate to meet this demand, and imports from Niger and Chad have been supplying one-fourth or more of Nigeria's needs. Given rising per capita incomes in Nigeria, demand for beef, a highly income-elastic commodity, is likely to continue to grow.

Access to southern pasture during drought will only be beneficial to the Tuareg if they are able to reach the south before their herds succumb. For this reason it is imperative that water resources in the southern desert and Sahel be balanced with the availability of pasture. Herders must not be allowed a false sense of security based on the ready availability resulting from the digging of deep-bore wells since this might keep them in the desert until pasture is eaten out all along the routes of escape to the south. North-south corridors through areas of arable farmland are also necessary to assure that the emptying of the desert can take place. These corridors should be located in areas where agricultural settlement is sparse and should include freedom of migration and trade across the Niger-Nigeria border.

Conclusion

On the basis of a case study of the situation in Niger, the argument of this paper is that proposed development and reconstruction programs and policies have two major, interrelated shortcomings.

1. They ignore the mutual interdependence of sedentary farmers and nomadic pastoralists which has been the basis for survival in the Sahel for centuries. In particular, they overlook the critical requirement for the livelihood of Sahelian pastoralists, namely the power to control dry-season pasture lands and to gain access to pasture and grain supplies during drought.

2. Although policies and programs have emphasized the need to bring the systems of land use into balance with the natural resources available, they have given scant recognition to the need to preserve and re-establish balance between land use systems and land tenure systems. The viability of a system of land use depends on the capacity of such a system to provide livelihoods for all potential participants in such a way as to supply them both incentives and security and assure them access to those resources necessary to maintain their way of life without damaging the natural resource base or endangering their chances for survival in the future.

Development policies for Sahelian countries which ignore either the interdependence of arable farmers and pastoralists or the relationships between the availability of natural resources, systems of land use, and land tenure systems are likely to yield disastrous results in the event of drought in the future.