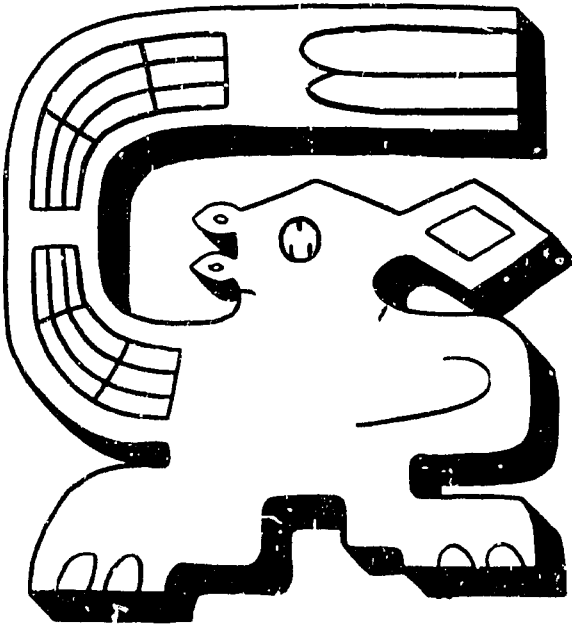


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# The Impact of Changing Agricultural Technology on African Land Tenure

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The urgent need to improve the economic performance of African economies has led to two major theoretical concerns. First, there is the continuing search for the secrets of the economic success of the developed countries in order to see what "models" they provide for African economic development.<sup>1</sup> Second, there is a radical look at man in Africa to see whether he is sufficiently "an economic man" to justify the assumptions or orthodox economic theories;<sup>2</sup> and also an examination of African cultures and tradi-

<sup>1</sup> Bruce F. Johnston, "Agriculture and Economic Development: The Relevance of the Japanese Experience," *Food Research Institute Studies* 6, no. 3 (1966): 251-312.

<sup>2</sup> Elisabeth Hoyt, "Economic Sense and the East African Impressions of a Visiting American Economist," *Africa* 22, no. 2 (1952): 65-69; S. Daniel Neumark, "Economic Development and Economic Incentives," *South African Journal of Economics* 26 (March 1958): 55-63; and W. J. Barber, "Economic Rationality and Behavior Patterns in an Underdeveloped Area: A Case Study of African Economic Behavior in the Rhodesias," *Economic Development and Cultural Change* 8, no. 3 (1960): 237-51.

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The substantive data are derived from a field study of economic, cultural, and technical factors affecting African economic development carried out by the Food Research Institute, Stanford University, in eastern, central, and western Africa, 1966-68. The research was conducted in seven areas, shown on figure 1: Teso (Uganda), Kisii (Kenya), Geita (Tanzania), Mazabuka (Zambia), Akim Abuakwa and Bawku (Ghana), and Northern Katsina (Nigeria). Grateful acknowledgement is made of the financial support from the Rockefeller Foundation. Neither the Rockefeller Foundation nor the author's colleagues in the study can be held accountable for the opinion and interpretation presented in this article.

tional institutions to determine what "incentives" and "barriers" they present to development efforts.<sup>3</sup> Although economic man has been found in many parts of Africa, African economies are not growing fast enough to meet the demands of the population.<sup>4</sup> This seems to present us with a paradox as well as a challenge. I shall not discuss this paradox here but rather shall explore some of the ongoing processes of change in one of Africa's focal institutions—the land tenure system.

African land tenure systems have attracted much attention. The total output of the literature on the subject is vast, and though largely uneven in quality, it is still growing.<sup>5</sup> The focus of inquiry is shifting from the anthropologist's traditional concern with rights in land as a dimension of social or genealogical geography and as an attribute of social structure to the economist's concern with "bottlenecks" and "barriers" posed by focal institutions in the process of economic transformation. In the latter frame of reference, attention is directed to the political, economic, and institutional factors which tend to keep rights in land outside the marketplace when labor has become a major commodity in the rapidly changing African economies.<sup>6</sup> This paper examines briefly the trends in the changing "contents" of African tenure systems resulting from the increasing adoption of agricultural technology. Use is made of the comparative data collected during recent fieldwork in sub-Saharan Africa. The areas providing data represent a wide range of contrasts in agricultural potential and economic and technical achievements. The bearing of these on the contents of land tenure is examined with the aid of data obtained from a sample of 480 farmers in the study areas.

### Land and Its Attributes

Land has many attributes. It is not only the physical dimension of a community but the spatial aspect of the polity. Land is also a factor of production—a factor associated with property ownership. In other words, there is "property in land." The concept of property in land implies the enjoyment of certain rights in a scarce value (land) which can be challenged by others. As Wilbert E. Moore phrases it, "A right is meaningless unless there are potential challenges to that right."<sup>7</sup> The redistribution of rights in land is one of the major problems of social and economic change. The existing rights in land, a major aspect of tenure arrangements, imply not only the idea of control over a scarce value and its productive wealth, but also the power relations, real or potential, between persons and social

<sup>3</sup> Victor C. Uchendu, "Socio-economic and Cultural Determinants of Rural Change in East and West Africa," *Food Research Institute Studies* 8, no. 3 (1968): 225-42.

<sup>4</sup> William O. Jones, "Economic Man in Africa," *Food Research Institute Studies* 1, no. 2 (1960): 107-34.

<sup>5</sup> Much of the ethnographic literature is contained in the series by Daryll Forde, ed., *Ethnographic Survey of Africa* (London: International African Institute, 1946-68).

<sup>6</sup> Victor C. Uchendu, "Some Issues in African Land Tenure," *Tropical Agriculture* 44, no. 2 (1967): 91-101.

<sup>7</sup> Moore, *Economy and Society* (New York: Random House, 1955), p. 12.

groups holding rights in land and those who do not—but aspire to a share of these rights. It is in this context that it can be said that tenure arrangements cannot be fully understood unless the *structure* and *content* of a social system are also understood.

The productive aspect of land is very important, particularly as economic development becomes a central concern. The status of an economy at a given period is a major determinant of the “content” of its land tenure. Whatever the body of rules regulating the acquisition and the use of rights in land, the dynamics of an economy at a given period of time tend to modify these rules. However, relics of old “ideologies” and formal “rules of tenure” tend to persist long after an economy has effected changes in the content of its tenure arrangements. Colson has called attention to this lack of close relationship between legal rules and actual rights in land. Her hypothesis is, “A knowledge of the land law does not permit an observer to predict the likelihood of finding any particular pattern of landholding unless he can also predict a great many other influences which may be operating upon the community.”<sup>8</sup>

The concepts developed by anthropologists of “ideal” and “real” culture can be useful in the analysis of tenure dynamics in a rapidly changing economy. The ideology of the tenure system in many African communities is that “land cannot be sold.” This is a sensible ideology for economies which either possessed an abundant supply of land or for those in which land might be in short supply but the economy was insufficiently monetized to make a land market a feasible institution. But many case studies have demonstrated that this is not a sacrosanct ideology; where the economic environment has been sufficiently altered to provide a new system of security, land is sold. In fact, a land market, responsive to economic pulls, is no longer a bizarre innovation in many parts of Africa.<sup>9</sup>

### The Impact of Agricultural Technology on Tenure Systems

The great contribution which an “efficient” land tenure system can make to economic development is no longer a subject for much debate. However, what constitutes an efficient tenure arrangement will be debated for a long time to come. Two of the central issues debated as an agricultural economy attempts a transformation are the problem of security in land and the question of access to land. These two issues are interrelated.

The first issue, the problem of security in land, may be quickly disposed. In traditional African economies, the security of rights in land is guaranteed and protected by the very principle under which the initial rights were acquired. In one community it might be the kinship principle; in others it might be the principles of residence, clientship, service to a higher authority, or mere political affiliation or allegiance. As long as the social relations which give rights in land are maintained, the question of insecurity in land seldom becomes a live issue. However, technical changes in agri-

<sup>8</sup> Elizabeth Colson, “Land Law and Land Holding Among Valley Tonga of Zambia,” *Southwestern Journal of Anthropology* 22, no. 1 (1966): 1-8.

<sup>9</sup> Polly Hill, *The Migrant Cocoa Farmer of Southern Ghana* (Cambridge: Cambridge University Press, 1963).

culture, such as the opportunity to grow cash crops and the ideology and land policies of modern African states, tend to upset the traditional security system. The growing number of litigations over land in many parts of Africa suggests that economic change is disturbing social relations and the land rights which these imply, and in many cases, the traditional land rights are also being redefined.<sup>10</sup>

The ideological attitudes of the ruling elites of African countries to questions of land tenure tend to have similar effects. To cite a few examples: Farmers in Geita district, Tanzania, were unwilling to admit to any rental or sale of their land because they knew that such transactions were against the ideology of their government. In northern Katsina, farmers freely admitted selling and renting their land, though it was clear from the prevailing legal codes that such transactions were not enforceable in the local courts. In Mazabuka district, Zambia, farmers selling their "rights" in land can and do overcome this problem by demanding a premium on the improvements made on their holdings (houses, wells, etc.)—which they are legally allowed to sell—the value added being the price of their land. The tenure implications of the many group farms and settlement schemes operating in many parts of Africa are not clear at the present. There is some evidence that in some of these schemes, tenants or cooperators show a feeling of insecurity of tenure, whatever the law might say.

The issue of access to land is a more complex one for those economies that are just entering the market. In these economies, the land market is not firmly established, though there are many other ways of acquiring rights in land. Noneconomic factors, like the pride of family, social interest, political ideology, and social and political status, may not only impose restrictions on access to land but often define who gets what interests in land and how much interest. These factors also institutionalize the channels through which interests in land can be acquired and disposed. In a previous discussion of this problem, I called attention to the role of the polity—the local sovereignties in land—in inhibiting access to land and in frustrating a rational pattern of agricultural development. I attributed the coexistence of land-surplus and land-deficit economies within the same national economy to the "spatial attribute of sovereignty" in land.<sup>11</sup>

With few exceptions, the ownership of land in many African communities is widely diffused rather than concentrated in the hands of a small landed aristocracy. The classic exceptions, the *mailo* system of Buganda and the *kibanja* system in Bunyoro, owe their origins to errors arising from the colonial misinterpretation of the indigenous land tenure traditions in southern Uganda.<sup>12</sup>

If a wide diffusion of rights in land implies easy access to land, the content of these rights poses problems for technical change in agriculture.

<sup>10</sup> John C. de Wilde et al., *Experiences with Agricultural Development in Tropical Africa* (Baltimore, Md.: Johns Hopkins Press, 1967), vol. 2, and Hill, *The Migrant Cocoa Farmer*.

<sup>11</sup> Uchendu, "Some Issues in African Land Tenure."

<sup>12</sup> John H. M. Beattie, "The Kibanja System of Land Tenure in Bunyoro, Uganda," *Journal of African Administration* 6, no. 1 (1954): 18-28, continued in vol. 6, no. 4 (1954): 178-85.

Land has peculiar property attributes, one of which is the fact that a "bundle of rights" can be enjoyed by different right-holders, whether individuals or social groups, on the same piece of land. The bundle of rights concept is central to tenancy. Property rights in land can be split between the landlord and tenant, between landlord and occupier (as in group farms), and between private and public interests (as in the state's right of eminent domain). In the classic tenancy situation prevailing in parts of the United States, the landlord (an individual or corporate firm) invests his capital in land while the tenant acquires "the productive potential of a parcel of land during a single growing season, the right to which can be sold for a fixed price (cash rent) or a share of the product (share rent)."<sup>13</sup> There are signs of this trend in many parts of Africa. The migrant farmers who raise yams and rice in northern Igboland could be cited as an example. The source of tenure insecurity for Igbo migrant farmers lies in the fact that their rights are not always enforceable in the local courts. This is another case where the legal system lags behind the developments in a changing economy.

The tenure implication of technological change in African agriculture is not one of access to land but rather one of how much access. The standard shorthand used by students of African tenure to convey the idea of a bundle of rights in land is to characterize the African tenure system as "communal." Lewis has distinguished three distinct senses in which the term *communal tenure* might apply.<sup>14</sup> In the first sense, the term refers to the right of several people to use the same piece of land, each on his account. Grazing rights and the right to cut thatching materials and collect firewood may be permitted to all members of the community on a holding in which one farm family has the exclusive right to grow their food and cash crops. This is the present system in Teso (Uganda), Bawku (Ghana), and Geita (Tanzania). The second, "communal use with collective management," is rare in traditional Africa. Although Africans tend to work cooperatively on such tasks as colonizing new land (e.g., the Lango in Uganda), they are basically farm-family cultivators. The group farms that are encouraged in both Uganda and Tanzania share many of the features of communal use and collective management tenure arrangements. Thirdly, there is the case where individual farm families have a right to exclusive use of particular pieces of land, but deny their right to dispose of their interests on the theory that "land belongs to the living, the dead, and the unborn" members of the lineage.

The economic impact of technological change in agriculture is to raise productivity and efficiency in farming. As long as this trend is sustained, technical change also changes the content of land tenure by reducing the number of right-holders on a piece of land. Technical change does not in any way reduce the bundle of rights in land. It not only increases the rights that can be enjoyed (by making the growing of a variety of crops

<sup>13</sup> James O. Bray, "Farm Tenancy and Productivity in Agriculture: The Case of the United States," *Food Research Institute Studies* 4, no. 1 (1963): 25-38.

<sup>14</sup> W. Arthur Lewis, *The Theory of Economic Growth* (London: Allen and Unwin, 1963), p. 121.

possible, and submarginal land arable, and through supplementary irrigation permits two or more crops to be grown in a season) but tends to concentrate these rights in one or two interest holders—the owner/occupier and the landlord and his tenant. It is irrelevant whether the landlord is a private individual or the state as long as he invests his capital and fulfills his role in the production process.

### Characteristics of the Case Studies

Our central hypothesis is that technical change tends to simplify tenure arrangements by progressive reduction of the number of right-holders in a given piece of farmland as an economy adopts many technical innovations. A preliminary analysis of data collected in recent fieldwork tends to lend support to this thesis.<sup>15</sup>

Our seven study areas lie between thirteen degrees north latitude and twenty degrees south latitude. This covers a wide range of ecological conditions, from the semiarid sudan zone of northern Katsina to the humid forest of Akim Abuakwa in Ghana's cocoa belt (see fig. 1). The mean altitude ranges from 300 to 7,000 feet, and five of the seven districts—northern Katsina, Mazabuka, Geita, Teso, and Kisii—are more than 1,500 feet above sea level. Rainfall is unimodal in northern Katsina, Bawku, Mazabuka, and Geita, but bimodal in Akim Abuakwa, Teso, and Kisii. The mean annual rainfall varies from 27 inches to 70 inches, and the number of rainy months from 4.5 to 12.

Variations in the economic achievements of the districts are as clearly marked as the variations in the environmental potentials and population pressure. About 70-90 percent of the available land in Akim Abuakwa, Teso, and Kisii is cultivable as against 60 percent in northern Katsina and Geita, and 25-50 percent in Bawku and Mazabuka. Practically all the available land in Kisii and Bawku is under cultivation, and in other districts the ratio between cultivable land and cropped land is high, about 65 percent or more. The density of population reaches 500 to 900 persons per square mile in Kisii, but ranges from 100 to 200 in Geita, Teso, Akim Abuakwa, Bawku, and northern Katsina.<sup>16</sup>

<sup>15</sup> In each field study area a three-tier approach was adopted in the process of data collection. A study commenced with visits to research stations, in order to obtain the technical background for means of increasing productivity and the scientist's appraisal of the problems of securing adoption of new techniques. In the second phase, information was sought on the means through which farm innovations were diffused to farmers and the role played by supporting institutions. This implied obtaining information on the government agricultural policy, the extension coverage, and the strength of the extension staff on the ground, staff training facilities, the extension approach, marketing facilities for cash and food crops, cooperative societies, the availability of inputs and credit, and the provision of subsidies. The third and last phase involved interviewing a sample of farmers. This took the greatest part of the study time. Generally a total of sixty farmers was interviewed in each district, except Kisii, where the striking differences in ecology, current agricultural potential, and achievement between Kisii highlands and Kisii lowlands made it desirable to take two samples of sixty farmers each. In Teso, Kisii, and Mazabuka districts, where the concept of "progressive," "improved," or "master" farmer is used by the extension staff, our sample was stratified into "progressive farmer" and "the neighbor," the ratio being 1 to 3.

<sup>16</sup> Population data is based on the most recent population census in each country. Wherever possible, this is supplemented with the most recent estimates for the district.

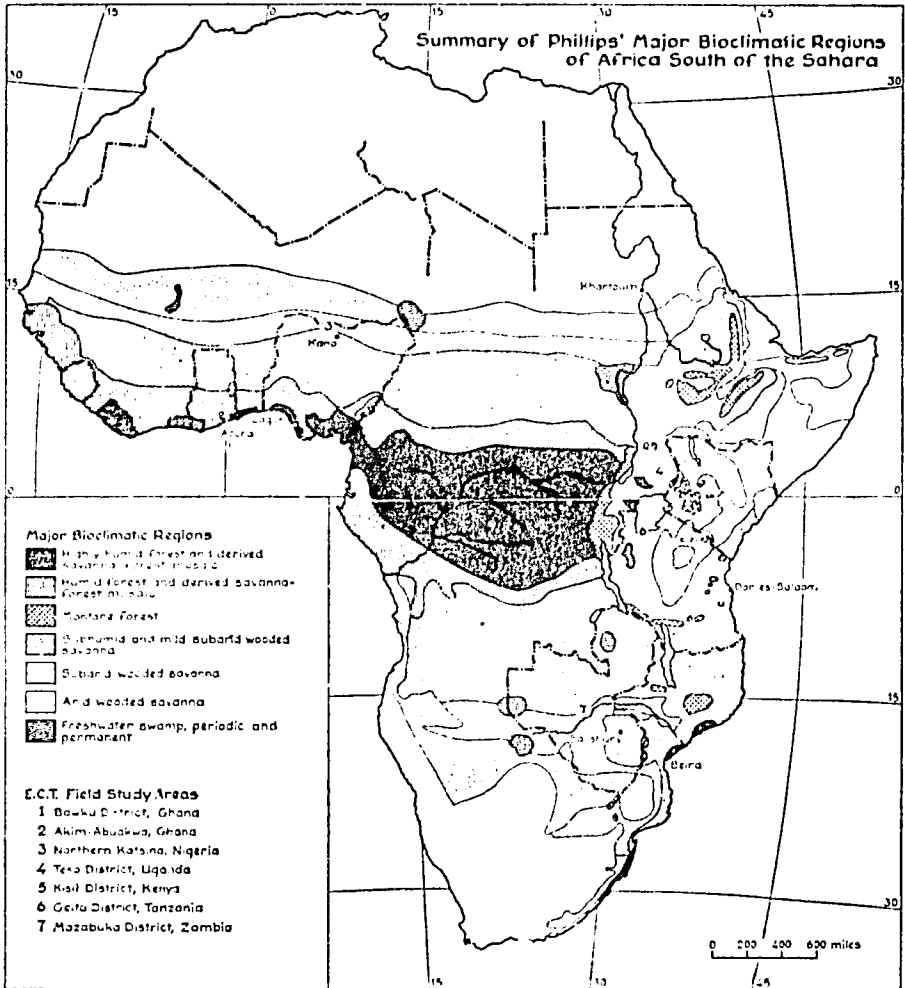


Figure 1

Farm sizes vary: 20 to 30 acres in Akim Abuakwa, Geita, and Teso; 8 to 10 acres in Kisii, northern Katsina, and Bawku; and over 16 acres in Mazabuka. Kisii and Geita have no land fragmentation problems, but in northern Katsina, Bawku, and Akim Abuakwa there are from 3 to 4.5 fragments per holding, and in Mazabuka and Teso, 1 to 2 fragments.

Millet and sorghum are the chief staples in northern Katsina, Bawku, and Teso. Maize has virtually replaced millet and sorghum as co-staples in Mazabuka and Kisii.<sup>17</sup> Maize and cassava are the co-staples in Geita as cocoyam and plantain are in Akim Abuakwa. The most important source of farm cash income in northern Katsina and Bawku is groundnuts; in Geita

<sup>17</sup> For the purpose of this paper, *staple foods* are defined as the major starchy cereals, roots, and tubers which are generally consumed in the centers of production. The term *co-staples* refers to two or more such starchy foods which are equally dominant in the diets of a given area or region.

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and Teso it is cotton; and in Akim Abuakwa and Mazabuka, cocoa and maize, respectively. Kisii has a more diversified economy with coffee, tea, pyrethrum, and maize as sources of cash income.

The Kisii (Gusii) economy probably presents our best illustration of the simplification process of tenure arrangements in response to technical innovations. Technical change in Kisii agriculture started about 1930 during which period the extension service of the Department of Agriculture laid emphasis on soil conservation, almost as an end in itself. This had little visible result in economic terms. The enclosure movement which started in the 1940s tended to restrict random grazing of cattle, but the real achievements came in the 1950s when high-value cash crops were introduced: pyrethrum in 1952, tea in 1957, exotic cattle and synthetic maize in 1963, and hybrid maize in 1964. The introduction of grade cattle prompted farmers to ensure that enclosures were stock proof, and the tree crops (tea and coffee) made interests in individual holdings quite exclusive. Especially in the Kisii highland, the specificity of interests in land has gone so far that brothers who cultivate adjacent holdings would have individual paths leading into their respective holdings and homesteads.

The developments in Mazabuka district, Zambia, are equally striking. Important features of the changing agricultural technology in Mazabuka include the early adoption of the ox plow and the continued interest of farmers in the acquisition and use of other ox drawn implements. Although the ox plow is commonly used in other African savanna areas, the Plateau Tonga of Mazabuka district are exceptional in the extent to which they have adopted a wide range of other ox drawn implements.

Through the instrument of the government's Improved African Farmer Schemes initiated in 1947, many technical innovations were able to gain acceptance among Plateau Tonga farmers; these included communal grazing paddocks, green manuring, and crop rotation.<sup>18</sup> In the last few years such farm inputs as hybrid maize seed, fertilizers, and insecticides are regularly purchased because they are highly profitable.

The communal grazing grounds which are generally enclosed have technically created a two-field system: an unimproved permanent pasture that is subject to group rights, and an arable field that is owner occupied and increasingly highly capitalized. Although the institution of a communal grazing ground in many parishes eliminates the annoying problem of random grazing over one's arable fields, the lack of any effective enclosure around the arable fields makes it difficult to deny neighbors right-of-way through one's holding. However, the technical device of a separate grazing ground appears to be a rational accommodation to change and tradition in a changing economy. The two-field system ensures full individual rights in an arable field and guarantees communal rights to pasture for cattle owners. The selective character of the enclosure system is reflected in the content of the new tenure arrangement. Rights in the communal grazing fields remain diffuse and thus preserve the traditional norm of easy access.

<sup>18</sup> C. E. Johnson, *African Farming Improvement in the Plateau Tonga Maize Areas of Northern Rhodesia*, Agricultural Bulletin no. 11 (Lusaka: Department of Agriculture, 1956), and A. M. Morgan Rees, *An Economic Survey of Plateau Tonga Improved Farmers*, Agricultural Bulletin no. 14 (Lusaka: Department of Agriculture, 1958).

However, rights in the arable fields are highly specific and are becoming easily vendable, whatever the legal code and the local courts might say.

Changes in economic environment have brought about individualization of tenure in other areas studied. In the Akim Abuakwa area, the growing of cocoa, a permanent tree crop, contradicted the principle of communal ownership of land. In this and other districts like Bawku, northern Katsina, Geita, and Teso, the kind and the level of agricultural technology in use has not resulted in the total elimination of secondary right-holders from an individually owned farm.

A few examples illustrate this. Technical change in Teso agriculture has been highly selective and the cumulative impact has been limited. Cotton and ox plow were introduced in the first decade of this century.<sup>19</sup> Following these successful innovations, strip farming was encouraged to deal with the problems posed by erosion. But enclosure has been lacking in an economy where cattle are quite important and highly valued socially as symbols of wealth and the only acceptable items for bridewealth payment. The lack of enclosure is a major limiting factor in achieving a high degree of specificity of tenure.

In Geita, Tanzania, the beginnings of an enclosure movement are visible, but there is no effective extension support for this. In Bawku, serious land hunger, in an ecologically marginal area where the cost of improved pasture is prohibitive, frustrates the trend toward the reduction of multiple rights in a holding. In Akim Abuakwa, a cocoa farming area in southeastern Ghana, individual interests have been fully attained on cocoa farms but not on farms devoted to food crops. It appears from these cases that certain technological changes in agriculture—tree crops, enclosures, and innovations involving high capital investment like grade cattle—tend to bring about the reduction of multiple rights in land faster than other innovations.

### Summary

Agricultural technology tends to change the content of a given land tenure. As African farmers increasingly apply modern agricultural technologies to farming, the basic issue in tenure will tend to shift from one of easy access to a question of how much access to land. The tradition of multiple interests that many Africans enjoy on the same piece of land remains a major obstacle to the adoption of technical innovations. The hypothesis tested here is that there tends to be a progressive reduction of right-holders in the tenure system as an agricultural economy adopts many technological innovations into its farming system. The policy implication is that agents of technical change must be increasingly aware of the tenure implications of some agricultural innovations which they promote among farmers who still enjoy multiple rights in land. Adapting technical innovations to the ecology of the land tenure system (i.e., the relationship between the land tenure system and the physical and sociocultural environment) is a major task which agents of technical change can no longer ignore.

<sup>19</sup> J. D. Tothill, ed., *Agriculture in Uganda* (Oxford: Oxford University Press, 1940), pp. 54-59; see also *Teso District Book* (Soroti: Department of Agriculture, n.d.).