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AGRICULTURAL CHANGE IN NORTHERN RHODESIA/ZAMBIA: 1945-1965†

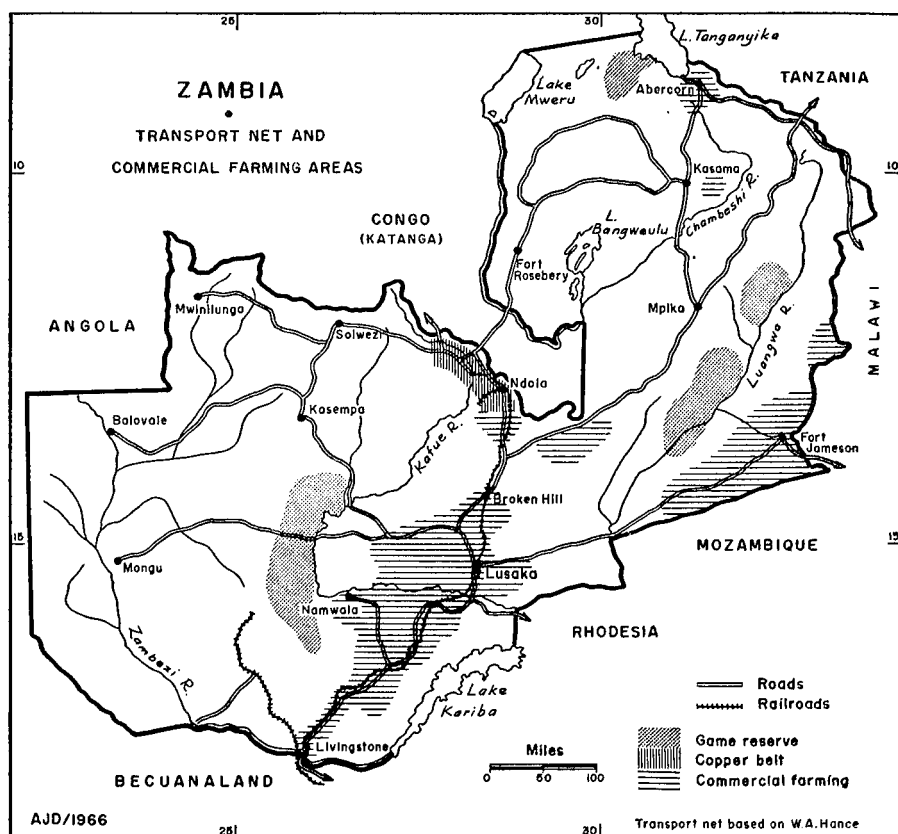
I. BACKGROUND

Zambia is a landlocked country of some 290,000 square miles in central Africa, with a population of about 3.5 million. Its boundaries abut on Bechuanaland, Rhodesia, and Moçambique to the south, Malawi and Tanzania to the east and northeast, the Congo in the north, and Angola to the west. Major rivers are the Zambezi, which flows through the flood plains of the Barotse Province and along the Rhodesian border, filling the huge Kariba lake and providing hydroelectric power for both Zambia and Rhodesia, the Kafue flowing through the middle of the country, the Luangwa in the east, and the Chambeshi in the north (Map 1).

The spread of good agricultural soils is limited, mainly comprising the larger tracts of fertile upper valley soils lying in the Kafue basin of the Central and Southern provinces, with westward extensions, and the valley areas of river tributaries feeding the Luangwa in the east. It is in these areas that commercial farming has developed. The extensive areas of Kalahari sands in the west of the country have little fertility, but the Zambezi flood plain and some of the swamp soils support relatively heavy concentrations of population. The flood plain also carries about 200,000 head of cattle for about six months of the year, and the fringe soils are of potential value for dry season cropping. In the north and northwest, apart from the swamp areas and the alluvial pockets in the river valleys, the huge tracts of plateau soils are sandy, poor, heavily leached by the comparatively high rainfall, and generally with a low base exchange capacity. They are well wooded, however, and this enables them to support a sparse population practicing shifting cultivation based on the lopping and burning of the trees. These areas present a highly difficult agricultural problem.

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MAP 1

Mean annual rainfall shows a steady decrease from north to south, ranging from 56 to 64 inches in the north and between 24 and 32 inches in the south. It is of course sharply seasonal, being concentrated mainly in the period from late October to March in the south and a somewhat longer period in the north. Rainfall coincides with the summer period and the length of the growing season varies from an average of about 130 days in the south to 170 days in the north. Temperatures range from minima of about 40 to 50 degrees (F) in the cool season to maxima of 80 to 90 degrees during the hot season.

The difficulty and cost of transport has been a constant brake on the country's development. The railway, jointly owned by the Zambia and Rhodesia governments, runs through the middle of the country and links up with the Congo rail system, but there is no rail network. There are over 20,000 miles of public roadways, but less than 1,000 miles is tarred, about 3,000 miles is graveled, some 5,000 miles of earth roads are maintained by mechanical equipment, and the rest are serviced by hand labor. External rail traffic has so far been almost entirely to or through Rhodesia on the common railway linking up with the rail system of South Africa and with the Moçambique railways through to the ports at Beira and Lourenço Marques. Overseas imports and exports carry the heavy costs of

overland haulage over about 1,500 miles of rail, and shipment to and from areas remote from the railway adds to the transport bill.

The recent history of the country dates from the explorations of Livingstone in the middle of the nineteenth century. He first sighted the magnificent spectacle of the Victoria Falls in 1855, and it was on a later journey, in 1873, that he died from malaria and dysentery in the swampy country just south of Lake Bangweulu. Trading companies began to push into the country from the south and east towards the end of the century and by 1900 the whole territory had been included in general terms in the charter granted to the British South Africa Company founded by Cecil John Rhodes. This company administered the territory, subject to powers reserved to the Crown, until 1924, when the British government took over direct administration. The administrative pattern was modified when the Federation of Rhodesia and Nyasaland (Southern and Northern Rhodesia and Nyasaland) was established at the end of 1953, with the federal government assuming major responsibilities in certain fields. However, opposition to the federal system and pressure for independence mounted over the next decade, and the Federation was dissolved at the end of 1963 and the new Republic of Zambia was created in 1964.

Copper is the basis of the Zambia economy. The Copperbelt, about ninety miles long, is estimated to contain over a fifth of the known world reserves of recoverable copper, and production accounts for about 15 per cent of non-Communist world supplies. Out of a total of just over a quarter of a million people in paid employment about one fifth are at work in the copper industry. Most of the copper deposits had been discovered by 1910 but development was slow until the late twenties, and the mines were hit by the world depression a few years later. Continuing expansion was threatened again by the fall in world copper prices in 1957, but joint action was taken by a group of world producers, including those operating in Northern Rhodesia, to stabilize supplies. The market recovered and by 1961 copper exports amounted to over £100 million in export value and accounted for more than half the value of all goods and services produced and sold for cash.

As a result of the development of the mining industry, the Copperbelt is highly urbanized, with more than half of all domestic manufacturing establishments located in the area. The striking contrast between life in the towns along the line of rail and that in the vast rural areas, where the greater part of the population is dependent on subsistence production and shifting cultivation still has to play a large part, provides a constant pull towards the towns. It is estimated that about 40 per cent of the able-bodied males are absent from the rural areas at any one time, working or seeking employment in the towns, with the absentee rate rising as high as 60 per cent in large parts of the Northern Province. This position has been a cause of longstanding government concern, partly because of the unemployment it has created and partly because it has been associated with a relatively slow rate of development in the rural areas. It has also been largely responsible for a continuous series of rural development plans, studding the last twenty years. These development plans probably offer the best means of following the motivation and progress of agricultural change in Zambia and have been used for that purpose in this monograph.

II. BEGINNINGS OF PROGRESS

Settlement and Agricultural Services

Two aspects of European activity have strongly influenced the progress of African agriculture in Northern Rhodesia: (1) the settlement of European farmers who both pioneered production for market and supplied the initial impetus for the provision of government services to agriculture, and (2) the growth of the copper mining industry within the country and within the neighboring Katanga Province of the Belgian Congo, which provided markets for much of the output in the early stages. The early farming settlers established themselves where market opportunities existed. Generally, they followed the construction of the railway, which was brought northwards from the border with Southern Rhodesia at Livingstone during the first decade of the century.

It is recorded that over a hundred permits for land occupation had been taken out in the districts along the line of rail by 1914, with the settlers mainly engaged in trading and in the production of maize and beef for the Katanga mining areas. Settlement was also taking place some 300 miles from the railway, at Fort Jameson near the eastern boundary of Nyasaland (now Malawi), where cattle raising and trading flourished until halted by disease. Cotton was cultivated in the vicinity of Fort Jameson until it too failed as a result of uncontrolled diseases and pests. Flue-cured tobacco then provided the main support of the settler community of that area until the price slump in 1929 led to the departure of more than half of the settlers. Government assistance managed to keep about sixty of them going during the difficult period prior to the outbreak of the Second World War. In the meantime the number of settlers along the line of rail had grown to about 300 by 1926; these farmers were mainly engaged in producing maize and cattle for the local market and for export to the Congo. Maize was the farming mainstay from the outset. It was, of course, the staple food of the African labor force and it was to be the crop through which African producers made a slow entry into the market economy. The relative importance of maize in the middle twenties is shown in the following summary of European crop acreage in 1925 (23):

	Acres	Per cent
Maize	35,600	60
Cotton	16,700	28
Virginia tobacco	4,300	7
Wheat	2,600	5
Groundnuts	200	—
Total	59,400	100

The amount of maize brought to market by African producers was increasing and there was a growing use of ploughs among African cultivators. Some instruction in agricultural practices was being undertaken by the mission stations, and the training of African demonstrators was part of the program of the Department of Agriculture. The first agricultural station was being built and the staff of the Department consisted of an administrator and six professional officers.

Growth in the market sector of agriculture went on at a healthy rate through

the early and middle twenties. The maize acreage, a reliable indicator, went up by 60 per cent between 1920 and 1930, but the supply was falling short of demand and former heavy exports to the Congo were now overweighted by imports, largely as a result of rapid mining development. With cattle the position was similar: exports to the Congo had grown to 5,600 head in 1925, but they declined after 1927 and by 1930 they had dwindled to about 800 head. Cotton was abandoned as a commercial crop in the latter part of this period and the market for tobacco was depressed, but these setbacks were offset by internal expansion. In 1929 Britain made available £160,000 in loan funds for agricultural development to meet increasing market demands. The missions, assisted by government grants, were engaging technical agriculturists. The Department of Agriculture was undertaking investigations into conservation methods, pest and disease problems, and plant breeding, and a new research laboratory was opened in 1929.

The world trade depression at the beginning of the thirties brought an end to this period of expansion. The quota agreement for copper led to the closing of all but two of the mines and as similar conditions existed in the Congo, former concern with ability to keep abreast of expanding demand was displaced by anxiety caused by shrinking markets. In 1931 an agricultural adviser was brought in to report on the position of the industry and the necessity or otherwise of encouraging further European settlement in agricultural areas (1). In a manner which became a familiar feature of later enquiries into agricultural prospects in developing countries, his report listed the agricultural imports in terms of quantities and values and proceeded to assess the scope for expansion in the light of the suitability or otherwise of production conditions. The net value of the balance of agricultural imports over exports at this time was only about £100,000 so the scope for import substitution was distinctly limited.

In a study of commodity prospects, the report stressed the importance of maize but suggested that the best available land had been taken up and it would be unwise to advocate production on inferior soils. Cotton had failed as a cash crop for European farmers, but it was thought that there were "possibilities for cotton in the native areas where there is plenty of labor to destroy the insect enemies" and where it might become valuable as a soil renovator in African systems of shifting cultivation. Beef supplies were badly balanced, with room for increased production of slaughter stock, but the capital requirement for ranching restricted that line of development. Thus with meager prospects for local and export markets, the adviser was unable to recommend increased settlement.

The commercial setback to European farming activities in the early thirties was accompanied by a reduction in government services, and the small research station was closed in 1935. The overall effect on agricultural production may be illustrated by a few maize statistics. The average area under maize from 1920 to 1925 was 33,000 acres. Over the next five years it expanded to 42,000 acres, touching 47,000 in 1930, but by 1935 it was back at 40,000 acres and the annual report of the Department of Agriculture for that year suggested that it might be wise if it was restricted to 37,000 acres until there was a marked expansion in internal demand. Yields had increased from an average of 4.6 bags an acre over the period 1919-30 to an average of 5.2 bags over the last five years, the territory was self-sup-

porting in a normal year and the Department was concerned with the possibility of uneconomic export.¹

Maize dominated the agricultural economy. Out of a total cash return on marketed crops amounting to £102,000 in 1934, maize contributed £80,000. Export prospects were poor and European producers were alarmed at the growth of competition from African areas. A committee set up by the Agricultural Advisory Board, which put forward recommendations for maize marketing control, remarked on the profound change in native agriculture along the railway belt brought about by the opening up of the markets, the segregation of natives into the reserves, and the adoption of the plough (2). It stated that "traditional methods on traditional soils are being abandoned in favor of what is usually but a parody of European farming at its worst." It suggested that African production was increasing at the cost of natural resources but in such a manner that competition would nearly eliminate the European maize grower. In fact, African marketed maize had gone up from about 30,000 bags to 50,000 since 1930, and with European production at about 170,000 there was strong likelihood of oversupply in good seasons.

Faced with the prospect of sagging internal prices and uneconomic export markets, the Committee recommended a system of market control designed to maintain the internal price level and to provide for quotas in the internal market. The Committee thought price maintenance was justified in that "it should be obligatory on the consumer to pay a price adequate to cover cost of production and a fair profit, but not to subsidise exports." So the concept of managed prices linked to cost of production was introduced, starting a long and widening trail of repercussions in the agricultural economy.

The quota method to be adopted was relatively simple. All maize brought to market was to be sold to a Maize Board. The Board would sell the maize at a predetermined price internally and for what it would fetch on export markets if there was a surplus above domestic requirements. The proceeds of the two categories of sales would be accounted for in separate local and export pools. One fourth of the maize sold internally would be deemed to have been sold on behalf of African producers and the remaining three fourths would be credited to the European growers (these being roughly the proportions in which maize was coming to market at that time). European growers would get individual quotas on the local market out of their joint share of the local pool but this was impractical in regard to African growers, who would in effect get an averaged price based on the joint realization of their share in the local and export pools. In order to make this latter part of the system effective, a stabilization fund was to be set up out of the proceeds of the African maize, a factor of some importance as this not only resulted in lowering the price to African producers but also served to establish funds to be used at a later stage for financing conservation measures in the African maize areas.

The findings of the Committee led to the setting up of a Maize Control Board in 1936. Probably in part as a result of the attention focused on African agriculture this sector began to get a better share of the slender development resources

¹ Bags of 200 pounds of shelled maize.

available and the beginnings of an extension service were initiated. Thus about £1,500 was allocated for various projects in African agriculture in 1938, including funds for an agricultural station, for tobacco experiments, beeswax production, and a scheme aimed at some measure of control of the system of shifting cultivation known as "chitemene."

The Chitemene System

Attention had been drawn to the forest denudation from the practice of chitemene by U. J. Moffat, in a description of African agriculture in the Abercorn District of the Northern Province, which appeared in the report of the Department of Agriculture in 1932. He wrote:

this system of agriculture is practised by the natives throughout the plateau from Abercorn down to the railway line. Every year thousands of acres of trees are cut down to supply the branches for making gardens. The following figures . . . may be quoted as an example. This area is approximately 12,000 square miles in extent and during 1931-32 there were 1,346 "chitemene" gardens. Over 21 square miles of forest was cut in order to make these gardens. This is an annual operation.

The chitemene system was practiced in various forms in regions of soil poverty and was thus widely prevalent in the northern areas of the country. It consisted in lopping the trees, piling and burning the loppings, and sowing the main grain crop in the ashes. Peters gave a full description of this practice as he found it in the Serenje Plateau region in 1946 in an area of nearly 6,000 square miles with an estimated population of 42,000 at a density of about seven persons per square mile (3). The practice in this region, with small circle burning, was more destructive of woodland than that followed further north. The staple crop was finger millet (*Eleusine corocana*). Trees were cut at breast height and the branches piled in circles about 19 feet in diameter after drying. Just prior to the rains the heaps were fired and the millet was sown broadcast in the ashes. Peters estimated that on fully regenerated woodland the average family of about six persons would cut 12 acres of woodland each year, but this might vary considerably and he cited the example of one man who cut 20 acres from trees of ten years regrowth to make a garden of less than a quarter of an acre, with the actual area planted to millet only 0.15 acre, less than one per cent of the woodland cut. Full regeneration of the woodland after cutting takes about 35 years, and since fertility is exhausted by one year's cropping the tendency is to cut at shorter intervals, with the necessity to cut a bigger area in consequence. At the time of the survey 75 per cent of the cuttings were trees not fully regenerated, with an average regrowth of only 17 years.

No cultivation is undertaken in this system, with the crop broadcast on the ashes in December and left until harvested from April to June. Grain yields are relatively good. Peters gave an average of 2,840 pounds of grain per acre off the burned area but this was probably high; averages of 1,200 to 1,800 pounds were recorded elsewhere. The diet of the chitemene cultivators is supplemented by a variety of crops grown in small supplementary gardens on the better soil patches under hoe cultivation.

The advantages of the system are that it allows of the use of soils otherwise unfit for cultivation, and gives reasonable certainty of a good yield. The overall labor requirement is low and confined to the cool weather season which contributes in large degree to the support of the population. Soil erosion is not a serious factor and with a low and stable population the system was well suited to the conditions and the times. However, the problem to which Moffat drew attention in 1932 was a matter of growing concern through the later part of that decade and no doubt would have received much closer consideration towards the end of the period, despite the preoccupation of the authorities with European agriculture, but for the stringencies imposed first by the general depression and later by the Second World War.

African Collaboration

As attention was turning more and more to the needs of the African areas the task of getting more collaboration between the people and the departments involved in work in the rural areas became increasingly important and the Native Development Board was set up in 1938 to forward that aim. It was given powers to allocate grants to native treasuries to enable them to carry out schemes for permanent improvements, and also to technical departments for schemes initiated by them in collaboration with the native authorities. Major schemes were regarded as matters of direct government responsibility and the Board concerned itself with the planning and coordination of such projects as were formerly undertaken on an ad hoc basis, or which had failed to materialize for lack of co-ordination.

This effort to involve the people in the work of improvement arose in part out of the need to overcome a degree of apathy and disinterest which was fairly common and in part to get over occasional resistance to development measures which was at times abetted by the native authorities. The Board did excellent work in the next few years and provided much of the inspiration for the rural development aspects of the ten-year plan tabled in 1945.

Government Agricultural Aims and Policy

It is perhaps appropriate to sum up the aims and policy of the Department of Agriculture towards the end of this period by referring to its annual report for 1939 which was prepared before the war again checked the growth of the Department's activities. The encouragement of European farming was still placed first, followed by the aim to raise the standard of living of the indigenous population. With echoes of Milligan, the report remarked that the extent of European settlement was governed by the internal demand for produce and by the very limited export possibilities. Hence the main problems of the European farmers were more economic than agronomic in character, and in recent years the Department had largely confined its assistance to the promotion of more orderly marketing and to the development of export crops. It noted that the raising of the standard of living of the indigenous population was an urgent problem and that the production of cash crops by Africans had a special importance in relation to the drift of adult males away from the villages. The following broad objectives were enunciated:

1. To provide an agricultural and advisory crop improvement service and to this end to conduct such experiments as are necessary.
2. To raise the general standard of living of the indigenous population through the improvement of nutrition and, where possible, through the development of cash crops and, concurrently, to take steps to see that increased production would not lead to soil deterioration.
3. To promote the orderly marketing of established crops, to provide marketing arrangements during the interim between experimental production and commercial production of new crops, and thereafter to safeguard the interests of producers when such crops were bought commercially.

Although the reports at the time laid a good deal of emphasis on development it is probably true to say that just prior to the Second World War the Department of Agriculture was only just beginning to advance beyond the stage of a service department for European agriculture.

Perhaps the best index of agricultural progress from 1920 to 1940 is that of maize production for market which shows both the growth of European agriculture and the rapid increase of African participation in the market economy. The gain in maize yields on European farms over this period also gives a rough measure of technical improvement in that sector. Both measures are shown in the tabulation below (from 23 with adjustments) :

	1920-25	1935-40
Maize marketed (1000 bags)		
European	95	206
African	15	152
Average yield (bags per acre)		
European	4.1	6.6

The average sales for 1935-40 in the foregoing table tend to mask the position in which production reached a peak in the middle thirties and then fell away, in part due to poor seasons and in part to the relatively low prices at the time the Maize Control Board was set up.

III. DEVELOPMENT FROM 1945 TO 1960

The Position in 1945

By 1945 maize production was recovering from the checks of a few years earlier, the government guaranteed price of 16/- a bag was 50 per cent greater than that of 1940, the season was good for the second year in succession, and about 475,000 bags came to market. Of this just over 40 per cent was African grown, providing some justification for the fears of the European farming community prior to the inception of maize control ten years earlier. In addition to the maize crop, about 25,000 bags of wheat, 3 million pounds of Virginia flue-cured tobacco, and one million pounds of Turkish were brought to market, almost all from European farms. Cotton growing had been revived in the African areas and 275 growers marketed 43,000 pounds of seed cotton in 1946. There were also 625 African growers of Burley tobacco, who produced 77,000 pounds of leaf off 273 acres.

The government agricultural service consisted of 20 Europeans with profes-

sional or technical qualifications and between 100 and 150 African fieldsmen, ranging from capitães without formal training to rural assistants who had taken a two-year training course in agriculture. There was no research establishment and whereas the service had formerly been focused on European agriculture, a swing of policy since the middle thirties had now resulted in a complete reversal; and in 1945, with the exception of one agricultural officer and a specialist tobacco adviser, the whole of the resources of the Department of Agriculture was directed to work in the field of African agriculture.

The sketchy agricultural force was operating from eight small stations in four of the seven provinces and much the greater part of the effort was concerned with reclamation and conservation. It was estimated that at the beginning of the war an area of some 1,500 square miles of the maize belt in the African areas of the Southern Province was rapidly degenerating through overpopulation and misuse, and the work of the Department was directed to the task of checking the erosion on the cultivated land, together with the introduction of a permanent system of agriculture based on rotational cropping with the use of manure. Contour ridges and contour grass strips were the chief methods of soil protection, and over the period 1940-45 some 50,000 acres of cultivated land had been protected in the Southern Province, involving over 1,000 miles of contour ridges and nearly 200 miles of grass strips. The reclamation work was largely paid for out of the accumulated funds in the native maize pool, which also helped to finance the demarcation of grazing areas, the upkeep and extension of roads, and the building and maintenance of earth dams.

In the Eastern Province the problem of increasing overpopulation in some areas in relation to traditional land use systems was being tackled by resettlement. Between 1942 and 1946 the planned resettlement of 318 villages had been carried through. All cultivated land in the resettled areas was protected by contour ridges or contour grass strips, with the work being undertaken by the villagers, first as a condition of occupation and after 1946 by compulsory orders from the native authorities.

Resettlement was also the main task undertaken in the Western Province, where 120 villages were moved between 1943 and 1946. The conservation of the cultivated lands was supplemented by protection of the headwaters of streams, springs, margins of watercourses, and steep slopes. Four small irrigation schemes, served by dams and gravity flow channels were constructed in 1946 with the object of supplementing the vegetable supplies to the Copperbelt, and a regular lorry service was initiated.

Trapnell's work on the ecology and farming systems of northeastern Rhodesia, published in 1943, had done much to draw attention to the problems in that part of the territory (4), and in the Northern Province the emphasis was on chitemene control. The safe carrying capacity of the Serenje Plateau under the chitemene system and taking submarginal land into account, was estimated to average about four persons to the square mile; but according to Peters the available area of just over 5,700 square miles held a population of over 42,000, giving a mean density of 7.3 persons per square mile. In some districts the density was as high as 17 persons per square mile and the land resources were rapidly deteriorating, with about half the area of woodland gardens cut after an average

of only 11 years' regeneration. This had led to a reduction in the garden area (*i.e.*, the area actually cropped) from about 10 per cent of the area cut to about 4 per cent with unfavorable changes in the character of the regrowth. Millet yields were declining and the need to increase the yields from the subsidiary (unburnt) village gardens on the better soil pockets, and to institute some control in the system of burning, was becoming increasingly urgent.

Control of the chitemene system consisted in spreading the villages to take in both old chitemene and new woodland areas, with each village to have access to 15 annual cutting blocks. Regenerated blocks were protected by singeing (early burning). Dug gardens were encouraged to provide for the increasing population, and these were contoured. The control area covered 3,000 square miles in 1946, containing 238 villages with a total population of about 22,000.

Background to Postwar Development Planning

The national planning framework.—In early 1945 the Provincial Commissioners in Northern Rhodesia were issued copies of a Colonial Office statement on colonial development and welfare together with a memorandum on African development planning in Northern Rhodesia and were asked to arrange for the preparation of district and provincial development plans. In what was to be the first major effort at long-term planning on a national scale, they were required to consult with Africans, missionaries, and other "non-officials" as well as with the appropriate government technical officers. It seems that the Commissioners had tried to make the most of a unique opportunity. When the coordinated plans were submitted to the government at the end of the year, they represented a total program that would have entailed costs far beyond the territory's resources.

A second approach was then made in late 1944, when a Joint Development Adviser to Northern Rhodesia and Nyasaland came to the Territory to advise on the general principles on which planning should be based. Working with a subcommittee of the Native Development Board, he presented a report at the beginning of 1945 and as a result the heads of the social and economic services departments were asked to draw up departmental plans and estimates to cover a ten-year period (5). The program included health services, African education, forestry, livestock industry, game and tsetse control, and communications and other services. It was based on the concept that economic and social stability must be founded on agricultural betterment. The expanding mining industry drew an increasing proportion of the able-bodied men to the Copperbelt, resulting in a tendency toward economic and social stagnation in the villages, and the government faced the task of trying to create a rural environment conducive to progress. This involved not merely agricultural improvement, but also measures to provide the facilities and services necessary for the beginnings of progressive community development. Although the mining industry was in large measure responsible for the backward conditions in the rural areas, it provided the bulk of the funds which could be used to remedy the position.

The Territory was now envisaged as consisting of a highly industrialized mining sector, a prosperous railway belt, and the remainder of the country at a stage bordering on stagnation, but with the plan for general rural development, in conjunction with the specific proposals for agriculture, aimed at vitalizing the

rural areas. The coordination of departmental activities was a function of the provincial administration, operating through the district officers throughout each provincial area. Obviously, development on a major scale would increase the work of the administrative staff very considerably, and it was felt to be too much to expect them to cope also with the wide range of additional tasks likely to arise in the new program.

Recognizing that balanced development would consist of an upward flow of ideas from the rural areas through the native authorities to government and a complementary flow of services from the government to village Africans, it was appreciated that the critical point at which failure or success would probably be determined was the point of contact between the government and the developing African. Therefore, to make good use of personnel experienced in communication with rural Africans, it was decided that carefully selected district officers should be seconded as full-time development officers.

The district development officers were to work in conjunction with a provincial team consisting of the senior members of each department (agriculture, health, education, etc.) in the province and a Development Authority was to be set up at national level, responsible to government for the allocation of funds. Its powers were to include a limited authority to issue instructions to any government department in regard to priority between different projects.

For the purposes of this part of the overall plan the Territory was to be divided into ten "development areas" selected on the basis of tribal affinities within the framework of the ecological survey. Development districts would be selected within each development area, and at first development would be largely concentrated in the chosen district. This would then become a demonstration district for the area as a whole and thereafter, with the approval of the provincial team, the development officers would move into other districts in the development area.

Five "development centers" were originally programmed to operate as part of the scheme but this was cut back to one at the initial pruning, with provision for a second at a later stage. The centers were for the purpose of giving practical training to the large number of Africans who would be required as the plan was implemented, and the original intention was to have one center in each of five of the development areas. Staff at each center would include two medical officers, an agricultural officer, and a health officer, and it was hoped that two mission representatives would be attached to it also. It was planned that each center should send out trained teams consisting of a teacher, a dispensary assistant, a sanitary assistant, and an agricultural fieldsman. The teams were expected to have a sound practical knowledge of simple preventive and curative medicine, of village welfare, and of development of the basic rural economy, including correct land utilization, animal management, and intelligent reporting of outbreaks of disease. In view of the resources available, and in particular of the human resources, the aim was high.

The likeness of this important aspect of the plan to community development planning is readily apparent and it was demonstrated not only by the wide range of communal activities it was proposed to generate and coordinate, but also by

the principles that were to govern its operation. A relevant passage in the official outline of the plan is worth quoting:

The provision of social and economic services is merely a question of adequate funds and staff. Even if by administrative skill the African population is persuaded to make full use of the services provided, development would still be one-sided. We should have fixed more firmly in the African's mind the idea already far too prevalent; that progress comes from Government alone and not from his own efforts. This is a fatal error. It must be established at the beginning of the programme that the African must progress on his own feet and will not be carried by Government. When any tribe or social unit is prepared to make strenuous efforts to improve itself the entire Government organisation should be available to help it, but nothing should be done for the people which they are capable of doing for themselves.

The importance of the rural development proposals lay in their awareness of the nature of the problems to be tackled and the basic soundness of the methods to be employed, much of which was due to the wide background of local knowledge and experience in which the plans were rooted. In the light of hindsight it is obvious that even after pruning the plans were still very ambitious, as many less well-founded plans have proved to be since. In the event, the community development program was reduced almost to the status of a pilot project before it was adopted. Plans for a broadcasting service for Africans, for a Central African Film Unit at a cost of £1 million, and for an expanded research program of The Rhodes Livingstone Institute were not included in the ten-year scheme as they were to be met from Colonial Development and Welfare Fund allocations.

Planning for agriculture.—The influence of the broad approach to African rural development planning was strongly evident in the program put forward by the Director of Agriculture, C. J. Lewin (6). The agricultural plan was focused on producers instead of on production, with no reference to commodity targets, self-sufficiency, or the need to export. It dealt first with the problems of African agriculture and much the greater weight of the proposals was concerned with that sector. No doubt the approach and emphasis were in part also the natural consequence of Lewin's professional background and they gave an authoritative basis for his proposals. As he pointed out in his introduction, "With all its deficiencies, the department, thanks to the Ecological and subsequent complementary surveys, has an unrivalled knowledge of the broad territorial pattern of soils, vegetation, and traditional systems and problems. This pattern forms the logical basis for development plans."

Lewin's brief description of the policy of his department and of certain of the difficulties holding up progress is worth quoting in full because of the choice it suggested between compulsion or incentives in seeking solutions for the most intractable problems of the African areas; he wrote:

In the native areas in which (with one exception) the department is at present working, the policy has been to secure, as far as possible, a redistribution and stabilisation (frequently a dilution) of population. The primary ob-

ject has been to obtain an optimum distribution of population under traditional systems and by close study of these systems to evolve and introduce gradual improvements so as to keep pace with the natural increases in population. This is a slow and unspectacular but safe policy and is, indeed, the only practicable one where stock is absent and while reliance must be placed on the voluntary adoption of improvements. Were compulsion to be introduced more rapid progress and much greater concentration of population would result, at a rate varying directly with the degree of compulsion applied. The one exception mentioned above is the maize belt of the Southern Province. Here the traditional agricultural system has broken down owing to uncontrolled use of the plough induced by ready markets for maize. A new system for this region has been devised and tested, but even though the new system would pay handsomely its voluntary adoption is proving too slow to prevent disaster. Much of the land in this, the most valuable Native area of the Territory, has been protected from erosion; but the work will be wasted if the fertility of the protected gardens is not maintained. Here departmental work is approaching a dead end. It can proceed little further until the methods worked out are imposed on the native inhabitants either directly, or indirectly by some system of graded produce prices allowing a premium for good farming methods.

The references to redistribution, concentration, and stabilization of population under traditional agricultural systems in the first part of the above passage were concerned with the chitemene areas where regrouping was part of the control system and also permitted more effective use of the slender force of agricultural officers. In this connection it was pointed out that "large inhospitable" regions would have to be neglected at first in the hope that conditions in the more favored regions could be made so attractive that there would be a voluntary movement towards them.

Lewin's fears of the approach of a large measure of stalemate in the work of the department in African areas in the absence of either compulsion or incentives marked an important stage in this field. In support of his suggestions he expressed the view that the African had no inherent desire to improve his agriculture or to rise above subsistence level, as any change in that direction would involve more labor, and he would rather conserve his energy than conserve his land. "Over much of Northern Rhodesia" wrote Lewin, "the African has ample land for his purposes and he is not, as elsewhere, forced to change his ways by necessity." The references to pressures elsewhere which were not present in Northern Rhodesia was probably inspired by events taking shape in the neighboring territory of Southern Rhodesia at that time.

In Southern Rhodesia the period of African agricultural development from about 1944 to 1960 has been described as that of "progress by compulsion" (7). The Native Production and Trade Commission set up in that country had reported in 1944 that maximum benefit from African agriculture could only be gained by compulsory planned production, with directed cropping, controlled stocking, and with the enforcement of good husbandry. In reaching that conclusion the Commission was no doubt motivated at least as much by increasing pressure on the land in the African areas arising from the Southern Rhodesia Land Apportionment Act as it was by the difficulties met with by the extension

services, but both were potent factors. Compulsory destocking of overstocked areas was already in operation, and the report set in train those moves towards stock limitation, imposed conservation, and delimitation of cultivation that were later embodied in the Native Land Husbandry Act.

Lewin was certainly well aware of the trend in the neighboring territory. Disappointed by the slow progress afforded by the methods available to him he sought not only to amplify his meager resources but to introduce a new approach. The broad choice appeared to be between progress by compulsion, as adopted in Southern Rhodesia, or the introduction of incentives. Under political conditions differing from those in the southern territory the final solution was a compromise, with elements of both.

The essence of the ten-year plan put forward by Lewin in 1945 was for a progressive and considerable increase in the extension services, with the emphasis on African agriculture and the great weight of the increase to be at field staff level. The plan made use of the ecological approach documented by Trapnell and his associates, and it was coordinated with the scheme under which area teams were to operate in the ten main natural divisions. The teams were to include the representatives of other services in addition to the agricultural staff, but the nucleus of every team would be the administrative and agricultural members. The plan stressed the importance of agriculture as the basis for general rural development.

The senior agricultural officer included in each area team was to be responsible for the general direction of the agricultural work. Agricultural supervisors, under the direction of the agricultural officer, would be in charge of experimental stations and of the extension work. Lewin envisaged that the posts of agricultural supervisors, all European, would eventually be filled by qualified Africans.

The African staff would consist of rural assistants, directly responsible to the supervisors, together with a large body of ungraded staff classed as demonstrators. The rural assistants were to be men who had passed the general education qualification of Standard VI and had two years of agricultural training. It was essential that they should be able to carry out written instructions, to convey the gist of the instructions to the ungraded staff, and to report in writing. Lewin did not attach much importance to the educational attainments of the ungraded staff if they were intelligent and responsible, and he proposed an initial training course of one year, with in-service training thereafter.

In comparison with the existing service, Lewin's staffing proposals were almost revolutionary. He reckoned that the area teams would be dealing with about 200,000 families and, starting at the point where his department made contact with the people, he suggested that one ungraded employee to each 200 families might be "rather generous staffing" but could prove inadequate if a greater degree of compulsion was applied. From this base he scaled the total staff requirement by working in the proportion of 5 demonstrators (the ungraded staff) to each rural assistant, 7 rural assistants to an agricultural supervisor, and 3 supervisors to an agricultural officer. The existing staff imbalance was obvious in a situation in which he proposed that the number of demonstrators should increase tenfold in ten years, while the rural assistants were quadrupled, the supervisors trebled, and the agricultural officers remained at the same strength. The effect

of the proposed staff expansion, in terms of numbers and costs, is indicated as follows (6):

	Approved 1945	Tenth year	Total 10 years
Staff (<i>number</i>)			
Agricultural officers	11	11	...
Agricultural supervisors	10	31	...
Rural assistants	50	200	...
Demonstrators	100	1,000	...
Expenditure (£)			
Recurrent	28,000	97,000	705,700
Capital	8,000	8,000	235,000

Set against the recommendations for an expanded extension service for the African areas, Lewin's proposals for European agriculture were relatively modest. He remarked that, until the slump, the Agricultural Department had been organized so as to deal almost exclusively with European agriculture, with little attention to the African sector, but in the years that followed this situation had been reversed, although the advisory service of agricultural officers had been available to European farmers. Lewin's new proposals were to provide for little more than moderate expansion of the existing service in this field. Staff provision was made for one full-time and two part-time agricultural officers for advisory and soil conservation duties, together with an irrigation engineer. The work at the Fort Jameson Tobacco Station and at the Lusaka Wheat Station was to be expanded and it was proposed that a tobacco adviser should be employed by the organization of tobacco planters through the aid of a government subsidy. Recurrent expenditure under this program was assessed at £8,000 per annum over the ten-year period as compared with an existing amount of £5,200, and total capital expenditure was put at £4,000.

The proposals in regard to research were kept to a minimum (with provision for one chemist, one entomologist, and one botanist) on the grounds that as agronomic problems in the two Rhodesias were similar, it would be better to aim at a common service in this field, using the balance of available funds for the direct improvement of the economic conditions of European farmers and for assistance to pastoral industry.

Agricultural Aims in the European Sector

Although the ten year plan of the middle forties was largely concerned with the rural development of the African and in particular with African agriculture, European farming got some share of attention. The number of farmer settlers was well short of a thousand, but maize marketing data (still the most reliable production index) showed that the quantity marketed had expanded from an average of about 170,000 bags over the period 1942-44 to some 240,000 bags over the period 1945-47, and was about 100,000 bags larger than the African maize contribution to market. Agricultural progress in 1945 was still largely a matter of European farming effort and the maize crop remained heavily dominant. Little progress was evident in the livestock industry, which was unable to supply the demand for livestock produce. The livestock population was reported as being relatively static for a number of years at about 650,000 head of cattle (with

less than one-fourth owned by Europeans), about 90,000 head of sheep and goats, and just under 40,000 pigs.

The competition between African and European production for the maize market continued as a live issue and the joint development adviser, G. F. Clay, suggested that it would be sound policy to encourage a reduction in one-crop maize farming, with the gradual development of more diversified agriculture (8). He thought that African and European development should be complementary, with European farmers moving away from maize in favor of livestock, including dairying to displace imports of dairy produce, irrigated wheat and vegetables and other cash crops, all of which involved knowledge, techniques, and capital not yet available to the African. He felt that the latter would expand production to provide the bulk of the maize for market, and could also supply store cattle for European farmers to fatten. They should be assisted to develop more intensive systems, involving the use of livestock and ley farming. Clay also took the line that it should be a cardinal feature of government policy that the internal food needs of the Territory would be met "as far as possible from internal production based on a reasonable return to the producer," which accounted to some extent for his emphasis on dairying and on irrigation for wheat production, neither of which was well suited to local conditions.

Complementary with the proposals for African agricultural development embodied in the ten-year plan, Clay suggested marketing machinery to stimulate production in remote areas. He pointed out that the existing policy gave rise to overproduction near railhead and consuming centers, with consequent problems of overpopulation and soil deterioration, as well as the exclusion of outlying areas from economic development. To meet these problems he put forward the remedy adopted by one developing African country after another at about that time, the averaging of marketing costs, particularly costs of transport. That system, which was in fact adopted within a limited framework a little later, had its merits, including the stimulation of organized marketing, as well as its serious demerits. It is interesting to note that in Northern Rhodesia it had its origins in part as a suggested method of checking land exploitation in areas near to market, which might have been better tackled by other means.

At this time a wartime department of Civil Supplies controlled imports, exports, and the internal distribution of a wide range of goods under emergency powers regulations. A nucleus for agricultural marketing was emerging which included the Maize Control Board, Cattle Marketing Board, Cold Storage Board, and Butter Importation Board, agencies which had been initiated mainly for regulatory purposes. Clay suggested the formation of a marketing and development corporation which would absorb the functions of the existing boards and also provide a framework within which cooperative marketing could be established on the basis of small producer cooperative societies.

A committee to advise on the development of the European farming industry had been set up to assist in formulating the ten-year plan and this body reported in 1946 (9). The three sections of the report dealt respectively with the prospects of expansion of European farming by means of new settlement, with marketing organization and price stabilization, and with export crops. The committee included the Director of Agriculture as a member and it had the benefit of Clay's memorandum as a starting point.

The report pointed out that the country was producing only 42 per cent of the internal requirement of wheat, 60 per cent of that of meat products, and as little as 16 per cent of its needs of dairy produce. It noted the dependence of the Territory on the high level of activity in the mining industry and the need for farming development as a stabilizing factor in the national economy, but suggested that the existing shortfall in agricultural produce should be regarded with caution in estimating the scope for new settlement. The prospects for new settlers as maize growers were not good since they would compete at a disadvantage with established growers, and no newcomer of moderate means could be advised to start cattle ranching because of the capital commitment involved and the relatively slow and unattractive return. New settlers should therefore aim at mixed farming, with a pronounced bias in favor of dairying and with tobacco production on favorable soils. So far the recommendations were practically identical with those of Milligan in 1931 but this committee did commit itself to endorsing a recommendation for 50 to 70 new settlers on a mixed farming basis.

The committee also endorsed a recommendation for the establishment of a Land Board to deal with applications for land, valuations and loans to new settlers, with the additional proposal that loans should be made available also to existing settlers on equally generous terms to enable them to develop their holdings. The emphasis here was on the matter of terms, as relatively substantial loans were already available to European farmers, but the committee considered that the interest rates were excessive, that the rules under which loans were made too rigid, and the maximum amounts too small. Long-term loans were available through the Loans Board up to a maximum amount of £2,000 on first mortgage for 20 years at 6 per cent, and through the two main producer cooperative societies to a maximum amount of £750 on short-term at not more than 5 per cent, out of funds provided by the government to the societies at 2.5 per cent.

The committee supported the plans for European agriculture put up by the Director of Agriculture as already outlined, with minor modifications, including the wider expansion of experimental and demonstration work and an increase in staff allocation for advisory duties. It endorsed the program for expansion of the veterinary services and in particular the proposals for research into disease causation and methods of prevention and eradication, animal husbandry research dealing with nutrition and genetics, and investigations into the improvement of management, breeding, and feeding.

In the second part of its report, dealing with marketing organization and price stabilization, the committee's recommendations to some extent resembled those concerned with community development in the main body of the ten-year plan. They embodied current thinking with respect to an approach which, although not fully realized in the years to follow, had profound effects on the direction of development in those fields. The committee felt that development plans for agriculture were unlikely to be effective unless they were accompanied by state action to ensure a safe internal market for agricultural produce at fair prices for both producers and consumers. A sound and balanced agricultural industry, in the words of the committee, "can be achieved only by means of a co-ordinated system of internal price stabilisation of farm produce based on long term estimates of supply and demand, the control of marketing, and the provision of financial assistance in whatever directions this is found to be necessary."

Since the report contained a specific recommendation that the producer prices of farm products should be linked to cost of production plus a reasonable return to the producer, the committee's interpretation of price stabilization based on long-term estimates of supply and demand seemed to call for some amplification, and this was offered. Confusing stabilized prices with fixed prices, the committee advised that stabilized price levels over a number of years would be unsatisfactory as costs seldom remained static: if they rose the margin of profit considered reasonable would shrink, resulting in hardship to producers; if they fell the profit margin would be unjustifiably wide, and the prices would bear onerously on consumers. So the committee suggested that the prices should be changed from time to time, based on cost of production figures interpreted by a trained agricultural economist, and adapted so that they would be in line with estimates of long-term trends in supply and demand. No mean task.

At the time of these recommendations the beginnings of agricultural marketing controls had been established by the setting up of the Maize Board in the maize crisis ten years earlier, the more recent but less active Cattle Marketing and Cold Storage Boards, and the wartime civil supplies regulations. Under the terms of the Maize Control Ordinance, European producers in the railway belt were compelled to surrender all maize in excess of farm requirements to the Board, and maize sold by African farmers was handled in the same way. The Board was the sole exporter and importer and it resold maize internally in lots of 15 tons to the millers. The government fixed the Board's buying and selling prices and in 1945 there was a guaranteed producer price of 16/- a bag (200 pounds net) and a Board resale price of 13/6 a bag, with the government subsidizing the annual deficit to avoid raising the cost of the basic foodstuff. Sales of maize by African to African, and all sales outside the maize belt area of control, were not regulated.

Buyers and sellers of cattle were free to negotiate between themselves. The Cattle Marketing Board had powers to protect the producer by fixing minimum prices for slaughter cattle, but in view of the shortfall in supplies maximum prices had been declared instead. Proposals to stabilize the prices of cattle on a cost of production basis had been submitted to the government and approved in principle. There was no control on methods of sale but a weight and grade basis was advocated as the best means of providing for fair prices and as a basis for marketing control. It was recognized that the system would have to be introduced alongside existing methods for practical reasons, and if it was to apply to African slaughter stock it would become necessary to organize regular sales where weighbridges could be provided and arrangements made for grading.

The production and sale of fresh milk was undertaken on a small scale near the larger towns, but although three dairy farmers were established on the Copperbelt it was reported that they were hard put to keep their stock alive, largely on account of tsetse fly. Adequate supplies of liquid milk for that area were to depend on marketing organization at a later date, with pasteurization to facilitate the transport of supplies from further south. Development in the dairy industry up to 1945 had been based mainly on cream production for butter manufacture at the cooperative creamery in Lusaka. Butterfat prices were too low, however, to promote a profitable dairy industry, and it was not until some years later that the device of stepping up the retail price of controlled imports of butter to provide a subsidy for local dairy producers was hit upon. Hence local butterfat produc-

tion had declined from a peak of about 170,000 pounds in 1936 to 44,000 pounds in 1945 in contrast with improving conditions in other branches of the farming industry. Since consumption of dairy produce was estimated at the equivalent of about 2.75 million gallons of milk annually, worth £140,000, with internal production meeting less than one sixth of the requirement, the concern of the planners with that sector of the industry is easily explained.

Although there was strong awareness of the need to seek agricultural export commodities to balance the heavy dependence of the Territory on copper, the only product with export prospects was tobacco. After its introduction in the early twenties, tobacco production had expanded until 1928 and had then slumped until there was a revival of interest at the beginning of the forties as a result of wartime demand. By 1945 the production of Virginia flue-cured tobacco had reached two million pounds annually, mainly in the Eastern Province. Turkish was also attracting attention and production along the line of rail rose from about 50,000 pounds in 1945 to over a million pounds in 1946. A Tobacco Marketing and Levy Ordinance had been passed in 1936 for the control of export tobacco but it had not been found necessary to impose restrictions under the Ordinance.

Against the foregoing general background, the advisory committee on the development of European farming made recommendations for a comprehensive system of marketing and price control for agricultural produce under a central marketing authority. It suggested that the authority should assume general direction of all marketing of specified agricultural produce, including purchase, importation, collection, storage, processing, distribution, sale, and export. It was to have powers to specify produce, to declare areas of control, to fix prices (subject to government approval), and to take over the direction of the existing marketing boards.

These specific proposals, concerned as they were with the representations of the European farming community, were not incorporated in the ten-year plan, but they were a milestone in the adoption of the principle of a managed agricultural economy, with state responsibility not only for the overall welfare of the industry, but also for the well-being of its several branches. It is likely that three factors contributed materially to the prevailing climate of opinion: the success of the system of maize marketing control in safeguarding the interests of European maize producers, the familiarity with control systems acquired during the war, and a growing appreciation by the farming community of the advantages to be gained by managed price systems.

Initial financial implications of the ten-year plan.—Two aspects closely related to the agricultural plan were the proposal of the Native Development Board for five development centers for the main purpose of training Africans for work in the various departments engaged in the plan, and the proposed allocation of £500,000 to be spent at the rate of £50,000 a year for the initiation of secondary industries and the expansion of agricultural production and marketing by a marketing and development corporation. The proposed development centers met with strong opposition and the provision was cut back from five centers to one (with provision for a second at a later stage) before the estimates were finally considered, a move which strongly militated against Lewin's plan for a considerable expansion of the agricultural field services. The proposal for a marketing and development corporation was also defeated.

When the overall plan came up for approval in 1946 it was against the background of current ordinary estimates of national expenditure amounting to £2.7 million whereas the increased commitment was expected to involve £650,000 annually by the end of the tenth year on expanded services. In addition, allowing for increases in recurrent charges in departments not directly concerned, it was estimated that a further recurrent commitment of £380,000 per annum should be allowed for. Thus total recurrent expenditure to be generated under the ten-year program, which was expected to absorb £13 million within the planning period, would raise the normal annual budget from £2.7 million to about £4 million, or by nearly 50 per cent after the initial pruning.

Cuts in the initial proposals had reduced the ten-year total for education by £900,000 and that for health by £400,000. The proposals under the heading of African Rural Development, which originally included provision for the five development centers, were cut back from nearly £2.2 million to £1.5 million, with the understanding that this part of the program would require modification in the light of experience. It was proposed to review the whole plan at three-year intervals, seeking approval for the amended funding at each stage. The revised overall program, finally accepted in 1947, was based on the following allocation of funds (5):

	Million £
Social services (health and education)	3.38
Economic services (agriculture, veterinary, forestry, game and fish, tsetse)	2.11
Rural development (centers and teams)	1.50
Communications	1.82
Water development97
Economic development (marketing, secondary industries, etc.)50
African housing	1.00
General building and Public Works	1.30
Local authority loans and balance42
Total	13.00

The plan was to be financed by a grant of £2.5 million out of the United Kingdom Colonial Development and Welfare Fund, by £5.5 million out of existing and future budget surpluses, and by £5 million out of loan funding.

Compulsion and Incentives for African Farmers

Two major problems concerned with African use of the land were faced by the Agricultural Department with its slender resources at the end of the war period. One was the growing need for an extension of control over chitemene in the northern, poor soil areas of the Territory, and the other was that of the increasing soil deterioration in the more favorable areas of production for market near the line of rail. Here the population concentration was getting worse through the pull of the commercial market for maize. The traditional system of cultivation with its long resting periods had been largely displaced by maize monoculture, often brought about as much by reluctance to undertake the task of stumping additional land as by land shortage. The situation was aggravated by the displacement of parts of the tribes in these areas from Crown Land and land alienated to Europeans, and this aspect of the problem, as well as the socio-

logical factors involved, was well documented as a result of a survey undertaken in 1945 (10).

The survey team was impressed by the fears and suspicions that had been aroused by past land alienations, and it recommended systematic explanations and propaganda to counter those feelings. Its main agricultural recommendations were for the registration of the larger holdings, with the occupiers then to be required to follow a compulsory rotation against threat of eviction, and the grouping of the smaller holdings into "social units," which could be readily assisted. It suggested also that the adoption of better farming methods should be stimulated by differential maize prices. The suggestions for compulsion and incentives were not new, but they were given additional force in the findings of a detailed and authoritative report, and a decision was reached to implement these proposals by means of the "African Improved Farmer Scheme" and other measures.

The African Improved Farmer Scheme

Johnson records that this scheme was introduced for the 1946-47 season by inviting farmers who wished to cooperate to register at their local agricultural stations (11). They were then required to adopt the "Kanchomba system,"² were visited and advised throughout the season, and awarded a certificate for satisfactory performance which entitled them to receive a higher maize price than that generally available for African maize. The higher price was, of course, only available for the estimated output from the improved land. In addition to following the rotation and the use of manure, the farmer had to maintain any necessary conservation works and to keep to reasonable standards of cultivation and weed control. Ninety-five farmers qualified in the first season and this rose to 362 in the third.

From the beginning of maize control in 1936, African producers had been paid less than the realized value for maize, with the difference first used for a price stabilization fund and later drawn upon to assist in payment for conservation works in the African areas of maize control. Under the improved farmers scheme the farmers who qualified got the full price of 22/- a bag, with other African producers getting 18/- a bag and in effect paying about 18 per cent of the full price as a contribution to the control of erosion and for price stabilization.

Two years after its inception the scheme was modified and improved. Administration was simplified by substituting an acreage bonus for the former crop price differential and two grades of improved farmers were introduced. To qualify for the first grade the farmer was now also required to crop half his land with legumes, with half the legume crop ploughed in and the following maize fertilized with superphosphate. The remainder of the maize land had to be dressed with manure. For the second grade it was not necessary to plough in the green crop and fertilizer was not compulsory. These changes checked the expansion of the scheme in the next year or two, but by 1952 the number of farmers qualifying had risen to 706.

Alongside the changes made in the scheme in 1949, the financial mechanism

² A system of simple crop rotation with manure and compost, evolved and demonstrated by the Kanchomba Agricultural Station.

whereby funds were made available both for the scheme and for general conservation assistance in the maize belt was also revised. The difference between the Maize Control Board full price and the price paid to the African was thereafter paid into a newly established African Farming Improvement Fund, to be administered by a committee on which African farmers were represented. The policy adopted by the committee, which reflected the fact that the funds derived from the proceeds of maize production, was to make use of it for purposes connected with the general improvement of farming in the area from which the funds arose.

Conservation work was stepped up by the use of tractors and mechanical units, and the provision of small dams and weirs continued. Subsidies were made available for ox carts. The distribution of seeds and fertilizers to improved farmers was undertaken. In collaboration with the Maize Board, buying points for maize were established and a rural maize buying service was inaugurated. An important feature of this service was the payment of a flat rate for maize throughout the area as a means of checking the increasing population pressure on the land adjacent to the railway depots. So Clay's proposal in his 1945 memorandum (8) to eliminate transport differentials was adopted in the second operative year of the ten-year plan in spite of the dubious implications of such an arrangement.

The following figures of expenditures from the Improved Farming Fund in 1951-53 show how the deduction in the African maize price was apportioned between general improvements and bonus payments to improved farmers (adapted from *II*, p. 11):

	Per cent
Soil conservation works	25
Marketing and storage facilities	20
Water conservation and supply	14
Ox-cart subsidies	10
Conservation equipment	8
Miscellaneous	6
Total for general improvement	83
Improved Farmer Scheme bonuses	17
Total expenditures	100

Although the improved farmer group received only 17 per cent of the total funds dispersed as a result of the price deductions, which reflected the low proportion of farmers qualifying, they also benefited, along with the rest of the community, from the general improvements and other assistance made available from the Fund. In effect, therefore, the system had two major consequences: it provided for an enforced contribution to general improvement throughout the area from all those who brought maize to market; and it also provided the means by which less efficient producers were required to subsidize more efficient producers. In addition, the introduction of the flat rate price for maize throughout the area meant, in effect, that producers near to railhead were paying a transport subsidy for the benefit of remote producers. Since the Maize Board did not accept small lots from African producers there was no means of avoiding that charge.

Conservation work and other improvements financed by the African Farming Improvement Fund were additional to projects supported by the general budget. Government funded the full cost of major conservation works of more than local

TABLE 1.—MAIZE PRICES, FUND CONTRIBUTIONS, AND BONUS RATES*
(Prices and levy in shillings per bag)

Year	Price ^a	Levy	African cash price	Levy as per cent of full price	Bonus per acre
1949.....	23/6	5/6	18/-	21	15/-
1950.....	26/8	5/5	21/3	18	18/-
1951.....	31/6	6/3	25/3	18	21/-
1952.....	35/6	8/3	27/3	21	22/6
1953.....	37/3	10/-	27/3	24	25/-
1954.....	37/6	9/6	28/-	23	27/-
1955.....	36/9	9/6	27/3	24	27/-

* Adapted from C.E. Johnson, *African Farming Improvement in the Plateau Tonga Maize Areas of Northern Rhodesia* (Department of Agriculture, Agricultural Bulletin No. 11, Lusaka, 1956), p. 10.

^a After deduction of the flat-rate transport charge of 3/6.

benefit and one third of the cost of those undertaken for the advantage of small communities. Johnson pointed out, in justification of the principle of compulsory contribution, that the price of maize was determined by a formula which allowed for the cost of proper measures to conserve soil fertility and for the capital development necessary for the expansion of production consistent with sound land use. In the European areas, quite apart from the higher standards of farming practice, steps had been taken to ensure general conservation through the area conservation committees set up under the Natural Resources Ordinance, whereas in the African areas the communal system of land tenure, together with the limited resources and small scale of operation of individual farmers made it necessary "to skim off what is considered to be a due proportion of the proceeds for land improvement before they reach the producer." Johnson saw it as neither racial discrimination nor discriminatory taxation, but as a practical way of dealing with what was an intractable problem. In fact there were strong elements of both discrimination and compulsion in the system but it was broadly justifiable in the long-term interests of the community. This was the era of paternalism, and the African Farming Improvement Fund was characteristic of that era.

According to Johnson's calculations, the "unimproved" farmer was getting 27/3 a bag in cash for his maize in 1955 after deduction of the flat transport cost of 3/6 a bag and the improvement levy of 9/6 a bag, as compared with the full price at Maize Board receiving depots on line of rail of 40/3 a bag. At that time the improved farmer got a bonus of 27/- an acre, equivalent to an average of about 20/- a bag;³ Johnson worked out the average return to him as the equivalent of 47/3 a bag at the rural depot (*i.e.*, after payment of transport). Table 1 shows the effect of the financial provisions of the fund.

The levy deductions were relatively heavy and it must be a matter of doubt as to whether or not this diversion of income from the low-income sector, with all its implications, was more than offset by the welfare value of the improvements it facilitated, even taking into account the long-run gains in productive

³ The implied yield (1.35 bags per acre) is low. On the basis of a survey carried out in 1955 Morgan Rees put the average yield on improved farms at 2.8 bags an acre (12, p. 25).

capacity. One weakness arose through the incidence of the levy on only a part of the land users, probably a small part. Inasmuch as maize was the one crop subject to marketing control and the predominant crop coming to market from the African area of the maize belt, the imposition of the levy on marketed maize was not only practicable, but reasonably equitable in regard to the African community. However, because the levy was not imposed on subsistence producers, sellers of cattle and livestock produce, those who produced and sold crops other than maize, those who sold maize other than through controlled channels, and (in effect) the advancing producers who took advantage of the bonus scheme, it obviously tended to bear most heavily on the emergent producer. It might be argued, therefore, that those who were struggling to gain a footing in the market economy through maize production were required to contribute on behalf of all those who did not make the same effort as well as on behalf of the small group of their more advanced fellows. Johnson made some reference to this aspect in discussing the limitations of the scheme in the passage quoted below:

The true nature of the problem has to some extent been obscured by misconceptions arising from the limited approach to it. It is possible that there has been a tendency to regard arable farming improvements perhaps too exclusively as a question of crop rotation, manure and contour ridges; and the necessity for better farm equipment and more consumption by the unimproved farmers in order to raise themselves out of subsistence agriculture has been insufficiently recognised as a basic requirement for progress. . . . The possible effects on the general standard of husbandry of restricting the income of unimproved farmers to provide enforced savings for soil and water conservation and direct cash inducements to improved farmers need to be assessed.

Following the early success of the scheme in the Southern Province, a second scheme was initiated in the Central Province in 1952, with 50 farmers qualifying in the first season. The number of improved farmers dropped from 706 in 1951 to 655 in the following year, but it recovered to 732 in 1954 where, with those in the Central Province, the total stood at over 1,000. However, even in the Southern Province where the scheme was well established, the total represented less than 5 per cent of the land occupiers in the maize areas, and these were producing about 10 per cent of the maize sold to the Board. Johnson reported difficulties in 1954, and it was partly for this reason that Morgan Rees undertook an economic survey of the scheme in 1957, ten years after its inception (12).

Seven localities containing 315 improved farmers were selected for the survey and data were collected from a random sample of 112 farms in those localities. The average size of the individual cultivated area was just under 26 acres, consisting of nearly 20 acres of improved land and 6 acres of additional garden, occupied by an average family of 9.3 persons of which four were adults. Maize was the chief crop on all the farms, covering about 62 per cent of the acreage under crops, with groundnuts, beans, and sunn hemp in about equal proportions taking up most of the remaining area. The proportion of maize was kept down by the compulsory rotation.

The maize yields, described as "shockingly low" by Morgan Rees, averaged only 2.8 bags to the acre on the improved lands and 1 bag an acre on the unim-

proved land as compared with an average yield of 7 bags an acre on European farms in the same year. The considerable superiority in yield of the improved land over the unimproved, even at this low level, was not such a striking testimonial to the advantages of the improved system as it might appear, however, as the farmers tended to neglect the unimproved gardens in order to qualify for the bonuses on the improved land. Moreover, since the rules provided that only half the improved land could be planted to maize each year, whereas the unimproved lands carried no restriction, the farmer could argue that there was no yield gain from the scheme unless the yield from the improved area was more than double that of the unimproved area. The most striking feature was the inverse correlation between yield and the size of the area planted to maize; where 15 acres or more were cultivated, the average yield was only 1.7 bags an acre compared with an average of slightly less than 3 bags on farms planting less than 15 acres.

The yield data suggested that family efficiency in maize production declined as the acreage increased beyond 15 acres and that, despite the fact that the improved farmer was fairly well equipped, there was a relatively low limit to the acreage he could handle effectively. However, as the size of the cultivated acreage increased there was a tendency for net farm income to increase. The bonus for improved farming, paid on an acreage basis, was obviously an important factor contributing to this. The effect of the acreage bonus system in encouraging individual expansion of the cultivated area under circumstances in which population pressure on the land was a matter of concern, was presumably regarded as offset by the good husbandry regulations promoted by the system.

Taking into account the produce consumed by the family, Morgan Rees showed that the average farm income was just under £47 for the year (£52 average for the first grade farmers and £35 for the second grade) and, together with nonfarm earnings amounting to £23, the total average income was only £70 for the year or the equivalent of about 120/- monthly. This was better than the average earnings of general laborers at that time, but the comparison would have been much less favorable if made in terms of income per worker since the average farm family included four adults.

The survey was undertaken in part because the improved farmer scheme was not expanding as rapidly as had been hoped. Moreover, the scheme called for a high degree of supervision and absorbed much of the time of the field staff, and in this light the results disclosed by the enquiry were disappointing. Morgan Rees showed that the scheme offered a cash advantage over the traditional system but the returns were still low. He suggested that without the inducement of the cash bonus there would be little desire on the part of the majority of the improved farmers to remain in the scheme but that some of them would probably continue to make use of the good husbandry practices advocated. An important factor affecting the scheme, and one that had limited the area in which the survey was undertaken, was the prevailing political climate which sometimes made it difficult to carry out extension work, and this undoubtedly contributed to the problems that were encountered in implementing the scheme. Although the results achieved in raising yields and farm incomes were disappointing, those responsible for continuation of the scheme thought that it was making a valuable contribution to soil conservation on the railway belt.

Peasant farmers.—Maize marketing control was a necessary complement to the improved farmer scheme which was therefore restricted to the areas in which the control was operative. The peasant farming scheme was initiated partly because of that restriction, partly to assist emergent farmers in the transition from subsistence production to commercial farming and partly to establish progressive farmers under a wide range of conditions to set an example to their fellows. This scheme to provide capital aid together with technical advice and assistance was begun in 1948. It was financed jointly by the United Kingdom Colonial Welfare and Development Fund and the Northern Rhodesia government as a project within the framework of the ten-year plan. Up to 1961, just over 2,500 farmers had been settled under the scheme, using funds from grants amounting to £300,000.

At first the farms were laid out together in blocks, with 30 acres of arable land allowed for each farm, the block system being designed with the idea of facilitating group use of equipment. Within a short time it was considered that 30 acres of cropland was too much for one family, and the area was reduced to as low as 15 acres in some districts, with separate individual holdings generally taking the place of the blocks, as little advantage was derived from contiguous holdings except under group settlement. Selected farmers were established with the initial costs met from interest free loans, on a basis whereby the loan became repayable in equal installments over a ten-year period from the second year of farming operations.

Hadfield reported on the scheme in 1962, following a survey in which he collected a considerable amount of individual detail about 1,000 peasant farms out of a total of some 2,500 (13). The average farm family consisted of just over 8 persons, including 3.5 adults. The dominant crops were maize, with an overall average of about 6 acres, groundnuts averaging 4.5 acres per farm, and tobacco, grown on less than a quarter of the farms at an average rate of half an acre per farm. Much the greater part of the income came from crops, with less than a third of the farmers recording cattle sales.

Average gross farm income in cash was low, at just under £65 per farm, with net cash income at about £57. Several factors suggested that the average incomes revealed by the survey were almost certainly slightly lower than the true incomes realized by the farmers. Nearly two-thirds of the farmers, with a great deal of family assistance, earned less than £50 in the year in addition to family subsistence. If the majority of these men were promising farmers within the village environment before they were brought into the scheme then the benefits of the scheme to some of them appear to have been small. The report took the view that there was great improvement in the position of the 13 per cent of the farmers who were earning cash incomes of £100 or more, but some of these would probably have done well in the village farming pattern. Moreover, average family size rose steadily from 7 persons in the lowest income group to 10.3 in the highest income group, and there is no doubt that a computation in terms of adult-male labor units would have narrowed the apparent income range and disclosed an even less promising picture.

In view of the generally low standards of income revealed by the survey it would have been surprising if the original loan repayments had been substantially

maintained. The average amount of the interest free loan provided on the establishment of the farms was £115 per farm, and the average amount per farm due for repayment in the year of the survey, including arrears brought forward, was just under £20. In fact, repayment was just under half the total amount due, and about 10 per cent below the amount due in that year; the arrears, therefore, were increasing. Repayment of the annual dues would have swallowed half the indicated cash income earned by a third of the farmers.

Hadfield was unable to get reliable estimates of crop yields, but the following tabulation, adapted from figures presented in the report, gives a rough indication of decreasing intensity of land use as the area of cultivated land increased (13):

Number of farms in the group	Average crop area (acres)	Income per acre (shillings)
30	10	80
60	11	102
280	12	82
558	16	53
34	17	45

Since crop incomes as shown above did not include that part of production consumed by the families, the income figures do not indicate absolute intensities of land use; and as a measure of relative intensities they might be misleading unless there was a fairly close relationship between average size of family and average area cultivated. Generally, however, a fairly close relationship is a reasonable assumption for such units. The striking fall in income per acre from the large group of 12-acre farmers to that of the 16-acre farmers denotes a fairly steep decline in the intensity of land use, comparable with that noted with reference to the improved farmers by Morgan Rees.

Weaknesses in the schemes.—There were probably four interrelated weaknesses in these schemes, apart from the debatable method by which the improved farmer scheme was financed. These were (1) the tendency for the participants to overreach themselves by cultivating more land than they could manage adequately; (2) the limited ability to respond fully to the need for changes in approach and technique under new conditions, particularly for the peasant farmer group; (3) the inability of the extension services to provide enough aid to establish the farmers on a sound basis in their new patterns of farming; and (4) the load of debt with which the peasant farmers started out.

The tendency for emergent farmers to increase the area of land they cultivate is understandable, but the consequences of overexpansion are often contrary to their expectations. Usually under these circumstances the supply of kraal manure is quite inadequate, and late planting of part of the area, invariably resulting in poor yields, is often unavoidable. And the rapid weed growth when the rains set in is likely to be more than the farmer can cope with. The evidence indicates that both the improved farmer scheme and the peasant farmer scheme were strongly affected by this weakness, but it is not a problem that is easily solved within the framework of planned systems for the abilities and resources of even emergent farmers vary widely, and what is within the scope of one may be far beyond that of another.

The difficulties facing African farmers in trying to move to more intensive

systems under these schemes were considerable. On the one hand they had the incentive and additional resources for expansion and on the other they faced the problems of new systems with new techniques. For many of them the change from the traditional pattern, with its socio-economic relationships, to commercial farming systems under new conditions and with new responsibilities, may have been too rapid. Against this background the extension services were not yet strong enough to provide the individual assistance that would have been necessary to make the schemes wholly successful.

Three stages of evolution of family farming are recognizable in the Northern Rhodesia pattern of African agricultural progress. They are:

- (1) improvement from the subsistence level by better production techniques, gaining better yields in first-stage intensification;
- (2) acreage expansion by the emergent farmer, using the improved techniques; but as there was little restriction on available land he tended to expand too far, losing part of the benefit of earlier intensification;
- (3) progress in the market economy through further intensification, in terms of techniques, crops, and systems.

The introduction of the improved farmer and peasant farmer schemes in the forties was part of the program of assistance for farmers in the second stage.

General Progress Under the Ten-Year Plan

The first financial review of the plan was undertaken in 1948. In the agricultural sector a major difficulty was the continuing staff shortage both at professional and technical levels, and to meet the urgent need for more agricultural instructors it was proposed to establish one training school immediately, to be followed by another in 1949 and a third in 1950. Initial progress under the broad scheme for coordinated rural development was hampered by the lack of agricultural staff and by housing difficulties, and the Commissioner for Native Development began to recruit his own building crews to overcome the latter bottleneck. The initial estimate of £13 million for the plan had grown to £17 million, and further revision brought it up to £19 million in 1951, when the second review was undertaken.

By 1951 it was readily evident that planning ahead for as long a period as ten years was unrealistic, and important changes in the direction taken by the plan in its various sectors and in the costs these would incur were inescapable. In the agricultural sector the wide extension drive envisaged by Lewin had been seriously hampered by staffing difficulties, and the establishment of the full provincial organization that had been proposed was still lacking five years after the plan had been adopted. The approved establishment of agricultural officers and supervisors, which numbered 21 in 1945 (with six vacancies) had been raised to 44 by 1950 but there was difficulty in recruiting suitable men.

The Natural Resources Board had been set up in 1949 to exercise general supervision over natural resources, to stimulate public interest in conservation, to recommend appropriate legislation, and to ensure coordination between the various bodies concerned. Its powers included the declaration of intensive conservation areas and the establishment of conservation committees among the land-

owners in such areas. A mechanized conservation section with three units equipped with machinery had been set up, and it was proposed to increase this to five units by 1953. In addition an agricultural research scheme had been launched, with the capital expenditure met from Colonial Development and Welfare funds. In the specific field of African agriculture the new thrust most readily defined was that embodied in the improved farmer and peasant farmer schemes.

The position with regard to the disposition of the potential African labor force at this time throws some light on the progress in agriculture. It was estimated that in 1950 the total of adult males in the territory consisted of about 450,000 of indigenous origin and 30,000 aliens. Of these about 200,000 were at work for wages, 20,000 were self-employed in occupations other than agriculture, and about 20,000 were engaged in commercial farming on their own account, these categories accounting for approximately half the total. The remaining 240,000 including about 70,000 reckoned as aged and infirm, were mainly supported by subsistence production. The 202,000 wage earners were engaged in the following main categories (14, pp. 24-25):

Mining	42,000
European farming	34,000
Domestic service	30,000
Unskilled labor	37,000
Government and other services	37,000
Factories and mills	15,000
Other	7,000
Total	202,000

Nearly half the indigenous able-bodied male population, including 50,000 outside the country, were absent from their villages, and the estimated total of those gaining a foothold as commercial farmers was only two-thirds of the number of those working in domestic service and less than two-thirds of those employed in European agriculture.

The community development proposals of the ten-year plan had run into the same difficulty that frustrated the Agricultural Department. The lack of skilled European staff to supervise the area team projects had led to the abandonment of the original concept of general territorial development and thus to a modification in rural development policy. The only development center under construction was converted into the headquarters of the area team, and the original rural development allocation of £1.5 million was cut back to £1.0 million partly on the grounds that nearly all projects in that field required a considerable degree of self-help and partly because it was evident that the original allocation would not be spent.

The 1951 review carried the first outline of the concept from which the policy of "reinforcement of success" was to emerge at a later stage. It reported that the following three categories had been adopted for classifying the rural areas for the purposes of development planning:

- (i) *Intensive Development Areas* which, owing to natural advantages of soil, water, access to markets and the like, would naturally yield the highest return for effort made to develop them.
- (ii) *Development Areas* which are capable of intensive development and

will receive it when staff and funds become available.

(iii) *Other Areas* which appear to be too poor in quality to maintain a concentration of population earning a reasonable living from the land.

"It appears logical," the report went on "that when available staff and funds are limited the initial effort should be made in regions best suited to it." This policy in effect confined the development effort to the area along the railway belt together with that part of the Eastern Province in the neighborhood of Fort Jameson where both ecological conditions and access to export markets via Nyasaland created conditions favorable for intensive development. Barotseland, and practically the whole of the northern and northwestern provinces, covering the greater part of the Territory in terms of area, were thus put on what has been described as a care and maintenance basis.

The third revision of the plan in 1953, stimulated by the continued increase in costs, was essentially financial. The overall costs of the plan had now risen to £52 million; few new projects were accepted and these only after a strong case had been made. The agricultural estimates suffered a small decrease and the provision for rural development was unchanged, with staffing difficulties as the limiting factor. Three training schools for African fieldsmen had been in operation since 1951, but even though the total intake was less than 100 difficulty was met in recruiting suitable trainees and the wastage during the training period was high. Unfortunately this position deteriorated as time went on and one of the schools was closed in 1953.

With the agricultural department under increasing pressure, it was felt that chitemene control should be taken over by the native authorities, leaving the agricultural supervisors free for other duties. Since the chitemene problem areas were generally remote and difficult this conclusion was obviously in line with the policy decision to concentrate the available resources in the more favorable areas.

Development of European Farming

When L. G. Troup made his enquiry into European farming in Northern Rhodesia in 1953 there were about 1,300 European farmers in the country, and they occupied about 45 million acres, most of it in the railway belt. Of this large area, including some ranching enterprises, not much more than 5 per cent was under cultivation, with maize occupying more than half the area under crops but now topped in market value by tobacco. Crops accounted for 84 per cent of produce marketed and cattle only 6 per cent (Table 2).

Troup was assisted in his investigation by analysis of the financial aspects of European farming undertaken by Morgan Rees (15). This analysis indicated that well over 75 per cent of the farms were either predominantly tobacco farms or predominantly maize farms but that there was a tendency to move away from monoculture. Emphasis was laid on the fact that too many postwar settlers had started with the notion that farming in an underdeveloped country required small initial capital and that many of their subsequent difficulties had resulted from this cause, accentuated by rising costs, difficult seasonal conditions, and the end of the tobacco boom. Few farms could be considered to be well developed,

TABLE 2.—EUROPEAN FARM PRODUCE MARKETED, 1952-53*

Item	Value (1000 £)	Per cent
Tobacco	1,404	41.5
Maize	1,233	36.5
Potatoes, vegetables, fruit	155	4.5
Other crops	49	1.5
Total crops	2,841	84.0
Cattle	200	5.9
Poultry and eggs	180	5.3
Milk	100	2.9
Other livestock	61	1.9
Total crops and livestock	3,382	100.0

* Data from L. G. Troup, *Report of a Commission of Inquiry into the Future of the European Farming Industry of Northern Rhodesia* (Government Printer, Lusaka, 1954), p. 11.

and their development would be slow unless some means could be found to inject large capital sums into the industry.

In addition to the overdraft facilities provided by the commercial banks, financial assistance was made available through the government sponsored Land and Agricultural Bank. The Bank had authority to borrow up to £1 million from the government and to advance money to farmers up to 60 per cent of the value of security offered, with an individual maximum of £5,000. Seasonal loans were available against stop orders on crops and there was provision for chattel mortgages. Interest rates were at 5 per cent on long- and medium-term loans and at 6 per cent on seasonal loans. Seasonal credit was also provided by producers' cooperative societies, including a cooperative agricultural development society which was enabled to borrow from the Land Bank at the rate of £640 per member.

In addition to indirect assistance and income tax rebates, the government provided for subsidies to European agriculture amounting to about £140,000 in 1953. Of this amount more than a third went to milk producers, a little less than a third went for assistance in water supplies and conservation work, and most of the remainder went to assist in capital development for cattle producers.

The price of maize, based on the cost of production formula, had risen from 25/8 a bag (200 pounds net) in 1948 to 40/9 a bag in 1953, a climb of over 58 per cent in five years. Production was expanding and was now mechanized in all operations except harvesting, with a few mechanical pickers in use. About 90 per cent of the marketed maize came from the vicinity of the railway belt, with more than half the total produced by 80 large-scale producers.

Flue-cured tobacco production, largely concentrated away from the line of rail in the Eastern Province prior to the war, had expanded considerably on the sandveld soils in the railway belt, and by 1953 total production was of the order of about 10 million pounds weight annually. Production was generally on the scale of about 50 acres per farm, with average yields of 500 pounds an acre but with the better growers getting up to 1,000 pounds an acre. Two successive crops were usually taken from land newly cleared of bush, followed by a maize crop,

with the land then left to regenerate for a number of years, a practice followed both to aid soil recuperation and to lessen disease and pest problems. This system, together with the work entailed in harvesting, involved heavy requirements in comparison with maize.

The number of cattle owned by Europeans, about 130,000 head, had not expanded with the increase in settlement. Although a few ranches had 2,000 head or more, the majority of the cattle were in small herds on farms in the vicinity of the railway strip. The productivity of the beef herds was low, mainly due to the harsh nature of the environment under conditions in which animals were very largely required to subsist off the veld. The annual calf drop was probably less than 50 per cent of the number of the cows and mortality was reckoned to be about 7 per cent per annum. Steers generally took five or six years to reach 1,000 pounds live weight, and the annual output of slaughter stock through trade channels was only about 9 per cent of the cattle population.

Milk production, almost entirely for the supply of European consumers, was also concentrated on the railway strip, although there was a little production near outlying population centers. The stock were chiefly of European breeds, mainly Friesland; management and breeding were well adapted to the conditions, and herd averages of 600 gallons per lactation were not unusual.

Growth from 1945 to 1956

The year 1956 marked a notable change with respect to government services to agriculture in Northern Rhodesia. The Order in Council by which the Federation of Rhodesia and Nyasaland was created in 1953 had made provision for the federal government to exercise exclusive powers for the control of exports and imports and for marketing and price control in regard to such commodities as that government might schedule. Responsibility for services to European agriculture could be taken over by the federal government with the concurrence of the territorial government, and the Northern Rhodesia government agreed to that takeover in 1956. This move had the effect of splitting the agricultural services on a racial basis, and the delegation of power with respect to agricultural marketing committed Northern Rhodesia to federal pricing policy in a manner discussed later.

This year was also the last year of the original ten-year plan, and it is appropriate to take a look at the changes that had taken place over the decade. The expansion of the staff of the Agricultural Department as shown in the departmental report for 1956 had taken a different shape from that envisaged by Lewin. Despite the recurrent theme of difficulty in finding adequate professional staff, the establishment in this category at the end of the period was well in excess of his forecast requirement, whereas the agricultural field staff was much below the planned expansion. The planned and actual expansion of extension staff was as follows:⁴

⁴ The data for 1956 are from the Department of Agriculture's *Annual Report for 1956*, p. 16 and the figures for 1945 are from (6). There were changes in nomenclature over the period for the lowest category of extension workers but "African fieldman" seems the most suitable. In 1956 this category included 283 agricultural assistants and 171 capitãos, i.e., fieldsmen without formal training. (It has been assumed that half of the 342 capitãos employed by the Department were engaged in extension work.)

	Agricultural officers	Supervisors	African fieldsmen
1945 establishment	11	10	150
Programmed for 1956	11	31	1,200
Actual 1956	28	54	454

It would seem from the foregoing comparison either that Lewin underestimated the professional strength necessary in an expanding extension department, or that the department was tending to become top-heavy. In fact, the evidence suggests that both conclusions would be justified. The change in direction of agricultural development policy, characterized by the improved and peasant farmer schemes, made relatively heavy demands on the professional corps, and probably invalidated the staff balance envisaged by Lewin. In addition, the serious failure to expand the training program for African assistants, attributed to the considerable difficulty in finding suitable trainees, was the major factor creating imbalance under the changing conditions. The comparative ratio of African fieldsmen to professional staff, at 7 to 1 in 1945, was programmed to widen to 20 to 1 at the end of ten years but in fact it had narrowed to about 5.5 to 1. The inability to find and train suitable Africans to assist in the extension effort was a serious drawback to African agricultural advancement over the closing stages of this period, and its effects were to continue.

Despite the problems faced by the Agricultural Department in its efforts to assist emergent African producers and at the same time to halt soil deterioration and correct the worst effects of population pressure on the land, the rate of growth of the African contribution to market was almost spectacular. The overall population increase from 1945 to 1955 was about 30 per cent (2.1 to 2.7 million), and it is estimated that the proportion of able-bodied males on the land remained roughly the same, at about 60 per cent over the period. A generous estimate of the annual value of African agricultural crops marketed over the three-year period 1944-46, chiefly maize, is about £380,000 in terms of 1955 prices; the comparable figure for the period 1954-56 was £1,500,000. Associated with a rate of population increase of about 2.5 per cent per annum was a rise in the contribution to market which was probably in excess of 15 per cent per annum. This was not solely attributable to increased production, since marketed output is largely measured in terms of produce recorded and the organization of rural marketing services had assisted in bringing more produce to market.

A more realistic picture of the change in terms of crop cash income may be had by a very rough calculation of average income among the families assumed to be selling more or less regularly in the recognized markets. Reckoning on an average of five people per family, and making allowance for those largely dependent on earnings from employment, and assuming further that one-fifth of them were sellers in the period 1944-46 and one-fourth in the period 1954-56, we have the following crude assessment of annual crop cash income per family:⁵

	1944-46	1954-56
Population	2,100,000	2,700,000
Families	420,000	540,000
Families making sales	84,000	135,000
Total cash crop income	£380,000	£1,500,000
Average per family selling	£4/10	£11

⁵ Population figures from census estimates; cash crop income estimated by author from various sources.

Cattle are omitted from the calculation as they were almost entirely in the nature of a by-product, and most of the items might be challenged on closer examination, but the comparison is probably a fair index of the gain in cash crop incomes from sales through recognized channels in terms of 1955 values. In addition, the spread of improved farming practices over the ten-year period must have had a marked effect on subsistence standards. Starting almost from scratch at the end of the war, and in the face of enormous difficulties, the Agricultural Department had made notable progress.

Some Aspects of Changing Government Policy to 1960

The policy aim of directing the resources available for African agricultural assistance to the more favorable areas, outlined in the 1951 review of the ten-year plan, became a governing factor in the work of the Agricultural Department over the following decade. The improved farmer and peasant farmer schemes were established within the framework of that policy, and the tendency to focus the limited extension effort on the more progressive farmers in the better areas turned attention to the need to encourage the production of intensive cash crops. Although the range of suitable crops was sharply limited there were marked advantages in this move.

Continuing development by the progressive family farmer based almost entirely on the maize crop usually involved acreage expansion, often to the stage of declining yield. The introduction of more intensive cash crops helped to offset that tendency while at the same time increasing the range of potential income. It provided also for a closer concentration of extension effort and more economical use of the limited services of professional officers. Thus the sequence of operations for the special crop could be taught stage by stage as the crop was grown and harvested, and it could be taught by fieldsmen with the necessary training and ability but without very high qualifications otherwise. Moreover, this form of extension could be directed at selected groups of farmers in a suitable area, thus maximizing the use of field staff. And since the crops were grown for sale the results were clear, both to the growers and as a record of extension achievement.

Turkish and Burley tobacco, groundnuts for the confectionery trade, and cotton, all crops for export, were introduced or fostered as intensive cash crops for African growers. Turkish tobacco was tested on pilot projects in 1955-56 and introduced in the following year. By 1959 some 770 growers grew 58,000 pounds of leaf worth £8,500. The Agricultural Department was sufficiently encouraged to make a strong effort to gain a place for the crop in the specialized export market and it aimed at a fourfold increase in the following year. This was almost achieved but with some decline in quality, in part due to the inability of the extension service to cope fully with the demands it created (16). The setback was overcome, however, and within two years production had reached 270,000 pounds. Both Burley tobacco and confectionery groundnuts were grown almost exclusively in the Eastern Province, where maize production for market was severely handicapped by the long haul to the line of rail.

The groundnut development was based on cooperative activity organized by the Cooperatives and Marketing Branch in collaboration with the Department of Agriculture. Primary cooperative marketing societies handling both groundnuts and maize were linked to form a cooperative union, with the parent body

undertaking the task of marketing the produce collected by the primary societies, including the specialist function of grading the confectionery nuts and placing them on the high-priced world market. The cotton drive was to come later.

Throughout this period it was a major aim of policy to stabilize the population in the better soil areas by the introduction of permanent farming systems. Planning on a regional basis was facilitated by aerial photography and fact-finding surveys, and resettlement schemes attracted a good deal of attention. In 1955 Priestley and Greening (17) assessed the resident population of an overcrowded area in the Eastern Province at 14,500 people on land capable of supporting about 4,000 without deterioration under the existing system of agriculture, and in 1957 a scheme was begun under which it was proposed to resettle about 7,000 people from 36 villages by 1965. The scheme met with difficulties, however, and it took five years to resettle 12 small villages. The work involved bush clearing to eliminate tsetse from fly-infested areas, road construction, village site selection, well digging and the erection of schools, stores and other essential buildings, but the core of the problem was in getting the villagers to move. They had long regarded the new area as waterless and fly infested; there was also a reluctance to sever tribal links and to move away from familiar sources of income in the local town where some worked and others marketed produce. In addition, there were untenanted European farms in the vicinity and the eyes of the villagers were turned toward the vacant land (18).

An interesting essay in accelerated development was undertaken in the Northern Province in the late fifties. The Province, with an area of about 75,000 square miles and a population of half a million, consists very largely of poor leached soils with unfavorable structure and low fertility. Under the chitemene system of shifting cultivation, the population/land balance had long been a major cause of concern. This was coupled with what was regarded as a serious problem resulting from the absence of a high proportion of the able-bodied men, probably about 50 per cent, under circumstances in which unemployment was increasing in the urban areas. To assist in correcting the apparent imbalance between town and country, the Rhodesian Selection Trust group of mining companies contributed £2 million as an interest-free loan toward general development with emphasis on areas from which the majority of mine employees were drawn, and this enabled the government to embark on an intensive development campaign in the Northern Province. The overall scheme met with little success, perhaps due to lack of attention to basic economic principles at the planning stage which was in part a consequence of political pressures. The Mungwi agricultural settlement and training scheme was the most important single aspect of the program.

The Mungwi scheme was planned with the dual objective of finding and demonstrating a system of settled farming to displace the chitemene system and of providing "a modern township with urban amenities which will attract back to their homeland the many Bemba who have become accustomed to the amenities of the towns." The first aim may be described as economic; the second was largely political and it involved the assumption that the creation of the township would be a major factor in inducing the permanent agricultural settlement by which the town would be supported.

Since the township was to provide an educational, social, and cultural center

for the Bemba tribe, it was considered that it should be centrally situated for that purpose and within easy reach of electric power and close to a good road network and other facilities. Although the choice of area was dominated by those factors, it was fairly representative of the poor soil chitemene region which offered little promise of supporting a settled agricultural population. The township itself was provided with electricity, pumped water, telephone facilities, schools through the secondary school standard, an administration center with a native authority court, and a development area training center for classes in building, carpentry, tailoring, business methods, housekeeping, and so on (19).

The core of the scheme was the training center, a group farm of 150 acres arable and 1,500 acres for grazing, with the arable split into 21 six-acre holdings, plus a house plot of one acre for each of the trainees. The center farm was worked on the basis of three years cropping and three years ley, with two cereal crops interspersed by a legume in the first period. Trainees were expected to spend one season, and preferably two, on the training farm. The surrounding settlement farms were planned in blocks of four, about 160 acres each, with 20 acres initially cleared for cultivation. At the outset the new farmers were to practice a system of controlled chitemene, using the six-course rotation under trial at the training center, with fertility improved by regulated burning of the loppings as the bush was cleared for grazing. The plan assumed that after a full rotation the economics of the system would enable the farmers to maintain fertility through the use of fertilizer instead of wood burning.

Difficulties were met from the outset and the scheme failed to develop as planned. Few wished to adopt the change from their usual way of living, and it was extremely difficult to find suitable trainees or to keep those who entered the program and met with unfamiliar discipline and the need for sustained effort. Of 21 trainees in 1959, 15 qualified for the extension farms; but in 1960-61, two and a half years after the inception of the scheme, only 10 trainees had been settled. By 1962 it had been decided to modify the scheme by placing applicants directly on their own farms where they were provided with extension assistance focused on cash cropping, with chitemene as the basis for subsistence cropping. The original rotation was modified by the introduction of Turkish tobacco and groundnuts to improve the cash return.

The scheme failed in the major purpose of establishing a thriving agricultural community to draw people away from the towns, for obvious reasons. Unless and until means may be found to make economic use of this and similar areas at improving standards of living the tendency of the population to migrate to where better opportunities are available cannot be halted other than by continuous and increasing subsidy. And while better opportunities exist it is difficult to find economic justification for subsidy for that purpose.

As a means of testing the feasibility of more permanent systems of agriculture the scheme was expensive, and it was unfortunate that this test was combined with an experiment in group training and settlement under highly unfavorable conditions. Six years after its inception the scheme had not succeeded in providing positive information on the major problem of finding an economic system that would offer promise as a sound basis for a settled agricultural pattern. The original rotation with its three-year ley had failed. Trials had so far indicated that

fertilizer had little residual effect, although there was a marked crop response both to fertilizer and to heavy dressings of farmyard manure. One important result was the demonstration that reasonable crop yields could be achieved. Whether they can be achieved on a permanent basis under systems that are economic is still in question.

The Position in 1960

By 1960 the African population of Northern Rhodesia had risen to just over three million and the non-African population was about eighty thousand. The economy continued to be very heavily dominated by copper production, which accounted for £120 million out of a total value of domestic exports of £129 million. Agricultural exports came to just over £2.7 million, consisting of £1.9 million for tobacco and £0.8 million for maize. Production for market by European farmers was still much greater than that of Africans and now amounted in total value to about £5.5 million, with 75 per cent of the total contributed by maize and tobacco in roughly equal proportions. African production for market had reached £2.5 million in a good year, with maize still heavily dominant, although groundnuts and cattle now ranked high. Progressive African farmers were now buying significant quantities of fertilizer, seed maize, scotch carts, barbed wire, equipment in a widening range, and a few tractors. It was estimated that there were 270 power-operated grinding mills and about 200 tractors in African ownership, many of the latter also doing work for hire. There were about 50,000 ploughs in use, which is perhaps a fair indication of the number of producers moving into commercial agriculture. The African Farming Equipment Company, a supply organization sponsored by government which obtained part of its capital through the funds derived from maize levies, had gross sales of £47,000 in 1960.

The marketing services initiated originally by the Agricultural Department, and expanded and organized by the marketing officers of the Cooperative Department, were taken over by the newly constituted African Rural Marketing Service in areas along the line of rail. Its main function was that of organizing the collection of grain at buying points or from primary cooperative groups and delivering it to the depots of the Grain Marketing Board, the federal authority that had displaced the old Maize Control Board. It was at this stage that the decision was taken to abandon the old system of pooled transport costs, recommended by Clay in 1945, in favor of charging actual costs. The marketing service bought half a million bags of grain in 1960.

Stimulated by the success of producer marketing cooperation in the founding and expanding of groundnut exports from the Eastern Province, the cooperative movement had spread in the farming areas of the Southern and Central provinces and more than a third of the African grain was bought by the societies. European cooperative societies had been in existence since the early days of white settlement, and in 1948 the government had encouraged the spread of the movement by appointing a registrar and forming a department to take charge of cooperatives and African marketing. Over 200 African societies were on the register in 1960, including a small number of consumer supply societies, between 30 and 40 thrift societies, and 154 produce marketing societies. The latter group had about 19,000 members and had a turnover of £1.7 million during the year.

Since 1956, when the federal government assumed responsibility for European agriculture and for marketing and price control of the chief agricultural commodities, the Northern Rhodesia Agricultural Department had been concerned exclusively with African agriculture, and in 1959 a Ministry of African Agriculture was constituted for the administrative grouping of the agricultural and marketing services. The Agricultural Department had not expanded at a rate to equal its widening responsibilities over the preceding five years. Professional and technical staff, mainly European, had increased by about 10 per cent but there had been no significant change in the numbers of African fieldsmen. The total of improved farmers had moved from 1,100 in 1955 to just over 3,000 in 1960 and the number participating in the peasant farmer scheme had grown from 651 to 2,443.

In accordance with the policy of concentration of resources adopted in 1951 much the greater part of the extension effort was directed to the improved and peasant farmers, with senior agricultural officers in charge of the executive functions of the committees directing the activities financed by the African Farming Improvement Fund. Well over £100,000 was paid out in bonuses, subsidies, and loans during the year from the proceeds of crop levies. The Turkish tobacco drive was in progress and attention was turning to the reintroduction of cotton. Cattle producers were getting assistance through the livestock improvement scheme, by the provision of bulls, and loan aid in terms of suitable stock. Sales facilities were provided at organized buying points and investigations were proceeding into grassland management problems. On a wider front, the unremitting work on soil conservation, an important aspect of the improved farmer scheme, claimed a large share of available resources. Land utilization surveys, as a basis for regional planning schemes, were in progress. Chitemene control continued in the northern areas, with the aim of stabilizing the villages and promoting an orderly sequence of shifting cultivation in the surrounding area.

The staff framework for agricultural extension consisted of the African agricultural assistant at village level, the agricultural supervisor or agricultural officer at district level or agricultural station (with between 30 and 40 stations), the chief (or Provincial) agricultural officer in charge of a group of districts generally corresponding with an administrative province, and the headquarters staff and specialist officers at Lusaka, the territorial capital. There was now only one training school for African agricultural assistants, with an intake of about 45.

Increasing political tension, which led to the dissolution of the Central African Federation in 1963, was a growing handicap in the extension effort.

IV. PROGRESS AFTER 1960

The Policy of Reinforcement of Success

Mounting concern with the growing imbalance in the national economy had been a major factor leading to the intensive development drive launched in the Northern Province in 1958, and in 1960 it was largely responsible for the setting up of the Rural Economic Development (R.E.D.) Working Party to draw up a program for an accelerated development thrust in the rural areas (20). This approach, consistent with recognition of the importance of agricultural development in the economic growth of underdeveloped countries, perhaps failed to pay

sufficient attention to the unusual circumstances in which industrial development, through copper mining, was in a position to stimulate and support agricultural development as the latter progressed to a stronger complementary position in the national economy. In particular there is reason to question the validity of the recurrent theme of the importance of attracting villagers away from the bright lights of the urban areas. Funds used for the establishment of the Mungwi township, for instance, might have served a better purpose in providing increased facilities for more families to live with their absent menfolk, most of whom were making a better contribution in the national economy than they would be likely to make in the unpromising areas from which they came.

The R.E.D. Working Party, however, accepted the view that economic conditions in the rural areas should be brought into balance with those in urban areas. It took as its starting point the very low standards of living in the rural areas, where the value of subsistence production was estimated at about £50 per family overall, with an average cash income of £5 yearly. It noted that the higher incomes and living standards of employed Africans in urban areas were largely responsible for the position in which 60 per cent of the able-bodied males were absent from the villages, and that it was important that the movement from country to town should be reversed. The major aim was to increase opportunities in the rural areas to match those in the towns. The Working Party was composed of the administrative heads of the ministries concerned, and its report dealt very comprehensively with the whole field of rural economic efforts—the supporting services, including credit, communications, land tenure, and research, the social aspects, including housing, education, and health, and with the administrative machinery and financial requirements.

The agricultural program was based on the concept of production targets. These were compiled, in terms of commodities, on a provincial basis and then aggregated to provide national totals for five years and ten years ahead. The following tabulation gives value targets in pounds for African produce marketed (adapted from 20):

	1959 actual	1965 target	1969 target
Maize	990,000	1,342,000	1,500,000
Groundnuts	328,000	960,000	1,800,000
Other crops	271,000	935,000	1,860,000
Cattle	360,000	1,200,000	2,250,000
Other livestock produce	5,000	125,000	300,000
Total	1,954,000	4,562,000	7,710,000

“Having set the targets,” the Working Party stated, “the next step is to suggest ways of achieving them.” The most promising sector of African agriculture was that already on the move, emergent farmers represented by those in the improved and peasant farmer schemes. There were about 6,000 in those schemes, cultivating some 120,000 acres, and it was estimated that their earnings were around £8 an acre, which would of course increase as efficiency rose. The report pointed out that 50,000 such farmers, cultivating ten million acres at £10 an acre when optimum efficiency was reached, would produce commodities worth £10 million per annum, *i.e.*, that 12.5 per cent of the farming population could produce five times the present value of marketed crops of the African farming industry.

The cost of new settlement in an undeveloped area, involving planning, laying out access roads, providing for water supplies, proper conservation, fencing, and the capital equipment for farming was put at between £20 and £30 an acre, but as it was proposed to concentrate the effort on the better soils where a great deal of development had taken place, much of the infrastructure was already there. Thus the full cost of the program over the period 1961-65 was estimated to be about £7.5 million additional to the current rate of expenditure. This cost was divided approximately into land use surveys, £200,000; clearing and other services, £5,300,000; and loans to farmers, £2,000,000. With this additional expenditure, the program was expected to raise the number of improved and peasant farmers to 50,000 and to stimulate production by other cultivators, thus providing an increased cash output of £2.5 million, an increase of 136 per cent, by the end of five years.

To support the drive for accelerated expansion of production and to assist and encourage subsistence producers, it was considered that 750 African agricultural assistants would be required by 1965. Supervisors capable of administering the development areas and planning farms and advising advancing farmers would need to be increased from about 60 to 110, and there would have to be appropriate increases in the higher professional, research, and administrative staffs. Seven farm institutes were recommended, four in the progressive areas for training farmers before farms were allocated to them and to provide short specialist courses for improved farmers, and three in the backward provinces to cater particularly for the subsistence cultivators emerging as improved farmers.

These proposals, aiming at rapid expansion of output by concentrating the available resources on about 12.5 per cent of the African land users, amounted to an explicit application of the policy of reinforcement of success. They were the logical outcome of the policy of concentration on the more favorable areas adopted in the early fifties. Whereas the broader policy outlined in the early post-war years had in effect laid at least as much emphasis on the generation of initial response as on the progress of the responsive sector, the policy defined by the R.E.D. Working Party clearly put the emphasis on aid to the progressive few.

It is not unlikely that this policy, rooted as it was in the hard limits of available aid, owed something also to the structure and methods of an agricultural service geared to the importance of measurable production expansion as the necessary complement of the unremitting task of halting and correcting soil deterioration. The earlier difficulties in recruiting candidates for training as fieldsmen may also be seen as a contributory factor. The adoption of production targets carried an important additional and related implication. It marked the tendency for planning to focus on production rather than on producers.

Offsetting the obvious advantages of the policy of reinforcement of success in the use of limited funds and staff was the corollary that this would largely preclude direct aid to most of those struggling to gain a living from the land. Under such conditions it is doubtful if the short-term gain in output would more than compensate for the slower but wider advance that would result from extension services on a broader basis. The concept of production targets could also have far-reaching consequences. Insofar as the natural progression from traditional systems of agriculture to commercial farming status is through family farming

with a subsistence base, the focus of planning on production for market is likely to bring the planners face to face with the limitations of small-scale enterprise at that level, both structural and technological. The pull of production targets may then exert a strong influence towards the initiation of group settlement schemes, cooperative farming, state farming projects, and other forms of guided or managed group effort by which those limitations may be overcome. This tendency became evident later.

The Working Party recognized the need to complement the proposals for accelerated production with recommendations for an adequate marketing service. In a frank discussion of the existing cooperative structure it expressed doubts concerning the ability of the societies to provide efficient service above that of the primary level (mainly as buying centers) through inability to appreciate such economic factors as those governing price changes. It mentioned the chronic difficulties met with in retaining honest and efficient management. In regard to cooperative associations, it drew attention to excessive overheads, with member societies not sufficiently associated with overall management and tending to regard the parent bodies as government agencies. It concluded that the time was not ripe for associations of cooperative societies, that primary societies should not be encouraged unless the ground was properly prepared, and that direct government buying was preferable where the people were not ready for cooperation. As an alternative to expansion of the cooperative system, the Working Party preferred to strengthen the system of statutory boards.

The capital expenditure involved in the joint proposals for agriculture and marketing, additional to the current requirement, amounted to £8.7 million, and the full cost of the program for expanded rural economic development was assessed at £33 million, inclusive of £7 million for communications and £5 million for African education. This was greatly in excess of available funds. In the paring that followed the allocation of additional funds to agriculture was cut to just under £3 million of earmarked funds, plus such amounts as would be made available annually out of resources held back for that purpose.

It would be inaccurate to create the impression that the resources of the Agricultural Department at this time were focused on the policy of reinforcement of success to the detriment of work in the field of conservation, and a substantial part of the additional funds made available was set aside for conservation work under regional planning schemes. With the cooperation of the other ministries concerned, and with the collaboration of the local authorities and the people, the teams engaged in this work put forward comprehensive plans for rural development based on improved water supplies, protection of stream banks and headwaters, demarcation and subdivision of communal grazing areas, and soil conservation measures.

Although the report of the R.E.D. Working Party was accepted by the government as the basis for planning the expenditure of the available funds, the policy of reinforcement of success was the subject of some critical examination in the years immediately following, with particular reference to the lack of balance in the extension effort that it implied. The weakness of the extension field staff in relation to the overall needs of African agriculture was emphasized. Plans for rebuilding and expanding the central training school were expedited, and a pro-

gram for the establishment of not less than twelve farm institutes at appropriate centers throughout the territory was put forward. It was proposed that these should be used initially for training Africans with prior education to standard VI level for work as agricultural demonstrators. This was to consist of a short course in advance of employment to be followed by a program of inservice training. The number of fieldsmen that would be necessary for a program of full-scale extension was put at over 1,500, as compared with the existing complement of about 350 at that time.

Stocktaking in 1964

The year 1964 marked the end of the colonial era for Northern Rhodesia. Mounting political tension had slowed down economic growth, resulting in a marked reduction in the number of Africans in employment and a slowing down in the growth of the gross domestic product. The annual average of Africans in paid employment had fallen from a peak of over 270,000 in 1957 to less than 250,000, and the gross domestic product, which was estimated to have moved up from about £140 million in 1954 to over £200 million in 1960, had suffered a series of checks since that date. The overall contribution of agriculture to the gross domestic product, steadied by the high subsistence fraction, hovered in the region of 12.5 per cent.

A clear picture of change in the European sector of agriculture was provided as a result of a census taken in 1964. The total number of European farms in 1964, about 1,300, was much the same as that noted by Troup ten years earlier, but less than 1,000 remained in production. The volume of output from this sector, however, was 2.5 times that of 1954, and its total value was estimated at £4.3 million. Table 3, adapted from the census report, shows the composition of the expanded volume of output together with the decline in unit value of the main crops in comparison with 1954 (21).

Prices for the two main crops were less favorable in 1964 than they were ten years earlier. The maize price had declined as a result of expanding federal production, the acreage grown for sale had dropped by about 20 per cent from that of 1963. In addition the 1964 season was unfavorable and the yield declined.

TABLE 3.—INDEXES OF VOLUME AND OF UNIT VALUE OF
EUROPEAN AGRICULTURAL OUTPUT, 1964*
(1954 = 100)

	Volume	Unit value
Tobacco	347	85
Maize	204	84
Other crops	135	100
Cattle sales	299	100
Dairy produce	331	88
Other livestock	138	122
All marketed produce	253	89

* Data from Zambia, Central Statistical Office, *Agricultural Production in Zambia* (Lusaka, 1964).

No comparable official figures are available with respect to the growth of African agricultural output over this period, but it is possible to make a crude comparative estimate similar to that made earlier in this note with reference to the period 1945-55. The figures are based on the returns for cash crops marketed through organized channels, and three-year averages are used to minimize seasonal influences. Cattle are again omitted as they were still largely a by-product of African farming, but this omission probably leads to an appreciable understatement of achievement during the later period since productive effort was beginning to respond to the incentives for increased production and sales of livestock products. The earlier rough comparisons, which are subject to the qualifications already noted, are extended in the following tabulation to give a crude assessment of annual income per family from cash crops for the period 1962-64. These figures are compared with the rough estimates for the earlier periods presented above, with the crop income estimates for all three periods adjusted to 1955 prices:

	1944-46	1954-56	1962-64
Population	2,100,000	2,700,000	3,400,000
Families	420,000	540,000	680,000
Families making sales ^a	84,000	135,000	204,000
Total crop cash income	£380,000	£1,500,000	£2,400,000
Average per family selling	£4/10	£11	£13

^a Assumed to be 20 per cent of the families in the first period, 25 per cent in the second, and 30 per cent in the third. Total families includes those not dependent on agriculture; the number of Africans in employment was roughly the same in the second and third periods.

The assessment of total crop cash income per annum throughout the period 1962-64 is based on the published figures of African crop sales, raised to compensate for the price decline in the chief crops and with the addition of an estimate to cover minor crops and vegetables (as for the earlier periods). The family averages are important as an indication of the problem faced by the Agricultural Department during the second period. The resources available for expanding farm output and sales were not sufficient to do much more than keep ahead of population growth. That comparison fails, however, to take into account the considerable amount of work that had been accomplished in laying foundations that would yield results over a long term.

The UN/ECA/FAO Mission

With the dissolution of Federation at the end of 1963 the Northern Rhodesia government resumed full responsibility for economic affairs within the Territory and a request was made for United Nations assistance for the major purpose of establishing the broad framework and policy of an integrated economic and social development plan. This led to the appointment of an ECA/FAO Mission and one of its main tasks was to examine the prospects for the rapid advancement of African agriculture and to suggest the means by which this might be accomplished.

In its report the Mission said that economic and social progress in the Territory depended on the rapid modernization of its traditional agriculture (22). It noted that subsistence farming was the mode of life of about 450,000 farm families

comprising 70 per cent of the population, with an estimated agricultural output of £25 million, of which about £5 million represented cash income (probably a considerable overestimate as the official figure for 1964 was £3.1 million). The Mission made projections of the increase in commercial output from agriculture which assumed that from a base of £5.9 million in 1965 the expected growth to £9.6 million by 1970 could be pushed up to £16.2 million (an increase of nearly 70 per cent) as a result of the Mission's program of action. This program involved the increasingly widespread adoption of modern techniques in all branches of farming within a framework provided by modified tenure systems, resettlement, provision of credit, improved marketing facilities, and the participation of local authorities.

As was to be expected, the bulk of the program as listed was largely concerned with the expansion of activities in progress or under consideration but formerly held back by the lack of adequate resources. Two items in the comprehensive program merit comment here because of the emphasis they carried in relation to the central theme of rapid modernization of the agricultural pattern.

The first was that by 1970 over 50 special resettlement units should be established with an average of 200 families per unit. The Mission had shown great interest in a pilot settlement project, recently initiated in a good soil area, in which the land was laid out in 20 acre units to facilitate mechanized cultivation. Provision for management and for mechanized services was made by the Agricultural Department and there was a compulsory rotation. Marketing facilities were also provided and the settlement was operated on a modified estate basis designed to lead to a cooperative farming project. At the time of the Mission's visit the scheme was unproven, however, and difficulties emerged later which suggest that it is unlikely that the rate of expansion projected by the Mission can be realized. It will be noted that the Mission's proposal amounted in effect to a bid to by-pass the structural limitations of the traditional system in the effort to boost production, a tendency referred to earlier in this paper.

The other major proposal to assist in the rapid modernization of agriculture was for the establishment of over 3,000 single-tractor machinery units by 1970. Two preconditions for the success of this proposed rate of mechanization were stressed by the Mission. To get over the initial difficulties associated with inadequate skill in maintenance and operation, it was suggested that the best means of introducing mechanization might be through machinery pools operated by the government or by local authorities, with the equipment to be taken over at a later stage by cooperating farmers. Concurrently with the process of mechanization, it was thought that training in use and maintenance might be provided through arrangements with manufacturers to organize suitable courses, together with guarantees for the installation of service and repair facilities.

The second precondition for success was that there should be an increase in the area cultivated. The Mission felt that additional production from the existing sown areas would not support mechanization and that an expansion of area, as well as better husbandry practices, were necessary. This line of approach was fully consistent with the ambitions of very many emergent African farmers, who tend to envisage the growth of their enterprise in terms of expanding cultivated area, with the tractor as the key to progress. Apart from other factors, the

Mission's approach was debatable in that it appeared to visualize advancement through the encouragement of extensive systems rather than by more intensive cropping. However, the Mission seemed to envisage an increase in intensity as well as area expansion, and it was suggested that high maize yields might result in a shift to other cash crops, with cotton given as an example.

Price and Marketing Policies

When the Central African Federation was dissolved, Northern Rhodesia inherited the federal marketing machinery for agricultural commodities as well as a considerable commitment to the methods that had been developed, and with some continuing obligations with respect to price agreements. Under the federal government the emphasis was on marketing controls in support of the price system. The government worked in close collaboration with producer organizations and the producer prices of the main food commodities, maize, beef cattle, and milk, were the subject of price agreements under which price changes were linked with changes in production costs. The Zambia government took over the marketing arrangements on a basis designed to avoid any disruption, but with clear recognition of the need to introduce changes.

Changes were necessary in part because the marketing and price patterns had been developed under conditions which differed in some important respects from those in Zambia, in part because of the need for some redress in a general policy which appeared to favor producer interests without due regard to national welfare, and in part because an essential feature of the federal system, the cost-price link, had been discredited. This cost-price link was a feature of the various commodity price agreements entered into between the federal government and European producer representatives. Price changes were geared to changes in costs indices, with investigations into costs of production undertaken from time to time to give information on the cost structure. The indices were thus under continuous revision.

The main weakness of the cost index system is that as producers gain in efficiency the unit costs of production may fall while unit costs of the factors of production are rising. Thus the average yield of maize on commercial farms over the five-year period 1949-53 was under six bags an acre, and over the five-year period 1959-63 it was just over twelve bags an acre. Although the unit costs of such factors as labor, fertilizers, equipment, and fuel had risen significantly over the ten years the unit cost of production had certainly declined because of increases in factor productivity. Under the federal system the gains from cheapening production, in part a result of state assistance, were wholly reserved to producers and with both maize and milk this led to serious overproduction.

In 1958 the maize price agreement had become insupportable. The expanding production had pushed up subsidy costs to £4.5 million, much of it to meet Grain Board losses on exports sold at prices greatly below cost. A new agreement was concluded between the federal government and producers under which losses on export would no longer qualify for government subsidy. Under this agreement the guaranteed producer price (based on the cost-price formula) was to continue to be paid for that part of the crop sold internally by the Board, but for export maize the producers were to be paid on the basis of realizations. In imple-

menting the new agreement the Board did not revive the quota system practiced in the thirties, but paid producers on the basis of an averaged price, with interim and final payments varying according to the size of the export surplus and the prices received for exports.

Under the new arrangement the average price to the producer varied with the size of the crop, and fluctuations were large in a situation in which the internal price was held at about 40/- a bag alongside export values of 25/- a bag or less. Price stability was clearly regarded as less important than maintaining a relatively high price of maize. Consumers, overcharged for maize through the continuation of the old incentive cost-price formula as the basis for internal prices, were in effect subsidizing exports. Total production throughout the federal area, which had expanded on the basis of an incentive producer price backed by government subsidy for the export of surpluses was supported under the new system by the high internal price structure.

The cost-price system for milk, embodied in successive milk price agreements, was never fully operative after 1958 when it became necessary to set a limit to the increasing subsidy commitment created by the expanding surplus. When the system was introduced into Northern Rhodesia the average price paid to producers by the Federal Dairy Marketing Board was a weighted average based on the sales of whole milk at a relatively high price, sales of surplus milk in the form of manufactured dairy produce at prices below cost, and a subsidy. The Board was assisted by a butter supply monopoly which enabled profits on imports to be used to support the dairy industry.

After achieving independence in 1964, the Zambia government adopted principles in agricultural price determination which gave more weight to consumer and national interests alongside those of producers, and that introduced far more flexibility. Examples of early changes, which made full use of the local branches of the statutory boards taken over from the federal government, will make that clear.

In regard to maize it was recognized that sound price policy should aim at the maintenance of self-sufficiency without stimulating production to such a level as would lead to heavy and consistent losses on export. Because of the cost and risk involved in importation, the maintenance of self-sufficiency in the face of seasonal crop fluctuations called for a price pattern geared to the production of the national requirement plus an adequate safety margin. So the cost-price formula was abandoned and a system adopted which recognized the interaction of demand and supply by arranging for price adjustments, within controlled limits, in accordance with careful assessments of the supply position. Market and price guarantees were continued, the latter within the framework of the new system of annual price determination.

Changes made in cattle price policy after the break up of Federation were designed to correct the former discrimination in favor of both producers and consumers of high grade beef at the expense of producers and consumers of the lower grades, and to stimulate overall production without reducing the demand of low-income consumers. When the Federal Cold Storage Commission began operations in Northern Rhodesia in 1960 it was operating under the familiar cost-price formula whereby prices were adjusted at each annual price review in accordance

with changes in costs. In addition to the cost-price adjustment, the pricing mechanism was concerned with the determination of price differentials for the various grades of cattle on a seasonal basis and in relation to each other within the framework of the guaranteed price. Varying prices seasonally and by grade made it possible for policy decisions to be made effective. Thus the flow of cattle to market could be influenced by variations in seasonal prices, and in practice the prices were adjusted to offer incentives designed to produce the most advantageous flow. Similarly, incentives could be offered to encourage the supply of certain grades in preference to other grades.

Federal cattle policy favored the production of high quality cattle and beef, partly because of the aim to establish a permanent footing on the export market with first-class beef and partly as a means of building up a strong cattle industry. So, under the federal system price incentives were offered for cattle in the higher grades. The prices paid by the Cold Storage Commission for the top grades under this incentive price policy resulted in regular losses by the Commission in the disposal of the beef. These losses were not made good by subsidy but were recovered out of the profits made by the Commission in handling low grade cattle and beef. So the producers of the lower grades of cattle were underpaid and the consumers of the lower grades of beef were overcharged in support of the effort to maintain and expand the production of high quality beef. This subsidization of producers and consumers of high grade cattle and beef by the producers and consumers of the lower grades was an established feature of cattle price policy.

The Zambia government made changes which recognized the principle that producer prices should reflect the market value of the beef and which took into account local conditions with regard to both supply and demand. On the supply side it was clear that the incentive prices for the former top grades were out of reach of the great majority of producers and that such effect as the system might have had in the improvement of overall cattle standards was confined to comparatively few producers. Moreover, any useful effect of the system was probably offset because of the adverse effect on improvement at the lower levels of production that resulted from paying low-income producers a price that was below the market value of their product. One effect of penalty prices for low quality and inferior animals was to discourage sales so that animals unlikely to improve, and which should have come forward for disposal, tended to be held back and kept on when their place in the grazing areas could have been filled to more advantages by other of better quality. Further, underpayment at this level deprived producers of part of the small amount of working capital becoming available to them at a stage at which capital scarcity is a strong barrier to more progressive farming. The change in policy was based on the assumption that sound expansion of the cattle industry would depend upon wide-scale improvement in production off the natural grazings and assistance at the low level, with particular emphasis on cattle management and grazing management.

The difficulty in formulating new milk price policy resembled in part that faced in respect of maize since the old cost-price formula was invalidated in regard to both commodities by surplus production. It also resembled in part one of the difficulties in regard to beef, the problem of artificially discouraging consumption by low-income consumers. In fact, the milk industry had been built up to

supply the upper income segment of the community, within a price framework which put whole milk outside the range of the great majority of the people. Against this background, a situation had arisen in which large quantities, surplus to the whole milk market, were disposed of as manufactured produce for net returns little better than might have been realized if it could have been offered for sale to consumers lower down the income scale.

The federal system of producer prices for milk embodied a price guarantee for that part of the supply resold as whole milk by the Marketing Board, together with a price based on the realization value of the surplus used for other purposes, assisted by subsidy. When the Zambia government took over the trend was one of rising production with whole milk sales failing to keep pace with the milk intake so that both the high percentage of surplus and the heavy absolute surplus were increasing, creating a growing strain on the system. The Board's retail price for whole milk was 9½d a pint on the Copperbelt and 8½d elsewhere. Consumption of whole milk by Africans was negligible, and the use of subsidy in support of an industry catering for the high-income segment of the community was hard to justify.

When the producer price agreement reached the end of its term, the Zambia government revised that part of the system, abolishing the dual basis of payment for milk in favor of an overall guaranteed price. Attention was then turned to the expansion of whole milk consumption, largely as a means of improving nutrition but in part also to place the dairy industry on a sounder footing. The milk subsidy was augmented and a scheme was introduced for the supply of cheap whole milk, at 6d a pint, for the low-income population of high density housing areas. Prior to its inception the scheme was strongly opposed on the grounds that it might lead to a serious shrinkage in the Board's sales at the higher prices.

Retail depots were established in the high density township areas for the sale of the cheap milk, and the success of the scheme was spectacular. Within a few months the surplus had disappeared, the Board's problem became that of embarrassing shortage, and arrangements for the reconstitution of whole milk powder to meet the growing demand on an interim basis had to be considered. No significant change was noted in the higher priced sales and the prospects for the dairy industry had been substantially improved.

The Problem of Land Tenure

There were three administrative categories of land in Northern Rhodesia prior to independence: Native Reserve Land, Native Trust Land, and Crown Land. The Native Reserve and Native Trust Lands, about 95 per cent of the total area, were vested in the Secretary of State for the Colonies, with the former held for the sole use of and occupation by Africans and the latter similarly reserved except that leases might be issued to non-Africans if that would benefit the local African population. The Crown Land was vested in the Crown and held for the use of non-Africans. After independence all land was vested in the President on behalf of the Republic of Zambia.

African occupants of agricultural land in Zambia do not yet have formal title to the land they occupy. Traditionally, land rights accrued from residence in a village community and in general individuals wishing to open new lands for

cultivation could do so without formal allocation, as the usual lands formed a common pool. Since much of the country was occupied under systems of shifting cultivation, this system was fully adequate in the absence of population pressure. As commercial farming developed, with the beginnings of stabilized farming systems in the more suitable areas, the weaknesses of the traditional pattern became increasingly evident, and a definite proposal for the introduction of formal title was included in the report of the Rural Economic Development Working Party (20).

The report noted the disadvantages of customary tenure, stressing the problem of increasing subdivision in the stabilized areas as a result of inheritance. It pointed out that land was not only inherited, but loaned, given away, and even sold, so that the modified form of land tenure in the progressive areas approximated very closely to individual ownership, with the important exception that formal title was lacking. Obviously the Working Party envisaged the problem only in terms of cropland.

It was proposed that tenure reform should follow the progress of land use surveys and land use planning as part of the concerted program for agricultural advancement. Freehold, or title as near to freehold as possible, was recommended, but with control over subdivision and sale. The acquisition of title should be permissive. These proposals were founded on the assumption that if a seeding of successful African farmers was established under individual title, the process would extend as development spread, provided that suitable conditions were framed to encourage and facilitate the change.

As a result, an Ordinance was passed in 1962 which authorized any Native Authority to recommend that an adjudication committee should be set up in any area within the control of the Authority to consider claims for registered title. The committee was empowered to make recommendations to be put forward with a demarcation plan for approval, after which title could be registered by the Registrar of Deeds. Thus the Ordinance made provision for formal freehold title but only when the landholders, through their local representatives, wished to make the change.

The Ordinance was passed towards the end of a period of acute political tension. Although it was framed as an enabling measure, the strong suspicion associated with any moves which might affect land rights was sufficient to render it a dead letter. This failure might prove beneficial in the long run, for the advantages of an early move to freehold by emergent farmers may be more than offset by the disadvantages. During the transitional stage, permanent farming patterns which are likely to differ widely from area to area under varying ecological conditions and economic pressures, are scarcely apparent. Thus the development of cheap and simple motive power could double the area commanded by family labor under conditions suited to semi-intensive farming systems, while the adoption of much more intensive practice might have the reverse effect in other areas. In particular, the part to be played by cattle in integrated farming systems may bring marked changes in the concept of family farming. One serious risk of early individual ownership is what might be termed "fragmentation by aggregation," i.e., the process by which a progressive farmer increases the size of his farming area by purchasing plots of land as they come on the market. The cause is very

different from fragmentation by inheritance or the splitting of bits of land off for sale although the result is similar. For these and other reasons the adoption of freehold, ahead of a clearer picture of the future pattern of development, could become a real handicap at a later stage.

Much of the effort needed for early stage development is beyond the scope of the individual. This applies not only to major works undertaken as a result of regional planning in connection with reclamation and conservation but equally to development schemes involving heavy capital commitment in land improvement and services and to the more diffuse but considerable effort needed before effective use can be made of the large areas of communal grazings. Exploitation of these areas and the development of the cattle industry must depend upon bush clearance, paddocking, water supplies, and other major improvements, which are not merely outside the scope of individual effort but are likely to be uneconomic unless undertaken on a large scale.

It would be unfortunate if an early move into freehold tenure led to a serious weakening of the communal fabric of land holding at a stage when that characteristic could be most valuable. The outstanding factors in the present situation are the need to ratify individual security in arable tenure, with safeguards against fragmentation where stable patterns of farming are emerging, and the equally important need, as far as is practicable, to retain and build upon the communal interest in land as the basis for accelerated overall development beyond the scope of individual effort. These needs are not incompatible.

V. DIFFERING APPROACHES TO PLANNING

The history of agricultural change in Zambia since 1945 is notable for the continuous series of plans, none of them more than partially successful, which contributed to the pace and direction of development. Much the most remarkable feature of the three major approaches to planning over this period was that of the differences in principle by which they were motivated. Thus the dominant theme of the ten-year plan in 1945 was socio-economic; the basic principle underlying the proposed agricultural thrust put forward in the report of the Rural Economic Development Working Party fifteen years later is perhaps best described as agro-economic; and, continuing this form of classification, the approach in the ECA/FAO survey report of 1964 might fairly be labeled as politico-economic. If the major aim of agricultural development is the advancement of the rural people in their use and occupation of the land, then the socio-economic approach of the ten-year plan was more soundly based than that of either of the two later programs.

In the ten-year plan the agricultural effort was envisaged as part of a program aimed at providing a better life for the people in the rural areas. The main emphasis was on expanding agricultural extension, closely coordinated with other services in the rural areas, with the focus on people rather than on production. There is no doubt that the widely spread system of coordination proposed in this plan, with its area training centers and integrated teams, contributed to its vulnerability. Shortage of funds and lack of suitable personnel created structural weaknesses which were never overcome. Although a good deal of progress was initiated within the framework of the ten-year plan the inability to use the socio-

economic approach more effectively may have contributed to the swing away from the principles on which it was based when the next major planning effort was undertaken.

Certainly, the agricultural plan in the R.E.D. program had a very different focus. It was an agro-economic exercise, frankly concerned with production, in a development drive aimed at making the best use of available resources. The old concept of paternalism was gone, planners were now grappling with the logistics of production, and for that purpose commodity targets had become more important than people. Of the three broad approaches noted here this clearly offered much the most effective use of resources in the short term, partly because it was framed entirely by officials with a great deal of knowledge and experience of the conditions under which the development thrust was to be made, but more largely because of the sharp and narrow focus on means of expanding production, with other considerations, including that of the progress of the great majority of the people on the land, as secondary to the main issue.

The politico-economic approach of the ECA/FAO Survey Mission is perhaps best assessed against a wider background. In newly independent countries there is generally a strong and widely based sense of political awareness; and economic activities in the early stages are likely to be influenced, sometimes to the point of domination, by popular enthusiasm and political expediency. This situation is probably quite unavoidable and the effect on development planning has to be reckoned with. It may lead to a tendency to base development programs on goals or targets that are not related to careful and critical surveys of available resources; and it certainly tends to focus attention on schemes which have popular appeal. In Zambia these normal characteristics of a young economy, politically revitalized, have been merged with another factor, the sudden weakening of, and serious threat to the former strong economic ties with countries to the south. The ECA/FAO survey clearly took careful account of the political background and this obviously had an important effect in shaping the Mission's approach.

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