# POPULATION GROWTH AND AGRICULTURAL DEVELOPMENT IN KENYA

By

W.M. Senga
R. Faruqee
B.A. Ateng

OCCASIONAL PAPER NO. 40

INSTITUTE FOR DEVELOPMENT STUDIES
UNIVERSITY OF NAIROBI
P.O. Box 30197
NAIROBI, Kenya.

OCTOBER 1980

1981

# Preface

The current rate of population growth in Kenya is 4 percent per year -- the highest anywhere in the world. This has serious implications for the economy. These implications, e.g. the fiscal burden of providing basic needs services, finding employment for a rapidly growing labor force, coping with a larger dependency burden leading to lower savings rate, etc. have been analyzed in the recent World Bank report, Population and Development in Kenya.

Most of these implications of the rapid population growth for the economy have something to do with the agricultural sector. In Kenya, as in most LDCs, agriculture provides the base for the government to meet, to a significant extent, its fiscal responsibilities; agriculture absorbs the largest part of the addition to the labour force and provides the surplus to the economy to invest. The future of Kenya's economy, like many other LDCs, will be shaped to a large extent by official policies in response to population growth and to the needs of the agricultural sector.

The need to follow up the World Bank report by focusing directly on the linkages between the population growth and the agricultural sector was stressed at the workshop held at the University of Nairobi on February 12-13, 1980, to review the Bank report. This paper, using available evidence, analyzes the linkages of population growth and issues of agricultural development in Kenya and examines the policy options for Kenyan planners.

W. M. Senga, Director
Institute for Development Studies
University of Nairobi

R. Faruqee
Population and Human Resources Division
The World Bank

B. A. Ateng'
Economics Department
University of Nairobi.

October, 1980.

Table of Contents

List of Tables

# POPULATION GROWTH AND AGRICULTURAL DEVELOPMENT IN KENYA

## INTRODUCTION

Several studies now exist on the interrelationships between population growth and economic development. Some include empirical findings in analysing the relationships (e.g. Birdsall, 1977; Cassen, 1977), while others apply a macro-model to estimate the strength of these relationships in a given country (e.g. Coale and Hoover, 1958, Newman-Allen, 1967, Walsh, 1971). Population growth effects on selected sectors have also been traced (e.g. Jones, 1975). These sectoral effects usually relate to the fiscal burden of providing services for a growing population.

Few studies have analyzed the interrelationships between population growth and agricultural development. Since agriculture dominates most less developed economies, a thorough understanding of the links between population growth and agricultural development is necessary in evaluating policy options. This study examines those vital links for Kenya.

In Kenya, like most LDCs, agriculture is the key sector, contributing nearly 40 percent of the gross domestic product (GDP), 70 percent of all exports and employing 75 percent of the working labour force. The dependency on agriculture in Kenya is not as extensive as in some Asian countries. However, considering the unprecedented rate of population growth in Kenya, agriculture is going to play a key role in absorbing the huge addition to the labour force.

At the current rate of population growth -- 4 percent per year -- which is the highest anywhere in the world, Kenya's population will double in 20 years. Such a rapid growth has serious implications for the economy, including the fiscal burden of providing basic needs services, finding employment for a rapidly growing labour force, coping with a larger dependency burden leading to lower savings rates, and so on.[1] Most of these consequences of rapid population growth have something to do with the agriculture sector of

---

1. See World Bank, "Population and Development in Kenya," report no. 2775-KE (Washington, D.C., 1980.)

the economy. In most LDCs, agriculture, the key sector, provides the base for the Government to meet, to a significant extent, its fiscal responsibilities. More importantly, agriculture absorbs the largest part of the addition to the labor force and often provides surplus for the economy to invest. With the present population growth rate, the future of Kenya's economy will be shaped to a large extent by official policies in response to population growth and to the needs of the agricultural sector.

This study has five parts: (1) a description of the Kenyan agriculture sector, (2) an examination of the effects of rapid population growth on the sector, (3) an analysis of how the agricultural sector - its current and potential production -- affect population growth and movement within the country, (4) an evaluation of the prospects of the agricultural sector in response to the population growth pressure, (5) a discussion of potential for policies involving population and agriculture.

## 1. The Structure of the Agricultural Sector

Types of Land and Farms. Kenya's agricultural potential varies widely and is classified on the basis of average rainfall. From a total 52 million hectares of arable land, only 6.8 million hectares (13 percent) are considered high potential, 3.2 million hectares (6 percent), medium potential; and the remaining 42 million hectares (82 percent), low potential land.[2]

The World Bank's Agriculture Sector Report of 1973 identifies six agro-ecological zones in Kenya, as follows: Zone 1-some 800 square kilometers of high altitude land; Zone 2-about 53,000 square kilometers of indigenous and planted forests, mostly used for tea, coffee, and pyrethrum cropping; Zone 3-about 53,000 square kilometers of medium agriculture potential given over to large-scale mixed farming with maize, wheat, and barley; Zone 4-another 53,000 square kilometers with marginal agriculture potential, suitable for ranching; Zone 5-300,000 square kilometers of moderate land development potential, the site of livestock development programs, wildlife reserves, and high-risk, subsistence-based, shifting cultivation; and Zone 6-nearly 112,000 square kilometers, or 20 percent of the total land area, mainly in the north, which can sustain only nomadic pastoralism.

---

2. Republic of Kenya, Statistical Abstract, 1978, p. 102.

A dichotomy between small-scale and large-scale farms characterizes the production structure of Kenyan agriculture. Peasants comprise the bulk of the farming population and produce mainly staple subsistence crops, with some surplus for marketing. The relatively few large-scale farmers, produce both cash and food crops for local and export markets. There are about a million and a half small farms of eight hectares or less, mostly in traditional farming areas. In addition, an estimated 200,000 nomadic families live on the 20 percent of Kenya's land that is unsuitable for cultivation. The large farms are located in the former "scheduled" areas, which before independence (1963) were reserved exclusively for white settlers. These farms market most of their output and buy most of their inputs.

Before independence, it was possible roughly to classify large and small farms according to subsistence or commercial operations. Since then, however, the distinction has become increasingly blurred. Many large farms formerly owned by foreigners have been taken over by Kenyans, and some of these have been converted into settlement schemes involving smallscale farming.[3] In addition, some large farms have been acquired by cooperatives, partnerships, and limited companies and divided into smaller holdings. Finally, many former subsistence farmers are now marketing a significant part of their output. This has resulted largely from the introduction of cash crops, especially coffee, on small farms.

A more detailed classification of large and small farms may be helpful for understanding the interaction of population growth and agricultural strategies. Large farms can be grouped under four broad categories: sugar estates and plantations, ranches, mixed group-owned farms, and mixed farms owned by individuals or small companies. The relative sizes of these categories are shown in able 1.

---

3. A great many Kenyan plantations and ranches are still owned by foreigners, probably because these holdings are not suitable for subdivision, and few local prospective buyers can afford them.

Table 1: Type, Number and Area Under Large Farms

| Type of Farm | Number of Farms | Area (000 hectares) |
|---|---|---|
| Sugar estates and plantations | 675 | 400 |
| Ranches | 225 | 1,200 |
| Mixed group-owned farms | 790 | 430 |
| Mixed farms owned by individuals or small companies | 1,010 | 470 |

Source: Ministry of Economic Planning and Development, Agriculture Sector Report: 1978 (mimeo)

The large-scale farm sector consists of about 2,207 farms. Of these, about 1,800 are mixed farms owned by groups, individuals, or small companies. The ownership and operation of the large estates, ranches, and plantations has changed little since independence, whereas that of the mixed farms has been transferred mainly to Africans. This trend is reflected in the distribution of large farms by hectares: Table 2 shows that the number of farms of 20,000 and more hectares has remained more or less unchanged over the years. Significant changes in the organizational structure of the large-scale farming sector have mainly affected the middle-sized and smaller holdings.

Table 2 also shows that the number of farms in the range of 20 to 49 hectares increased from 271 in 1965 to 363 in 1977, whereas the number of farms of 1,000 to 1,999 hectares each decreased from 262 to 214 between 1965 and 1977. However, since 1970 the official breaking up of large farms has slowed down somewhat because of a lack of local buyers and the government's uncertainty as to its economic desirability. (The latest Five-Year Plan supports the land transfer programme.)[4]

Judith Heyer and J.K. Waweru (1976) have made a four-way classification of small farms, as follows: the "non-scheduled" areas--former African areas, containing more than a million small farms and 250,000 pastoral holdings; the settlement schemes -- Million Acre, Harambee, Haraka, Ol Kalou, and Shirika, which encompass 637,000 hectares of large farm land broken up into 35,000 holdings; the irrigation schemes, on which about 3,500 tenants are settled; and illegal settlements, in which some 300,000 small farmers live.[5]

---

4. Development Plan, 1979-83.

5. This estimate is based on the study by P. Mbithi and Barnes (1975).

Table 2: Distribution of Large Farms by size of Holdings in Selected Years

(number of holdings)

| Size of Holding (Hectares) | 1965 | 1970 | 1975 | 1976 | 1977 |
|---|---|---|---|---|---|
| 0 - 19 | 294 | 417 | 455 | 452 | 469 |
| 20 - 49 | 271 | 324 | 355 | 361 | 363 |
| 50 - 99 | 247 | 304 | 306 | 320 | 321 |
| 100 - 199 | 338 | 364 | 393 | 384 | 390 |
| 200 - 299 | 286 | 321 | 347 | 345 | 352 |
| 300 - 399 | 228 | 253 | 256 | 258 | 255 |
| 400 - 499 | 185 | 218 | 219 | 219 | 224 |
| 500 - 599 | 468 | 498 | 490 | 492 | 492 |
| 1,000 - 1,999 | 262 | 243 | 211 | 211 | 214 |
| 2,000 - 3,999 | 114 | 107 | 114 | 111 | 109 |
| 4,000 - 19,999 | 114 | 111 | 105 | 107 | 106 |
| 20,000 and over | 13 | 15 | 13 | 13 | 14 |
| Total | 2,820 | 3,175 | 3,264 | 3,273 | 3,309 |

Source: Republic of Kenya, Statistical Abstracts, 1969, 1974, 1977. Central Bureau of Statistics, Agricultural Census of Large Farms, 1977, p. 6.

Note: Number of holdings from 1970 onward are based on the new metric groupings, whereas those for the previous years are based on the old acreage groupings.

As for cropping distribution, we have the production figures of the principal crops on large farms--sisal, tea, sugarcane, coffee, wattle, pyrethrum, wheat, and maize from 1965 to 1977 (see able 3). Note that the area under sisal declined from 107.2 thousand to 67.9 thousand hectares between 1965 and 1972 as world market demands decreased. Tea and maize cultivation have increased over time, whereas coffee, pyrethrum, and wheat growing have decreased.

Production of all these crops is concentrated in certain areas because of ecological factors. Maize and wheat are mainly grown in the mixed farming districts of Nakuru, Uasin Gishu, and Trans Nzoia; coffee is grown almost exclusively in Kiambu and Muranga. Most of the tea is produced in Kericho. Sisal comes from the dry parts of the Central, Rift Valley, Eastern, and Coast Province.

Data on land use by small-scale farms and settlement schemes can be obtained from the district sample surveys taken occasionally by the Central Bureau of Statistics. The most recent figures are for 1969-70 (Table 4). The data for small farms are not exactly comparable to those for the large ones in Table 3, because the former data are classified under "cereals" and "pulses,"-- and "temporary" and "permanent" crops. Of the cereals, maize and sorghum appear to be the most widely grown varieties; beans, cowpeas, and pigeon peas lead among the pulses. The small farms also produce coffee and tea, which along with bananas and coconuts constitute what are called "permanent" crops.

## 2. Effects of Population Growth on Agriculture

A Historical Perspective. The major characteristics of the Kenyan agriculture sector--the dichotomy of large and small farms--is often rightly traced back to colonial policies. However, the role of demography in fostering large farms in the colonial days is often overlooked.

The colonial agricultural policy barred Africans from owning land in the so-called "white highlands," where most of the good quality land is located. To lure foreign settlers, the colonial government made this land available to them on easy terms. At first, the displaced Africans from the highlands were forced to live on "reserves." Soon the government, realizing the need for a cheap labor supply, brought the Africans back and compelled them to work for the white settlers. Also, Africans were taxed intensively and this forced them to work for wages.[6] But these policies would not have totally succeeded if the process was not helped by increasing population pressures, which ensured a supply of cheap labor.

The early policy of compelling Africans to work on settlement farms--by force, by taxation, and by preventing their access to large holdings or profitable crops--was somewhat relaxed in the mid 1920s. By that time, the African population had grown to the extent that cheap labor was abundant. Thus, population pressure plus economic measures ensured that Africans would be available to work on the settlers' farms. Another effect of growing

---

6. See E.A. Brett, Colonialism and Underdevelopment in East Africa: The Politics of Economic Change, 1919-39. (London: Heinemann, 1973) Brett has shown that the bulk of the tax revenue between 1920 and 1934 came from the African population.

Table 3: Large Farms: Areas Under Principal Crops, 1965-1977

(000 Hectares)

| | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sisal | 107.2 | 108.7 | 103.4 | 83.9 | 85.7 | 85.1 | 82.1 | 67.9 | 74.0 | 81.9 | 73.8 | 77.0 | 67.5 |
| Tea | 19.3 | 20.7 | 20.7 | 21.4 | 21.8 | 23.8 | 23.8 | 23.8 | 25.5 | 26.3 | 26.0 | 25.3 | 24.7 |
| Sugarcane | 18.3 | 17.1 | 21.9 | 26.5 | 26.1 | 28.1 | 28.1 | 26.9 | 27.1 | 29.3 | 31.5 | 30.1 | 32.2 |
| Coffee | 29.5 | 29.1 | 28.7 | 28.4 | 27.6 | 28.4 | 28.4 | 29.4 | 28.6 | 28.5 | 28.3 | 29.8 | 30.0 |
| Wattle (for sale as bark) | 23.8 | 23.1 | 18.6 | 17.5 | 16.5 | 16.6 | 16.6 | 16.1 | 13.7 | 13.6 | 12.1 | 11.8 | 11.7 |
| Pyrethrum | 4.8 | 5.0 | 4.8 | 4.9 | 3.0 | 3.7 | 3.7 | 3.6 | 3.2 | 4.3 | 4.1 | 3.0 | 2.3 |
| Wheat | 108.5 | 120.9 | 133.1 | 139.8 | 137.3 | 92.7 | 92.7 | 89.2 | 82.6 | 89.3 | 89.8 | 86.6 | 80.9 |
| Maize | 3.9 | 57.3 | 57.6 | 51.6 | 55.8 | 66.3 | 66.3 | 77.2 | 75.8 | 63.7 | 68.1 | 74.3 | 85.4 |

Source: Republic of Kenya, Statistical Abstract, 1974, Table 95, p.130; 1977, Table 96, p. 119.
Central Bureau of Statistics, Agricultural Census of Large Farms, 1977, pp. 10-16.

Table 4: Small-scale Farms and Settlement Schemes: Estimated Crop Areas, 1969/70

| Type of Crop | Estimated Crop Area (000 hectares) |
|---|---|
| **Cereals** | |
| Improved maize | 147.4 |
| Unimproved maize | 848.3 |
| Bulrush millet | 44.7 |
| Finger millet | 36.1 |
| Other millet | 13.1 |
| Sorghum | 141.2 |
| Wheat | 5.5 |
| Other cereals | 3.3 |
| **Pulses** | |
| Beans | 322.6 |
| Pigeon peas | 61.2 |
| Cow peas | 66.6 |
| Field peas | 12.8 |
| Yellow, green and black grams | 14.4 |
| Other pulses | 2.0 |
| **Temporary Industrial Crops** | |
| Cotton | 65.6 |
| Sugarcane | 28.3 |
| Pyrethrum | 15.3 |
| Groundnuts | 10.5 |
| Oil Seeds | 12.5 |
| Other temporary industrial crops | 6.0 |
| **Other Temporary Crops** | |
| Cassava | 76.8 |
| English potatoes | 37.7 |
| Sweet potatoes | 22.7 |
| Yams | 8.2 |
| Cabbages | 12.4 |
| Other vegetables | 1.2 |
| Other temporary crops | 28.4 |
| **Permanent Crops** | |
| Coffee | 62.5 |
| Tea | 19.6 |
| Coconuts | 40.0 |
| Bananas | 75.3 |
| Cashew nuts | 34.4 |
| Other fruits | 23.1 |
| Other permanent crops | 4.5 |
| Total area under cultivation | 1,547.1 |

Source: Republic of Kenya, Statistical Abstract, 1977, p. 112.

population pressure was to transform African agriculture into subsistence farming, which also encouraged Africans to hire themselves out to work for cash. Before World War I, Kenyan agricultural production accounted for at least 70 percent of Africa's; but by 1928 it contributed less than 20 percent. The absolute value of African export production fell steadily until the reserves became entirely subsistence agriculture. (Leys, 1973).

Increasing Pressure on Land and Changing Farm Size. With population growth came a gradual shift from large- to small-scale farming, and although the rate of change has been slow, the direction is clear. To date, the effect of this shift has not been totally unfavorable, as the following discussion indicates.

It was once assumed that, if the large farms were broken up, the marketable surplus would fall, leading to a decrease in exports. This assumption has been proved wrong. Table 5 compares the roles of large and small farms in gross marketed production from 1966 to 1977 and clearly shows the increasing importance of the small-scale sector. In fact, the importance of the smallscale sector is even greater than what the figures suggest, because only about 30-40 percent of the total small-farm production is sold outside the area in which it is produced, and the amount marketed locally does not appear in official statistics.

The small-scale sector has also had outstanding success with four important cash crops in Kenya-coffee, tea, sugar and pyrethrum.

The relative contribution of the small-scale sector to agricultural surplus is not the important consideration. Knowing the sector's relative efficiency in factor use is crucial in understanding the relationship between population growth and the prospects of the agricultural sector. Factor use efficiency has been studied and documented in some detail. For example, information is available on the nature of input and its relationship to output in both large and small farms as expressed in intensity of land cultivation.[7] This information has been obtained from surveys on settlement schemes representing small farms throughout the country and case studies on large farms in the Trans Nzoia District.[8] The discussion of the relationships

---

7. See J. Heyer, et al., 1976.

8. See Ministry of Finance and Planning Statistics Division, Kenya Statistical Digest, Volume 10, no. 1, 1972.

Table 5: Gross Marketed Production from Large and Small Farms, 1966-1977

| | LARGE FARMS | | SMALL FARMS | | TOTAL | | PERCENTAGE SHARE OF SMALL FARMS |
|---|---|---|---|---|---|---|---|
| | K£ Million | Annual Percent Change | K£ Million | Annual Percent Change | K£ Million | Annual Percent Change | Percent |
| 1966 | 36.0 | 8.1 | 32.8 | 37.4 | 68.8 | 20.3 | 47.5 |
| 1967 | 32.9 | -8.6 | 34.1 | 4.3 | 66.9 | 2.8 | 51.0 |
| 1968 | 34.4 | 4.9 | 35.8 | 5.9 | 70.2 | 4.9 | 51.0 |
| 1969 | 37.9 | 10.2 | 38.3 | 7.0 | 76.2 | 8.5 | 50.3 |
| 1970 | 41.2 | 8.7 | 44.2 | 15.4 | 85.4 | 12.1 | 51.7 |
| 1971 | 42.1 | 2.1 | 44.6 | 0.9 | 86.7 | 1.5 | 51.4 |
| 1972 | 50.3 | 19.4 | 55.6 | 24.8 | 105.9 | 22.2 | 52.5 |
| 1973 | 60.0 | 19.2 | 63.3 | 13.8 | 123.3 | 16.4 | 51.3 |
| 1974 | 73.4 | 22.2 | 75.0 | 18.5 | 148.4 | 20.4 | 50.6 |
| 1975 | 71.8 | -2.2 | 90.1 | 20.1 | 162.0 | 9.2 | 55.6 |
| 1976 | 122.1 | 70.1 | 128.0 | 42.1 | 250.0 | 54.3 | 51.2 |
| 1977 | 206.0 | 68.7 | 208.5 | 62.9 | 414.6 | 65.8 | 50.3 |

Source: Republic of Kenya, Economic Survey, 1974, p.55, Statistical Abstract, 1979, p. 104.

between farm size, output per acre, and employment per acre will be expanded in considering future options. The available evidence shows that in most cases small farms, holding other things constant, give more output and more employment per acre than large farms.

The relative efficiency of the small farm may be related to factors that have not yet been given much attention, however. For example, land quality may be the overriding consideration. If most of the remaining large farms are in areas of lower agricultural potential and if most of the existing small farms are in higher potential areas, a further transition from large to small-scale farming may not be as helpful as past records would indicate. Growth and efficiency are not uniform throughout the entire small-scale sector. They are concentrated in the highland areas, which have benefited the most

from the longstanding government program to help small farms.[9] The low-land areas have gained little from the government program; productivity in some of the lower and drier areas actually has worsened as population increased.

The data show that high potential lands benefitted by the introduction of crops most suitable for those areas. The growth rate of the small farm sector, as indicated by growth of marketed output, shows that most of the growth came from a small fraction of the total operations. This was especially true for coffee and tea: 3.3 percent of farmers in Muranga received almost 64 percent of the total coffee income in 1970-71; similarly, 1.2 percent of farmers in Gatei and Gakuyu received about 38 percent of the total tea income during the same years.[10]

Thus the apparently positive outcome of the transition from large to small farming because of the population pressure on land, is only limited to good quality land suitable for certain crops. Therefore, this optimistic result is not relevant to the long-run prospects of the agricultural sector.

On the negative side, population growth in the drier areas has led not only to lower per capita income but to famine, as land carrying capacity was exceeded. Generally, the harmful effect of population pressure on Kenya's farmland is taking many forms. First, as Mbithi and Barnes (1975) have shown, part of the marginal--low, dry--land is becoming arid because over population is leading to improper cultivation. They have found that squatter migrants on marginal lands often harmfully exploit the natural resources, both by destroying forests and by using poor farming techniques, such as inadequate fertilization and soil conservation. Heyer and Waweru have noted that relatively large numbers of people in Eastern Province are moving into previously unexploited uninhabited areas because of population pressure. Prospects there appear somewhat better, but the land is poor and no agricultural infrastructure exists. As a result, these areas are rapidly deteriorating, and the migrants are being forced to move again. Although this trend is in keeping with the old tradition of shifting cultivation, it is becoming too intensive and lengthy a process. If squatters stay more than three years in one place, using

---

9. The program was based on the Swynnerton Plan. This plan was created in 1954 by the then Assistant Director of Agriculture, R.J.M. Swynnerton. It covered a whole range of subjects, including, land tenure, consolidation and registration of holdings, extension of services, agricultural credit, and marketing policies. See L.D. Smith (1975) "An Overview of Agricultural Development Policy."

10. Heyer et al. (1976).

improper techniques of cultivation, the results are often so damaging that they cannot be corrected for decades. In addition, concentrations of population have led to depletion of valuable water catchments, in many places which upsets the equilibrium between land use and land capacity.

Second, even on better quality land, excessive fragmentation can lead to a loss of output, as output data from settlement schemes show. On some farms held by groups or cooperatives, members have unofficially divided the land among themselves, and as a result output has been lower than it would have been under more efficient management or more rational distribution. This problem is acute in the Haraka settlement scheme, where each family receives a small farm of five to seven acres on condition that the children will seek their livelihood elsewhere when they become adults. In practice, the children do not go elsewhere. The resulting land fragmentation has led to a gradual decline in the size of individual farms and an accompanying loss of productivity.

Third, landlessness is an important consequence of growing population pressure and a measure of rural poverty; unfortunately, data are sketchy.[11] The first Integrated Rural Survey (IRS 1) did not include landless households, but IRS 2 did. Preliminary findings by Thorbecke and Crawford show that nearly 11 percent of the total number of households are reportedly landless, and about 50 percent of them were estimated to be below the poverty line determined by the Ministry of Economic Planning and Development (MEPD). The concept of landlessness in IRS 2 is somewhat confusing, however. The entries for landlessness per se, and for households without land and households with zero hectares seem to be close. However, the provincial distribution of landless households is widely divergent-- ranging from 4.7 percent in Western Province to nearly 20.3 percent in Rift Valley Province. The discrepancy between landlessness and rural poverty is seen in Nyanza and Western, the two poorest provinces, as measured by the proportion of households below specific consumption and income standards (Table 6). These two provinces also have the lowest percentage of households without land. The data are not inconsistent because it is perfectly possible that provinces with large holdings but comparatively more households without land have on average higher income, and also that households without land could be deriving income from the nonagricultural sector.

Food Supply and Nutritional Status. Food requirements of a growing population exert a direct pressure on the agricultural sector. Estimates of food requirements of a population are usually derived from energy requirements and a safe level of protein intake. Food requirements are not the same

11. It was learned from sources at the Ministry of Planning that a major study on landlessness will be undertaken during the current Five-Year Plan (1979-83)

thing as the effective demand for food, which incorporates "income effects". However, a recent Food and Agriculture Organization (FAO) study shows conclusively that in most developing countries the population increase will be by far the dominant factor in influencing total demand for food.[12] Thus how food availability in Kenya is likely to be affected by population growth, among other things is worthwhile discussing.

Table 6: Percentage of Small Farm Households Below Poverty Line By Provinces (1974)

| Provinces | Percent of Households Below Poverty Line | | |
|---|---|---|---|
| | ILO Estimate I[a] | ILO Estimate[b] | MFP Estimate[c] |
| Central | 17.8 | 18.2 | 32.0 |
| Coast | 37.7 | 43.5 | 35.3 |
| Eastern | 27.1 | 28.5 | 40.2 |
| Nyanza | 50.7 | 55.5 | 42.0 |
| Rift Valley | 36.5 | 38.8 | 34.0 |
| Western | 47.7 | 51.6 | 56.0 |
| Kenya | 35.8 | 38.5 | 41.0 |

a. Consumption criterion at 1,700, Kenyan Shillings.
b. Consumption criterion at 2,200, Kenyan Shillings.
c. Income criterion at 2,000, Kenyan Shillings.

Source: Ministry of Economic Planning and Development and ILO.

Per capita food availability obviously depends on the rate of agricultural output growth compared with population growth. In Kenya, the rate of total agricultural growth has already shown a sign of decline. From an impressive average annual growth rate of 4.6 percent between 1964 and 1972, the annual growth rate of agricultural output has slowed to 2 percent during the 1972-77 period, although the agricultural population during the same period increased by more than 3.5 percent annually. This implies that per capita agriculture output has been declining since 1972. The higher growth rate of agricultural output before 1972 can be ascribed to such factors as availability of arable land, diffusion of high yielding maize, growth of

---

12. United Nations, FAO. Provisional Indicative World Plan for Agricultural Development, Vol. 1, New York: United Nations, August 1969.

coffee production, and so on. However, the recent sluggish rate is at least partly attributable to diminishing returns to labour, as arable land resources are fully utilized.

Table 7 presents the trend in per capita food availability, clearly showing that the food situation in Kenya has become less favourable.

Table 7: Annual Growth Rates of Population and Food During 1961-76

| Period | Population | Total Production Food | Agr. | Cereals | Per Capita Production Food | Agr. | Cereals |
|---|---|---|---|---|---|---|---|
| 1961-70 | 3.3 | 3.6 | 3.8 | 5.5 | 0.2 | 0.4 | 2.1 |
| 1970-76 | 3.3 | 0.2 | 1.1 | -0.8 | -3.1 | -2.2 | -4.0 |

Source: FAO: 4th World Food Survey, p. 69.

Since 1970, total food production has been growing only marginally, on a per capita basis, food availability has actually been falling during the 1970-76 period. However, in aggregate terms the food supply appears to be adequate so far. In 1976, the estimated per capita energy requirement was 2,053 calories daily; the protein intake, 52.6 grams per day. Although little agreement exists on what constitutes nutritional adequacy, Bohdal suggests 2,252 calories per person per day, while Cleave proposes 2,150 calories and 52.5 daily grams of protein.[13]

The aggregate picture of how adequately the current food balance sheet can supply energy and protein requirements on average is somewhat misleading for assessing the nutritional status of the Kenyan people. Much depends on how food is distributed, for which data are scarce. Given what is known about the distribution of income and consumption, it seems reasonable to expect that significant numbers of children and adults in Kenya are facing serious nutritional deficiencies.

One approach in evaluating nutritional status is to convert standards of minimum or desirable consumption into such measures as the minimum monthly income necessary for an adequate diet, or the minimum size of landholding

---

13. M. Bohdal, N.E. Gibbs, and W.K. Simmons, "Nutrition Survey and Campaign Against Malnutrition in Kenya, 1964-68," and J.H. Cleave, "Food Requirements and Availability in Uganda: A National Food Balance Sheet," in V.F. Amann, D.G.R. Belshaw and J.P. Stanfield, eds., Nutrition and Food in an African Economy, Makerere University, 1972.

necessary for subsistence for an average household. A recent International Labour Office report by Ghai et al. (1977) takes "the pattern of food consumption regarded as optimal by Bohdal ...calculate(s) the minimum food expenditure necessary for an adequate diet for a rural household in each province in April/May, 1977."[14] These figures are presented in Column 1 of Table 8. Column 2 of the Table, shows the figures of the total food consumption, including both purchases and own production, from the Integrated Rural Survey of 1974-75. Column 3 adjusts these figures for the increase in price level between December 1974 and March 1977. After calculating total food consumption as a percent of the estimated minimum food expenditure necessary for an adequate diet, the resulting figure is compared with the results of the nutritional table. The degree to which the population makes the minimum food expenditures necessary for an adequate diet varies from one province to another and the two provinces with the lowest total for food consumption-- Western and Nyanza--are some of the most densely populated.

Table 8: Food Consumption and Expenditures for Adequate Diet and Nutrition
(K Shs)

| Province | Minimum Food Expenditures for Adequate Diet April/May 1977[a] | Total Food Consumption Purchased and Own Production 74/75[b] | Total Food Consumption Adjusted to March 77 Price Level[c] | Total Food Consumption as percent of Min. Exp. |
|---|---|---|---|---|
| Central | 5449 | 3118 | 4365 | 80 |
| Coast | NA | 2613 | 3658 | NA |
| Eastern | 5622 | 3068 | 4295 | 76 |
| Nyanza | 5400 | 2039 | 2854 | 53 |
| Rift Valley | 5924 | 2564 | 3590 | 61 |
| Western | 6010 | 2108 | 2951 | 49 |
| North Eastern | NA | NA | NA | NA |

a. D. Ghai, E. Thorbecke and M. Godfrey, "Alleviating Poverty and Meeting Basic Needs in Kenya," ILO Consulting Mission, 1977. p. 18.

b. Table 8.16, IRS, 1974-75. p. 62.

c. According to Economic Survey 1977, Table 5.15, p. 49 food prices increased approximately 40% during the period December 1974-March, 1977.

Changes in Land Tenure and Utilization Pattern. Access to land in Kenya traditionally was determined by land use. A number of persons, groups of persons, or tribes might hold different rights over the same land area. For

14. D. Ghai, E. Thorbecke, and M. Godfrey, "Alleviating Poverty and Meeting Basic Human Needs in Kenya," ILO Consulting Mission, 1977. For Bohdal's optimal pattern of consumption, see M. Bohdal, N.E. Gibbs, and W.K. Simmons, "Nutrition Survey and Campaign Against Malnutrition in Kenya," 1964-68; (report to the Ministry of Health of Kenya on WHO/FAO/UNICEF assisted project.).

example, one group might claim grazing rights over a certain area, while another might hold hunting rights there, and still another have the right to cultivate it. In any case, the traditional land tenure system in Kenya was complex, and differed widely from tribe to tribe. As discussed, during colonization customary rights were abrogated to provide holdings for the foreign settlers, and reserves were created for displaced tribal groups. In the late 1930s, however, certain traditional tribal boundaries were officially adopted; ironically enough, it was the colonizing authority that "legalized" the long-standing rights of certain tribes to their home area.

Population pressures led to drastic changes in the land tenure and ownership patterns in the reserves. As traditional authority was weakened, especially in high population density areas like Kisii, Kiambu, and Kakamega districts, a narrower system of access to land developed in which exclusive units were held by families or individuals. This in turn led to further fragmentation of holdings and, more significantly, to incessant land disputes, as clans, families, and individuals sought to hold or gain access to ancestoral lands. (Okoth-Ogendo, 1975).

To meet this problem, the colonial government in 1954 began to restructure the land tenure system through land consolidation and registration. Even after Independence the programme's effect continues. First, fragmented holdings are consolidated; then the land is registered, the land and holders are given title deeds. The first phase includes surveying, mapping, and recording. In the second phase, land size and quality are considered and distribution is made accordingly.

The important land settlement schemes have been: 1) The Million Acre Settlement Plan, under which 35,000 families were settled on 470,000 hectares of land, at a total cost of K£30 million. 2) The Harambee Scheme, through which 400 families were allocated 6,500 hectares of land. 3) The Haraka Settlement Scheme under which 14,000 families were settled on 105,000 hectares, 4) The Ol Kalou scheme under which 86 large-scale farms covering a total of 56,000 hectares were taken over by 2,000 families, and 5) The Shirika Programme under which 105 farms totalling 108,627 hectares were operated by 12,000 families between 1971 and 1976 at a total cost of £6.3 million.[15] Under this programme the farms were not subdivided into smaller units. Instead, each

---

15. Republic of Kenya, Development Plan 1974-78, pp. 229-30.

farmer was allocated a small unit of land, about one hectare, for food production, while most of the land was set up as a large-scale community unit, with a manager provided by the Department of Settlement.[16]

These settlement farms are also affected by population growth pressure. Many of these farms that were settled by African partnerships and cooperatives to avoid fragmentation, are now subdivided among partners or shareholders. Squatter settlements have also grown on many of these farms. On government land, population pressure has taken the form of illegal settlement that is haphazard, uncontrolled, and often destructive.

Historically a few landmark changes in the land utilization pattern can be identified. Until 1930, there appeared to be no scarcity of arable land in the nonscheduled areas--those earmarked for African farmers. Various forms of livestock grazing and shifting cultivation were practiced, with expansion to new land as the population grew. This worked well for some time, but by 1930, land utilization in the nonscheduled areas began to take on a more settled pattern. In the late 1940s, growth of cash crops was permitted on the African farms. These significant changes came in response to increasing population pressure on agriculture.

### 3. Effects of Agricultural Development on Population Growth

Agricultural production and population growth. Since the agricultural sector is the source of livelihood for nearly 74 percent of the population and supplies staple foods, it has significant effects on population growth. The effects are through mortality, migration, and--to a lesser extent--fertility.

In the absence of agricultural output figures by provinces, Table 9 presents the population growth rates and agricultural land under various crop categories. Although no causal links are claimed, a strong association between population growth and the increase of agricultural land for food is production increased comparatively more also had more than average population growth.

---

16. Republic of Kenya, Statistical Abstract, 1977, p. 105.

Table 9: Growth of Population and Agricultural Production on Farms

| Provinces | Population Growth Rate 1962-69 | Population Growth Rate 1969-79 | Year | Cereals | Temporary Industrial Crops | Permanent Industrial Crops | (thousand Hectares Root Crops Vegetables Pulses & Fruits | Total |
|---|---|---|---|---|---|---|---|---|
| Central | 3.3 | 3.4 | 1970 | 202.2 | 20.3 | 78.3 | 196.2 | 497.0 |
| | | | 1975 | 377.7 | 17.3 | 128.7 | 503.1 | 1026.8 |
| | | | % increase | 86.8 | -14.8 | 64.4 | 156.4 | 106.0 |
| Coast | 3.5 | 3.5 | 1970 | 137.0 | 16.4 | 102.9 | 87.4 | 343.7 |
| | | | 1975 | 120.9 | 12.0 | 137.5 | 81.5 | 351.9 |
| | | | % increase | -11.8 | -26.8 | 33.6 | -6.7 | 2.3 |
| Eastern | 2.9 | 3.5 | 1970 | 388.4 | 47.4 | 33.3 | 335.0 | 804.1 |
| | | | 1975 | 622.8 | 37.9 | 101.5 | 866.7 | 1628.9 |
| | | | % increase | 60.3 | -20.0 | 204.8 | 158.7 | 102.5 |
| Nyanza | 3.7 | 2.2 | 1970 | 282.7 | 59.0 | 15.9 | 83.7 | 441.3 |
| | | | 1975 | 541.5 | 90.4 | 20.7 | 142.9 | 795.5 |
| | | | % increase | 91.5 | 53.2 | 30.2 | 70.7 | 80.3 |
| Rift Valley | 3.4 | 3.8 | 1970 | 257.7 | 19.2 | 73.7 | 15.6 | 366.2 |
| | | | 1975 | 295.3 | 23.4 | 62.6 | 14.8 | 396.1 |
| | | | % increase | 14.6 | 21.9 | -15.1 | -5.1 | 8.2 |
| Western | 3.9 | 3.2 | 1970 | 175.2 | 19.4 | 8.4 | 53.8 | 256.8 |
| | | | 1975 | 310.9 | 51.1 | 4.8 | 224.8 | 591.6 |
| | | | % increase | 77.5 | 163.4 | -42.9 | 317.8 | 130.4 |
| TOTAL | 3.4 | 3.4 | 1970 | 1443.2 | 171.7 | 312.5 | 771.7 | 2699.1 |
| | | | 1975 | 2268.6 | 232.3 | 455.9 | 1836.3 | 4793.1 |
| | | | % increase | 57.2 | 35.3 | 45.9 | 138.0 | 77.6 |

Source: Republic of Kenya, Statistical Abstract 1972, pp. 99, 105, 106

_____, Statistical Abstract 1977. pp. 126, 127, 140

Temporary Industrial crops include cotton, sugarcane, pyrethrum, groundnuts and oil seeds

Permanent Industrial crops include sisal, tea, coffee, wattle, etc.

Pulses include beans and peas.

Agricultural output growth may be both cause and effect of population growth. But the strong observed association between agricultural land under food production and population growth is consistent with the hypothesis that better agricultural products and better prospects for production--because of good quality land--led to better mortality conditions, higher in-migration, and perhaps higher fertility--because of better health and a desire for more children. Each of these possibilities are examined.

Effects on Mortality. Adult mortality in Kenya is relatively lower than what is usually observed for countries of the same level of living or development as Kenya. This may reflect the favorable aggregated food balance in Kenya, as noted. In comparison, infant and child mortality are not low in Kenya. This may reflect, among other things, a problem of interfamily distribution of food, child-rearing practice, and the social status and roles of mothers. These determine the time and attention mothers give to children.

Regional variation of mortality rates is substantial. Life expectancy at birth by province is shown in Table 10. Among the eight provinces, Nyanza has the lowest life expectancy; Nyanza has also one of the lowest increase of agricultural output and a low per capita good quality land (see Tables 9 and 11). Central Province, only 150 to 200 miles away from Nyanza, has the highest expectancy of life at birth, a difference being of some 15 to 20 years.

Variations by district are even larger. The highest expectation of life at birth, 63.2 years, was in Nyeri district in the Central region, and the lowest, 34.2 years, was in the Siaya district, in Nyanza. (North Eastern and Rift Valley Provinces where census data are unreliable, were excluded). The 30-year difference in life expectancy is extraordinary. The difference in agricultural growth and potential between the two districts is also significant.

Effects on Migration. The effect of external migration on total population growth has been negligible. But the role of internal population distribution, and consequently of population growth in specific areas, has been significant, although relatively small compared with the impact of natural population increases.

Information on internal population mobility in Kenya is available from birthplace data collected in 1962 and 1969.[17] Unfortunately, direct comparison between the two years--and thus direct estimation of intercensal

---

17. The census data of 1979 have not yet been processed for use.

Table 10: Expectation of Life at Birth By Provinces, 1969

| Regions | Expectation of Life at Birth | | | |
|---|---|---|---|---|
| | Census Estimate | Corrected[a] By ILO | Corrected[b] By World Bank Male | Female |
| Nairobi | 56.0 | 56.8 | 54.0 | 58.0 |
| Central | 57.8 | 60.1 | 54.7 | 61.0 |
| Coast | 47.2 | 43.4 | 45.1 | 49.7 |
| Eastern | 52.0 | 49.8 | 48.7 | 55.3 |
| North Eastern | 47.6 | 47.3 | 32.9 | 35.9 |
| Rift Valley | 55.3 | 54.1 | 40.7 | 43.9 |
| Nyanza | 42.5 | 38.6 | 39.4 | 45.6 |
| Western | 49.4 | 43.5 | 48.7 | 50.1 |
| Kenya | 49.0 | 47.8 | | |

a. ILO Working Paper (Anker & Knowles), No. 60, Table 2.

b. Bank estimates.

Table 11: Estimated Availability of Good Quality Land (1969)

| | Hectares (000's) | Ha/person 1969 | Ha/person 1979 |
|---|---|---|---|
| Central | 912.41 | .54 | .39 |
| Coast | 588.83 | .6 | .44 |
| Eastern | 1055.32 | .55 | .39 |
| North Eastern | 126.90 | .52 | .35 |
| Nyanza | 1224.80 | .58 | .46 |
| Rift-Valley | 3173.13 | 1.45 | .98 |
| Western | 741.00 | .56 | .40 |

Source: Statistical Abstract. 1977. Table 81.

Medium and Low Potential lands were converted to high quality land on the assumption that 5 hectares. of medium potential land and 100 hectares of low potential land was equivalent to 1 hectare of high potential land.

migration--is impossible, because of provincial boundary changes between the censuses. However, birthplacedata for 1969 provide estimates of lifetime migration between provinces (see Table 12).

Table 13 shows that internal population movement in Kenya is substantial. In 1969, there were 1.4 million people who had been born in a province other than the province in which they were then living: 1.8 million born in the district other than their district at that time. Thus one in every eight persons living in Kenya in 1969 moved at least once in his lifetime from one province to another, and one in every six from one district to another.

Nairobi, Coast, and Rift Valley provinces received the most immigration. In Nairobi Province, roughly three out of every four persons were lifetime immigrants; in Coast Province--where Mombasa, the capital is located--one out of every four; and in Rift Valley, one out of every five. Forty percent of in-migrants to Nairobi came from Central Province, the principal source of migrants to the capital city.

The chief provinces of out-migration were Nairobi, Central and Western. Approximately two out of every three persons born in Nairobi were counted elsewhere in 1969; the corresponding proportions for Central and Western provinces are one out of six and one out of seven, respectively.

Table 12: Lifetime Migrants by Provinces, 1969

| Province | Lifetime | | | | | |
|---|---|---|---|---|---|---|
| | In-migration[a] | | Out-migration | | Net-migration | |
| | Number | Percent | Number | Percent | Number | Percent |
| Nairobi | 386,273 | 75.9 | 303,580 | 59.6 | + 82.693 | +16.2 |
| Central | 168,281 | 10.0 | 332,554 | 19.8 | - 164,273 | - 9.8 |
| Coast | 212,652 | 58.9 | 27,666 | 7.7 | + 184,986 | +51.2 |
| Eastern | 45,085 | 2.4 | 262,871 | 13.8 | - 217,786 | -11.4 |
| North-Eastern | 10,962 | 1.8 | 10,380 | 1.7 | + 583 | + 0.1 |
| Nyanza | 193,986 | 9.1 | 186,069 | 8.8 | + 7,899 | + 0.4 |
| Rift Valley | 460,672 | 20.8 | 88,823 | 4.0 | + 371,849 | +16.8 |
| Western | 72,210 | 5.4 | 200,946 | 15.2 | - 128,736 | - 9.7 |
| Kenya | 1,550,122 | 14.2 | 1,412,889 | 12.9 | + 137,233 | + 1.3 |

a. Including those born outside Kenya.
Source: Data from the 1969 Kenya Population Census.

Table 13: Interprovincial Streams of Life-time Migration in Kenya, 1969

| | Percent Distribution of "In" and "Out" Streams for Each Province | | Number of Migrants In Streams to and From Each Province | |
|---|---|---|---|---|
| | "IN" STREAMS | "OUT" STREAMS | "IN" STREAMS | "OUT" STREAMS |
| NAIROBI | | | | |
| Central | 40.0 | 23.7 | 132,313 | 71,888 |
| Coast | 2.8 | 15.3 | 8,887 | 46,471 |
| Eastern | 19.5 | 1.3 | 64,372 | 3,860 |
| Northeastern | .3 | .1 | 928 | 64 |
| Nyanza | 16.3 | 39.0 | 53,985 | 118,561 |
| Rift Valley | 4.5 | 10.6 | 15,025 | 32,161 |
| Western | 16.6 | 10.0 | 54,892 | 30,585 |
| CENTRAL | | | | |
| Nairobi | 47.8 | 39.8 | 71,888 | 132,313 |
| Coast | 1.8 | 4.4 | 2,654 | 14,742 |
| Eastern | 10.8 | 4.5 | 16,362 | 15,064 |
| North Eastern | .3 | .2 | 419 | 646 |
| Nyanza | 5.2 | 2.5 | 7,818 | 8,213 |
| Rift Valley | 30.7 | 47.0 | 46,430 | 156,255 |
| Western | 3.8 | 1.6 | 5,850 | 5,322 |
| COAST | | | | |
| Nairobi | 29.9 | 33.7 | 46,461 | 8,887 |
| Central | 9.5 | 10.1 | 14,742 | 2,654 |
| Eastern | 31.8 | 12.4 | 49,398 | 3,269 |
| North Eastern | .9 | 16.6 | 1,397 | 4,377 |
| Nyanza | 15.8 | 12.1 | 24,487 | 3,175 |
| Rift Valley | 2.6 | 10.8 | 4,011 | 2,848 |
| Western | 9.5 | 4.2 | 14,714 | 1,121 |
| EASTERN | | | | |
| Nairobi | 11.5 | 39.8 | 3,860 | 64,372 |
| Central | 45.0 | 10.1 | 15,064 | 16,362 |
| Coast | 9.8 | 30.5 | 3,269 | 49,398 |
| North Eastern | 6.8 | 1.6 | 2,273 | 2,522 |
| Nyanza | 9.6 | 1.3 | 3,195 | 2,087 |
| Rift Valley | 10.3 | 16.5 | 3,443 | 26,633 |
| Western | 7.0 | .3 | 2,350 | 497 |
| NORTH EASTERN | | | | |
| Nairobi | .7 | 9.0 | 64 | 928 |
| Central | 7.2 | 4.1 | 646 | 419 |
| Coast | 49.1 | 13.9 | 4,377 | 1,397 |
| Eastern | 28.3 | 22.1 | 2,522 | 2,273 |
| Nyanza | 2.8 | 15.0 | 251 | 1,546 |
| Rift Valley | 9.3 | 25.8 | 826 | 2,650 |
| Western | 2.6 | 10.4 | 233 | 1,067 |

Table 13: (continued

Interprovincial Streams of Life-Time Migration in Kenya, 1969

| | "IN" STREAMS | "OUT" STREAMS | "IN" STREAMS | "OUT" STREAMS |
|---|---|---|---|---|
| NYANZA | | | | |
| Nairobi | 70.0 | 29.0 | 118,561 | 53,986 |
| Central | 4.9 | 4.2 | 8,213 | 7,818 |
| Coast | 1.9 | 13.2 | 3,175 | 24,487 |
| Eastern | 1.2 | 1.7 | 2,087 | 3,195 |
| North Eastern | .9 | .1 | 1,546 | 251 |
| Rift Valley | 6.0 | 45.8 | 10,156 | 85,157 |
| Western | 15.1 | 6.0 | 25,591 | 11,175 |
| RIFT VALLEY | | | | |
| Nairobi | 7.9 | 16.9 | 32,161 | 15,025 |
| Central | 38.8 | 52.3 | 156,255 | 46,430 |
| Coast | .7 | 4.5 | 2,848 | 4,011 |
| Eastern | 6.6 | 3.9 | 26,633 | 3,443 |
| North Eastern | .7 | .9 | 2,650 | 826 |
| Nyanza | 21.1 | 11.4 | 85,157 | 10,156 |
| Western | 24.1 | 10.0 | 97,316 | 8,922 |
| WESTERN | | | | |
| Nairobi | 52.7 | 27.3 | 30,585 | 54,892 |
| Central | 9.1 | 2.9 | 5,322 | 5,850 |
| Coast | 1.9 | 7.3 | 1,121 | 14,714 |
| Eastern | .8 | 1.2 | 497 | 2,350 |
| North Eastern | 1.8 | .1 | 1,067 | 233 |
| Nyanza | 19.0 | 12.7 | 11,175 | 25,591 |
| Rift Valley | 15.2 | 48.4 | 8,932 | 97,316 |

Source: Sly, David F. "Life-time Migration Patterns in Kenya, 1969" (Nairobi: Population Studies and Research Institute, University of Nairobi n.d.), pp. 14-15.

is located--one out of every four; and in Rift Valley, one out of every five. Forty percent of in-migrants to Nairobi came from Central Province, the principal source of migrants to the capital city.

The chief provinces of out-migration were Nairobi, Central and Western. Approximately two out of every three persons born in Nairobi were counted elsewhere in 1969; the corresponding proportions for Central and Western provinces are one out of six and one out of seven, respectively.

Almost 40 percent of out-migrants from Nairobi Province were enumerated in Nyanza and nearly 24 percent in Central; other important receiving provinces were Coast (15 percent), Rift Valley (11 percent) and Western (10 percent). Nearly half of all out-migrants from Central Province were enumerated in Rift Valley, another 40 percent in Nairobi. Western Province sent nearly half its migrants to Rift Valley, with another 27 percent enumerated in Nairobi and 13% in Nyanza.

On balance, Rift Valley, Coast, and Nairobi provinces had sizable net lifetime gains through migration, while Eastern, Central, and Western provinces had sizable losses. Net migration in Nyanza and North Eastern provinces was not large.

The major migration flows are clearly affected by the agricultural potential of land; internally people move to areas of better quality land or areas of less agricultural density. Nyanza and Western Provinces have high agricultural density and these provinces have sizable losses from lifetime migration. Similarly, the Eastern and North Eastern Provinces have low quality agricultural land; they have also experienced net losses from lifetime migration.

Effects on fertility. The effects of agricultural production or its potential on fertility result from both the desire for or the capacity to have children. The preferred family size is likely to be positively related with farm size because of the economic benefit derived from children's work on farms. This relationship, however, operates only to the extent that educational opportunities for children are viewed as sources of long-term investment, for example, for old-age support. Then, there can be a substitute of what is known as "quality" of children for the quantity, implying that fewer children will be desired but more resources will be allocated for their education.

The effect of agriculture on the physical capacity to have children is more direct since it works through the mother's nutritional and health status. Adequate food supply and working conditions in the agricultural field affect the ability of the mother to bear and raise children. Again, the relationship is not positively monotonic. After a point, when the physical conditions are no longer binding, the quality of children becomes an important consideration.

Table 14 provides some empirical evidence that the relationship between fertility--average number of live births--and quality adjusted land ownership. It is clear from the table that for women of certain child bearing age, the average number of live births increases with the quality adjusted land owned by the household.

Multivariate analysis done elsewhere, 18/ controlling for a host of other variables, also shows a positive effect of farm size on fertility.

Table 14: Average Number of Live Births for Rural Households by Wife's Age and Number of Quality Adjusted Acres of Land Owned

| Wife's | Quality Adjusted Land Owned | | | | |
|---|---|---|---|---|---|
| | None | 0.1 4.9 | 5.0-9.9 | 10.0-19.9 | 20.0 or more |
| 15-19 | 0.79 | 1.03 a/ | 1.37 a/ | 1.33 a/ | 1.27 a/ |
| 20-24 | 2.26 | 2.49 | 2.31 | 2.39 | 2.25 |
| 25-29 | 3.48 | 3.81 | 3.97 | 4.01 | 4.02 |
| 30 34 | 3.96 | 5.65 | 5.24 | 5.34 | 6.21 a/ |
| 35-39 | 5.94 | 6.49 | 6.78 | 6.88 | 6.69 a / |
| 40-44 | 5.65 | 6.08 | 6.47 | 6.90 | 7.46 a/ |
| 45-49 | 6.47 a/ | 6.65 a/ | 6.50 | 6.86 a/ | 7.00 a/ |

a. Less than 30 and more than 9 observations.

Source: ILO/University of Nairobi Household Survey, 1974.

18. World Bank, Kenya: Population and Development Washington, D.C., July 1980.

4. Future Outlook

Aggregated Picture. This section focuses on the broad picture of agricultural prospects under alternative scenarios of population growth. Only about 9 percent of the total land area is high potential; another 9 percent is medium potential. 19/ FAO estimates that in 1976 Kenya had a population density of 231 persons for every square kilometer of agricultural land. This is very high by sub-Saharan African standards. 20/ The African average was 40, while Ethiopia had 37, Tanzania, 31; and Uganda, 113. It is, however, true that the Kenyan density by units of arable land is still lower than some Asian countries. (For example, in India there are 346 people for each such unit.) Given the widely diverse population densities within Kenya in population density,so the degree of population pressure on land in some parts of Kenya probably is now as serious as in some Asian countries. 21/ Since the overall population growth in Kenya is much higher than that of Asian countries, clearly the Kenyan figure soon will be comparable to high Asian agricultural densities and could exceed them.

Several rough estimates of carrying capacity--how many people can be economically supported by the agricultural output of the land--based on assumptions of potential agricultural productivity, quality and mix of crops, and technological improvements, have been made for Kenya. Table 15 gives a 1973 IBRD estimate of carrying capacity at a given income level for two years--1972 and 2000. The figures for 1972, derived from the IBRD Agriculture Sector Report, indicate that the available land is capable of accommodating only 3.7 million more people in the rural areas than it supported in 1972. This is estimated on the assumption of given technology. The figures for 2000, prepared by the Kenyan Ministry of Lands and Settlement, were estimated on a different basis. First, the minimum income level assumed in the estimates of the Ministry of Lands and Settlement is Ksh 125 per capita annually in market prices. Second, the estimates of the Ministry of Lands and Settlement assumes that agricultural output will grow at an annual rate of 4.1 percent, largely through technological progress. This projected estimate of the effect of

---

19. W.M. Senga, 'Kenya"s Agriculture Sector,' eds. J. Heyer, J.K. Maitha and W.M. Senga, Agricultural Development in Kenya (Nairobi: Oxford University Press, 1976).

20. FAO, Production Yearbook 1977.

21. We come back to this point about diversity of agricultural density later in the section.

Table 15: Carrying Capacity of Land

| Province | Rural Population, 1972 | Population Surplus (+) or Excess 1972 Capacity (-) | Projected Rural Population, 2000 | Population Surplus (+) or 2000 Excess Capacity (-) |
|---|---|---|---|---|
| Central | 1,800,000 | 0 | 5,483,000 | +2,938,000 |
| Coast | 750,000 | - 1,250,000 | 1,60L,000 | - 576,000 |
| Eastern | 2,000,000 | + 300,000 | 5,250,000 | +1,903,000 |
| North-Eastern | na | na | 529,000 | + 339,000 |
| Nyanza | 2,400,000 | + 840,000 | 6,385,000 | +2,979,000 |
| Rift Valley | 2,300,000 | - 370,000 | 5,394,000 | -3,110,000 |
| Western | 1,440,000 | + 100,000 | 4,351,000 | +2,050,000 |
| Total | 10,690,000 | -3,710,00 | 29,000,000 | +6,522,000 |

Sources: For 1972 estimates, IBRD Agriculture Sector Survey (254a-KE, 1973), Annex I, 1973.
For 2000 estimates, Government of Kenya, Physical Planning Dept., Ministry of Lands and Settlement, 1976.
This rural population projection is consistent with to the series of constant fertility, showed in Table 7.4 of this report.

technological progress appears somewhat high, considering the fact that the actual rate of growth of agricultural output has been only 2 percent during the 1972-77 period. However, under these assumptions, the estimates show that pressure on the land will increase drastically during the next two or three decades, from a negative 3.7 million (1972) to a positive 6.5 million by the year 2000. These figures have been used by Richardson et al. (1977) to argue that by the end of the century there will be an excess rural population of 3.5 million for which the government must make room, possibly through the creation of new urban centers.

The estimates of carrying capacity are somewhat speculative, since they are sensitive to assumptions about land quality, crop mix, current and potential output per hectare, and, of course, projected income levels for fully utilized land.

An important aspect of carrying capacity in Kenya is the wide diversity in man/land ratio. Population density is correlated with quality of land, but the existing wide divergence makes the population pressure in some areas far more acute than in others, particularly in regard to the future. One estimate shows that more than eight times the national average amount of high potential land is available per person in certain districts of Narok; more than ten times the average, in Lamu. 23/ Yet, in some districts like Kakamega, Kiambu, and Nyeri, the availability of high potential land to population is only 50% of the national average. Interregional differences are only part of the diversity. Judith Heyer and J.K. Waweru have described the variations existing within the same region. 24/

Disaggregated Picture by Region. Because of the wide agricultural diversity, a disaggregated picture of agricultural prospects is appropriate given Kenya's differential population growth.

Population estimates for the year 2000 that have been made for various provinces are discussed in this section. The proportions provide a basis for a critical review of the current and planned policies involving landholdings and agricultural development in regard to current and future population growth.

---

23. Richardson et. al. (1977).

24. J. Heyer and J.K. Waweru. "The Development of the Small Farm Area," eds. J. Heyer and others, Agricultural Development in Kenya (Nairobi: Oxford University Press, 1976), p. 188.

Any population estimate based on past trends must be checked against the capacity of the land to absorb the projected increase. This task is difficult because land absorption capacity varies with factors such as:

- the quality of soil, rainfall, and temperature;
- the level of income desired for the average farmer;
- the improvements in agricultural technology that become available and the farm's capacity to afford them;
- annual variations in climate that result in droughts; and
- crop failures and other reasons for drastic declines in the number of people a unit of land can support.

Consequently, figures for the maximum population that Kenya's agricultural sector will be able to support in the future are only estimates. Approximations for the provinces are presented in this section. Only six agricultural provinces are considered here. Nairobi and North Eastern provinces were omitted.

i) Western Kenya (Nyanza and Western Provinces). The figures presented in Table 16 show that the overall rates of annual population growth in Western Kenya were 3.8 percent during 1962-69 and 2.6 percent during 1969-79, representing the rates at which births outnumbered deaths in the region, plus or minus the net migration to or from the region. Since Western Kenya has traditionally been a region of out-migration, it would appear that the natural growth rates of the population in this region should exceed the growth rates recorded. Table 16 shows that the population growth rates declined from 3.8% to 2.6% during the two intercensal periods.

The natural population increases for Nyanza and Western Provinces to the year 2000 in Table 16 have been estimated on the basis of an average annual growth rate of only 3 percent, which is somewhat higher than the growth rate during 1969-79. The assumption here is that out-migration rate would be lower in the future. At this assumed rate of increase, Western Kenya will have a population of 8,628,200 by the year 2000, as against 4,470,800 in 1979.

The prospect of such an increase in population presents grave problems from an economic planning viewpoint. Currently, almost 90 percent of the population of Western Kenya are farmers. The Ministry of Agriculture reports that, under traditional farming methods, each family requires 1 to 1.5 hectares of land in wet areas and as much as 3 hectares of land in the drier areas to obtain a subsistence standard of living. Thus, a simple calculation reveals

Table 16: Natural Population Growth Projection for 1980 and 2000 - Western Kenya

| District | Actual Population | | | Average Annual Rate of Increase | | Projected Population |
|---|---|---|---|---|---|---|
| | 1962 | 1969 | 1979 a/ | 1962-69 | 1969-1979 | 2000 |
| Kisumu | 301,800 | 398,200 | 479,708 | 4.0% | 1.9% | 995,500 |
| Siaya | 325,600 | 383,700 | 471,899 | 2.4% | 2.1% | 959,500 |
| South Nyanza | 481,600 | 661,900 | 815,260 | 4.6% | 2.1% | 1,685,000 |
| Kisii | 526,100 | 672,000 | 867,420 | 4.8% | 2.1% | 1,680,000 |
| Total Nyanza Province | 1,634,100 | 2,115,000 | 2,634,300 | 3.7% | 2.2% | 5,289,700 |
| Kakamega | 600,200 | 782,200 | 1,033,070 | 3.8% | 2.8% | 1,950,000 |
| Bungoma | 241,900 | 350,000 | 503,253 | 6.4% | 3.6% | 875,000 |
| Busia | 172,400 | 203,000 | 300,158 | 2.4% | 4.0% | 507,500 |
| Total Western Province | 1,014,500 | 1,335,100 | 1,836,500 | 4.0% | 3.2% | 3,338,500 |
| Total Western Kenya | 2,648,600 | 3,451,000 | 4,470,800 | 3.8% | 2.6% | 8,628,200 |

Source: Republic of Kenya, Western Province, Regional Physical Development Plan, Town Planning Department, Ministry of Lands and Settlement, May 1970, p. I - 11

a/ Republic of Kenya, Ministry of Economic Planning and Community Affairs Provisional Population Census 1979.

that even if all the farmable land in Western Kenya were to be divided into minimum units, fewer than 7 million people could derive a mere subsistence living from the land now farmed. The situation becomes even worse, when the possibility of raising the average income of the Kenya farmer is being considered. If the average farmer is to make K£100 every year in addition to subsistence, he will need between 2.25 and 7 hectares depending on the quality of the soil and the amount of rainfall. At this level, Western Kenya has sufficient land for farming population of only less than 3 million.

Table 17 estimates the "overflow" population that will result in the year 2000. The case A assumption is that all land is cultivated at subsistence level; case B considers a situation in which all available land is parcelled out to farms just large enough to provide an annual income of K£100 in addition to subsistence. The land problem becomes critical by the year 2000 in most districts in Western Kenya even if the population is willing to settle for a subsistence standard of living. If an income level above mere subsistence is desired, the land problem becomes an issue much sooner and the surplus population becomes only 3 times of what would be if only subsistence income is arrived at. Most districts of Western Kenya already have too great a farm population for every farmer to achieve a substantially higher income. Only Bungoma and Busia Districts show a surplus farm population capacity by 2000 only under conditions of subsistence income to the farming population.

It is clear that the possibility of absorbing any population increase into the farming economy and at the same time raising the level of the average farmer's income becomes rapidly worse. By the year 2000, approximately 5.5 million people will live in Western Kenya with insufficient land to achieve an annual family income of K£100 in addition to subsistence.

Since the urban areas of Western Kenya cannot be expected to absorb more than 0.7 million by the year 2000 even under conditions of rapid economic expansion, as many as 4.9 million Western Kenyans will need jobs in nonfarm rural industries or will have to migrate out of Western Kenya so that farms there can remain at an economic size.

ii) Central Province. Table 18 shows that population projections for Central Province refer only to the former Trustland Area. The projected rate of natural increase for the African population were made using two alternative assumptions: first, that the current fertility rates will remain

Table 17: Projection of Population Requiring Resettlement or Non-Farm Employment in Western Kenya, 2000

Case A If Farms are Allowed to be Reduced to Minimum Size Necessary for Subsistence Only
Case B If Average Farm Size Increased to Allow Income of Sh. 2000 p.a. Plus Subsistence

| District | Total Farmable area in Sq.Km | Case A | | | Case B | | |
|---|---|---|---|---|---|---|---|
| | | Hectares needed for subsistence* | Maximum farming population ** | Population who will need settlement or non-farm employment *** 2000 | Hectares needed for income of sh. 2000 pa plus subsistence * | Maximum farming population | Population who will need settlement or non-farm employment *** 2000 |
| Kisumu (Siaya | 4633 | 2 | 1,390,000 | 564,700 | 4 1/2 | 618,000 | 1,336,700 |
| South Nyanza | 5735 | 3 | 1,150,000 | 505,000 | 7 | 492,000 | 1,163,000 |
| Kisii | 2204 | 1 | 1,320,000 | 360,000 | 2 1/4 | 588,000 | 1,092,000 |
| Total Nyanza Province | 12,572 | | 3,860,000 | 1,429,700 | | 1,698,000 | 3,591,700 |
| Kakamega | 3268 | 1 1/2 | 1,310,000 | 646,000 | | 560,000 | 1,396,000 |
| Bungoma | 2535 | 1 1/2 | 1,010,000 | - | | 415,000 | 460,000 |
| Busia | 1625 | 1 1/2 | 650,000 | - | | 280,000 | 227,500 |
| Total Western Province | 7438 | | 2,970,000 | 646,000 | | 1,255,000 | 2,083,000 |
| Total Western Kenya | 20,010 | | 6,830,000 | 2,075,700 | | 2,053,000 | 5,675,200 |

* Based on reports issued by Ministry of Agriculture
** Assumed Family size = 6
*** Based on Annual population increase of 3%

Source: Republic of Kenya, Western Province Regional Physical Development Plan, Town Planning Department, Ministry of Lands and Settlement, May 1970, p. 1 - 14

Table 18: Projected Population Totals and Estimated Population Increase 1962-2000 Central Province (African Trust Land Only)
Assuming no Out-Migration

| District | 1962 | 2000 | | | |
|---|---|---|---|---|---|
| | Trust Land Actual Population | Low Projection Proj. Pop. | Low Projection Accum. Incr. | High Projection Proj. Pop. | High Projection Accum. Incr. |
| Kiambu | 355,709 | 680,116 | 324,407 | 1,286,955 | 931,246 |
| Nyeri | 240,845 | 460,496 | 219,651 | 871,377 | 630,532 |
| Muranga | 340,396 | 650,837 | 310,441 | 1,231,553 | 891,157 |
| Kirinyaga | 167,946 | 321,113 | 153,167 | 607,629 | 439,683 |
| Total:- | 1,104,896 | 2,112,561 | 1,007,665 | 3,997,513 | 2,892,617 |

Based on Projection of total African Population of Kenya 1970 - 2000 prepared by Department of Statistics, Ministry of Economic Planning and Development.

Low Projection Assuming declining fertility and declining mortality.
High Projection Assuming constant fertility and declining mortality.
Average family size Assumed 5.7.

Source: Republic of Kenya, Central Province, Regional Physical Development Plan, Town Planning Department, Ministry of Lands and Settlement, July 1967, p. 22.

constant while the mortality rates will decline; second, that both the current fertility and mortality rates will decline. These two projections are referred to as the "high projection" and "low projection," respectively. They show an increase in population of between 91.2 percent and 261.8 percent by the year 2000.

Table 19 shows two projections of each district's absorption capacity and the "overflow" population that would result from a natural population increase, assuming constant and declining fertility rates. These projections were made on the basis of two broad assumptions. The first shows the result of increasing the farming population until there is only enough land for each farmer to live at a bare subsistence level. This holding for the subsistence level was assumed, on the basis of Ministry of Agriculture studies, to be 3.5 acres--about 1.4 hectares--of land for each family. By the year 2000, even at this minimum living standard, there would be an overflow population of some 293,000 if the low projection materialized and 2,000,000 if the high projection occurred.

The second projection has been made on the assumption that each farmer should have a minimum annual income of K£100 in addition to subsistence production. In Central Province it has been estimated that a farmer would need 8 acres--about 3.5 hectares--to achieve this target. At this density there would be a population overflow, as shown in Table 19, of 1,300,000 to 3,200,000 by the year 2000.

Table 20 shows the effect on population densities in the former Trustland area of the Central Province by district, if no out-migration were to occur. By 2000 the average amount of land for each family would be less than one acre (<0.4 hectare) in several locations if the high projection is realized and less than 2 acres (<0.8 hectare) with the low projection.

(iii) Coast Province: The figures in Table 21 show that the average population growth rate for Coast Province between the three census periods, 1962, 1969, and 1979 was an annual 3.5 percent. The Table further shows the population projection for the year 2000, when the population of the province would reach 2,660,000--almost twice its level of 1,338,731 in 1979. Studies of Coast Province have shown that little surplus agricultural land of high productive capacity is to be found there.

Table 19: Projected Population Overflow Central Province (Former African Trust Land)

1. Assuming 3.5 Acres per Family (Minimum Requirement for Bare Subsistence)

2. Assuming 8.0 Acres per Family (Recommended Standard to Product Subsistence Plus £100 Income p.a.)

| | Trustland | BASED UPON 3.5 ACRES PER FAMILY | | | BASED UPON 8.0 ACRES PER FAMILY | |
|---|---|---|---|---|---|---|
| | | Pop. | Overflow by 2000 | | Overflow by 2000 | |
| | Acreage | Capacity | Low Projection | High Projection | Low Projection | High Projection |
| Kiambu | 413 | 430,346 | 249,770 | 850,609 | 491,788 | 1,098,627 |
| Nyeri | 327 | 340,734 | 119,762 | 530,643 | 311,384 | 722,265 |
| Muranga | 588 | 612,696 | 38,141 | 618,857 | 382,709 | 963,425 |
| Kirinyaga | 418 | 435,556 | -114,443 | 4,127 | 130,505 | 417,021 |
| Total:- | 1,746 | 1,819,332 | 293,230 | 2,010,236 | 1,316,386 | 3,201,338 |

Based on Projection of Total African Population of Kenya 1970 - 2000,
Prepared by Department of Statistics, Ministry of Economic Planning and Development.
Low Projection Assuming Declining Fertility and Declining Mortality.
High Projection Assuming Constant Fertility and Declining Mortality.

Source: Republic of Kenya, Central Province Regional Physical Development Plan, Town Planning Department, Ministry of Lands and Settlement, July 1967, p. 29.

Table 20: Projected Population Densities and Land/Family Ratios 1962 and 2000)

Central Province (Former African Trustland) Assuming no Out-Migration

| District | 1962 | | 2000 | | | |
|---|---|---|---|---|---|---|
| | Actual | | | | | |
| | Av. Density Persons P.S. Mile | Av. Acreage per Family | Av. Density Persons P.S. miles | Av. Acreage per Family | Av. Density Persons P.S. Mile | Av. Acreage Per Family |
| Kiambu | | | | | | |
| Total African Trustland | 861 | 4.0 | 1,646 | 2.2 | 3,115 | 1.2 |
| Most Dense-Kabete Loc. | 1,360 | 2.7 | 2,600 | 1.4 | 4,290 | 0.7 |
| Nyeri | | | | | | |
| Total African Trustland | 736 | 5.1 | 1,407 | 2.6 | 2,662 | 1.4 |
| Most Dense-Muhoya Loc. | 1,245 | 2.9 | 2,380 | 1.5 | 4,504 | 0.8 |
| Muranga | | | | | | |
| Total African Trustland | 579 | 6.3 | 1,107 | 3.3 | 2,094 | 1.7 |
| Most Dense-Loc. 18 | 1,058 | 3.4 | 2,023 | 1.8 | 3,828 | 0.8 |
| Kirinyaga | | | | | | |
| Total African Trustland | 402 | 9.1 | 769 | 4.8 | 1,454 | 2.5 |
| Most Dense Inoi Loc. | 846 | 4.3 | 1,617 | 2.3 | 3,061 | 1.2 |

Based on projection of total African population of Kenya 1970-2000 prepared by Department of Statistics, Ministry of Economic Planning and Development. Low Projection assuming declining fertility and declining mortality. High Projection Assuming constant fertility and declining mortality. Average family size assumed - 5.7.

Source: Republic of Kenya, Central Province Regional Physical Development Plan, Town Planning Department, Ministry of Lands and Settlement, July 1967, p. 30.

iv) Rift Valley Province. This province has extensive large scale farms and forest areas. But, can the agricultural potential of the province provide productive work for the natural population increases in the province and still absorb the expected "overflow" from other provinces?

At the time of the 1962 census the population of the Rift Valley was 1,739,800 representing a gross density of 10.2 persons per square kilometer. By 1969 this figure had risen to 2,210,289 persons--13.0 persons every square kilometer. By 1979 the figure rose to 3,240,316 persons--19.0 every square kilometer. The average annual growth rate during the 1962-69 period was 3.4 percent. During 1969-79 the rate increased to 3.8 percent. These overall average figures give no indication, however, of the wide variations of population density caused by differences in soil and rainfall. The growth rates by districts and projections for the year 2000 are shown in table 22. Districts recording growth rates significantly greater than 3.4 percent a year for the period 1962-69 and greater than 3.8 percent a year for the period 1969-79, probably were receiving immigrants from other districts. About 4,693,500 people are expected to be living in the Rift Valley Province by the year 2000 given the trend of population growth.

Table 23 shows that if all the land in the Rift Valley Province were to be developed to its optimum agricultural use, the entire projected population of the province in the year 2000--4,693,500--in theory could have enough land for each family to earn K£ 100 plus subsistence and there would still be enough room for another 1,439,000 persons.

Rift Valley Province is relatively wealthy in land resources. It is the only province that will be able to support its projected agricultural population in the year 2000 with more than K£100 for every family. Table 23 further shows that, even if the province were completely empty of existing population, it would only absorb half of the expected rural population "overflow" of 12.5 million people from Central, Western and Nyanza Provinces at a level of K£100 per family by the year 2000. However, since Rift Valley's own population is expected to increase from 2.2 million to 4.7 million by the year 2000, no more than 10 percent of the overspill from these provinces could expect to find land in the Rift Valley, even if every hectare were to be brought into its maximum use.

Table 21: Coast Province Population Growth Rates in 1962-1969, 1969-1979 and A Projection for the year 2000

| District | Actual Population | | | Compound Rate of Annual Increase | | Actual Population 1969 Mathematically Projected to 2000 at a Compound rate of 3.4% per annum |
|---|---|---|---|---|---|---|
| | 1962 | 1969 | 1979 | 1962-1969 | 1969-1979 | |
| Kilifi | 247,832 | 307,568 | 428,087 | 3.1% | 3.3% | 867,000 |
| Kwale | 157,828 | 205,602 | 286,852 | 3.9% | 3.3% | 580,000 |
| Taita | 90,146 | 110,472 | 148,108 | 2.8% | 2.9% | 310,000 |
| Tana River* | 39,502 | 50,696 | 92,153 | 3.6% | 6.0% | 143,000 |
| Lamu | 22,961 | 22,401 | 42,030 | -0.3%(decline) | 6.3% | 64,000 |
| Mombasa | 179,575 | 247,073 | 341,501 | 5.7% | 3.2% | 696,000 |
| Total Rural | 558,269 | 696,739 | 997,230 | 3.2% | 3.6% | 1,964,000 |
| Total Coast Province | 737,844 | 944,082 | 1,338,731 | 3.5% | 3.5% | 2,660,000 |

* The figure for the Tana River District Poulation has been adjusted to take account of an inter-census period boundary change.

Source: Republic of Kenya, Coast Province Regional Physical Development Plan, Town Planning Department, Ministry of Lands and Settlement, May 1971, p. 17.

Table 22: Rift Valley Population Growth Rates in 1962 - 1969, 1969 - 1979 and A Projection for the Year 2000

| District | Actual Population | | | Annual Rate of Increase | | Projected Population Year 2000 |
|---|---|---|---|---|---|---|
| | 1962 | 1969 | 1979 | 1962-1969 | 1969-1979 | |
| Narok | 110,100 | 125,219 | 213,278 | 1.8 | 5.3 | 196,700 |
| Kajiado | 68,400 | 85,903 | 148,278 | 3.3 | 5.5 | 216,600 |
| Nakuru | 227,900 | 290,863 | 522,333 | 3.5 | 5.9 | 727,500 |
| Nandi | 167,200 | 209,068 | 293,193 | 3.2 | 3.4 | 543,500 |
| Kericho | 340,600 | 479,135 | 635,044 | 4.9 | 2.8 | 1,205,700 |
| Elgeyo/Marakwet | 161,000 | 159,265 | 149,361 | -0.1 | -0.6 | 155,200 |
| Baringo | 150,400 | 161,741 | 202,642 | 1.0 | 2.3 | 218,800 |
| Turkana | 159,300 | 166,225 | 142,708 | 0.5 | -1.5 | 190,300 |
| Samburu | 56,600 | 69,519 | 76,830 | 2.9 | 1.0 | 145,100 |
| Trans Nzoia | 86,100 | 124,361 | 259,601 | 5.2 | 7.4 | 318,200 |
| Uasin Gishu | 92,000 | 191,036 | 303,900 | 11.0 | 4.6 | 466,200 |
| West Pokot | 59,000 | 82,458 | 158,373 | 4.8 | 6.5 | 217,000 |
| Laikipia | 61,300 | 66,506 | 134,474 | 1.2 | 7.0 | 92,800 |
| | 1,739,800 | 2,210,289 | 3,240,316 | 3.4 | 3.8 | 4,693,500 |

Source: Republic of Kenya, Rift Valley Province, Regional Physical Development Plan, Ministry of Lands and Settlement, Town Planning Department, Nairobi, 1971, p.20.

Table 23: Rift Valley Province - Farm Intake Capacity of Population Overspill by 2000

| District | Maximum Farm Population '000 persons @ £ Per Annum | Projected Population Year 2000 '000 persons | Intake Capacity of Overspill '000 Persons |
|---|---|---|---|
| Narok | 981.3 | 196.7 | 784.6 |
| Kajiado | 65.7 | 216.5 | -150.8 |
| Nakuru | 499.6 | 727.5 | -227.9 |
| Nandi | 792.0 | 543.5 | 248.5 |
| Kericho | 1148.0 | 1206.7 | -57.7 |
| Elgeyo/Markwet | 336.7 | 155.2 | 181.5 |
| Baringo | 371.0 | 218.8 | 162.2 |
| Turkana | 110.4 | 190.3 | -79.9 |
| Samburu | 69.7 | 145.1 | -75.4 |
| Trans Nzoia | 476.3 | 318.2 | 158.1 |
| Uasin Gishu | 672.0 | 466.2 | 205.8 |
| West Pokot | 443.3 | 217.0 | 226.3 |
| Laikipia | 165.7 | 92.0 | 73.9 |
| Total | 6132.7 | 4693.5 | 1439.2 |

Source: Adopted from Republic of Kenya, Rift Valley Province, Regional Physical Development Plan, Ministry of Lands and Settlement, Town Planning Department, Nairobi, 1971, p.16.

Comparison of the 1969 population figures (table 22) with the figures for maximum farm populations in table 23 shows that two districts, Turkana and Kajiado, already have populations that are too high for every family to earn an annual K£100 per person from farming. By the year 2000, three more districts, Nakuru, Kericho, and Samburu will have joined this category.

v) Eastern Province. Table 24 shows the projections for the year 2000 and the estimated population overspill by that year. The population projection was made on the assumption that the province's growth pattern will be at the same rate as the overall figure for the country. The population of Eastern Province is not evenly distributed due to climatic variation and lack of good agricultural land. About three-quarters of the province are arid or semi-arid areas with low density population well below the provincial average.

Table 24: Eastern Province - Estimated Overspill Population by 2000

| Name of District | 1962 | Estimates for 2000* | | | | | Population Projection Estimated by 2000** | Overspill |
|---|---|---|---|---|---|---|---|---|
| | | | | Non-Farming | | | | |
| | 1962 | 1969 | 1979 | Urban | Rural | Farming | Total | |
| Machakos | 571,600 | 707,214 | 1,019,126 | 149,000 | 86,600 | 655,800 | 837,400 | 1,577,600 | 740,200 |
| Kitui | 284,700 | 342,953 | 463,512 | 24,000 | 92,900 | 92,900 | 827,100 | 785,700 | -41,200 |
| Embu | 134,700 | 178,912 | 262,085 | 124,500 | 19,800 | 152,500 | 296,800 | 371,800 | 75,000 |
| Meru | 473,800 | 596,506 | 832,710 | 57,500 | 98,200 | 755,200 | 906,400 | 1,307,700 | 401,300 |
| Isiolo | 54,600 | 30,135 | 43,375 | 13,000 | 7,100 | 54,800 | 74,906 | 150,400 | 75,500 |
| Marsabit | 37,500 | 51,581 | 96,229 | 13,000 | 2,000 | 155,500 | 170,500 | 103,500 | -67,200 |
| Total | 1,556,900 | 1,907,301 | 2,717,037 | 381,000 | 306,600 | 2,488,500 | 3,176,100 | 4,296,800 | 1,120,700 |

*Estimated population that can be expected to derive a livelihood within the Province at the rate of £47 p.a. cash in addition to subsistence - for the farming population and assuming all the land is utilized; as well as the non-farming activities.

**"Mean" projection of population assuming declining mortality and "gradually" declining fertility.

Source: Republic of Kenya, Eastern Province - Regional Physical Development Plan - Town Planning Department - Ministry of Lands and Settlement - Government Printer, Nairobi, 1970, p. 1-20.
Republic of Kenya. "Provincial Population Census 1979" (mimeographed).

The wide variation between the projections discussed for each province, depending on the assumptions made, show the limitation of long range forecasting of the agricultural or any other sector. Such projections, however, underscore the magnitude of the problem that the country will face if birth rates remain high at the current level and if the objective is to raise the income of the small farmers.

If Kenya cannot produce agricultural output at a level above subsistence requirements, then the possibilities of economic growth will be severely limited. If we assume, based on the recent trend that there will be no significant productivity increase in the near future, a maximum 14 million people can support themselves through agriculture in the whole country with the provision of K£100 for each family above the subsistence level.

Disaggregated Picture by Sources of Growth [25]

Three basic ways of increasing agricultural production and employment are (1) expanding agricultural land supply through irrigation, drainage or conversion of forests and pastures, (2) shifting cropping patterns towards crops of higher value and more employment potential, and (3) intensifying land use through innovations. This section focusses on the prospects of these three approaches.

Irrigation is considered an important method of expanding agricultural land supply. In Kenya, the estimates of irrigation potential vary between 200,000 to 500,000 hectares. Taking the upper limit of the estimates, namely 500,000 hectares, the expected contribution of irrigation to agricultural production is approximately K£225 million, constituting about 25 percent of the increase needed by the year 2000 in response to population growth. The employment potential from irrigating 500,000 hectares is about 800,000 jobs, which is less than 20 percent of the needed increase in the agricultural employment by the year 2000. Assuming a more favorable prospect about the employment coefficient from irrigation, the total employment potential from the higher estimate of irrigation potential is nearly 2 million jobs, which is about 50 percent of the needed increase in agricultural employment. If, however, the lower estimate of the irrigation potential is combined with the lower

---

25. This subsection is based on work by Gene Tidrick (1979) which constitutes a part of the forthcoming World Bank document, Basic Economic Report for Kenya. In that report, the growth potentials of the agricultural sector are discussed in further detail.

estimate of the employment coefficient, the employment potential will cover only 3 percent of the increased labor force seeking employment by the year 2000.

In considering the cost of irrigation, prospects become limited, because irrigation is expensive. If the cost estimate from the Bura Irrigation Scheme is used as a typical cost of irrigation, then the estimated cost of irrigating 500,000 hectares is nearly $4.3 billion (K£1.6 billion) in 1979 prices. This figure can be compared with the projected total agriculture investment during the 20 years of the century, $11 billion (K£ 2.7 billion). This implies that the irrigation development could absorb as much as 60% of the total projected investment funds for agriculture over the next 20 years and about 15 percent of the total government development expenditure during the same period. In addition to the expense, the irrigation schemes also have several technical and economic problems. Manpower availability is a constraint. Moreover, the rate of return from irrigation is easily reduced if the land quality is poor. It has been found that small irrigation projects in the high altitude good quality land have a much higher rate of return than a large irrigation project in the dry area.

The 1979-83 Development Plan points out that the irrigation programme will undergo a major review in the first year of the Plan. Alternative systems of water use, irrigation settlement schemes with intensive water needs, and supplementary irrigation with lower water inputs per hectare will be considered in view of the limited water resources and the water needs of both high-potential and semi-arid and arid lands. The emphasis will be on the development of a great number of small-scale irrigation projects. /1979-83 Development Plan, p.255/

Drainage is another feasible way of increasing the supply of agricultural land. Although the government has not invested in drainage, the potential for increasing land area through drainage seems to be better than irrigation. An estimated 1 million hectares of high and medium potential land mostly in the valley floors, can be reclaimed through drainage. Most of this land is in Western Kenya but some reclaimable areas may also be found in Coast and Rift Valley provinces. The production benefit from drainage is not as high as irrigation because part of the waterlogged areas are cultivated, although not to their full potential. Employment potential is, however, high, because of the labor needed to maintain drainage schemes. Employment per hectare

reclaimed is estimated at 2 man-years per hectare, which is 25 percent higher than the estimate for irrigation. The value added would range from 330 to 360 per hectare depending, of course, on the type of crop grown in the area. The development cost of drainage is, however, significantly lower than irrigation, giving a high rate of return for drainage. First, Kenya has limited experience with drainage systems partly because land shortage is only a recent experience. Second, drainage systems need coordinated efforts such as a group of small holders to plan and maintain them. Government intervention is required to develop a certain kind of system through which landowners can benefit from the drainage and share cost equitably.

It is stated in the current Development Plan that efforts will be made to develop a great number of drainage and flood controls for valley bottoms and other areas of impeded drainage with the potential for intensive farming to include appropriate crop and livestock activities.

Another means of increasing the supply of agriculture land would be, of course, bringing large forest areas under crop cultivation. Obviously, such a move has ecological implications and needs to be studied carefully. Some people who advocate cultivating forests as a means to increase agriculture production point out that crops such as tea would be as good as the forest providing watershade coverage. Since tea is also a labor-intensive crop, they argue that, by clearing 1 million acres of high potential land from forest, 800,000 jobs and K£200 million worth of tea could be produced. This is, of course, subject to the demand for tea, which is not always within the control of the economy. If other crops are planted in a cleared area, the benefit may not be a gain of 100 percent, because in some cases the Forest Department already has a practice of temporarily clearing and leasing for agriculture. In addition to ecological considerations, the preservation of wildlife which in Kenya is an important source of tourist income is an element that will be affected if a part of the forest is cleared.

Four-fifths of Kenya's lands is dry and if there is any method of dry land agriculture, it could significantly increase the agricultural potential in Kenya. Currently, much of this land is devoted to pastoralism but there is increasing migration from densely populated high potential areas to these areas. Some people point to the prospects of using the vast dry land to increase agricultural output and employment. However, the production and employment potential of these marginal areas are extremely limited for several reasons. First, any

farming of this land will quickly damage the fragile environment and the soil properties. In fact, signs that inappropriate farming methods were used by those who come from high potential areas are now apparent in Kenya. Using the wrong method leads to erosion and serious deterioration in the quality of the land. Second, even ignoring the ecological damage, dry land farming is highly risky and has limited potential. Crop failure is expected at regular intervals. Also, any increase in level of absorption in the pastoral areas upsets the traditional pastoralism and may have lasting effect on the economy. Potentially dry land farming can create conflict between farmers and pastoralists, who would come from different tribes and have to draw on the same land resources including water, forage, and so on. This does not, however, mean that there is no prospect for expanding the pastoral system in Kenya. Development strategy in the marginal areas must focus on increasing the living standards of their existing population rather than bringing in more people for agricultural production. The marginal land may not be able to absorb long term population increase in the pastoral areas, much less absorb any migration from other areas.

Changing the cropping pattern may be another way of increasing both production and employment, because the different crops require different amounts of input as well as produce different levels of output. Enormous variations occur in the employment and production of different crops in Kenya. Small-holder tea farms provide about 4 to 5 times as much employment per hectare as maize. In terms of value added, small holder tea is nearly twice that of maize. Some crops have even wider margins, for example, potato is labor intensive, requiring 50 times the labor to wheat production. Yet, the cropping pattern cannot be changed arbitrarily. There are several limitations including the quality of land and the demand for the product. In some areas, certain crops cannot be grown, so shifting of crops is not possible. On the other hand, even if potato needs much more labor than wheat, it does not mean that there can be a wholesale shift from wheat production to potatoes. At the margin, however, there is some prospect of substitution and thereby increasing employment and output in the short-run.

The other constraint to consider about changing the cropping pattern is that some crops not only have low yield but are also less risky. From the small farmers' point of view, a less risky crop with lower yield would be preferable to a crop with fluctuating yields and income. The cost of cropping pattern, therefore depends not only on the market for the product but also on the optimality of allocating inputs, including the risk factor. Estimating output and employment prospects from changing cropping patterns in Kenya is difficult; output from rural farms as well as the regions must be considered.

Pricing policy represents another limitation to increasing production by changing the cropping pattern. Output and employment in the agricultural sector can be increased by merely changing the cropping pattern. It has been recorded that in certain areas there has been a tremendous increase in output only through changes in the cropping pattern. For example, in the Central Province between 1963 and 1974, changing the cropping pattern increased labour absorption by more than 28 percent. The expansion crops were tea, coffee, and maize. Changing the cropping pattern can be used in accordance with suitable pricing policies where labor-intensive crops that use land intensively can be favored against those that don't increase production or employment as much.

Since land is only one of the inputs for production, there is a possibility of partially substituting other inputs for land. Thus, it is possible to use land intensively by both labor and capital and thereby increase production. In the past, agricultural output increased in Kenya due to the increase of per acre yield. This is achieved though better methods of production It is now estimated that in Kenya the production can be doubled by applying the best known methods and technology. In this intensive cultivation, employment may not increase as fast as output. The sources of increased yield are fertilizer, better seeds, and so on. However, these items are not without cost and the prospects of increasing yield by using these modern inputs have to be based on the rate of return to the inputs. Thus, yield increases may be technically feasible but economically unjustifiable. If there are distortions, pricing policies can correct those to increase yields but if the rate of return to the production is low, and the output does not justify the use of input, then the chances of increased production to use these inputs becomes limited.

Subdivision of holdings is another important source of increasing agricultural production and employment by using land intensively. This does not increase the land nor change the cropping pattern. It only changes the possibility of substituting other inputs for land when the holdings are small. This point will be amplified in the discussion of policy options for the government in the following section.

5. Future Options--

In outlining future policy options involving linkages of population growth and agriculture in Kenya the discussion focuses on the likely effect of population growth on agriculture. Agriculture also has an effect on population growth through mortality, migration, and fertility. In discussing the

policy options about agricultural development, the feedback effects of agricultural development on population growth are ignored.

Small Farm Development. The first and foremost option is, of course, subdividing of large farms into small holdings. In a sense, this is the inevitable choice, but there is also economic and equity grounds for breaking up the large farms. Since the economic grounds relate to the intensive use of scarce resources such as land, the evidence on the intensity of input use in small and large farms should be examined.

Indications of the relationship between output per acre and farm size are shown in Tables 25 and 26. Table 25 indicates that in 1967-68 the smallest farms in the settlement schemes--less than 10 acres--achieved a higher gross output per acre of land and had a higher percentage of land under crops than larger farms in the schemes. Output per acre declined as average size of farm increased, with gross output falling to KShs 111 per acre for settlement farms of 70 acres and more. This decline was more or less matched by a decrease in the proportion of land under crops and an increase in the stocking rate, that is, grazing acres per stock unit.

Table 26 shows that in 1970-71, on the large farms in Trans Nzoia, output per acre fell from KSh 248 on farms of less than 250 acres to KSh 65 on farms of 2,000 acres and more. The relationship between output per acre and farm size in the large-scale farm sector, however, is not as strong as it is in the small-scale sector, especially in the range of 250 acres and less than 2000 acres (see Tables 25 and 26).

It would appear from these data that the smaller farms, particularly those of less than 20 acres, obtained high levels of output per acre. Moreover, the outputs from settlement farms in the 10-to-20.9 acre range were no higher than those achieved by the smaller large-scale farms in Trans Nzoia district. Nevertheless, output levels from larger settlement farms generally were clearly below those of the large-scale farms surveyed. Because the proportion of land under crops on farms of more than 30 acres was generally no greater than on most of the large farms, and owing to the lower average yield per acre of the settlement farms, the larger settled areas produced a relatively low output. On average, the total land under crops in the settlement schemes and large-scale farms was 19 percent and 16 percent, respectively (see Tables 25 and 26).

Table 25: The Relationship Between Farm Size Output, Land Utilization, Employment, and Mechanical Expenditure on Settlement Schemes, 1967-68

| Farm Size Group | Average Farm Size | Gross Output | Land Use: Proportion of Land Under Crops | Stocking Rate | Labor Inputs - Manpower Equivalent per 1,000 Acres: No. of Family Laborers | No. of Regular Laborers | Total No. of Laborers | Expenditure Machinery, Cultivation* |
|---|---|---|---|---|---|---|---|---|
| | Acres | KSh per Acre | % | Grazing Acres per Stock Unit | | | | KSh per crop Acre |
| Less than 10 | 7.3 | 635 | 45 | 0.9 | 781 | 27 | 808 | 6 |
| 10-19.9 | 13.8 | 250 | 30 | 2.6 | 370 | 29 | 399 | 11 |
| 20-29.9 | 23.5 | 156 | 24 | 3.0 | 211 | 23 | 234 | 9 |
| 30-39.9 | 34.7 | 161 | 16 | 3.8 | 135 | 24 | 159 | 28 |
| 40-49.9 | 44.4 | 113 | 14 | 4.1 | 103 | 21 | 124 | 21 |
| 50-59.9 | 52.3 | 98 | 13 | 5.1 | 93 | 18 | 111 | 19 |
| 60-69.9 | 64.5 | 98 | 19 | 5.3 | 77 | 32 | 109 | 12 |
| 70 or more | 124.8 | 111 | 14 | 3.6 | 42 | 28 | 70 | 10 |
| All Farms | 30.5 | 156 | 19 | 3.5 | 164 | 26 | 190 | 14 |

* These figures do not reflect the charge per acre for machinery services, but indicate the average expenditure over all crop acres.

Source: Ministry of Finance and Planning, Kenya Statistical Digest, Volume X, No. 1, March, 1972, p. 7.

Table 26: The Relationship Between Farm Size Output, Land Utilization, Employment, and Mechanical Expenditure on Large Farms in Trans Nzoia, 1970-71

| | | | Land Use | | Employment - Men Equivalents per 000 Usable Acres | | | |
|---|---|---|---|---|---|---|---|---|
| Farm Size Group | Average Farm Size | Gross Output | Proportion of Land Under Crops | Stocking Rate | No. of Regular Laborers | No. of Casual Laborers | Total No. of Laborers | Expenditure Machinery, Cultivation |
| Acres | Acres | KSh per Acre | % | Grazing Acres per Stock Unit | | | | KSh per crop Acre |
| Less than 250 | 183 | 248 | 46 | 3.2 | 38 | 55 | 93 | 135 |
| 250 - 499 | 326 | 161 | 21 | 3.1 | 31 | 31 | 62 | 140 |
| 500 - 749 | 546 | 133 | 24 | 3.8 | 26 | 17 | 43 | 136 |
| 750 - 999 | 816 | 113 | 19 | 6.2 | 29 | 15 | 44 | 146 |
| 1000-1249 | 1,012 | 89 | 13 | 4.4 | 19 | 15 | 34 | 119 |
| 1250-1499 | 1,194 | 149 | 18 | 4.2 | 28 | 18 | 46 | 167 |
| 1500-1999 | 1,502 | 128 | 10 | 4.3 | 18 | 10 | 28 | 155 |
| 2000 or more | 2,979 | 65 | 9 | 7.1 | 7 | 7 | 14 | 131 |
| All Farms | 890 | 117 | 16 | 4.8 | 21 | 15 | 36 | 143 |

Source: Ministry of Finance and Planning, Kenya Statistical Digest, Volume X, No. 1, March, 1972, p. 8.

The figure in Table 25 show that the intensity of cropping, as defined by the proportion of land under crops, declines from 45 percent to 14 percent between farms of less than 10 acres to farms of 70 acres or more. All things being equal, the intensity of land use increases as farm size decreases.[26] To establish the negative correlation between farm size and crop intensity, however, the data derived from large and small farms must be corrected for land quality.

Another way to examine the relative efficiency of large and small farms is to compare the cost of resources required to produce a given level of output. Data from settlement schemes and large farms in the Trans Nzoia district show that in general, less expenditure for all inputs was required for small-scale farms than for large-scale operations (see Table 27). Their output is considered as a function of three inputs--machinery, labor, and materials. The difference in the cost of inputs in relation to a given output is based on the total inputs used. Small farm development would help in attaining other national objectives, for example, equitable distribution of income, because the resources of such countries are largely agricultural. It is therefore important to explore changes in the production structure as they relate to the objectives of increased employment, reduction of economic inequalities and national production efficiency.

Table 27: The Amount of Resources Required to Produce Kf 100 Output on Settlement Farms and Large Farms, 1964/65 - 1970/71 (KSh)

| | Settlement Farms | | | | Large Farms | | |
|---|---|---|---|---|---|---|---|
| Survey Year | Machinery* | Wages | Material Inputs ** | Survey Year | Machinery* | Wages | Material Inputs ** |
| 1964/65 | 113 | 272 | 517 | 1967/68 | 475 | 328 | 533 |
| 1965/66 | 112 | 254 | 425 | 1968/69 | 455 | 313 | 555 |
| 1966/67 | 61 | 289 | 349 | 1969/70 | 433 | 339 | 537 |
| 1967/68 | 35 | 250 | 296 | 1970/71 | 425 | 306 | 530 |

Notes: * Defined as expenditure on fuel and repairs. The decline in the figures on the settlement farms partly reflects a shortage of these services.

** Defined as expenditure on inputs for crops and livestock.

Source: Ministry of Finance and Planning, Kenya Statistical Digest, Volume X, No. 1, March, 1972, p. 8.

26. It should be kept in mind that the settlement schemes each had a target income based on land potential: thus the differences in output per acre and cropping intensity between large-scale and small-scale farms can to a large extent be explained by differences in ecological and resource constraints. In addition, certain land usage restrictions may have been imposed by the Government.

Tables 25 and 26 show that employment per acre is inversely related to farm size. This relationship is pronounced in settlement farms, where there is a variation of from 808 jobs to 70 jobs per 1,000 acres between the smallest and the largest farms. On the large farms in Trans Nzoia, the difference was from 93 jobs to 14 jobs per 1,000 acres as farm size increased, partly owing to the lower proportion of land under crops on the larger farms. Considering regular labor only, little difference between the settlement farms and the large farms is apparent despite the differences in farm size.[27]

Data collected by the Farm Management Survey 1969-70, in Nyeri, Kiambu, Nandi, and Nyandarua districts of Kenya indicate that crop mix has a strong influence on employment potential irrespective of farm size. Labor input data obtained from small farms in Nyeri, Kiambu, and Nandi districts and on settlement farms in Nyandarua district show that a farm with only a few acres of coffee or tea can have a considerably high level of labor input than a smaller farm that grows mainly maize, pyrethrum, or wheat. Although farm size or scale of operation may have some influence on labor input in the production process, the type of crop grown on the farm appears to be a more important factor.

De facto subdivisions have occured on many of the group-owned large farms. This is recognized by the government, which favors legalizing such subdivisions to improve management efficiency.

Several questions must be answered before devising an appropriate policy for breaking up large farms. First, what causes the misuse of resources on some existing large holdings? Is it lack of managerial expertise? If good management were provided, would these farms produce more efficiently?

Second, what sort of support infrastructure is necessary for the successful transition from large to small holdings?

Third, should there be a legal minimum farm unit size, to avoid excessive and uneconomic subdivision?

Fourth, how will the shift to small farms affect strategic production and sensitive resources?

Fifth, what kind of smallholder organization will be needed to promote effective farming practices and use of the legal infrastructure?

---

27. In determining the employment potential of land used, a distinction must be made between the job opportunities created and the number of people supported. If the number of job opportunities is used as a measure for employment, the proportion of land under crops, the mix of crops on each farm, and the ability of the farmer to obtain other agricultural inputs must all be considered.

Sixth, what kind of institutional and legal framework is desirable to implement an appropriate land use policy? (Examples include legal provisions for expropriating the holdings of absentee landowners, temporary acquisition of farms by the government for reallocation, and land taxation.)

Seventh, what schedule is both feasible and desirable for large- to small-scale transformation?

Finally, what crop mix will be ideal for what area, given techno logical, and population constraints? Available data indicate that crops such as coffee and tea have high labor-land coefficients in small-scale settings, and can be grown successfully there.

A word of caution is pertinent. The relative efficiency of the small farm may be related to factors that may not have been given much attention so far. For example, land quality may be the overriding consideration. If most of the remaining large farms are in areas of lower agricultural potential, and if most of the existing small farms are in higher potential areas, a further transition from large to small scale farming may not be as helpful as one would expect from past experience.

Marginal Land Development. Government now encourages marginal land development to support the growing rural population. Preliminary estimates show that agricultural productivity in the marginal/semi-arid areas has been increasing at an annual 1.5 percent, whereas population has been growing at the rate of at least 3.5 percent.[28] As a result, farmers and pastoralists have been dependent on outside help for food, often in the form of government relief. The government therefore aims for the conservation, rehabilitation, and management of the marginal lands, to halt resource deterioration and to increase productivity.

Machakos and Kitui districts, and Eastern Province, provide examples of how marginal lands are currently used and what prospects they hold. The areas are characterized by low and highly erratic rainfall. Crop production risks are high there even with average rainfall, but in seasons with less than average rain, failures are common. The timing of operations becomes crucial in such areas, planting and weeding cannot be staggered without much output loss. Maize, sorghum, millet, beans, cow peas, pigeon peas, and grams are the dominant subsistence crops in these areas. Cotton and sunflower, with

---

28. In some areas, productivity has actually fallen because of excessive and improper cultivation. Heyer and Waweru, (1975).

limited amounts of castor, sisal, fruits, and vegetables are the cash crops. Cassava is considered a famine crop. Traditional and intermediate technologies are used on nearly all the farms, and modern inputs such as fertilizers, insecticides, and mechanization are used on a scale far below that recommended by researchers. Soil erosion has become severe in many regions.

The program of marginal land development, therefore, has to include plans to improve ranching. Stock limitation, grazing quotas, public financing for group ranches, regulations against suboptimal livestock holding and rehabilitation of natural resources are crucial concerns.

The development of dryland mixed farming of suitable crops is the basic component of marginal land development for agriculture.

Government planners admit that returns to investment for the development of marginal lands cannot compete with investment in the transformation of large farms into small holdings. The following estimates, based on the figures available in the drafts for the next plan support that observation.

Through the Integrated Agricultural Development Plan (LADP III), a package is being proposed for the group-owned mixed large farms that either have informally or legally subdivided, or will opt for subdivision before 1979. 29/ The package includes provision for establishing legal subdivision, physical planning, organizing a cooperative of the new farm owners, and integrating the agricultural development of the farm.

The present value of program cost, spread over 25 years--discounted at 10 percent annual rate--is estimated at K£12.9 million. This amount is the difference of the total cost with the program and without the program. (Extra costs will be incurred for the farms, whether or not the program is implemented.) The cost per hectare is estimated at Ksh. 19o.

The benefits of the program have not yet been worked out in detail, but an estimated 20 percent increase in gross output will allow the program to break even. A recent study of the large farm sector has estimated the extent of inefficiency on poorly managed group farms. The overall margin per cultivated

---

29. IADP III essentially provides for an integrated package of services--extension, farmer training, input supply market facilities and credit-- to be funneled through cooperatives.

Sixth, what kind of institutional and legal framework is desirable to implement an appropriate land use policy? (Examples include legal provisions for expropriating the holdings of absentee landowners, temporary acquisition of farms by the government for reallocation, and land taxation.)

Seventh, what schedule is both feasible and desirable for large- to small-scale transformation?

Finally, what crop mix will be ideal for what area, given techno logical, and population constraints? Available data indicate that crops such as coffee and tea have high labor-land coefficients in small-scale settings, and can be grown successfully there.

A word of caution is pertinent. The relative efficiency of the small farm may be related to factors that may not have been given much attention so far. For example, land quality may be the overriding consideration. If most of the remaining large farms are in areas of lower agricultural potential, and if most of the existing small farms are in higher potential areas, a further transition from large to small scale farming may not be as helpful as one would expect from past experience.

Marginal Land Development. Government now encourages marginal land development to support the growing rural population. Preliminary estimates show that agricultural productivity in the marginal/semi-arid areas has been increasing at an annual 1.5 percent, whereas population has been growing at the rate of at least 3.5 percent.[28] As a result, farmers and pastoralists have been dependent on outside help for food, often in the form of government relief. The government therefore aims for the conservation, rehabilitation, and management of the marginal lands, to halt resource deterioration and to increase productivity.

Machakos and Kitui districts, and Eastern Province, provide examples of how marginal lands are currently used and what prospects they hold. The areas are characterized by low and highly erratic rainfall. Crop production risks are high there even with average rainfall, but in seasons with less than average rain, failures are common. The timing of operations becomes crucial in such areas, planting and weeding cannot be staggered without much output loss. Maize, sorghum, millet, beans, cow peas, pigeon peas, and grams are the dominant subsistence crops in these areas. Cotton and sunflower, with

---

28. In some areas, productivity has actually fallen because of excessive and improper cultivation. Heyer and Waweru, (1975).

limited amounts of castor, sisal, fruits, and vegetables are the cash crops. Cassava is considered a famine crop. Traditional and intermediate technologies are used on nearly all the farms, and modern inputs such as fertilizers, insecticides, and mechanization are used on a scale far below that recommended by researchers. Soil erosion has become severe in many regions.

The program of marginal land development, therefore, has to include plans to improve ranching. Stock limitation, grazing quotas, public financing for group ranches, regulations against suboptimal livestock holding and rehabilitation of natural resources are crucial concerns.

The development of dryland mixed farming of suitable crops is the basic component of marginal land development for agriculture.

Government planners admit that returns to investment for the development of marginal lands cannot compete with investment in the transformation of large farms into small holdings. The following estimates, based on the figures available in the drafts for the next plan support that observation.

Through the Integrated Agricultural Development Plan (LADP III), a package is being proposed for the group-owned mixed large farms that either have informally or legally subdivided, or will opt for subdivision before 1979. 29/ The package includes provision for establishing legal subdivision, physical planning, organizing a cooperative of the new farm owners, and integrating the agricultural development of the farm.

The present value of program cost, spread over 25 years--discounted at 10 percent annual rate--is estimated at K£12.9 million. This amount is the difference of the total cost with the program and without the program. (Extra costs will be incurred for the farms, whether or not the program is implemented.) The cost per hectare is estimated at Ksh. 19o.

The benefits of the program have not yet been worked out in detail, but an estimated 20 percent increase in gross output will allow the program to break even. A recent study of the large farm sector has estimated the extent of inefficiency on poorly managed group farms. The overall margin per cultivated

---

29. IADP III essentially provides for an integrated package of services--extension, farmer training, input supply market facilities and credit-- to be funneled through cooperatives.

hectare is about 40 percent lower on the average poorly-managed farm than on the average well-managed farm. If it is assumed that the program will lead to an increase of output at least to the level of the well-managed farms, then the benefit cost ratio would be 2:1. In fact, the ratio should be substantially higher because the program is expected to boost productivity beyond the level of an average well-managed farm.

The payoff from marginal land development is significantly lower. MOFP sources show that the economic benefit from the adoption of new technology are barely equal to the cost. 30/ According to a detailed analysis of a marginal land development project, the Machakos Integrated Development Project, the benefit/cost ratio for crop production is 1.23:1. Including livestock development, the ratio rises slightly to 1.52:1, which is still much lower than the investment in transforming a large farm into small holdings. 31/

Several deductions can be made from the evidence that investment in marginal land development yields a significantly lower return than investment in high-potential land. In the short run, investment in building an infrastructure to shift from large to small farming is a desirable answer to increasing population pressure on the land. But because good quality land is at a premium, further subdivision will eventually become undesirable, and the only option will be to develop marginal land. That development will be substantially more resource-intensive, which implies a much slower growth in the sector and fewer prospects for absorbing the increasing population dependent on the land.

Population Control. The discussions of the agricultural options convey a sense of pessimism about the long term prospects. This underscores the need of a vigorous population policy for a reduction in population growth rate. The maternal and child health family planning program (MCH-FP) operating since 1962 will have to be strengthened substantially. What is needed more is a broad based population policy, including a vigorous family planning information education, and communication program and a selective development for inducing

---

30. Ministry of Agriculture, Small Farm Sector Policy Paper 1978 (mimeo).

31. Ministry of Agriculture, Draft Plan Documents.

fertility decline. The ingredients of such a strong policy and an effective program have been outlined in a recent World Bank report. 32/ The government is also currently considering to launch a vigorous second phase of a family planning and health program, corresponding to the current Five Year Plan, 1979-83. This new phase of the program in contrast to the existing MCH-FP program will include a strong element of information, education, and communication. This is clearly a step in the right direction.

---

32. World Bank, "Population and Development in Kenya," Report No. 2775-KE Washington, D.C., 1980.

BIBLIOGRAPHY

Anker, R. and J.C. Knowles. "An Empirical Analysis of Mortality Differentials in Kenya at Macro and Micro Levels." Working Paper No. 60, Geneva: International Labour Office, 1977.

Bohdal, M., N.E. Gobbs and W.K. Simmons, Nutrition Survey and Campaign Against Malnutrition in Kenya, 1964-68. Report to the Ministry of Health of Kenya on 1040/FAO/UNICEF assisted Project, 1968.

Birdsall, N. "Analytical Approaches to the Relationship of Population Growth and Development, "Population and Development Review, 3:1,2 (July 1977): 63-102.

Brett, E.A. Colonialism and Underdevelopment in East Africa: The Politics of Economic Change, 1919-39. London: Heineman, 1973.

Cassen, Robert. "Population and Development: A Survey," World Development, Vol. 4: 10, 11 (1976): 785-830.

Coale Ansley J., and E. M. Hoover. Population Growth and Economic Development in Low Income Countries: A Case Study of India's Prospects. Princeton, N.J. Princeton University Press, 1958.

Cleave, J.H. "Food Requirements and Availability in Uganda: A National Balance Sheet" in Nutrition and Food in an African Economy. Edited by V.P. Amman, D.G.R. Belshaw and J.P. Starfield. Kampala: Makerere University. 1972.

Central Bureau fof Statistictics, Ministry of Economic Planning and Community Affairs. Agricultural Census of Large Farms 1973 and 1974. Nairobi: Government Printer. February, 1977.

_____. Agricultural Census of Large Farms 1977 Nairobi: Government Printer. December 1978.

_____, Ministry of Finance and Planning. Economic Survey 1974 Nairobi: Government Printer 1974.

_____. Economic Survey 1977 Nairobi: Government Printer, 1977.

_____. Integrated Rural Survey 1974-75 Nairobi: Government Printer. March 1977.

_____. Kenya Statistical Digest Vol. 10, No. 1, Nairobi: Government Printer. March 1972.

_____. Statistical Abstract 1974, Nairobi: Government Printer. 1974.

_____. Statistical Abstract 1978, Nairobi: Government Printer, 1978.

United Nations, FAO. Provisional Indicative World Plan for Agriculture Development, Vol. 1. August 1969.

_____. Production Yearbook, 1971.

Ghai, D., E. Thorbecke and M. Godfrey. "Alleviating Poverty and Meeting Basic Needs in Kenya." ILO Consulting Mission 1977.

Heyer, J., J. K. Maitha and W.M. Senga eds. Agricultural Development in Kenya. Nairobi: Oxford University Press, 1976.

International Labour Office and University of Nairobi. Household Survey 1974.

Jones, Gavin W. "Population Growth and Health and Family Planning." in Population and Development Planning. Edited by Warren Robinson New York: The Population Council, 1975, pp. 107-133.

Leys, C. Underdevelopment in Kenya: The Political Economy of NeoColonialism, London: Heinemann, 1975.

Mbithi and Barnes. Spontaneous Problems in Kenya. Nairobi: East African Literature Bureau, 1975.

Newman, Peter and P.H. Allen. Population Growth and Economic Development in Nicaragua, prepared for the Government of Nicaragua and U.S. Agency for International Development, Washington, D.C., 1976.

Republic of Kenya. Development Plan 1974-78. Nairobi: Government Printer 1974.

_____. Development Plan 1979-83 Nairobi: Government Printer. November, 1977.

_____, Ministry of Lands and Settlement. "Central Province, Physical Development Plan" July 1967.

_____, Coast Province Regional Development Plan, 1970.

_____. Eastern Province Regional Development Plan, 1970.

_____, Rift Valley Province Regional Development Plan, 1971.

_____. Western Province Regional Development Plan, May 1970.

Okoth-Ogendo, H.W.O. "African Land Tenure Reform" in Agricultural Development in Kenya. Edited by J. Heyer et al. Nairobi: Oxford University Press 1976. pp. 152-186.

Richardson, H. and others. "National Urban Development Strategy for Kenya Rural - Urban Balance." Washington, D.C.: World Bank, December 1977. Mimeographed.

Senga, W.M. "Kenya's Agricultural Sector" in Agricultural Development in Kenya. Edited by J. Heyer et al. Nairobi: Oxford University Press, 19 1976. pp. 69-110.

Sly, David F. "Life-time Migration Patterns in Kenya 1969." Nairobi: Population Studies and Research Institute, University of Nairobi, n.d.

Smith, Lawrence D. "An Overview of Agricultural Development Policy" in African Development in Kenya. Edited by J. Heyer et al. Nairobi: Oxford University Press 1976. pp. 111-151.

Tidrick, Gene. "Issues in Agricultural Development." Washington, D.C., The World Bank 1980 (Mimeographed).

Walsh, B. T. Economic Development and Population Control. New York: Praeger Publishers, 1971.

World Bank "Agricultural Sector Survey - Kenya" 2 vols. Report No. 254a-K-E. Washington, D.C. 1973.

_____, "Population and Development in Kenya" Report No. 2775 - K.E., Washington, D.C., 1980.