



*PART FOUR*

*Industrial Development Plans*

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# AGRICULTURE

## Problems

Major problems facing the region are overpopulation in the coffee-banana belts and the problem of nutrition. These problems can be solved by expanding agricultural acreage and raising productivity, the former requiring the development of irrigation systems, and the latter the intensive provision of extension services.

Extension of cultivated land will be possible only with reliable sources of water. The use of more and better input materials such as chemical fertilizers, pesticides, insecticides, improved seeds and varieties, etc., as well as better farm management are necessary. Mechanization of cultivation in lowland areas and provision of more convenient means of commuting between kihamba and shamba are important in this respect.

A decrease in wild grass during the dry season is the greatest obstacle to livestock farming in the region. Also, competition of concentrated feed with food crops for human beings presents a problem. The number of cows in highland areas cannot be increased very much because of the limited amount of land for cultivation of cattle feed. Cattle diseases stand in the way of increased production in livestock farming.

The average annual growth rates envisioned for food and cash crops are 5.0% and 4.2%, respectively. Though rationalization of production and marketing, the income of farmers can rise at an even higher rate.

## Production Goals

Achievement of the future agricultural production goals shown below will make it possible to cope with an increase of 38% in population in the ten-year period 1975-85 and to enhance per-capita calorie intake from 1,580 calories in 1975 to 2,200 calories in 1985 and per-capita protein intake from 38 grams to 55 grams. The production of export crops is also to be increased in order to contribute to the earning of foreign exchange.

	Production (tons)			Annual increase (%) (1985/75)
	1975	1980	1985	
<b>Food crops</b>				
Bananas	305,809	363,300	431,480	3.5
Maize	45,466	73,200	117,760	10.0
Wheat	9,359	13,750	20,200	8.0
Paddy rice	6,332	11,160	19,670	12.0
Irish potatoes	8,830	12,970	19,050	8.0
Sweet potatoes	3,965	5,310	7,100	6.0
Finger millet	3,800	5,080	6,810	6.0
Cassava	3,125	4,140	5,600	6.0
Beans	2,904	3,890	5,200	6.0
Vegetables	3,034	4,060	5,430	6.0
Citrus fruits	83	130	210	10.0
<b>Cash crops</b>				
Coffee	20,518	24,960	30,370	4.0
Sugar	49,103	62,660	76,100	4.5
Sisal	6,986	7,000	7,000	0
Cotton	1,196	1,930	3,100	10.0
Seed beans	770	980	1,250	5.0
Pyrethrum	95	150	250	10.0
Cardamon	19	30	50	10.0

The average annual growth rates envisioned for food and cash crops are 5.0% and 4.2%, respectively. Though rationalization of production and marketing, the income of farmers can rise at an even higher rate.

## Strategy and Measures

### 1) Crops

An increase in crop production can be achieved by increasing yields on and expanding existing cultivated land. Emphasis should generally be placed on increase of yields for greater results with less investment in the short run. This will require greater inputs and better management. Extension of cultivated land depends upon the availability of water, and exploitation and efficient utilization of water is a key to the successful expansion of agricultural land. In selecting the crops to be planted, moreover, the amount of water available should be taken into consideration. In addition, the provision of necessary inputs, transportation and other infrastructural facilities, and skilled manpower have to be assured.

#### • Bananas

Bananas are the largest food crop in the region in terms of production and calorie value per hectare, about 50% of the calorie intake in the region being accounted for by them. Their leaves and canes are used to feed fowls. However, the planting of bananas is limited to areas where there is much rainfall or a high level of subsurface water. There is therefore little leeway for extending the planted area. This is why bananas have been given the lowest production growth rate. What increase there will be due to an increase in yield, which can be achieved through better varieties, proper spacing in the case of interplanting with coffee, and malting.

#### • Maize

An annual production growth rate of 10% is planned for Kilimanjaro, which is a target that will require a considerable effort. The increased production will be realized mainly by increasing yield and extending planted area, particularly in lowland and upper lowland area. In the extension of planted area priority will be given to locations where irrigation will be available: about 3,000 ha of newly reclaimed irrigated land in the Moshi and Pangani Basin areas. In order to decrease irrigation costs, double cropping is recommended. Also, yield can be raised by increasing irrigated area, efficient use of water, improvement of cultivating techniques, and greater use of improved seeds (hybrid and composite seeds), fertilizers, insecticides, etc.

#### • Paddy

The highest production growth rate planned in the present report is that for paddy. The reasons are: (1) the planted area doubled during a recent 10-year period; (2) rice is the second largest crop in the region in terms of calorie value per hectare (next to banana) and quantity of protein per hectare (next to wheat); and (3) the yield is very high with well-managed irrigation, and, as verified by the Japanese team, paddy production is profitable. At present paddy is produced mostly in the southeastern part of Moshi Town and in the Mkomaji Valley of the Pare District. These areas will remain the paddy production centers, with priority being given to increase of yield rather than to expansion of irrigated land. In the areas mentioned above, double cropping involving combination of paddy with other crops such as maize, vege-

tables, etc., is recommended. Such crop rotation protects against soil exhaustion and diseases and insects in the soil. Also, paddy can be cultivated in swamps, which are not suitable for other crops.

- **Coffee**

A great increase in coffee production should not be planned as prices in world markets will not remain so high in the long run. In order, however, to cope with international competition for the time being, efforts have to be directed to reduction of production cost and to improvement of quality in order to get higher prices. Such efforts should be made as soon as possible while prices are still high because it is certain that the international competition in terms of both quality and prices will become severe again. The following measures should be further strengthened:

- a) Replacement of old or diseased trees with young plants;
- b) Use of pesticides for improvement of quality and quantity; and
- c) Promotion of centralized pulping to improve quality, taking into account the fact that better management of central pulperies is essential to the participation of more farmers, who otherwise will do their pulping themselves.

Also, this opportunity should be taken to build more warehouses.

- **Cotton**

From the angles of domestic consumption and export, cotton is an important crop from which fibers, cooking oil and oil cakes are made. It also contributes to the expansion of industries such as spinning, weaving, oil extraction, and feed production. Cotton is a valuable cash crop to smallholders in lowland areas. Therefore the largest growth rate is given to cotton in the present plan in spite of technical difficulties in cotton production. However, cotton is vulnerable to drought, diseases and pests, and insects. The production increase can be realized more by increase in yield than by expansion of planted area. Irrigation and adequate extension services are necessary to improve the yield. TCA's service staff should be strengthened. The prices at the farmer's gate seem to be unattractive when compared to those of other crops.

- **Sugar**

Sugar plays an important role both as an export product and in home consumption. However, rapid expansion of planted area will not be easy since irrigation facilities are inadequate. Some of the newly exploited water sources will be allocated to the expanded sugar cane area within the context of the overall water development plan of the region. It should be noted that efficient use of water can be made by estate farms like TPC and NAFCO. With expansion of irrigation, it will not be difficult to achieve the targets for sugar production set in the present report.

## 2) Livestock

- **Feed**

Alleviation of the feed problem, one of the major obstacles to an increase in livestock production, will depend on successful use of pasture and successful exploitation of agricultural by-products and other hitherto unutilized resources.

In order to secure enough protein-rich feed for domestic animals to maximize their productive ability, it is neces-

sary to utilize as feed agricultural by-products and those miscellaneous grains not used as food grains.

The shortage of roughage during the dry season is one of the major causes of drastic deterioration of livestock nutrition. In order to secure a sufficient amount of roughage during the dry season, it is essential to put wild grasses to more rational use than they are at present and to take measures to improve natural pasture at the earliest possible opportunity. One thing that can be done in this respect is to improve haymaking. Also worth pursuing is cultivation of feed grasses of the pulse family on fallow lands of estates for the production of hay. This last scheme is also an effective means of improving soil fertility.

- **Improvement of productive capacity of livestock**

Improvement of productive capacity depends above all else on successful improvement of breeds and/or crossbreeding. And for this, it is of vital importance to consolidate relevant organizational frameworks and to train experts who can give guidance in improved techniques.

- **Sanitation of livestock**

It can be easily imagined that epidemic diseases and chronic diseases cause serious economic loss. Investigation and early diagnosis of these diseases for their prevention would bring a significant increase in livestock production. At present, however, there is no facility that can make accurate diagnosis of these diseases, not enough experts for affording guidance, and a lack of adequate transportation for the few experts that there are. It is thus essential to establish a facility in each locality that can deal with the problem and reinforce the system of extension services.

- **Distribution of products**

It is necessary to see to it that producers are given adequate incentive to produce in terms of distribution of their products. As livestock production increases in the future, accompanied by an increase in the volume of products shipped out of the region or exported out of the country or further processed within the region, the distribution networks leading to consumption centers will have to be improved, and related facilities such as butcheries and livestock markets will have to be expanded. Such improvement and expansion should be started on before too long.

- **Measures for promotion of dairy farming in highland areas**

Agriculture is so intensive in these areas that there is hardly any land available for stock farming. Also, production of roughage is seriously limited, making it virtually impossible to increase production of livestock products by increasing the number of cattle. Priority, therefore has to be given to efforts for qualitative improvement of the livestock through crossbreeding and for improvement of the productive capacity of livestock through improvement of nutrition and breeding and raising techniques. In order to increase production of milk, it is essential to increase the fertility ratio, to introduce better breeds of cows, to improve the milk yielding capability and to increase the quantity of grasses produced. And in order to increase the fertility ratio, it is essential to establish a system that assures crossbreeding of appropriate breeds of cows at appropriate times and to establish and gradually expand communities concentrating on stock farming.

## Proposed Agricultural Projects

An agricultural development plan including the following projects is proposed for the sake of improving existing conditions and realizing production targets.

- Two irrigation projects
- One water survey project
- Five extension service projects for crop farming
- One mechanical service project
- One coffee nursery project
- Four extension service projects for livestock farming

The irrigation projects are tied to the crop extension service and mechanical service projects since the latter are essential for their successful implementation from the viewpoint of integrated agricultural development. Infrastructural improvements as well are to be made in the second phase. The proposed projects will provide a basis for comprehensive rural development of the areas concerned. The irrigation and water survey projects and the extension and mechanical service projects are summarized below, the total amount of investment other than working capital for all eleven projects being an estimated 34.5 million shillings.

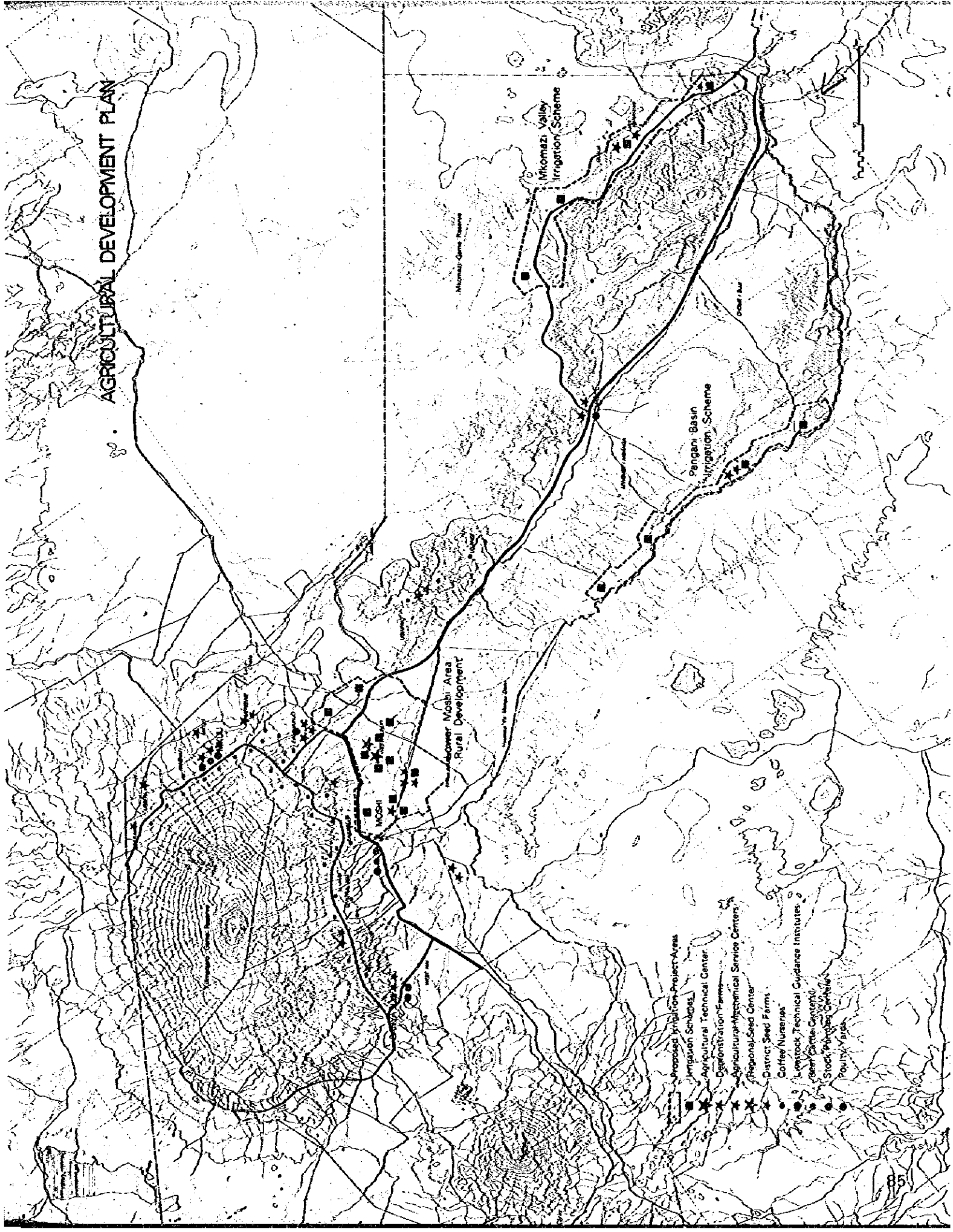
## Outline of Livestock Farming Projects

Project	Outline of the plan	Facilities	Effect
Livestock Technical Guidance Institute	Technical guidance in livestock sanitation, breeding techniques and feed production	Mobile guidance unit Experimentation farms	5 to 6% increase in livestock production through control of animal diseases and increase of productive capability
Beef Cattle Center	Production and distribution of breeding stock Experiments and investigations for improvement of livestock breeding Experiments and tests concerning feed crops	Buildings and cattle houses Beef cattle, sheep, and goats — 50 each — and 25 pigs	Increase in meat production
Dairy Farming Center	Production and distribution of breeding stock Experiments and investigations for improvement of breeding techniques Experiments and investigations for improvement of feed Experiments concerning and demonstration of stock farming	One center each in Moshi and Rombo Cows and goats, — 50 each	Increase in milk production
Poultry Yard	Improvement of breeding fowls Production and distribution of improved chicks Experiments concerning and demonstration of breeding techniques	Buildings and fully equipped breeding houses 2,000 breeding fowls Hatching capacity of 226,000 per year	Regional self-sufficiency in the supply of chickens

## Outline of Crop Farming Projects

Project	Outline of the plan	Facilities	Effect
Agricultural Technical Center	Training of leaders, instructors, and farmers Dissemination of improved agricultural techniques and ways of improving living conditions	Training institute Model test and display farms Model seed multiplication farm	Demonstration of increase in productivity on test farms and improvement of living conditions
Seed Multiplication Farm	Production and distribution of improved bean, rice, sorgham, finger millet, and vegetable seeds	Regional seed center (5 ha) Multiple seed farms (3 in each district; 10 ha for each farm)	Production of seeds for supply to 5,000 ha of farm land Increase of 15% to 20% in crop production
Rice Production	Improvement of rice fields Dissemination of improved cultivating techniques	3,800 ha of fields selected from the two irrigation projects 10 display farms (0.3 ha each)	Increase in yield per hectare in non-project areas as well as in project area
Vegetable Production	Dissemination of new techniques Collective transportation and marketing	8 display farms (0.1 ha each; 2 in each district) Cultivation of tomatoes, cabbages, onions, and carrots, and subsidies for superior seeds, fertilizers, and agricultural chemicals (200 ha) 8 trucks	Increase in revenue from non-project areas as well as from project area
Cotton Production	Farm improvement Technical guidance in cultivation	500 ha of land selected from the two irrigation projects Subsidies of superior seeds, fertilizers, and agricultural chemicals (1,000 ha) 8 display farms (0.1 ha each; 4 each in Moshi and Pare districts)	Increase in yields in non-project areas as well as in project area
Agricultural Mechanical Service Center	Provision of ploughing, harrowing, ridging, and pest control services Repairing of agricultural machines and tools Training in tractor operation	Service centers: 2 in Moshi, 2 in Pare, and 10 in Hai and Rombo districts 60 tractors and attachments	Increase in agricultural production Foreign exchange savings through prolongment of service life of machines and tools
Coffee Nursery	Supply of nurslings to 667 ha a year	40 nurseries with a total area of 20 ha	Yield increase: from 800 kg/ha to 900 kg/ha tare

# AGRICULTURAL DEVELOPMENT PLAN



## IRRIGATION PROJECTS

The two aforementioned irrigation projects involve nineteen schemes: eleven in Lower Moshi, four in the Pangani Basin, and four in the Mkomaji Valley. More precisely, these are agricultural development projects emphasizing irrigation development, which consists of improvement of existing irrigation systems and drilling of new wells. The plan is to increase irrigation acreage and open up new farming areas to irrigation. Each scheme is summarized below, and the total amount of investment other than working capital for these projects is estimated at 121.3 million shillings.

### Lower Moshi Area

Location	Planned area (ha)		Crops	Water sources
	Improve-ment	New develop-ment		
Mandaka	480	480	Rice, maize & beans	Njoro River
Upper Miwaleni	0	400	Maize, beans, cotton & vegetables	Underground water
Miwaleni	80	280	Maize, beans, cotton & vegetables	Underground water
Lower Miwaleni	200	600	Maize, beans, cotton & vegetables	Rau River and Miwaleni springs
Kitereni	40	200	Maize, beans, cotton & vegetables	Mua River and underground water
Soko	80	200	Rice, maize, beans & cotton	Soko springs
Chikereni and Ntakuja	80	320	Rice, maize, beans & cotton	Rau River and underground water
Mabogini	120	160	Rice, maize, beans & cotton	Njoro springs and underground water
Musaranga and Mandaka	0	200	Maize & beans	Rainwater (open levees)
Kileo	0	200	Cotton & beans	Kileo springs
Makuyuni	0	200	Maize, beans, & cotton	Himo River
<b>Subtotal</b>	<b>1,080</b>	<b>3,240</b>		

### Mkomaji Valley Area

Location	Planned area (ha)		Crops	Water sources
	Improve-ment	New develop-ment		
Kishiwani	400	400	Rice, maize & cotton	Kishiwani River
Gonja	400	400	Rice, maize & cotton	Hinglili River
Ndungu	400	400	Rice, maize & cotton	Goma River
Kifrio	1,600	1,600	Rice, maize & cotton	Seseni River
<b>Subtotal</b>	<b>2,800</b>	<b>2,800</b>		

### Pangani Basin Area

Location	Planned area (ha)		Crops	Water sources
	Improve-ment	New develop-ment		
Kiriya	120	400	Maize, beans, cassava & cotton	Nyumba ya Mungu Reservoir
Marua	120	800	Maize, vegetables & bananas	Nyumba ya Mungu Reservoir
Ruva Mferujini	720	1,200	Maize, cotton, cassava, sweet potatoes, bananas & beans	Nyumba ya Mungu Reservoir
Jetengeni	280	800	Maize, cotton & cassava	Nyumba ya Mungu Reservoir
<b>Subtotal</b>	<b>1,240</b>	<b>3,200</b>		
<b>Total</b>	<b>5,120</b>	<b>9,040</b>		

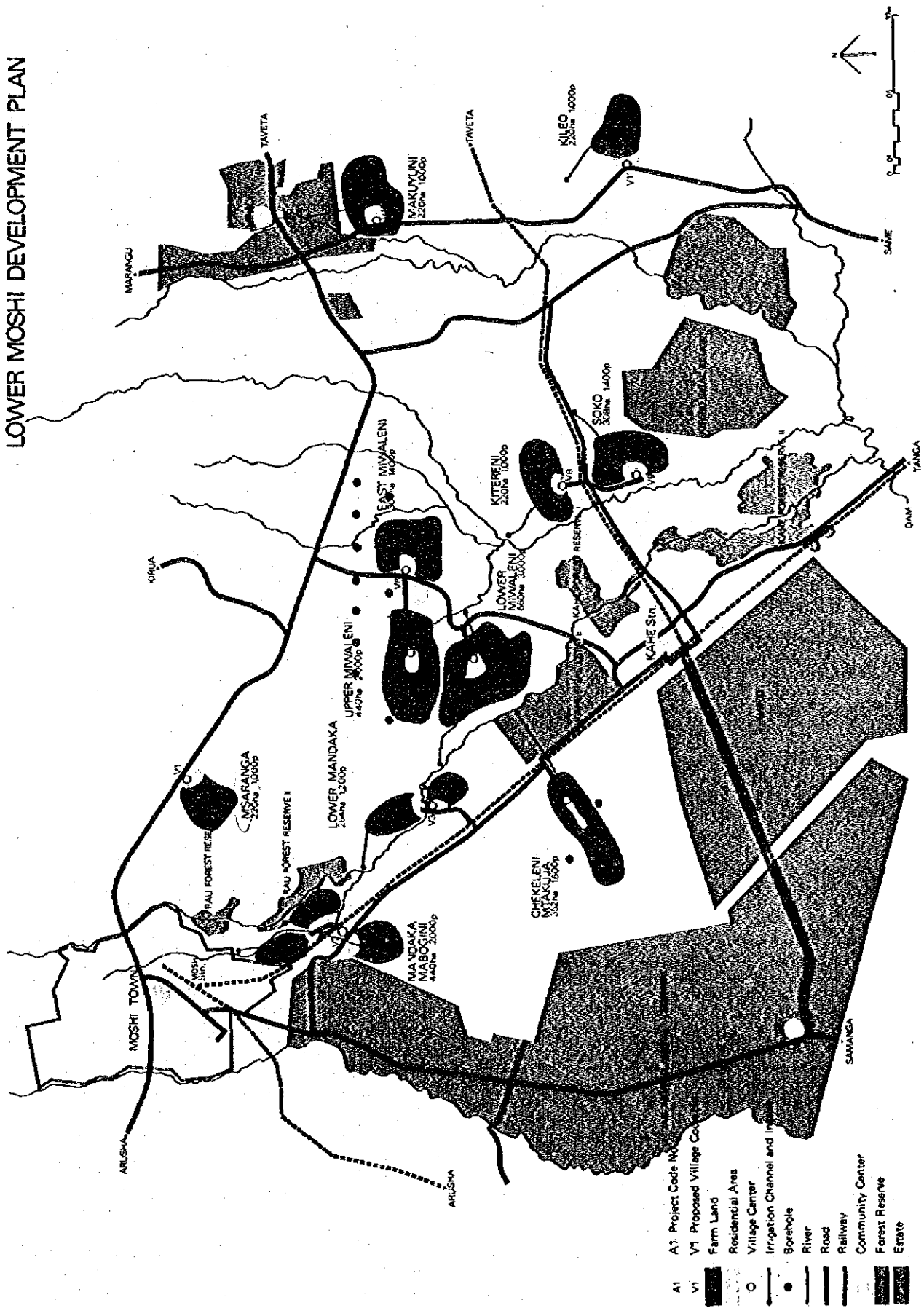
### Water Resources Development Projects

Location	Area (km <sup>2</sup> )	Water Sources
Mt. Kilimanjaro	350	Sanya, Kuware, Kikafu, Weru-Weru, Pau, Mus and Himo Rivers
Lower Hai	50	Underground water and springs
Lower Rombo	40	Lake Chala and Lumi River
North Pare	50	Lake Jipe
West Pare	20	Makanya River
Mapping	500	South Pare Mountain Area



Irrigation Channel

# LOWER MOSHI DEVELOPMENT PLAN



- A1 Project Code No.
- V1 Proposed Village Co.
- Farm Land
- Residential Area
- Village Center
- Irrigation Channel and Inlet
- Borehole
- River
- Road
- Railway
- Community Center
- Forest Reserve
- Estate

## WATER RESOURCES

### Rainfall Water Resources and Evapotranspiration

In general, the region is relatively blessed with rainfall in comparison with other regions of the country. However, there is variation of rainfall in time and space in the region. The upper slopes of Mt. Kilimanjaro and the Pare Mountains abound in precipitation, which ranges from 1,500 mm to 2,000 mm a year. On the vast expanse of low-lying area of the region, however, there is only 400 mm to 600 mm of rainfall a year. There are two annual rainfall peaks: November – December and March – June. This fact is clearly reflected in the agriculture of the region. Coffee and bananas are cultivated on the densely populated middle slopes of Mt. Kilimanjaro and the Pare mountains without irrigation. In low-lying areas, however, maize, beans, sugar, root crops, sisal, etc., are cultivated by means of irrigation, which is yet to be adequately developed.

Evapotranspiration in the region amounts to 40 – 50% of annual rainfall at an altitude of 1,500 m and 50 – 60% at an altitude of 800 – 900 m. The ratios of discharge and ground water recharge to effective rainfall on the southern slopes of Mt. Kilimanjaro range from 54% to 76% and from 24% to 38%, respectively.

### Catchment Area and Run-off

There are two major rivers: the Pangani, with two large tributaries, the Kikuletwa and the Ruvu, and the Mkomazi. The former collects the waters of innumerable streams on the southern slopes of Mt. Kilimanjaro and of springs in the plain areas below. The catchment area and annual run-off are 7,700 km<sup>2</sup> and 1,192 million m<sup>3</sup>, respectively. Of the total run-off, 62% flows into the Kikuletwa, and the rest into the Ruvu. The percentage of water coming from springs is estimated 60%. The large Nyumba ya Mungu reservoir at the confluence of these tributaries has a storage capacity of 1,140 million m<sup>3</sup>. The eastern slopes of the South Pare Mountains account for 80% of the total run-off of 280 million m<sup>3</sup> into the Mkomazi.

### Water Utilization

In the region water is supplied by means of reservoirs, pipes, traditional furrows, and wells. There are 11 reservoirs in the region – 7 in the Pare District and the rest in the Moshi District. The Nyumba ya Mungu reservoir is extremely large, the Kalimawe reservoir of medium size, and the rest small. Five of them are used for irrigation. The natural gravity piped water supply system is predominant in the region. The water is obtained from mountain streams or springs. The total length of pipeline was more than 1,000 km in 1976, and about one-third of the total population is serviced by this system. The cost of water supplied by this system in the region is less than the standard established by the central government. Traditional furrows have long been used on the slopes of Mt. Kilimanjaro and in the Pare Mountains for irrigation and domestic water supply purposes. The total volume of water consumed by way of these furrows is estimated at 187 million m<sup>3</sup>/year. The total length of these furrows is 920 km on the slopes of Mt. Kili-

manjaro and 780 km in the Pare Mountains. The numbers of furrows are 567 in the former case and 207 in the latter, most of which are 2 km to 3 km long. The water comes from surface flow, springs, and occasionally reservoirs. However, the water losses of this system are great. Ground water is pumped up through bore holes in the area below the southern slopes of Mt. Kilimanjaro and on the western side of the Pare Mountains. The depth of existing holes ranges from 60 m to 100 m, and the yield for the most part from 50 m<sup>3</sup>/hr to 500 m<sup>3</sup>/hr. The total amount of ground water consumed in the region is estimated at 17 million m<sup>3</sup>, of which 88% is accounted for by Kahe basin and 10% by Pare Mountain areas. There is a possibility of further development of ground water sources in the region. The breakdown of water consumption by river and by water source is as shown below.

	(million m <sup>3</sup> )				
	Kikuletwa	Ruvu	Pangani M.	Mkomazi	Total
<b>SURFACE WATER</b>					
Irrigation	32.1	79.0	146.0	25.2	282.4
Domestic pipelines	5.0	8.1	0.3	1.0	14.4
Domestic furrows	1.5	7.8	1.0	0.5	10.8
Subtotal	38.7	94.9	147.3	26.7	307.6
<b>Ground water</b>					
Irrigation	0	1.7	13.3	–	15.0
Domestic pipelines	0.4	1.5	0.5	0.0	2.4
Subtotal	0.4	3.2	13.8	0.0	17.4
Total	39.0	98.0	161.2	26.8	325.0

### Water Consumption

Total annual consumption of water in the region is estimated at 325 million m<sup>3</sup>, of which 91.5% is accounted for by irrigation water. Seventy percent of the irrigation water is consumed by local farmers by way of traditional furrows, and the rest by large-scale plantations such as those of NAFCO and TPC. About 95% of all water consumed is supplied from surface sources, including springs. The total amount of water used in the Kikuletwa basin is 42 million m<sup>3</sup>/year, of which 97% is supplied from surface sources. Eighty percent of total consumption is for irrigation via traditional furrows, and the rest is for domestic purposes. Water consumption in the Ruvu basin amounts to 98 million m<sup>3</sup>/year, most of which is comes from surface sources. Eighty-four percent of it is for irrigation. Total water consumption in the Pangani valley is 161 million m<sup>3</sup>/year, 90% of which is accounted for by surface sources. TPC consumes 87 million m<sup>3</sup>/year for sugar cane cultivation, and farms downstream of the Nyumba ya Mungu dam cultivation consume 63 million m<sup>3</sup>/year for other irrigation purposes. The water sources in the case of the former are the Kikuletwa River and the underground water in the Kahe basin, and that the case of the latter is the Pangani River. On the western slopes of the South Pare Mountains 14 million m<sup>3</sup> of water a year is consumed by way of traditional furrows. Total water consumption in the Mkomazi valley is 27 million m<sup>3</sup>/year, most of which is represented by surface water.



## Water Availability

The amount of water available in the region is estimated at 1,500 million m<sup>3</sup> a year. However, it will not be possible to extend utilization of surface water very much because of the present intensive use of water and because of the operational needs of the Nyumba ya Mungu dam. Although surveys of ground water sources have not been completed, it appears that more than 300 million m<sup>3</sup>/year will be available, which makes ground water the best bet for future extension of water supply in the region.

## Demand Supply of Water

In the region water is used mainly for irrigation and domestic purposes though there is some water consumption by agroindustry. This situation will continue during the period covered by the present study. Furthermore, water consumption will increase as population grows and agricultural production increases.

At present 390,000 persons, or 45% of the total population of the region, are serviced by a piped water supply system. The present study calls for supply of water to 580,000 persons, or 57% of the total population, in 1980 and to the entire population of the region in 1990 (1,342,000 persons). To attain these targets, 26,000 m<sup>3</sup>/d (9.5 million m<sup>3</sup>/y) and 80,500 m<sup>3</sup>/d (29.4 million m<sup>3</sup>/y) have to be supplied in 1980 and 1990, respectively. The existing intake capacity of the water supply system is 37,600 m<sup>3</sup>/d, and the potential surface water supply is estimated at 80,500 m<sup>3</sup>/d. Therefore, there should be no difficulty in achieving these targets. However, in areas where only ground water is available where it can be supplied at reasonable cost, ground water will have to be exploited. In areas where neither surface water nor nearby ground water is available and the population is very sparse, relocation of population should be considered.

At present 28,000 ha, or about 18% of the total cultivated area of the region, is irrigated. With the irrigation projects proposed in the present study, 9,240 ha will be irrigated by 1985, entailing a water supply of about 96 million m<sup>3</sup>/year. The required water will be obtained from both surface and ground sources in the Ruvu basin and from surface sources in the Pangani and Mkomazi valleys, as shown below.

	Surface water			Total	(million m <sup>3</sup> )	
	Rivers	Springs	Dams		Ground water	Total
Ruvu	21	1	0	22	16	38
Pangani	0	0	32	32	0	32
Mkomazi	11	0	15	26	0	26
Total	32	1	47	80	16	96

As stated before, readily available surface water is already being used close to capacity in the region. Even on mountain slopes where rainfall is ample, a shortage of water for traditional irrigation is being felt in drought years, which occur approximately once every five years, because of an increase in population. In view of the existing water supply and demand situation, efficient use will have to be made of the following sources of water:

- Water saved through improvement of existing water supply systems;
- Surface water in areas where specific yield is satisfactorily high and construction of small earth dams is feasible; and
- Ground water to be developed in the future.

## Water Resources Development

First priority should be given to improvement of existing water supply systems, which will enable more efficient use of limited water resources. Conveyance loss of furrows is usually 35 – 50% per kilometer, and even greater loss takes place on lower mountain slopes and adjacent plains in the Kahe basin and the Mkomazi valley. Owing to lack of flow control devices at intakes, water flows through furrows even when it is not used. The same is true of the piped water supply system.

Although the cost of water from small dams is much greater than that of water supplied by means of gravitational intake, it may be necessary to build such dams in order to be able to make the most of the limited water resources of the region. Several good sites for small dams have already been identified, and basic surveys for the construction of such dams should begin soon.

In the Kahe basin there is enough ground water to furnish an estimated 300 million m<sup>3</sup> a year, although only half of this potential is being realized at present. Another 50 million m<sup>3</sup> can easily be developed. In the Sanya plain and the Lower Rombo area surveys should be carried out to determine availability and distribution of ground water. Since it is costly to pump up ground water by diesel engine, electric pumps are recommended, which will require electrification of development areas. Such ground water should be used only for the domestic water supply since it is expensive for irrigation.

## Administration

The Regional Water Engineer's Office is responsible for construction and maintenance of the water supply systems of the region. Since even now the engineers of this office have their hands full, it is definitely necessary to boost its technical staff, particularly, engineers and experts with a higher education and ample experience, for further development of water resources in the region through the addition of the following personnel as a minimum for implementation of the water development projects proposed in this study:

- 1) A well-qualified hydrologist to supervise hydrologists in the regional office in the processing and analysis of raw hydrological data.
- 2) An experienced civil engineer and assistants for improvement of earth dam constructions.
- 3) An engineering geologist for investigation of dam sites.
- 4) A team of hydrogeologists, including geophysicists and drillers, for exploration of ground water sources.

At the same time, it will be necessary to establish a section in the office for the systematic filing of information and data accumulated so far and assistance in future project preparation.

## Study Projects

In view of the water supply and demand situation and the potential availability of water in the region as described above, the following projects are proposed:

### 1) Improvement of existing water use systems

As already mentioned, present consumption of water by way of furrows and pipes involves considerable losses. The following steps should therefore be taken in this respect, and concrete plans should be formulated for the projects concerned.

- Installation of control devices at furrow and piped water supply system intakes in order to make it possible to reduce water losses by tapping the water only when it is needed and only in the amount that is needed;
- Lining of furrows to reduce conveyance losses; and
- Making irrigated fields more level for more efficient use of irrigation water and increased yield per hectare.

### 2) Surveys of additional water resources

Increase in population and agricultural production in the region, make it necessary to develop new water sources for irrigation and domestic water supply purposes. Surveys of both surface water and ground water have to be carried out in order to ascertain the feasibility of projects for such development.

- Study of feasibility of small dam construction

The following surveys and studies should be carried out for prospective dam sites:

#### Installation and operation of gauging stations

Rain gauging stations		
	Kilimanjaro	7
	North Pare	3
	South Pare	2
	Kisangara	1
	Njoro Same	1
	Makanya	1
	<b>Total</b>	<b>15</b>

Run-off gauging stations		Recorders	Staff gauges
	Kilimanjaro	7	13
	North Pare	1	3
	Mkomazi	2	2
	Kisangara	1	1
	Makanya	1	1
	<b>Total</b>	<b>12</b>	<b>20</b>

Surveying		
	Kilimanjaro	6
	North Pare	4
	<b>Total</b>	<b>10</b>

Geological survey		
	Kilimanjaro	6
	North Pare	4
	South Pare	4
	<b>Total</b>	<b>14</b>

Mapping		
	South Pare mountains	

### • Ground water survey

In the region ground water is found in the aquiferous strata of structural basin deposits (Kake basin), weathered volcanic deposits (Sanya plain and Lower Rombo), and fracture and fault zones (Pare Mountains). The following surveys and tests should be undertaken in addition to surface geological investigations in order to determine the amount and depth of water deposits:

Area	No. of survey points for resistivity	No. of test drilling holes	No. of pumping tests	Surveying area (km <sup>2</sup> )
Sanyo	200	8	8	40
Kake Basin	200	10	10	80
Rombo	100	6	6	20
Kileo	20	3	3	6
Kifaru	40	2	2	9
Kisangara	40	3	3	15
Njoro Same	40	3	4	8
Same	40	2	2	6
Makanya	40	3	3	8
Pangani	40	2	2	4

The water resources survey project will require an estimated 2.3 million sh. in development expenditures over a number of years and 140,000 sh. a year for the operation of gauging stations.

#### Small dam construction study

(1,000's of sh.)

	1977/78	1978/79	1979/80	1980/81
Gauging stations				
Rain	100			
Run-off	213			
Surveying	67	67	32	
Geological survey	42	150	138	109
Mapping				
Subtotal	422	217	170	109
Ground water survey				
Surface geology	27			
Resistivity	47	34		
Drilling tests and pumping	420	420	420	
Subtotal	494	454	420	
<b>Totals</b>	<b>916</b>	<b>671</b>	<b>590</b>	<b>109</b>



A Typical River on Mt. Kilimanjaro in Rombo District.

# WATER RESOURCES DEVELOPMENT PLAN



# INDUSTRY

## Development of New Industries

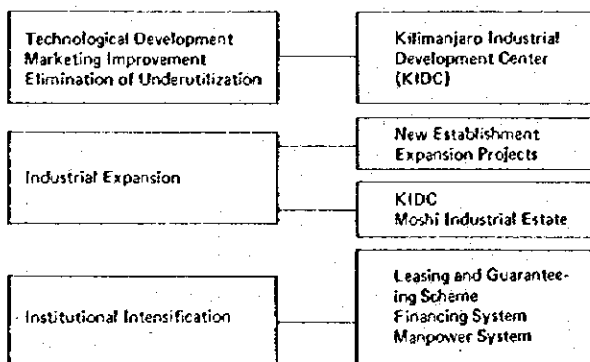
With the aim of boosting industrial activities in the region, 89 local units of 24 new industries are proposed on the basis of the following selection process.

- 1) 41 potential industrial projects were listed on the basis of a field survey of local industrial opinion and our industrial experience.
- 2) Two stages of screening of these industries were involved: a "merits/difficulties" test and a "possibility of implementation" test involving such criteria as availability of a materials, marketability, and skill required.
- 3) Project priority was considered on the basis of 10 technical, political, economic and social criteria on the local and national levels.
- 4) Economic feasibility was roughly checked.

## Strategies and Major Programmes

The following strategies will be important from the standpoint of effectively overcoming various constraints and problems standing in the way of industrial development in the region.

- 1) Maximum utilization of existing industrial production capacity in the region.
- 2) Full utilization of locally available resources, including recycling of waste materials.
- 3) Preparing foundation for basic industries by introducing foundries, forges, and metal processing and ceramics industries.
- 4) Encouraging industrial linkage between existing industries and between them and other economic sectors.
- 5) Proper allocation of industries in the region, including establishment of fundamental conditions for development of village industries.
- 6) Improvement of existing technological and development of other appropriate technology.
- 7) Reorganization or introduction of a distribution system
- 8) Establishing and strengthening the policies and institutional setup for production expansion and productivity improvement, especially for rural industries.

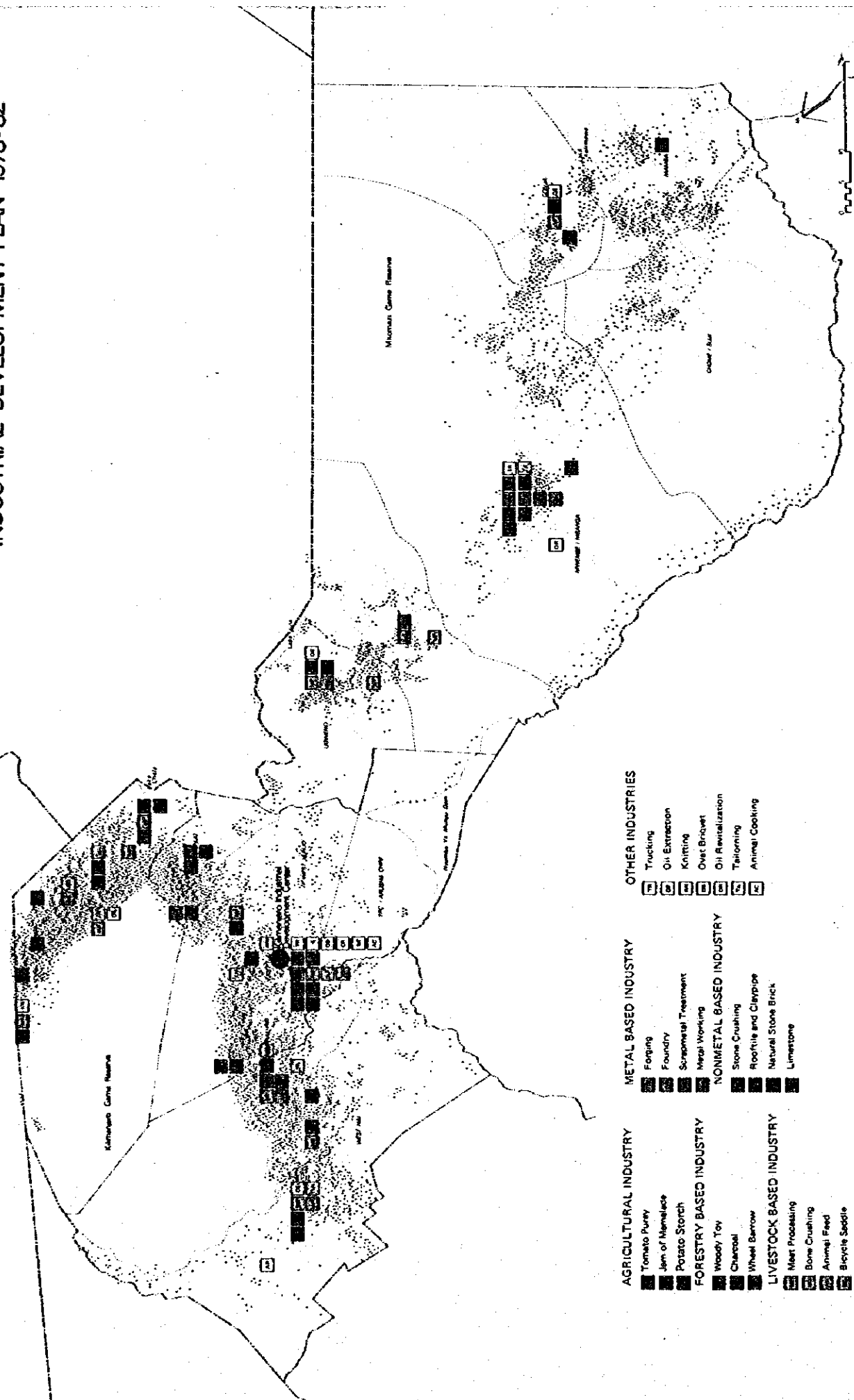


Industrial Project Types	Proposed Number of Projects	Annual Output per Project, 70% capacity (1,000 sh.)	Initial Investment per Project (1,000 sh.)	Employment per Project
1. Trucking	4	403	895	11
2. Stone crushing	5	260	287	13
3. Foundaries	2	148	175	9
4. Forging	4	161	192	11
5. Vegetable cooking oil	5	121	78	8
6. Tomato puree	3	139	54	8
7. Jam and marmalade	2	109	40	16
8. Animal feeds	3	71	45	7
9. Starch	3	106	87	7
10. Meat processing	10	336	33	5
11. Bone crushing	4	76	51	10
12. Animal cooking oil	4	118	29	6
13. Charcoal	8	40	12	5
14. Wooden toys and educational materials	4	126	47	8
15. Wheelbarrows	4	134	37	5
16. Roof tiles	3	81	37	13
17. Scrap metal treatment	5	193	131	7
18. Uniform tailoring	4	403	103	15
19. Knitting	3	340	87	14
20. Bicycle saddles	1	370	90	10
21. Sawdust briquettes	3	58	26	6
22. Oil revitalization	2	84	104	5
23. Natural stone bricks	1	139	56	2
24. Gemstone polishing	2	148	68	21

The total initial investment costs required for these new industrial projects are estimated at approximately 7 million sh. These projects will also provide employment for more than 700 persons.

Name of project	Marketability: Estimated yearly demand (Mainly based on RTC sales values)
1. Trucking	Demand in terms of transportation services is enormously high.
2. Stone crushing	1,600,000/- total output of 5 construction companies.
3. Foundary	175,000/- with possibility of 500,000/-
4. Forging	600,000/- of knife, Hoe, Panga, Axe
5. Vegetable Cooking Oil	6,000,000/- with animal cooking oil (gee)
6. Tomato Puree	200,000/- 500,000/- Tomato Related Products
7. Jam and Marmalade	200,000/-
8. Animal Feeds	1,300,000/- supplied by National Milling Corporation
9. Starch	8,000,000/- of baking powder
10. Meat Processing	1,000,000/-
11. Bone Crushing	100,000/- with an expectation of increase in demand
12. Animal Cooking Oil	6,000,000/- with Vegetable cooking oil
13. Charcoal	349,440/- Briquette Project
14. Wooden Toys and Educational Materials	170,000/- 2 sets per classroom for all the Primary Schools.
15. Wheelbarrow	200,000/- by RTC and TFA
16. Roof Tile	16,000,000/- in terms of G/S
17. Scrap Metal Treatment	1,312,000/- in terms of steel imported.
18. Uniform Tailoring	2,000,000/- 2 pair per school boy or girl.
19. Knitting	120,000/-
20. Bicycle Saddle	1,000,000/- present sales of bicycle by RTC.
21. Sawdust Briquette	349,440/-
22. Oil Revitalization	600,000/-
23. Natural Stone Brick	A few million shillings of demand would be expected.
24. Gemstone Polishing	600,000/- to 1,000,000

# INDUSTRIAL DEVELOPMENT PLAN 1978-82



- |                                 |                                |                         |
|---------------------------------|--------------------------------|-------------------------|
| <b>AGRICULTURAL INDUSTRY</b>    | <b>METAL BASED INDUSTRY</b>    | <b>OTHER INDUSTRIES</b> |
| 1 Tomato Puree                  | 1 Forging                      | 1 Trucking              |
| 2 Jam of Mameleact              | 2 Foundry                      | 2 Oil Extraction        |
| 3 Potato Starch                 | 3 Surfmatal Treatment          | 3 Knitting              |
| <b>FORESTRY BASED INDUSTRY</b>  | 4 Metal Working                | 4 Ovet Briquet          |
| 1 Woody Toy                     | <b>NONMETAL BASED INDUSTRY</b> | 5 Oil Revitalization    |
| 2 Charcoal                      | 1 Stone Crushing               | 6 Tailoring             |
| 3 Wheel Barrow                  | 2 Rooftile and Claypipe        | 7 Animal Cooking        |
| <b>LIVESTOCK BASED INDUSTRY</b> | 3 Natural Stone Brick          |                         |
| 1 Meat Processing               | 4 Limestone                    |                         |
| 2 Bone Crushing                 |                                |                         |
| 3 Animal Feed                   |                                |                         |
| 4 Bicycle Saddle                |                                |                         |

# KILIMANJARO INDUSTRIAL DEVELOPMENT CENTER

## Objectives

The proposed Kilimanjaro Industrial Development Center is designated to serve as a pivot of industrial development in the region. Its headquarters are to be located in Moshi Town. It will play a central role in intensification of industrial development as the major element of a comprehensive approach to this task. The following are the objectives set for it:

- Guidance in and dissemination of production and managerial technology.
- Development and introduction of technology suitable to local situations.
- Raising of rate of operation of facilities through improvement of maintenance systems.
- Introduction and encouragement of new industries by undertaking feasibility studies, setting up pilot machinery, and testing new products.
- Special encouragement of basic industries such as forging, foundry work, metal processing, and ceramics.
- Guidance for intensification of industrial linkage, including beneficial interdependence between small industries and large industries.
- Intensive guidance in production and managerial skills for rural industries based on rural markets and local resources.
- Short-term training in specific skills and techniques.
- Merchandising guidance and provision of product display opportunities and channels of operation for distribution.
- Collation and dissemination of industrial information.

## Activities

### 1) General extension services

- Managerial and marketing guidance  
The KIDC will provide a wide spectrum of management and marketing guidance in order to improve the present poor management, improper pricing, unskilled purchasing of materials and inappropriate merchandising.
- Engineering guidance  
The KIDC will provide mobile maintenance guidance, repair services, and processing of some spare parts. The majority of industries are faced with machinery troubles, lack of spare parts, and vehicle breakdowns. To overcome these problems, a maintenance and regular check-up system, repair service, and manufacturing of spare parts will be promoted. Spare parts processing will be done in KIDC workshops.

### 2) Workshop services

The KIDC workshop will cover repair service and spare parts manufacturing on order; establishing and publicizing pilot plants in promising industries, and test manufacturing of new products; development of new and appropriate technology, including recycling of waste materials; and analysis and examination of the native and quality of materials and products after completion of their manufacture.

The KIDC will have a forging unit, a foundry unit, a metal working unit and a ceramic unit. A forging unit with heat treatment facilities is an essential facility for machine repair and spare parts processing. Also, a metal-

working unit for cutting, pressing, grinding, fitting, and finishing is vital for machine repair, especially of assembling machines. Furthermore, a forging unit is important for the development of agricultural implements and cutlery goods and will greatly contribute to rural development by upgrading village blacksmiths.

A foundry unit is also basic for both existing and future industries. As in the former case, a foundry unit can provide equipment which is desperately needed and produce accessories, kitchenwares, pumps, and building materials for future industries.

The ceramic/pottery unit is for providing an extension service to existing small rural potters and burnt brick-makers. Pottery, burnt bricks, clay pipe for irrigation, and roofing tiles are technically accessible. A good-quality kiln will be established for scattered potters and improvement of product quality. In the future, the ceramic industry could evolve to the stage of building tiles, refractories, and insulators.

### 3) Short-term training

The KIDC will retrain and upgrade semi-skilled personnel, especially in maintenance and repair techniques, metal-cutting, welding, heat treatment, forging, pottery wheel operation, cost estimation, and product design.

### 4) Research and planning services

These services will include collection and processing of information for compilation of a regional industries guidebook assistance in obtaining bank loans, and various feasibility studies.

The biggest problem in this area is transportation, which means that some vehicles must be procured. The installation of a shed for them is recommended. The vehicles will be used to deliver finished products and to carry raw materials. Another facility to be included in the station is a storeroom for finished products and raw materials.

Since village industries cannot readily obtain appropriate repair services and machinery and equipment remain idle for long periods with consequent declines in production. A repair section will be attached to each station. A technical expert assigned to it will assist village industries in repairing machinery and provide maintenance guidance. The section will have some simple machinery and tools.

### 5) Sales promotion services

The KIDC will provide an urban marketing center in the middle of Moshi. Such a unit will be quite effective for village and small industries in terms of advertising and selling their products. The urban marketing center will be helpful in exhibiting the products of village industries in order to create additional markets besides local markets.

### 6) Rural industry promotion services

Two rural industry promotion stations will be established in Pare and Rombo as a part of the KIDC's activities. They will provide package industrial services such as marketing physical distribution, repair service, input supply, and technical guidance. These activities will be carried out in close association with KIDC headquarters.

In order to demonstrate the products of village industries, the stations will be equipped with showrooms. Marketing officers working in the stations will collect

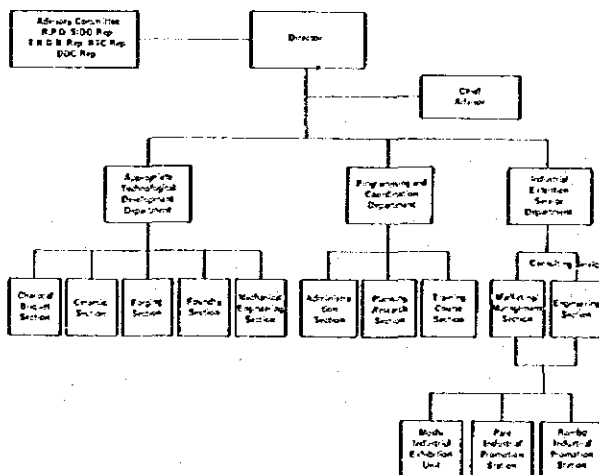
market information from various sources and provide it to village industries. Such a function will be very useful in view of the local market-oriented actions of these industries.

### Inputs

The total initial investment costs of the KIDC will be approximately 10 million sh. The annual operating costs will amount to approximately 954 thousand sh. Staff requirements will come to 89 persons, all told.

Headquarters	74
Control Center	4
Programming and Coordination	
Administration	11
Planning and Research	5
Training Course	5
Extension Service	
Marketing and Management	10
Engineering	5
Appropriate Technological Development	
Foundries	7
Forging	6
Mechanical Engineering	11
Ceramics	6
Briquettes	4
Moshi Industrial Exhibition Unit	7
Pare Industrial Promotion Station	4
Rombo Industrial Promotion Station	4
<b>Total</b>	<b>89</b>

### Organization Chart of the KIDC



### Relation to Moshi Industrial Estate

There is a lack of many physical and financial resources, and the technological problem is the most serious impediment to future industrial development. The metal and engineering industries proposed for the industrial estate in Moshi, in particular, will require a higher level of technology. Furthermore, joint production processes will require common technical standards and terms.

In order to encourage and complete the proposed industrial estate, an intensive technological development policy is required. Thus, it is proposed that the Moshi Industrial Estate Project be carried out in conjunction with that for the Kilimanjaro Industrial Development Center, or immediately following it. Improvement and coordination of technical conditions will open new industrial horizons.

### Establishment of Kilimanjaro Leasing Company

The major problem of development of village industries in Kilimanjaro is that of financing. Village industries lack management capability and collateral, and the banking system itself lacks funds and capability. These problems might be overcome within the present system if NCB and TRDB are considerably strengthened.

Fortunately, there is a five-year-old TIB fund (6 million Tsh.) for the promotion of small-scale industry which has not been utilized yet. This fund should be used as efficiently and fruitfully as possible. Since small industries suffer from a lack of collateral, establishment, under the direction of TIB, of a guarantee institution using that fund is recommended. If the fund is managed carefully the maximum which TIB can guarantee will be 60 million Tsh., or ten times the present amount, which will be enough to cover the demand for loans of small-scale industrial establishments nationwide for the time being.

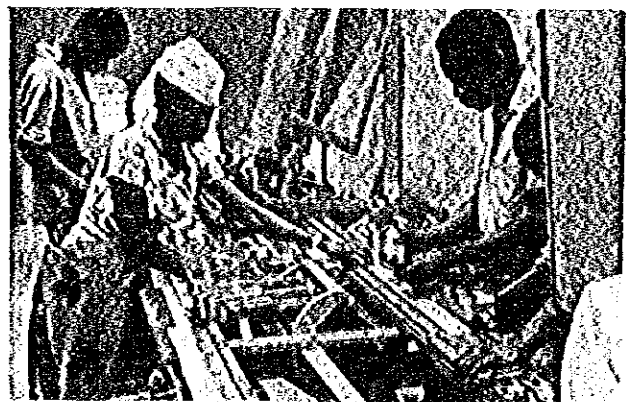
For the purposes of upgrading management capability and project finding and formulation, SIDO should be considerably strengthened. SIDO should have control over the issuance of guarantees for greater incentive to organize and develop village industry.

The Kilimanjaro Leasing Company is needed to function as a financing intermediary using RTC facilities and converting small lending to large lending to the advantage of financial institutions (NBC, TRDB) and as a technical assistance agency for KIDC owning the items it leases and therefore taking great care of them.

### Industrial Coordination

KLC will coordinate the activities of the many institutions which so far have been separately assisting small-scale industries. At the same time, SIDO in Kilimanjaro will be strengthened in terms of work capability and staff. Each institution involved in this scheme – TTB, UBC, TRDB, RTC, and KIDC – will cooperate with KLC activities. Market channels and merchandising assistance will be provided to small-scale industries for realization of greater business potential.

The means of production will be owned by the government through the KLC, and at the same time the system will provide incentive for increase of productivity by charging its small-scale industry clients a leasing fee.



Match Production Line at Kibo Match Factory, Moshi Town

# FORESTRY

## General

The purpose of this section is to observe the present state of the natural environment of the Kilimanjaro Region from an ecological viewpoint, analyze various problems in this regard and the reasons for them, and serve as material that can be consulted for the purpose of establishing an ecologically balanced natural environmental system. The total forest area in the region at present accounts for only 1,286 km<sup>2</sup> (9.7%) of the total area of the region.

## Natural Environment Conservation Forests

Forests, particularly in areas with severe natural conditions such as the Kilimanjaro Region, can help to conserve the natural environment in many ways, including those listed below and by promoting the stability and progression of other vegetation:

- 1) Water resource function (ensuring a stable supply of water)
- 2) Prevention of washing away of earth (stabilization of river beds and banks)
- 3) Prevention of landslides and loss of topsoil
- 4) Prevention of flood damage by temporarily holding back the rainwater
- 5) Windbreaking
- 6) Drought prevention through reduction of evaporation
- 7) Temperature adjustment through provision of shade
- 8) Improvement of soil quality through the rotting of fallen twigs and leaves and by increasing the number of bacteria and microorganisms in the soil

## Production Forests

It is important that a clear distinction be made between natural environment conservation forests and production forests. Although the latter also to a certain extent play an environmental conservation role, that is not their main purpose.

Demand for forest products has been steadily growing within the region.

Year	Production (m <sup>3</sup> )	Total demand (m <sup>3</sup> )	Shortage (-) or surplus (+)
1971	16,900	67,863	- 50,963
1972	19,500	16,090	+ 3,410
1973	30,700	17,487	+ 13,213
1974	15,400	23,790	- 8,390
1975	20,400	33,095	- 12,695

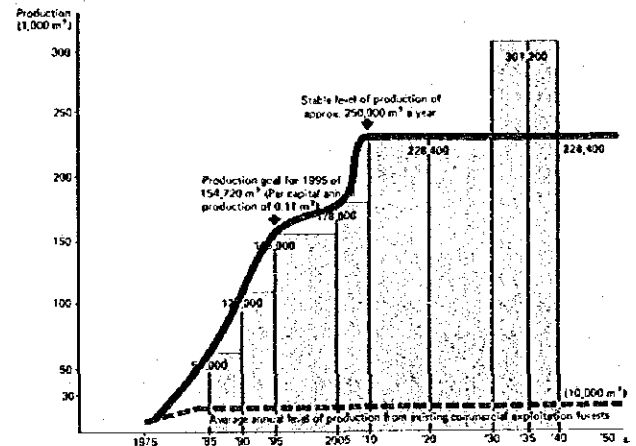
The proposed forest production target for 1995 is regional self-sufficiency. The forestry industry differs from other industries in that a long period of time is required in order to achieve an increase in production owing to the fact that the growth of trees is slow.

In 1975 per-capital consumption of forest products was as follows:

Housing materials	0.015 m <sup>3</sup>
Fuel wood and charcoal	0.023 m <sup>3</sup>

Although it is difficult to say just what the per-capital level of demand for wood will be, the figure of 0.11 m<sup>3</sup>, or three times the 1975 level, has been assumed for 1995. This comes to 154,720 m<sup>3</sup> with a population of 1,456,000. Since average annual production from 1 km<sup>2</sup> of such forests is about 2,000 m<sup>3</sup> when 20-year-old trees are felled, this supply gap can be filled by planning for approximately 70 km<sup>2</sup> of new commercial exploitation forests.

## How the Level of Production Will Change



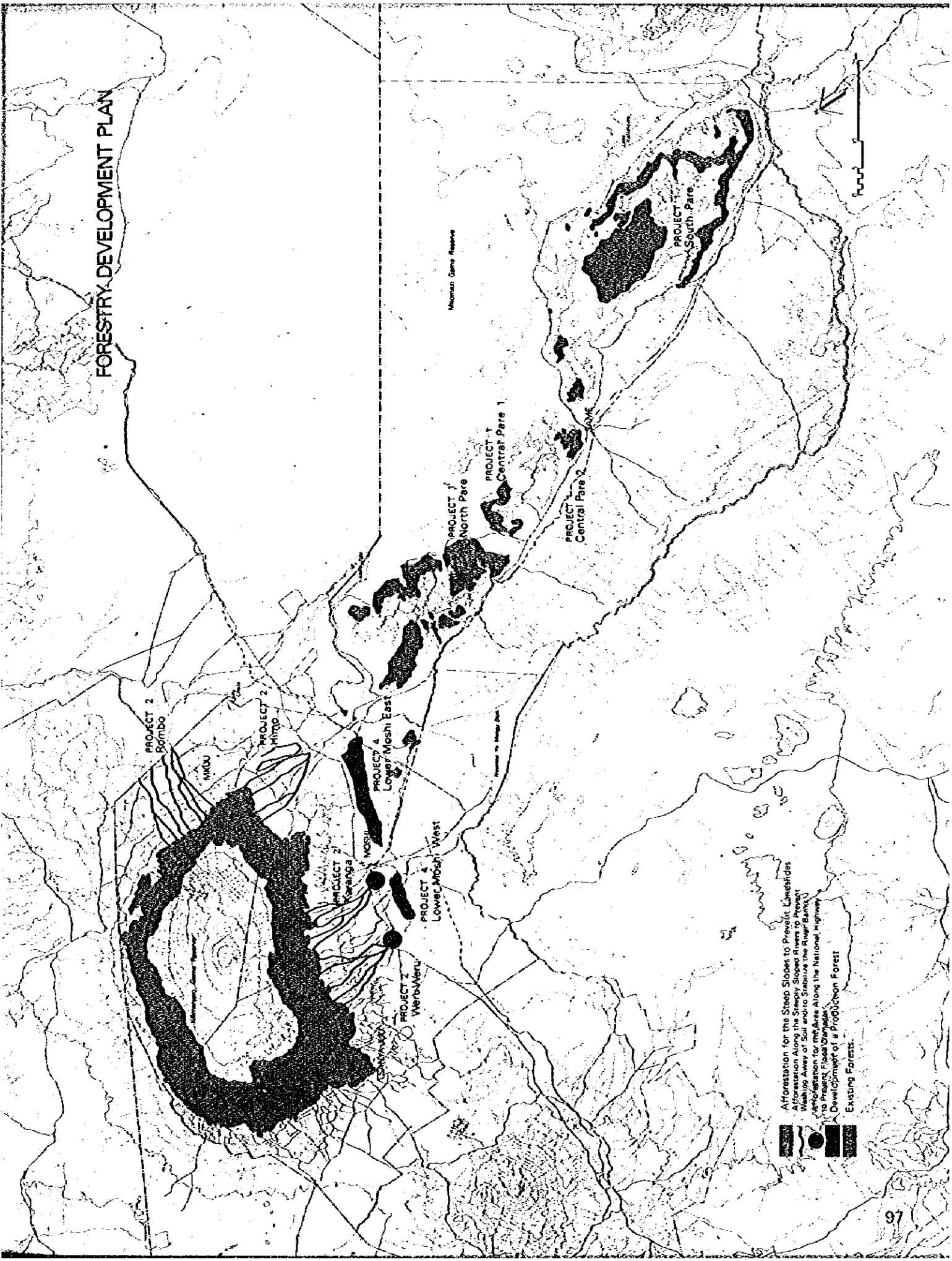
## Outline of the Projects

- 1) Afforestation project for the steep slopes of the southern side of the North Pare Mountains to prevent landslides. The total area to be afforested is approx. 50.0 km<sup>2</sup>. This project is to be planned and led by the district forest officer. During the 10-year period of the project 5.0 km<sup>2</sup> ha are to be afforested yearly.
- 2) Afforestation project along the steeply sloped rivers on the southern and eastern sides of Mt. Kilimanjaro to prevent washing away of soil and to stabilize the river banks. The total area to be afforested is approx. 26.0 km<sup>2</sup>. This project is to be planned and led by the district forest officers of each project area. During the 10-year period of the project approx. 2.6 km<sup>2</sup> are to be afforested yearly.
- 3) Afforestation project for the areas along the national highway on the southern side of Mt. Kilimanjaro to prevent flood damage. The total area to be afforested is approx. 12.0 km<sup>2</sup>. This project is to be planned and led by the regional forest officer in cooperation with the district forest officers. During the 10-year period of the project approx. 1.2 km<sup>2</sup> are to be afforested yearly.
- 4) Development of a production forest in the lowland areas of the Moshi District.

Area of production forest	70 km <sup>2</sup>
Area of other grounds attached to the production forest	10 km <sup>2</sup>



# FORESTRY DEVELOPMENT PLAN



Afforestation for the Steep Slopes to Prevent Landslides
   
 Afforestation Along the Steep Sloped Rivers to Prevent
   
 Washing Away of Soil and to Stabilize the River Banks
   
 Afforestation for the Area Along the National Highway
   
 Development of a Production Forest
   
 Existing Forests

# GAME CONSERVATION

## General

The Game conservation plan outlined here is closely related with the tourism industry in Tanzania, since spectacular nature and rich wildlife are Tanzania's main tourism resources. The special attraction East Africa offers to tourists is close observation of wildlife, including lions, elephants, rhinos, buffalo, and leopards, in their natural habitat.

The Mkomazi Game Reserve, established in 1951, occupies a plain running roughly N.W. — S.E. along the Kenya border.

This plain dips gently to the east and ranges in altitude from about 3,000 feet in the northwest to a little below 1,000 feet near the Uмба River in the southeast. The rainfall figures for places within the Game Reserve are very low, and the eastern part of the Reserve is one of the driest parts of Tanzania.

## Migration of Animals

The migration of animals is roughly divided into two types: south-north and east-west migrations. In either type, animals start to migrate at the beginning of the dry season and return to the original area at the start of the rainy season. As for habitat conditions, the eastern part is poor in water resources and vegetation; consequently the bio-mass (total number of animals) of animals is small.

Extensive south-north migration is observed especially in Mkomazi Game Reserve East among animals such as elephants, grante gazelles, zebras, rhinos, and hartebeasts. Migration starts in general in December around the beginning of the dry season, but this differs by species. Elephants migrate in large groups of about 100. Other animals form small groups. The destination is the comparatively water-rich savanna of Tsavo National Park West in Kenya.

The east-west migration is smaller in scale than the south-north migration, though it involves almost the same animal species. The east-west migration is also extensive in Mkomazi Game Reserve East. One destination is the Uмба River area near the Usambara Mountains, another is the Mkomazi River area near the Pare Mountains.

## Potential Wildlife Areas

From the animal migrations, it is clear that the western part of Mkomazi Game Reserve has higher potential than the eastern part. In the western part, the area at the foot of the Pare Mountains has especially high potential during the dry season. In addition to the high potential area near the Pare Mountains, it is assumed that the Lake Jippe area has very high potential. Therefore, long-term investigations of these areas will be necessary in the future, taking into consideration the relationship with Tsavo National Park. As a result, the Mkomazi Game Reserve, in contrast to other national parks and reserves, shows a peculiar tendency of having a higher potential as a tourism resource during the dry season.

## Outline of the Projects

### 1) Survey on wildlife and habitat

Objective areas include the Mkomazi Game Reserve area, the Lake Jippe area, and, if possible, the southern part of Tsavo National Park West. The survey is to be conducted over a period of 10 years. Several Japanese advisors will make up a survey team in cooperation with the game officers, game conservators and game wardens of the study area. The cost of the survey will be 540,000 shillings annually for 10 years, with support from Japanese organizations for wildlife conservation.

### 2) Water resources survey

Objective areas include the Mkomazi West and Lake Jippe areas. The cost of the survey will be 270,000 shillings annually for a period of 2 years.

### 3) Investigations and experiments to determine the potential of the area for human land utilization.

To be covered is the Kishiwani area. Details of the plan are to be decided after discussions with related agencies. The period of the project will be 5 continuous years. The cost will be 20,000 shillings per year.

### 4) Construction of bore holes

Based on the results of Project 2 on water resources, about eight bore holes are to be constructed by 1985 at a rate of one per year. The cost of construction of each bore hole will be 270,000 shillings.

### 5) Increasing the number of visitors' rooms

The number of visitors' rooms is to be increased by 14 in two buildings in the areas near Ibaya lodge and Kishima lodge. Each building will be approx. 80 m<sup>2</sup> in area, and construction costs will be 450,000 shillings.

### 6) Construction of youth center for wildlife conservation

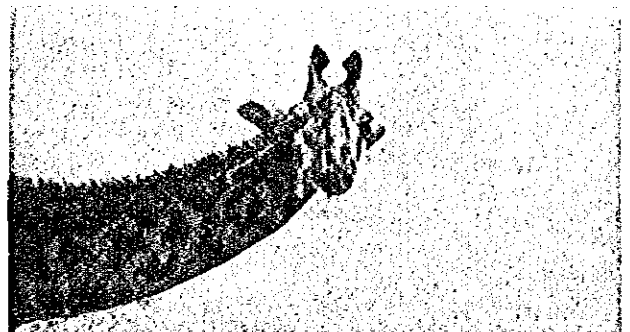
The construction site will be near the Kishima area. The building will have a floor space of approx. 250 m<sup>2</sup>. Construction costs will be 5,400,000 shillings. One curator, two assistant curators, and two maintenance workers will be stationed at the center and will be provided with housing nearby.

### 7) Overseas training of rangers

Details of the training are to be determined in discussions between the governments of Tanzania and Japan.

### 8) Overseas financial aid

Provision of approx. 270,000 shillings a year for 10 years as financial aid for management expenditures is under consideration by Japanese wildlife conservation organizations.



# MKOMAZI GAME RESERVE



### Project-1, Wildlife Habitat Survey

In this project wildlife habitats, wildlife migration in the dry season, ecological biomass, vegetation, and other aspects of the 2,500 km<sup>2</sup> Mikomazi Game Reserve Area will be comprehensively surveyed over a period of ten years so as to be able to improve the environment for wildlife protection on the basis of the results, including possible extension of the limits of the reserve area.

### Project-2, Water Resources Survey

In this project a 2-year survey will be made of the water resources in this game reserve area with a view to stabilizing the wildlife habitat in consideration of the fact that scarcity of water in the dry season seems to be the principal reason for a greater amount of wildlife movement out of the reserve than is usually true in the case of other reserves.

### Project-3, Land-use Potential Survey

Along the Same-Gone district road near the boundary of the reserve area are to be found many villages, grain fields, and pastures. Furthermore, as an area already selected for an irrigation project, it has considerable potential for urban development, which will require adjustment with the game reserve area. Accordingly, in this project land use adjustments and experiments in terms of both agricultural use and use for protection of wildlife will be undertaken over a period of 5 years in a 150 km<sup>2</sup> area around Kisiwani.

### Project-4, Construction of Boreholes

Boreholes will be built at the rate of one a year in areas found to be suitable for development of water for wildlife on the basis of the survey results of Projects 1 and 2.

### Project-5, Enlargement of Visitors' House

In order to cope with the increasing number of visitors to the area and improve the northern tourism circuit, the existing Visitors' House, with 28 rooms will be enlarged to include 14 new rooms in the vicinity of the main entrance.

### Project-6, Construction of Youth Center

A youth center with a library, slide room, exhibition room, museum, accommodations, and other facilities will be built over a period of two years in the vicinity of the main entrance for the purpose of providing young boys and girls an opportunity to observe the ecology of wildlife.

## TSAVO WEST NATIONAL PARK

# TOURISM

## Policy and Guidance of National Tourism Development

The promotion of tourism, needless to say, is a very effective way of earning foreign exchange for Tanzania's economic development. Moreover, foreign exchange will come in quicker in the case of promotion of tourism than in the case of promotion of exporting industries. The following are some goals that are recommended in this respect:

- 1) Formulation of tourism policy and guidelines on the national level for intensive promotion of international tourism, taking into account the recent trends therein.
- 2) Establishment of direct access to Tanzania by international tourists, especially on a charter flight basis.
- 3) Development of both the northern and eastern parts of the country as international tourist destinations.
- 4) Maximum use and improvement of existing tourist facilities and services for short-term program.
- 5) Development of additional minimal facilities in order to be able to meet the increase in international tourism expected in the near future.

In order to make it possible to attain these goals various subsidies and other promotional measures will have to be devised at the national level, and national comprehensive tourism planning will have to be overhauled, particularly with respect to development of better air and land tourism routes.

## Regional Tourism Development

In the context of such overall development of international tourism on the national level, particular priority should be given to development of the northern part of the country, in which the Kilimanjaro Region is situated. In this respect, it is especially important that maximum utilization be made of airports, particularly for charter flights, that overland transportation be urgently improved, and that tourism services, including accommodations, be raised to a level at which it will be possible to cope with the number of visitors that is anticipated.

## Kilimanjaro International Airport Tourism Center Complex

This concept of the complex places it as the functional core of transportation in the northern region as attached to the existing airport building, and, eventually, as a terminal for west-bound excursions to traditional game reserved areas and east-bound excursions to Mt. Kilimanjaro and its environs.

The functions and facilities of this complex will be minimal as necessary to fulfill the function of an airport terminal hotel and a land-transportation center for touring circuits, which will be gradually developed as required.

Outline of Function and Facilities of "K.I.A. Tourism Center Complex" is as follows:

- Lodgings: 50 – 80 units of international standard
- Restaurant/bar lounge/coffee shop
- Shopping-souvenir arcade

- Airlines/travel counters
- T.T.C/T.T.L. branch office & service counters
- Tourism information center
- Game information center
- Transportation center (bus, cruiser, rent-a-car and taxi)
- Guide center
- Tourism institutes (hotel training/guide recruitment, tourism accounting and tour operation)
- Garage service station
- Staff quarters
- Tax-free shop operation
- Airport restaurant (operation and flight catering)

## National Tourism Organization and Activities in Outline

Tanzania's tourism administration, including tourism development planning, tourism statistics, tourism promotion and advertizing overseas, and supervision of hotels and other tourism facilities, as well as many other facets and aspects of tourism in Tanzania, is the responsibility of the Tourism Bureau of the Ministry of Natural Resources and Tourism, which has taken over most of the functions once performed by the now defunct Tanzania National Tourist Board. At the present time the Tourism Bureau runs tourist information offices in most major towns in Tanzania as well as overseas tourism publicity offices in London, Frankfurt, and New York. In charge of actually operations is the Tanzania Tourist Corporation (TTC), the successor to the tourism department of the National Development Corporation. Established in 1969, its fields of activity include construction and operation of hotels and other tourist accommodation facilities, tourism infrastructural investment, travel services, consulting services for operation of private hotels, production and showing of tourism-related films, and organization of safaris.

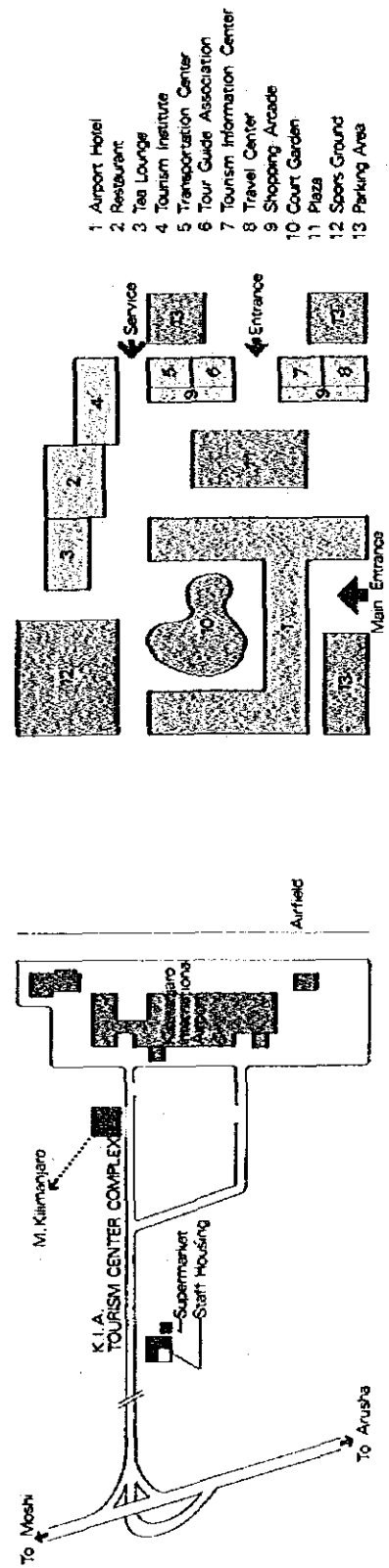
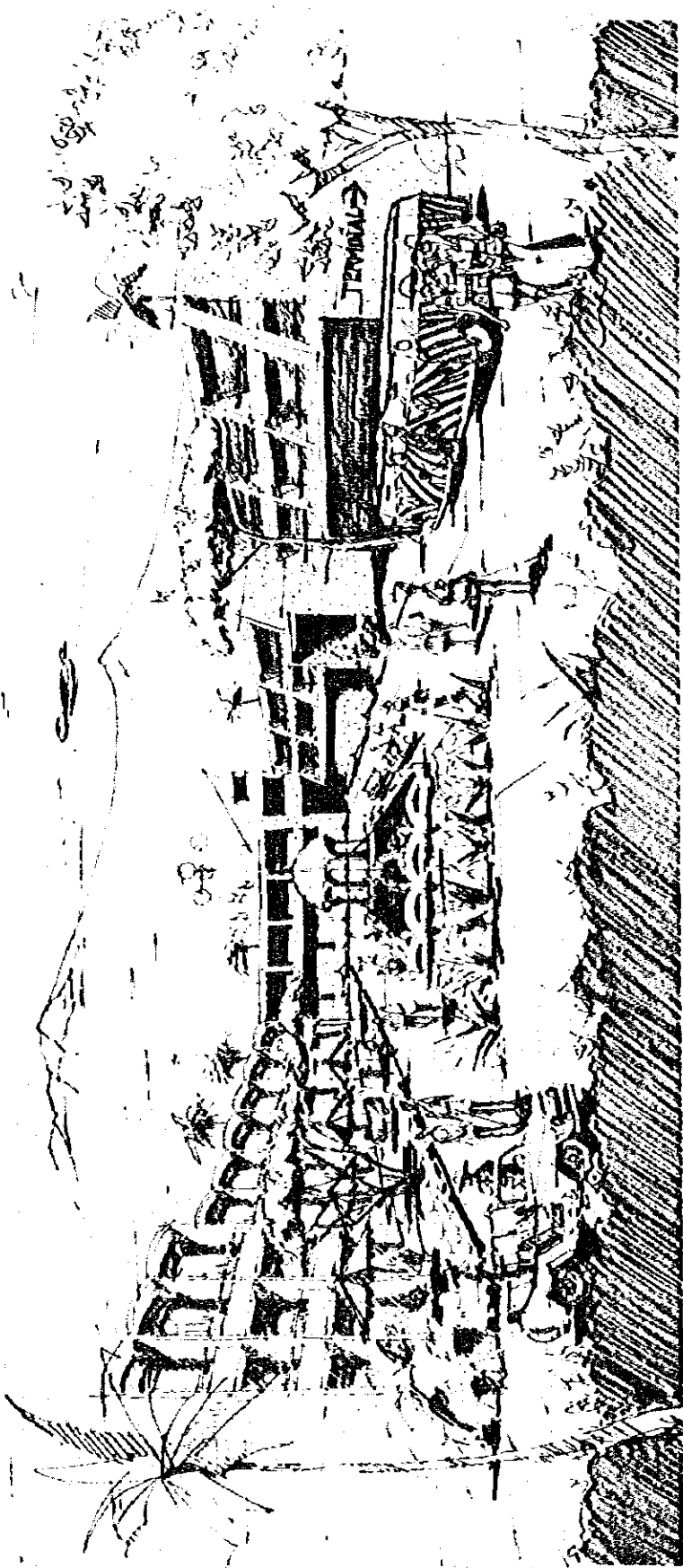
## Tourism Resources in Outline

Tanzania is divided into three tourism zones: the Northern Circuit, the Indian Ocean Coastline Belt, and the Southern Circuit. The Northern Circuit, which embraces the Kilimanjaro and Arusha regions, is the richest of the three in tourism resources in terms of both natural scenery and wildlife. From east to west, it boasts the Mkomazi Game Reserve, Kilimanjaro National Park, the Mount Meru Game Reserve, the Arusha, Tarangire, and Lake Manyara national parks, the Ngorongoro Conservation Area, Serengeti National Park, and many other natural tourist attractions.

## Hotel Capacities and Occupancy Rates in Arusha and Moshi Areas

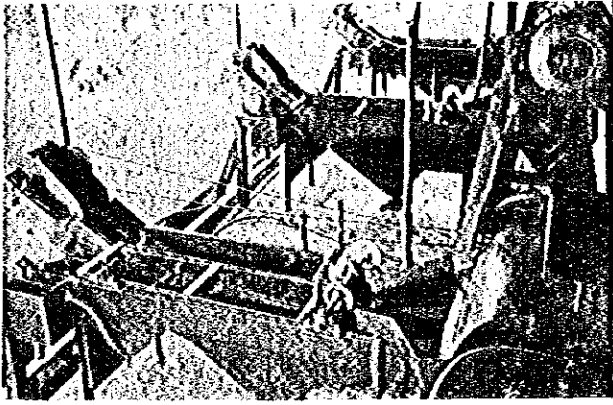
	1972	1973	1974	1975
Number of hotels	18	17	19	19
Number of hotel rooms	475	480	605	512
Room occupancy rate	42.3	42.3	79.0	51.0
Number of hotel beds	787	826	863	872
Bed occupancy rate	36.2	35.7	61.2	43.3
Annual number of bed/nights (1,000)	106.0	106.6	116.5	134.0
Tanzanians	45.6	61.4	62.0	74.8
Foreigners	60.4	65.1	64.5	59.9

# KILIMANJARO INTERNATIONAL AIRPORT TOURISM COMPLEX



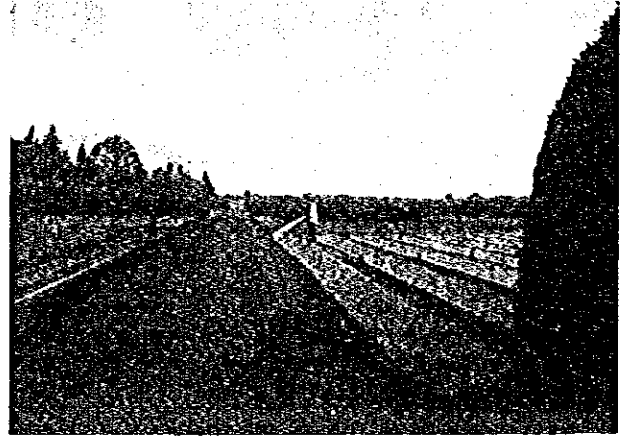
HEART OF THE KILIMANJARO REGION





**Coffee Processing**

At a coffee bean processing plant. Coffee is an important cash crop not only in the Kilimanjaro region but also in the country as a whole.



**Coffee Nursery: National Agriculture Co., Ltd., Rongai Dairy Farm**

There are twenty such coffee nurseries in the region at present, and the present plan calls for another forty by 1995.

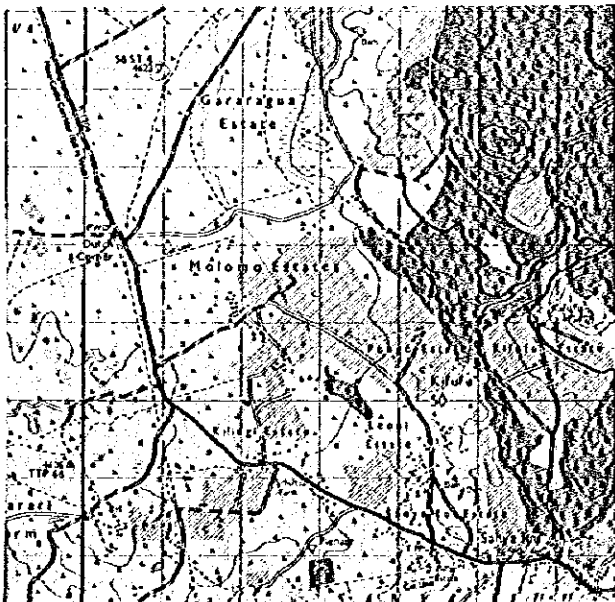
**Movement of People**

The traditions of the Chagga, Pare, and Sambia people say that before 1500 their present mountains and hills were empty of people. Then small groups of people, mostly from the Kamba and Taita in the north, came south and began to occupy the lower hills of the mountains. The main Kamba and Taita peoples had probably come from the northeast some time before. Other groups followed the first groups to Kilimanjaro. Often each clan split up and settled in different places. As time passed one family in each part of the mountain became powerful and was accepted as the family from which the chief was chosen. Often this chief's family was one of the last groups to arrive. By 1700 the people on Kilimanjaro were recognizing the local chiefs, eight of whom are of Kamba descent, and not the heads of their clans as their leaders. The same thing happened among the Pare and Sambia people. (A Short History of Tanganyika)



**Sugar Cane Estate: Tanzania Planting Company**

This 70 km<sup>2</sup> estate in the lower Moshi area is a fine example of modern agriculture in the region.



Typical Estate Area in Hai District



**Maize Threshing: kirua**

Facilities like this, basis to everyday life, are to be found throughout the region.