

PN ABK 566

EN 80000

DEVELOPMENT PROSPECTS IN ARUMERU DISTRICT

Prepared for:
USAID/Tanzania

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June 1977

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DEVELOPMENT HISTORY OF ARUMERU DISTRICT

A. Agricultural Production Trends

1. Crop Production

Crop production and marketing estimates are presented for 1963-1974 for Arusha Region in Tables 1 and 2 and for 1969-1974 for Arumeru District in Tables 3 a and b. The amount of crops sold to National Milling Corporation (NMC) in Arumeru District 1975-January 1977 are presented in Table 4. Settler and peasant coffee production figures for Arumeru District 1969-1975 are presented in Table 5. The estimated production acreage in Arumeru District 1975/76 is presented in Table 6.

Fluctuations in production reported in the tables are due to a number of factors, not the least of which is the general unreliability of agricultural production data. Many farmers do not know how many acres they have and may have only a hazy notion of their yield given serial harvesting practices and storage in non-standard containers. A thriving smuggling trade to Kenya where a 90 kilo bag of maize fetches 150-200 Kenya shillings as opposed to 76/50 Tanzanian shillings locally reduces any incentive for accurate reporting of one's acreages or yields. Since it is quite possible that the figures in the tables bear only a coincidental relation to reality, fluctuation in production is discussed from personal albeit undocumented observations.

The one verifiable fluctuation shown in the charts is the dramatic drop in production due to the poor rainfall in 1973/74.

In some other areas production fell as a result of the movement of people into villages during Operation Vijiji. Very few people were moved in Arumeru District, none of them in the highly productive banana/coffee belt. Hence it is unlikely that any variation in production can be attributed to Operation Vijiji.

TABLE 1

HARVEST FIGURES (INCLUDING ESTIMATES) FOR ARUSHA REGION SINCE 1963 (in tons)

Crop	1963/64	64/65	65/66	66/67	67/68	68/69	69/70	70/71	71/72	72/73	73/74
Maize ¹	69,240	42,000	24,692	56,064	87,996	73,448	7,279	171,556	33,475	74,000	31,774
Finger Millet/ Sorghum ²	2,000	2,572	2,380	6,000	9,200	-	-	-	800	6,088	25
Wheat	8,708	12,118	19,927	9,824	19,401	14,495	10,435	27,051	37,103	37,498	29,339
Pyrethrum	480	888	624	531	705	542	536	250	306	371	252
Seed Beans	9,259	12,066	4,975	3,575	6,344	-	-	-	13,858	14,370	-
Coffee	6,177	6,312	8,927	9,305	6,529	11,183	10,141	9,367	9,246	13,007	4,417

¹ Figure sold was 25 percent.

² Same as No. 1 (Calculated to figure in food consumed).

TABLE 2

CROPS SOLD IN ARUSHA REGION (BY TONS)

Crop	1963/64	64/65	65/66	66/67	67/68	68/69	69/70	70/71	71/72	72/73	73/74
Maize	17,310	18,500	6,173	16,516	21,999	19,362	1,819	42,888	8,368	18,500	7,944
Finger Millet/ Sorghum	500	643	595	1,500	2,300	-	-	-	200	1,522	1,350
Wheat	8,708	12,066	19,927	9,824	19,401	14,495	10,435	27,051	37,102	13,498	20,338
Pyrethrum	480	888	624	531	705	542	536	249	305	340	252
Seed Beans	9,259	12,066	4,975	3,575	6,344	-	-	-	13,868	14,370	-
Coffee	6,177	6,312	8,927	9,305	6,529	11,183	10,141	9,367	9,246	13,007	4,417

Source: Regional Agricultural Development Office.

TABLE 3
CROP PRODUCTION ARUMERU DISTRICT

A. Crop Production (in tons)						
Crop	1969	1970	1971	1972	1973	1974
Maize	15,000	15,750	16,537.5	16,254.8	6,300	15,120
Beans	2,000	2,200	2,205	3,560.4	2,100	3,439
Bananas	50,000	52,500	55,125	58,125	28,532	34,260
Vegetables	3,500	3,675	3,858.75	40,000	4,200	4,325
R. Potatoes	200	210	2,205	2,505	1,800	1,500
S. Potatoes	2,000	2,100	2,205	2,546	1,380	1,840
Fruits	500	525	552.25	600	525	550
Fiwi (Ngwara)	400	440	520.00	356.9	13	78
Castor Seeds	160	168	176.4	275.5	28	22
Grams	10	9.5	4.75	3.75	1.0	115
Cotton	465	489.25	512.65	577.15	27	56
P. Peas	1,500	1,575	1,653.75	1,588	267	324
Sunflower	10	9.05	4.75	2.01	0.25	0.15
Onions	1,500	1,575	1,653.75	1,453	260	1,340
Pyrethrum	102	107.2	117.08	308	339.7	239.3
Coffee	13,160	13,819	14,508.08	16,502.88	6,356	7,611.1
Wheat	2,500	2,625	2,756.25	2,845.05	495	690
Sisal	2,909	2,763.55	2,487.15	2,244	1,820	2,548
Sugar Cane	2,221	2,352.65	2,448.65	2,100	-	-
Finger Millet	2,000	2,100	2,205	2,215	120	144
Sorghum	750	787	1,162.05	709.03	5	5.5
Cow Peas	1,000	1,050	102.05	153	0.5	0.25
Cassava	25	27.05	30.25	32.05	130	150

TABLE 3 (Continued)

B. Marketed Production (Tons)
(Through Primary Co-op Societies)

<u>Crop</u>	<u>1972/73</u>	<u>1973/74</u>	<u>1974/75</u>
Coffee	7,173.2	3,816.7	4,955.5
Lima Beans	413.3	12.6	77.17
Maize	3,154.5	1,950.6	4,014.9
Beans (food)	1,446.9	583.8	377.5
Cotton	123.4	26.3	55.8
Pigeon Pea	141.0	2.36	0.14
Wheat	788.6	492.75	689.5
Castor	22.8	27.8	21.06
Green Gram	1.184	0.232	0.115
Lentils	-	0.981	110.6
Pyrethrum	296.7	339.7	239.3
Pepper	121.08	64.69	10.7

Source: District Agricultural Development Officer

TABLE 4

CROPS SOLD TO NATIONAL MILLING CORPORATION IN ARUMERU DISTRICT
1975-1977

	<u>Wheat</u> (90 kilo bags)	<u>Maize</u> (90 kilo bags)	<u>Beans</u> (90 kilo bags)	<u>Sorghum, Finger Millet, Bullrush Millet¹</u> (100 kilo bags)
June 1, 1975 - May 31, 1976	6,391	78,506	1,915	120
June 1, 1976 - Jan. 1, 1977	4,409	20,271	1,162	150

¹ Sorghum 75%, bullrush millet 19%, finger millet 6%.

Source: National Milling Corporation

TABLE 5

COFFEE PRODUCTION (TONS) IN ARUMERU DISTRICT
1969-1975

<u>Year</u>	<u>Settlers</u>	<u>Tanzanians</u>	<u>Total</u>
1969			13,160
1970			13,819
1971			14,508.09
1972/73	8,329.66	7,173.2	16,502.86
1973/74	2,539.3	3,816.7	6,356
1974/75	2,656	4,955.5	7,611.5

Sources: DADO Arumeru

TABLE 6

NUMBERS OF LIVESTOCK IN PROJECTED ARUMERU DISTRICT DESTOCKING PROGRAM BY WARD 1975

Division	Ward	Cattle			Goats			Sheep		
		Present Stock	To be de-stocked (30%)	Remainder	Present Stock	To be de-stocked (40%)	Remainder	Present Stock	To be de-stocked (40%)	Remainder
King'ori	M/ya Chai	4,354	1,456	3,398	5,033	2,013	3,020	3,099	1,240	1,859
	Kikatiti	5,409	1,623	3,786	5,211	2,884	4,327	4,420	1,768	2,652
	King'ori	12,351	3,705	8,646	14,345	5,738	9,607	8,916	3,566	5,350
	N/Nanyuki	<u>10,142</u>	<u>3,043</u>	<u>9,099</u>	<u>9,625</u>	<u>3,850</u>	<u>5,775</u>	<u>9,465</u>	<u>3,786</u>	<u>5,679</u>
	TOTAL	32,756	9,827	24,929	36,214	14,485	22,729	25,900	10,360	15,540
Mukulat			(40%)			(50%)			(50%)	
	Kisongo	11,590	4,636	6,954	14,104	7,052	7,052	9,981	4,991	55,090
	Mateves	3,120	1,248	1,872	3,246	1,623	1,623	2,308	1,154	1,154
	Mwandet	9,625	3,850	5,775	11,257	5,629	5,629	8,813	4,406	4,407
	Musa	10,420	4,168	6,252	13,716	6,858	6,858	7,889	3,944	3,845
	O/Sambu	<u>20,402</u>	<u>8,161</u>	<u>12,241</u>	<u>21,295</u>	<u>10,648</u>	<u>10,648</u>	<u>20,605</u>	<u>10,303</u>	<u>10,302</u>
TOTAL	55,157	22,063	33,094	63,618	31,809	31,809	49,596	24,798	24,798	
Moshono			(30%)			(40%)			(40%)	
	Nduruma ¹	5,971	1,791	4,180	11,339	4,536	6,803	6,727	2,691	4,036
	Mlangarini	3,098	930	2,168	5,117	2,047	3,070	1,082	433	649
	Sokon II	<u>6,070</u>	<u>1,821</u>	<u>4,249</u>	<u>6,029</u>	<u>2,412</u>	<u>3,617</u>	<u>570</u>	<u>228</u>	<u>228</u>
TOTAL	15,139	4,542	1,597	22,485	8,994	13,490	8,379	3,352	5,027	

TABLE 6 (Continued)

Division	Ward	Cattle			Goats			Sheep		
		Present Stock	To be de-stocked (30%)	Remainder	Present Stock	To be de-stocked (40%)	Remainder	Present Stock	To be de-stocked (40%)	Remainder
Mbuguni	Mbuguni	6,222	1,867	4,355	6,318	2,527	2,791	7,735	3,094	4,641
	Majengo	4,617	1,385	3,232	8,605	3,442	5,163	6,984	2,794	4,190
	Kikwe	3,598	1,079	2,519	4,587	1,835	2,752	3,373	1,349	2,024
	TOTAL	14,437	4,331	11,106	19,510	7,804	11,706	18,092	7,237	10,855
Enaboishu	Kiranyi	6,575	1,973	4,602	911	364	547	230	92	138
	Ilkidinga	4,306	1,292	3,014	582	233	349	210	84	126
	Loruvani	6,230	1,869	4,361	549	220	329	205	82	123
	Kimunyak	10,972	3,292	7,680	3,610	1,444	2,166	972	389	583
	Sombetini	3,189	957	2,232	4,188	1,675	2,513	1,847	739	1,108
	TOTAL	31,272	9,383	21,889	9,840	3,963	5,904	3,464	1,386	2,078
Poli	Nkoanrua	1,462	438	1,024	521	209	312	1,480	592	888
	Akheri	1,428	428	1,000	213	85	128	998	399	599
	Seela/Singisi	1,089	327	762	290	116	174	932	373	599
	Nkoaranga	1,832	550	1,282	312	125	187	1,279	512	767
	Poli	1,642	493	1,149	488	195	293	1,453	581	872
	Songoro	1,193	358	853	428	171	257	1,631	652	979
	TOTAL	8,646	2,594	6,052	2,252	901	1,351	7,773	3,109	4,664

TABLE 6 (Continued)

TOTAL ARUMERU DISTRICT LIVESTOCK IN DESTOCKING PROGRAM

	<u>Currently Held</u>	<u>To be de- stocked</u>	<u>Remaining</u>	<u>Earnings</u>
Cattle	157,407	52,740	104,667	26,370,000/-
Goats	147,890	67,956	79,934	5,436,480/-
Sheept	112,000	50,242	62,292	4,019,360/-

Source: District Livestock Development Officer

A possible cause of fluctuation in production is the transition from settler estate agriculture to small holder or government estate agriculture. Settlers are involved in the production of coffee (approximately 36% of total district production), sisal, sugar, flower seeds and beans. Sixty-one estates in the District remain in the hands of settlers, but settlers have left and the transition has doubtless caused some unmeasured change in the pattern and quantity of production. This is in part due to the lack of sufficient personnel with experience in managing commercial agricultural estates. It is also due to differences in priorities and goals. For example, the Valeska Estate once had 7,500 acres primarily planted to sisal. Two thousand acres have been given to peasant farmers who are uprooting the sisal to plant maize, beans and finger millet. ARUDECO, which holds the bulk of estate, has planted 250 acres of maize and 50 acres of seed beans. No decision has yet been made on the fate of the remaining sisal acreage.

Yet another factor is the series of government production campaigns. Starting with Kilimo cha Kufa na Kuona (life and death agriculture) which included the free distribution of inputs, the peasants have been steadily exhorted to grow more food. As a matter of policy each person over 18 must have 2 acres of food crops and 1 acre of cash crops. Starting in 1975 the National Maize Project (NMP) provided subsidized seed fertilizer and insecticide to villages. It is likely that this resulted in some increase in production but there are no reliable data available.¹

The rise in coffee prices from last year's shs 8/50 per kilo of parchment to a probable final price of shs 12/00 per kilo (the first and second payments total 9/00) will probably result in increased coffee production due to more careful picking.

2. Livestock and Dairy Production

The estimated numbers of cattle, sheep and goats in Arumeru District in 1975 and destocking quotas are presented in Table 6. Again, these figures should be taken with a sizeable grain of salt. Not only are people unlikely to be candid with a government official about the number of livestock they own, but the livestock population also varies with movement of herds in and out of the district.

¹ Data on knowledge of good maize practices and maize practices followed in 15 Arusha Villages are presented Fortmann, L.P. 1976, "An Evaluation of the National Maize Project in Arusha and Morogoro Regions after One Cropping Season." Prepared for USAID/Tanzania mimeo.

TABLE 7

CATTLE BROUGHT TO MARKET AND SOLD IN ARUMERU DISTRICT
JANUARY 1976 TO APRIL 1977

<u>Year</u> <u>Year</u>	<u>Month</u> <u>Month</u>	<u>Brought</u> <u>to Market</u>	<u>Sold</u>
1976	January	2,157	1,228
1976	February	1,260	880
1976	March	1,018	800
1976	April	1,829	1,127
1976	May	1,690	800
1976	June	1,775	940
1976	July	2,300	923
1976	August	1,887	1,364
1976	September	2,422	1,687
1976	October	1,703	1,308
1976	November	1,658	1,435
1976	December	1,945	1,330
1977	January	1,019	807
1977	February	1,190	910
1977	March	1,230	855
1977	April	<u>1,197</u>	<u>585</u>
	TOTAL	26,280	16,929

Source: Richard Lema, Tanzania Livestock Marketing Corporation.

Dairy production has dropped over the past 8 years or so. At one time the District was self sufficient in milk. Now 78% of the milk marketed in the area is reconstituted imported powdered milk. In part this is due to the destruction of grazing land by overgrazing cultivation of slopes, destruction of forest land, and drought. A second problem is the high incidence of mastitis. This is largely due to the poor housing provided animals by peasant farmers. This is often a small, mud, stick and thatch shed with dirty water standing around in which mastitis bacteria thrive.

Data on cattle sales in Arumeru District for 1976 and January-May 1977 are presented in Table 7. Due to poor quality of the stock for sale Tanzania's livestock Marketing Corporation (TLMC) does very little buying in the district. Private buyers do the bulk of the purchasing. Fluctuations in sales to some extent reflect weather conditions.

The number of cattle brought to market is considerably greater than the number of cattle actually sold. In part this is due to the poor quality of the cattle. Cattle not sold in District markets, do, however, eventually make their way to other markets outside the district. Most of the cattle are traded not by the farmers themselves but by middle men.

People complain that the price is too low. They also may say that they are placed in an untenable position by the insistence that they sell off their thin cows to buyers who want only fat cows.

B. Non-Agricultural Economic Activity

Wildlife has been a source of income for the area. Arusha National Park lies on the slopes of Mount Meru. Arusha is also the starting off point for safaris to Serengeti, Ngorongoro Crater and Lake Manyara Parks. The tourists patronize local hotels, restaurants and bars, rent cars, and buy souvenirs. Unfortunately since the closing of the border with Kenya, the tourist trade has declined to a close approximation of zero.

Another source of income from wildlife is the activity of the Tanzania Wildlife Corporation. The corporation has 80 acres of land near Oldonyo Sambu where wildlife is held for observation before being shipped to zoos overseas. The holding ground has a permanent staff of 30 and employs from an average of 8-10 to as many as 80 temporary staff. The holding ground maintains 20 acres of lucerne irrigated from the mountain but there has been no discernable demonstration effect from this practice.

Both the Park and the holding ground remove land from agricultural production and grazing, the park in an area which suffers from land pressure. On the other hand, both provide employment in areas where alternative means of livelihood to agriculture production must be found.

The Small Industries Development Organization (SIDO) has been setting up small industries in the district since 1974. SIDO is supposed to provide technical and marketing assistance. The groups established include:

- (1) Singisi Pottery Group. This group has been working for three years. The majority of the group are making traditional pots which are sold locally and in the Arusha market. Two women and three boys are working with a potter's wheel turning out ash trays, tea sets, coffee pots, coffee mugs and so on. This ware is not being marketed at the present as glaze is not available. Two Danish professional potters are currently working with the group. The group has a workshop and a clay pit completed. At the moment the group is searching for refractory clay for lining the kiln and is building additional clay pits. A major problem is transport for searching for the clay and for getting firewood for the kiln.
- (2) A group in Olmoshiro makes carpets.
- (3) A group in Oljoro is making shoes which they have sold to Bora Shoes.
- (4) There is supposed to be a knitting group at Singisi but they are experiencing difficulty with their machines.
- (5) The Poli UWT with some assistance from SIDO established a banana fiber cooperative. The club raised the money to send two women to Kenya to learn how to prepare the fiber and make baskets. Forty five women belong to the group which meets twice a week. Each woman receives the money from her own products less a share for the district UWT. Individual earnings for a three month period vary from 6/00 to 400/00 shillings with most women earning about 300/00 shillings.
- (6) There are lumberyards in Nkoankali and Nshupu.
- (7) Tengeru carpentry workshop has 17 members producing chairs, sofa sets, tables and beehives. Much of the output is sold to institutions.
- (8) Mareu Ujamaa Village has a soap factory which produces 1200 bars of soap per day to be sold within the region. Although the plant has been experiencing difficulties it is considered by SIDO to be in production.

(9) Akheri UWT has 8 women producing table cloths, place mats, baby sheets, baby shawls, bed spreads, and carpets on hand-looms made in Tabora. Currently 4 of the women are attending a nine month course in weaving at Tabora. They produce 2.5 meters per day. They are currently experiencing difficulty in obtaining colored thread.

(10) Machines for 1.2 million shillings sugar factory at Karagai are on the way.

(11) A tomato canning plant has been proposed for Ngarenanyuki. The plant would employ 82 people and process 400 tons of tomatoes per annum.

(12) There is a coffee factory at Akheri and Ndoombo. Each factory employs a full time manager and in the coffee season five laborers. The Akheri factory processed 300,000 kilos of coffee in 1976/77 and has handled up to 400,000 kilos.

There are six other factories at Sing'isi, Poli, Ngyari, Mulala, Sokon II and Oltoroto.

The handicraft industries have had the effect of getting money into the hands of women who use it for clothes for their children including school uniforms, food and household utensils and furnishings.

Small industries are critical for the area because of the tremendous land pressure. Although there has been pressure on the people to move, they have been reluctant to do so as this would require them to leave their relatives with whom they have strong ties. Small scale industries would allow more people to stay in the village with less pressure on available land. (Employment in a small scale industry does not, of course, alleviate the problem of land required for housing.)

As can be seen in Appendix A, there is ample room for expansion for employment in the provision of basic services. Of the 20 villages which cover four district areas, seven have no maize mill; 16 have no tea shop; none have a bakery; 14 have no carpenter; 11 have no tailor; most have no bicycle repair shop; 17 have no charcoal making; 16 have no brick making.

There is in fact demand for these services. Thirteen villages have maize mills, three of them obtained by loan. Two other villages have applied for TRDB loans for maize mills. The need for transport is mentioned frequently as a first priority. Four villages in Ngarenanyuki Ward have raised part of the money for a bus themselves. Other villages would greet enthusiastically any transport enterprise. Tailors are required for making school uniforms which will be in greater demand with the implementation of Universal Primary Education. The Government's goal of improved housing will require the services of skilled carpenters.

There are many opportunities for expansion of small industries which are discussed below.

Fish ponds stocked with tilapia have been built in 10 villages, Oldadai, Leganga, Maroroni, Ibou, Enaboishu, Bangata, Akheri, Tengeru, Magereza ya Arusha, Kikune Kata.

Fifty eight beehives have been distributed to Ujamaa villages but only one village got bees. The honey company in Tanga is a reliable buyer and beekeeping should be profitable if it could be established.

C. Social and Political Influence

In the early 1950's Arumeru was the site of the Meru Land Case which eventually found its way to the United Nations. The case had its roots in the aftermath of World War I when the Wameru were given the opportunity by British administrators to "buy back" two farms which had "belonged" to German settlers. Starting in 1923 the tribe began installment payments raised among the people on the basis of ability to pay. From 1930-1939, a tax of SH 2/00 per head was imposed with which the remainder of the purchase price was paid. In 1949 in a revision of the official policy that land could be alienated only if it were not nor foreseen to be required by the tribe and that any residents would have the option of remaining where they were, the British ordered the Wameru to leave the Engarenanyuki area they had purchased and move to the hot, tsetse ridden plains around King'ori. The Wameru refused to move. If the King'ori land was so good, they said, they would gladly give it to the European settlers. In the meantime, they requested that they be given training in modern dairy and cattle production with the British which they maintained were vital to the development and well being of the territory. The British refused and forcibly evicted the 3000 passively resisting Wameru from their land. Despite a pending appeal to the United Nations, seven British officials, replete with military uniforms and swords, arrived in Naarenanyuki on 17 November, 1951 and 120 police and 100 Kikuyu laborers and proceeded to burn the houses to the ground. Those livestock which were not burned to death inside the houses were rounded up and driven away. The villages of Ngabcbo, Singise, and Leguruki were also burned. The Wameru appeal to both the Trusteeship Council and the General Assembly resulted in no action by the UN. It did, however, provide yet another rallying point for the growing TANU movement.

None of the Europeans who obtained tracts of the land were able to make a success of farming it. Eventually the farms came onto the market to be bought once more by the Meru, the last one being bought with money provided by the Tanzanian Government in 1961.

The seizure of the Meru land impeded development progress by the deliberate exclusion of the Wameru from learning about modern production methods, by diverting all their energies to the defense of their land, and by the destruction of property and an established, successful farming pattern. On the other hand, it served as a stimulus to development in that one of its outcomes was the Meru Co-operative Union which will be described below.

There have been two major adjustments in government policy in recent years which affect the form of village development.

In August 1975 the Villages and Ujamaa Villages Act was passed. Operation Vijiji had moved as many people as possible into nucleated settlements.

The Villages Act formalized the results of Operation Vijiji and set out a legal framework for village operation. The Act prescribed a three step process the goal of which was the creation of an ujamaa village.

First a village must be registered. To be registered it must have 250 households (although exceptions may be made to this requirement) and defined boundaries. (According to District Officials the latter provision has lead to some squabbling in the land tight areas of Arumeru.)

Once a village is registered, it must elect a village council which is a working governing body. All village residents over the apparent age of 18 constitute the Village Assembly which elects the village council. Any village resident over 21 can be elected to the Village Council. As soon as a Village Council is elected the village may be registered as a body corporate. An incorporated village may buy, hold and sell property; obtain loans, and is deemed to be a multi-purpose cooperative society. At present 72 Arumeru villages have elected village councils and 55 have been registered as bodies corporate. As can be seen in Appendix B, none of the villages in Mukulat Division have been so registered. The greatest concentration occurs in the Division nearest Arusha.

When the party regional executive committee is satisfied that a "substantial portion of the economic activities of the village are being undertaken and carried out on a communal basis," the village may be designated an ujamaa village. There are no ujamaa villages in Arumeru District.

In 1975 the government also declared that all cooperative societies were to dispose of their assets and liabilities and disband. The buying and selling functions of the cooperatives in Arumeru District have been largely assumed by the Tanzania Coffee Board and National Milling Corporation (NMC).

The abolition of the cooperatives was undertaken because many cooperatives were corrupt or inefficient. However, people appear to feel that ARCU was an effective cooperative with reasonable grass roots control. They feel that even though there are people's representatives on the governing boards of NMC, RTC, TCB and so on, these centralized national organizations are not theirs in the way the smaller organization was. Although the Coffee Board has assumed the supplying and marketing functions of ARCU with no perceptible problems, people express dissatisfaction over two sets of problems. One is the distribution of ARCU's assets. Shareholders are to receive a share of the liquidated assets. This has yet to be done causing anxiety among some shareholders. Second, ARCU provided a wide range of services such as a dairy cow importing program, dukas and loans for small farmers. As it is not yet clear what organizations will undertake the provision of these services and farmers feel they may have difficulties particularly in getting loans.

The abolition of the corporation does not appear to have had a negative effect on the marketing of coffee. It is not clear how efficient NMC has been in buying other crops although the old ARCU buying posts have been maintained. The abolition of the cooperatives without consulting the people may have had one negative effect. It is difficult to engender commitment to plans and institutions when they may be changed without notice from above.

D. Past Development Efforts

The Meru Cooperative Union was a successful private development effort. Its success lay in the fact that it was truly a grass roots effort. The coffee cooperative was the people's own and from the beginning they contributed their own resources to make it run. Alienated by the Meru evictions described above, the Wameru boycotted the colonial government cooperative program and hired their own technical advisor. The cooperative succeeded in lowering the commissions taken by the coffee agent and the brokers at the processing and shipping center which were higher than those charged non-Africans. They increased production by improving agronomic practices and distributing inputs particularly improved variety seedlings on a credit system. They improved roads and bridges which not only made the coffee trade less expensive and difficult but also stimulated other local trade and transport. They set up a coffee processing factory which provided employment and substantially raised the grade and the price of their coffee in the Nairobi market. They built schools and sent students off to study on scholarships.

In contrast, recent forestry preservation in West Arumeru ran into trouble. Men who were supposedly guarding the forest slopes to prevent further destruction of the watershed were in fact taking bribes to allow the people to farm and graze the steep slopes. In the end some 20 people were dismissed from government service, serving as an example to others who might be tempted to misuse positions of authority. The problems of the project served as a valuable lesson particularly when compared with the success of the MCU.

The crucial difference between these projects is participation and control by the people involved. In the case of the MCU, although the policy of the colonial government was to encourage cooperatives, the people disassociated themselves and their effort from that policy. Their cooperative was their own effort to solve their problems as they perceived them in their own way. The MCU did in fact benefit from the assistance given to the cooperative efforts but it probably would have had some success without it simply because of the commitment of the people to the effort. In contrast, while the goal of the forestry project was also to benefit the people, the people perceived it as detrimental to their interests and undermined it.

The ujamaa experience also shows the importance of genuine participation and control by the people. Villages which rushed to "become Ujamaa" in order to get the early government tractors, water, free agricultural inputs -- often ended up as over-capitalized and not particularly productive. Similarly, villages which were forced into certain production sometimes experienced strange and wonderful difficulties in achieving any production at all. (The days of solemnly planting seedlings upside down are not behind us.)

On the other hand, where people see the necessity and efficacy of working together and they control the decisions, they can accomplish a great deal. A case in point is Makiba Village in Majengo Ward, a dry, desolate place even in the midst of the rains. The people of Makiba were the former employees of a nationalized sisal estate. They have cleared 1,000 acres of old sisal and thorn trees by hand. They have built a water tank by hand. They have 500 ujamaa chickens, a duka and a maize mill. Last year the community unanimously decided to put all the profits of the ujamaa shamba into a tractor rather than dividing them up. All this has been done with only a minimal amount of government assistance.

The Appropriate Technology Project under SIDO (sponsored by SIDA) could serve as a model for future projects. The project aims to set up technical resource centers, develop appropriate technology for village needs and start self-sufficient small industries. Teams of Tanzanians are living in four villages to identify with villagers their technical problems and to work

out appropriate solutions to those problems. Progress is already being made in experimenting with methane digesters in wood poor but rich manure West Arumeru.

This approach utilizes the knowledge and experience of the people living in the area. It also results in a commitment to making the project work by the people because it is in fact "theirs."

The Masai Project offers an example of how not to do things in West Arumeru. By providing water and veterinary services without mandatory destocking, the project contributed to the rapid conversion of some grazing land to virtual desert by growing numbers of well watered, longer lived livestock.

Destocking is crucial to any development in West Arumeru where the problem is one of a badly unbalanced ecosystem. Any project in West Arumeru must be undertaken on an all or nothing basis -- no destocking, no project. This decision must be made by the people themselves or like the forest project it will result in bribes, hidden livestock and further destruction of the land. Doubtless the decision of the people will have to be backed up by by-laws to convince the recalcitrant. But planning with the people should reduce the tensions and resistance that might otherwise arise from a destocking program. This means that a significant part of any project in West Arumeru must be ample time for talking with people about their problems and alternative solutions. It also means that the government must make it very clear that recovery in this area requires a balance approach and without destocking there can be no program. Destocking must be presented as the required initial step in a multi-phase development program.

A classic mistake to be avoided is the provision of free inputs. As demonstrated by the National Maize Project, the provision of free inputs simply establishes the expectation that all future inputs will be free as well. According to the DADO previous provision of free inputs or hidden loans for inputs made selling those inputs in subsequent years extremely difficult. Development workers in the area have observed that where there is a mix of tribes, change occurs more rapidly. There is less reinforcement of traditional values and norms where the population is mixed. The villagers of Makiba with a mixture of 30 tribes and four nationalities say, for example, that each group contributes its own special abilities and each learns from the others. Such areas occur around old estates, parts of West Arumeru, and to some extent on the eastern border of the district.

ARUMERU DISTRICT ENVIRONMENT

A. Ecological Factors

The inhabited areas of Arumeru District can be divided into three basic ecological zones. The fourth zone is the uninhabited mountain peak.

The COFFEE BANANA BELT is found on the mid slopes of Mount Meru from 4000 to 6000 feet. The soils are humic ferrisoils of moderate base status and Euthropic Brown soils on volcanic rocks in the humid areas. There is no need for phosphate or potassic fertilizers on these soils.² The natural vegetation was forest but there is little space on these slopes which is not being cropped or occupied by houses.

The FIELD CROP ZONE is found on the lower slopes of Mt. Meru from 3000 to 4000 feet. The soils are Euthropic brown soils, brown calcereous soils, and ferruginous tropical soils. Generally, there is no deficiency in phosphorous, potassium or lime although 100 pounds per acre of double super phosphate was recommended on eroded soils. Data are available on a few specific sites in this zone:

Usa River has freely drained sandy loam which is low in manganese.

Mringa Estate has fine sandy volcanic loam with a magnesium/potassium imbalance.

Oljoro has chocolate brown clay loam derived from tuff with a poor percolation rate and surface capping. The soil is poor in manganese.

The natural vegetation in this zone is some forest and bush and scrub.

The SEMI ARID LIVESTOCK ZONE is on the plains fringing Mt. Meru from 3000 to 5000 feet. This has brown calcareous soils and red brown soils. Phosphorous and potassium fertilizer are generally not necessary.

The West Arumeru areas of Mukulat Division and Ngarenanyuki Ward must be treated as a special case. The area averages 30-35 inches of rainfall a year but the rainfall is highly unreliable. 1976/77, considered a good year, saw 24 inches

² All information on soils and fertilizers is from G. D. Anderson, 1967. "Practical Suggestions for Pasture Improvement in Northern Tanzania" Tengeru Report No. 120 and "Report on Fertilizer Experiments on Seed Beans in Arusha Region" Tengeru Report No. 33.

of rain from October to May. During the previous 7-8 years there was bad drought throughout the area. The area which goes to 5000 feet is undulating hills traversed by 14 gullies covering 66 miles in a north-south direction. The gullies, a result of overgrazing, terrible farming practices, and the wanton destruction of forests are increasing in size. Around Mwandet and Olkokola there is considerable wind erosion. Local people call the dust clouds "Oldonyosambu Rain" and suggest that Oldonyo Vumbi (dust) would be a more fitting name for the place. This area is in immediate need of destocking, afforestation, planting of grass and erosion control in the gullies.³

Rainfall data for a variety of date and sites are presented in Tables 8-10. Of the four sites, Tengeru is considered a high rainfall area. Monduli Coffee Estate and Mlangirini are low rainfall areas. Rainfall follows a bimodal pattern with short rains in November and December and the more reliable long rains from February to May. Rainfall is generally good and reliable on the mountain and lower and less reliable on the plains and in West Arumeru. About 15 inches per year is the minimum possible for crop production.

B. Demographic Factors

The number of households in each village is presented in Appendix C. This is not a complete list of villages (estimates run up to 116 villages). The approximate total number of households in the district is 38,079 with the following breakdown by division: Moshono 6,416, Mbuguni 4,303, Poli 8,643, Mukulat 8,021, King'ori 5,268, Enaboishu 5,428.

Fifty percent of the population of Arusha and Arumeru Districts lives on the 14 percent of the land which comprises the coffee and banana belts. Population density is 332 persons per square kilometer in the smallholder area and 189 person per square kilometer in the estate area of this belt.⁴ Land pressure had long been acknowledged to be a problem in this area. Population density in the field crop area is 45 persons per

³ Sources: "Land Reclamation Project Arumeru District, Mukulat Division and Ngarenanyuki Ward in King'ori Division"; David Peterson, 1976. "Life at Oldonyosambu: The State of the Environment," prepared for the Arusha Appropriate Technology Project.

⁴ Source of population figures: United Republic of Tanzania, Ministry of Communications and Works. Feasibility Study of Kilimanjaro Area. Development Potential and Feeder Roads Improvements, Report Volume II Agriculture and Development Potential.

TABLE 8

TABLE OF RAINFALL AT TENGERU 1966-1976 (Inches)

1966	29.29	1971	37.95
1967	53.14	1972	28.62
1968	67.61	1973	62.06
1969	29.52	1974	58.69
1970	40.00	1976	25.70

Source: DADO Arumeru District

TABLE 9

TABLE OF RAINFALL AT MADIIRA COFFEE ESTATE (SEELA/SINGISI KATA)
1974-1976 (Inches)

	<u>1974</u>	<u>1975</u>	<u>1976</u>
January	Nil	1.08	1.24
February	2.76	1.06	1.75
March	3.23	2.36	4.06
April	13.44	2.40	10.98
May	3.13	4.57	3.52
June	1.85	0.98	2.00
July	1.44	Nil	Nil
August	0.81	Nil	Nil
September	Nil	Nil	Nil
October	Nil	Nil	Nil
November	1.65	Nil	Nil
December	<u>2.05</u>	<u>Nil</u>	<u>2.03</u>
TOTAL	43.32	12.45	25.58

TABLE 10

TABLE OF RAINFALL JANUARY - APRIL 1977 AT FOUR SITES IN ARUMERU
DISTRICT (Inches)

	<u>Tengeru</u>	<u>Mondul: Coffee Estate</u>	<u>Madiira: Coffee Estate</u>	<u>Mlangarini</u>
January	NA	1.34	5.54	4.24
February	6.80	5.66	3.53	2.63
March	6.90	3.75	5.56	7.70
April	16.50	6.81	16.19	14.25

square kilometer with 33 percent of the population on 54 percent of the land. Population density in the Ngarenanyuki-Oldonyosambu area is 29 persons per square kilometer.

The growth rate (natural increase only) for Arusha Region is 3.4 percent and 2.9 for the former Arusha District. The average number of children born per woman is 7.1. Life expectancy is 53 as opposed to (in 1967) 41 for the rural mainland as a whole.

According to 1967 census figures, 39 percent of the population of then Arusha District had been born outside the district and 22 percent had been born outside the region. This in migration was probably accounted for by employment offered on estates. There continues to be in-migration to the area. One impetus to immigration is bad weather elsewhere. For example, when there is hunger in Dodoma, says one observer, there is migration to Arumeru.

As a result of in-migration there is a considerable tribal mix around Arusha town, around the old estates, and along the eastern end of the district. Even Mukulat Division has a mix of Wameru, Waarusha, Wabena, Wakyusa, Iraqw, Wachagga, Wanyaturu, Wairamba, and Kikuyu. There is also some seasonal movement with the cattle herds by the men primarily.

FARMING SYSTEMS

The area planted to different crops in the 1976/77 cropping season is presented in Table 11. The total acreages indicated may be somewhat off because of intercropping. The division of the District into production zones given below is subject to some inaccuracies.

A. Coffee/Banana Belt

This includes all of Poli Division plus Sokon, Ilkidinga, Loruvani and Kiranyi wards. As the name suggests, the major crops are coffee and bananas. In previous seasons fertilizer, insecticide, and herbicide were provided to the coffee farmers at the beginning of the season and the price deducted from the first payment to the farmer. This year it was decided to continue the hidden loan method for insecticide and herbicide but to charge the farmer for fertilizer (at a 50 percent subsidy) at the beginning of the season. As a result less than 10 percent of the farmers used fertilizer. Farmers are able to get away with this due to the fertility of the soil. In contrast to Kilimanjaro where a good farmer using fertilizer averages 15 bags to the acre, a Meru farmer gets 15 to 20 bags without and up to 30 bags per acre with fertilizer. This year most of the fertilizer went to estates which snapped it up at the bargain prices and elsewhere.

Kitchen gardens are intercropped. According to the 1971-72 agricultural census over 80 percent of maize in the former Arusha District was intercropped, the most common pattern being beans and maize. This figure was judged by Kilimo officials in 1975 to be rather high. Several sources in the present study said that much maize was grown under monoculture. Unfortunately, a finer geographical breakdown of the census data was not obtainable. Observation would give the impression that much coffee/banana belt maize is intercropped with beans and bananas. Often farmers in this area maintain their coffee shambas on the mountains and maize shambas on the plains.

According to the DLDO about 4,000 farmers in the district keep a total of 7,600 dairy cows. He estimates the production of these cows to be 3-4 liters per day with an average butterfat content of 4.5 percent, not dropping below 3.6 percent. Dr. Njau of the VIC estimates production to be 5-6 liters per day with a production potential of roughly 20 liters per day depending on the animal. According to Northern Dairies the butterfat content averages around 4 percent. The cows are largely kept at home in a low stick, mud and thatch shed and fed forage by hand.

TABLE 11

CROP AREA BY WARD 1976/77 CROPPING SEASON (ACRES)

Ward	Cotton	Coffee	Pyreth- rum	Wheat	Sisal	Castor	Seed Beans	Maize	Mixed Beans
Kimunyaki	-	-	-	-	-	-	-	700	350
Kiranyi	-	1,935	-	-	-	-	-	350	363
Loruvani	-	1,189.2	-	-	-	-	-	460	500
Ilkiding'a	-	2,443	350	-	-	-	-	550	300
Oljoro	-	-	-	-	-	-	-	1,000	1,250
Nkoanrua	-	3,382.1	-	-	-	-	-	520	293
Nkoanranga	-	3,876	-	-	-	-	-	1,000	450
Poli	-	3,691.5	-	-	-	-	-	700	304
Akheri	-	3,700.7	-	-	-	-	-	460	283
Songoro	-	2,831.5	-	-	-	-	-	350	300
Seela/Sing'isi	-	5,263.2?	-	-	-	-	-	305	290
Sokon	-	3,591.9	-	-	-	-	-	1,020	295
Nduruma	500	845	-	-	17,000	150	1,000	2,000	1,000
Mlangarini	50	-	-	-	774	50	500	1,000	500
King'ori	-	923.4	-	-	-	45	10,200	9,000	4,000
Maji ya Chai	-	400	-	-	9,887	50	-	7,000	1,100
Kikatiti	-	504.2	-	-	-	100	-	4,435	2,000
Ngarenanyuki	-	-	-	-	-	-	-	2,370	1,600
Mbuguni	200	-	-	-	4,000	40	3,000	3,100	800
Kikwe	-	50	-	-	-	65	5,300	2,100	1,800
Majengo	-	-	-	-	1,402	50	1,000	1,100	412
Mateves	-	-	-	2,000	-	-	-	1,550	665
Kisongo	-	-	-	-	-	-	-	3,460	185
Musa	-	-	-	6,000	-	-	-	900	800
Mwandet	-	-	471	-	-	-	-	2,030	1,000
Olturumet	-	338	-	400	-	-	250	1,100	970
Oldonyosambu	-	-	900	-	-	-	-	3,000	1,500
Olkokola	-	-	550	-	-	-	-	500	500
Leguruki	-	923.4	-	-	-	-	-	5,000	400
TOTAL	750	32,399.7	2,271	8,400	33,063	550	21,250	57,060	24,210

Source: DADO

TABLE 11 (Continued)

CROP AREA BY WARD 1976/77 CROPPING SEASON (ACRES)

<u>Ward</u>	<u>Bananas</u>	<u>Finger Millet</u>	<u>Vegetables</u>	<u>Root Crops</u>	<u>Onions</u>
Kimunyaki	800	-	20	50	-
Kiranyi	200	-	20	150	-
Loruvani	800	-	250	100	170
Ilkiding'a	900	-	250	100	100
Oljoro	-	-	100	-	-
Nkoanrua	2,000	-	50	5	5
Nkoanranga	2,600	-	100	5	-
Poli	1,800	-	25	5	-
Akheri	2,000	-	50	10	-
Songoro	416	-	50	10	-
Seela/Sing'isi	1,000	-	30	30	-
Sokon	500	-	75	25	300
Nduruma	150	-	100	15	10
Mlangarini	150	-	50	20	5
King'ori	250	-	20	5	-
Maji ya Chai	150	-	75	50	-
Kikatiti	150	500	10	-	-
Ngarenanyuki	-	300	250	50	350
Mbuguni	100	300	100	40	-
Kikwe	10	300	20	8	5
Majengo	50	350	50	30	-
Mateves	-	-	10	-	-
Kisongo	-	-	5	-	-
Musa	-	-	15	-	-
Mwandet	-	-	30	-	-
Olturumet	10	-	30	-	-
Oldonyosambu	-	-	80	-	5
Olkokola	-	-	50	-	-
Laguruki	150	-	50	10	-
TOTAL	14,186	1,750	1,965	718	950

Source: DADO

Unfortunately, such housing is conducive to mastitis which is a severe problem in the area. According to Njau, cows are tested for brucellosis before sale and hence there is very little if any of the disease in the district. He says, however that foot and mouth disease is common because not everyone vaccinates and the disease is constantly spreading from farm to farm.

Milk which is not consumed at home or sold locally is sold to Northern Dairies. There are cooling facilities at Oljoro, Oldonyosambu, Karangai and Ngarenanyuki. 10,000 liters of milk a day are collected locally of which 20 percent comes from small producers. The milk collected locally is mixed with reconstituted powdered milk to produce 45,000 liters of milk daily. Northern Dairies officials say they could easily absorb any increase in production. The present price being paid for milk is 2/50 a kilo delivered to the plant and 1/80 per kilo for milk collected by the company.

Estates account for a significant amount of the coffee production. As can be seen in Tables 5 and 12, in 1974 just under half of the coffee land was held by estates accounting for about 35 percent of the production this year. One difference between estate and peasant coffee production this year, is that the estates are using fertilizer. Seed beans are also grown in the coffee/banana belt, estates holding 65 percent of the land under the crop. In general estate agriculture is more mechanized than peasant agriculture.

There are 216 tractors in the District, 4 owned by Kilimo. Estates own some of the tractors but most are owned by peasant farmers. Of the small farmer tractors, most belong to people living on the mountain who use them to cultivate their shambas on the plain.

B. The Field Crop Zone

This area includes King'ori Division, Kimunyak Ward, Mbuguni Division and parts of Mukulat Division. As can be seen in Table 11, the crops grown in this area are sisal, wheat, castor beans and a great deal of maize. Peasants account for 68 percent of the wheat land and 85 percent of the maize land in the District as a whole. Wheat production is generally mechanized. Sisal is an estate crop which is harvested by hand. Cash crops are grown under monoculture. Some subsistence crops are grown under monoculture but intercropping of maize and beans and sometimes sorghum or millet and maize is not uncommon.

More cooperative and ujamaa production is found here than in the coffee/banana belt. No data on ujamaa acreage were available.

TABLE 12

CROP AREA BY PEASANT AND ESTATE FARMING 1974 (HECTARES)

<u>Crop</u>	<u>Peasant</u>	<u>Estate</u>	<u>Total</u>
Coffee	4,112	4,000	8,112
Maize	12,000	2,000	14,000
Wheat	2,200	1,000	3,200
Seed Beans	3,360	6,690	10,250
Posho Beans	<u>9,500</u>	<u>1,000</u>	<u>10,500</u>
TOTAL	31,172	14,690	46,062

Source: DADO

Furrow irrigation is used to increase the productivity of some of the drier areas. Mbuguni, the lowest place in the district, has 2,045 acres irrigated from the river by two furrows on which maize, beans, finger millet, bananas, pigeon peas, ngwara (a kind of legume), sunflower, onions, cabbage, carrots, papaya, oranges, lemons, cotton, and a few plots of rice on an experimental basis are grown. The channels are cleaned by hand every three months. Most of the ujamaa shamba is double cropped in a maize-beans rotation. Last year the ujamaa produce was sold as follows: Beans 31,000/-; maize sh 16,000/-; ngwara sh 2,040/-; and finger millet sh 12,000/-. The whole area could be extremely productive.

Kilimo is recommending drought tolerant crops such as serena, millet and oil seed crops as a substitute for maize in the drier areas of this zone such as Mbuguni, Nduruma and Mukulat Division. Serena seed has met with some acceptance. Bullrush millet has not been sent out simply for lack of seed.

C. The Semi-Arid Cattle Zone

The area includes most of Mukulat Division and southeastern parts of the District such as Makiba. Oil seed crops and serena are recommended for this area. Sisal and maize are grown in the southeastern parts where people hire private tractors from as far away as Mwanza to cultivate their land. The Mukalat area as described above suffers from severe erosion. Pyrethrum growing has been suggested as a cash crop for this area. Some pyrethrum areas have, however, been returned to forest reserve. The dry areas around Makiba have potential if reliable water could be found. Kilimo has a horticultural unit at Makiba with 29 acres under irrigation and 51 more to be opened. The unit grows onions, oranges, okra, papaya, bananas, beans, pineapple, lemons and is experimenting with groundnuts. The unit sold 470 orange trees to local farmers this year. A similar unit at Malala sold Sh 2,000/- per month in citrus seedlings at 2/- and vegetable seedlings at =/3 each. Wheat is grown in monoculture. Some maize is grown in monoculture, other is intercropped with beans or peas.

D. Division of Labor

The following division of labor is common. In all areas women are responsible for the kitchen garden. In general men clear the land. Among the Wameru men plant, prune and apply fungicide and insecticide to coffee. Men do most of the fertilizer application. Women do most of the cultivating, weeding and harvesting of coffee. Men do all the selling of coffee and keep most of the money. Women do most of the work with maize including cultivating, planting, weeding and thinning. Among the Waarusha men cultivate the maize with ox ploughs. Planting and harvesting is done together. Women do all the weeding. For coffee, women do the mulching while men prune and spray. Again the men do the selling and keep the money. Women milk the cows.

AGRICULTURAL SUPPORT SYSTEM

A. Research

The nearest agricultural research station is 50 miles from Arusha town at the Lyamungu Coffee Research Institute and Experiment Station. No trials are being done in Arumeru District by Lyamungu staff. Formerly there was an agricultural research and training institute at Tengeru six miles from Arusha. Tengeru staff did conduct off station trials although it appears from the reports that they were done primarily on substations and estates.

Trials in farmer's fields conditions are being conducted by the National Maize Research Program based at Ilonga. While none have been conducted in Arumeru District, variety trials conducted in the Southern Highlands are generally applicable to Arumeru. Legume research is based at Ilonga also.

Cotton research is done at Ukiriguru and Ilonga Research Stations. A major advance in cotton technology has been the ultra low volume (ULV) sprayer. The battery-run ULV which looks like a short fishing rod case, allows the farmer to spray a large area in a short time without using huge amounts of water or constantly pumping. It has been adopted by cotton farmers in Arumeru.

It should be noted that a perfectly adequate technology already exists for most food crops. In the 1950's there was a food crop research program which worked with sorghum, cassava and maize, with excellent results, some of which unfortunately have been lost. The maize and legume research program is furthering this food crop research although in fact very few of the maize production problems are related to varieties. There are already varieties for all elevations in Tanzania as well as a special short season variety and a short stalked variety which does not lodge. The major task remaining -- streak resistance -- is well under way. Management practices appropriate for small farmers have also been established. The Tropical Pesticide Research Institute is located in the District.

B. Extension

There are 21 Mabwana Shamba in Arumeru working directly with farmers and villages, less than one per ward. According to the DADO, the average Bwana Shamba should be responsible for 700 households. On a straight numerical basis the average Bwana Shamba serves 1,800 households. An examination of village population figures and distribution of Mabwana Shamba would lead one to suspect that some are covering five or more villages and over 2,000 households -- all this on foot.

There are four females staff members, one of whom works in the village. The DADO claims it is better to have men because the man in the household should be approached. Women at all levels (ward and division secretaries, villagers) say that a Bibi Shamba would have much better rapport with the women who are doing a lot of the work and would not have much trouble if any, with the men, particularly if she came from outside the district. There is a two year certificate course after form four for Bwana Shamba training. The curriculum of some of these courses appears to be overly theoretical for the training of field workers. Fifteen of the district's Mabwana Shamba have completed Form IV and a two year certificate course. The rest have completed Standard 7 and are undergoing on-the-job training.

According to the job description, a Bwana Shamba should attend all village, ward and party meetings; know the working area including crops grown, how to improve crop production, and what new crops could be introduced; help villagers make plans have supervised demonstrations plots in each village, preferably a communal plot or have his/her own shamba as a demonstration plot.

Theory is far different from practice. It is difficult for a Bwana Shamba to be taken seriously when, as is sometimes the case, he/she does not follow his/her own advice at home. Often the Bwana Shamba is viewed with a sort of amused disrespect. Two nuns who lived in a village reported planting maize with the villagers under the Bwana Shamba's supervision. People were planting five seeds to a hole while his advice was one per hole. When the people discovered that the nuns were following his advice, they were absolutely flabbergasted. The women then took it upon themselves to advise them, "don't pay any attention to him. You don't have to do what he tells you." People voice two major complaints about some extension staff. One is that people don't get to see them because they are out drinking. The second is that they are corrupt and ask money for services. To this might be added the observation that when some extension staff do work, it tends to be at their desk and not in the shamba.

On the other hand, many Kilimo staff are quite competent and people do ask them for advice. For example, one old man was observed to come into the DADO to ask what he should use on American borer worms in his beans and then spent several minutes discussing the merits and dangers of the choice of insecticides.

The Bwana Shamba in Oldoyosambu was observed to be quite knowledgeable about the problems and crops in his area and appeared to have a reasonable working relationship with the farmers.

The Bwana Shambas are somewhat hampered by their own negative attitudes about farmers -- a negative attitude often engendering a negative response. In a study of Mabwana Shamba, 3 out of 4 Arumeru staff in the sample agreed with the statement, "It is hard to get a sense of accomplishment working with peasants."

The Bwana Shamba's task is also complicated by the working situation. Inputs they are supposed to distribute may not arrive or may arrive incorrectly labeled. They may convince people to grow a new crop only to have the prospective buyers not show up. They may be required to assume a police role which interferes with their role as educators. Sometimes they must carry out technically unsound agricultural policy issued by well intentioned non-agriculturalists. None of this adds to their credibility, but it does add to their frustration.

The most effective spreader of technology appears to be the demonstration plot in a farmer's field using his/her labor. Effective, economic techniques are likely to spread if they do not encounter structural difficulties -- lack of credit, lack of inputs, lack of a decent marketing system, low prices.

Ciba Geigy has developed a maize practices instruction kit to be accompanied by a demonstration plot and a slide show which is always a crowd gatherer. It includes a collapsible flip chart and picture pamphlets and can be easily carried over the shoulder by even a small person. There are large numbers of these kits available free in Dar. They might be worth investigating.

C. Credit

There are no traditional forms of cash credit in the area outside of borrowing from one's friend or relative. There was and is in-kind credit in the form of reciprocal labor sharing agreements. One can ask friends to come and help harvest or weed or whatever and then provide food and drink afterwards. The reciprocal labor could be organized on a group basis. Among the Waarusha invitations are made to friends, not to the general public, lest misfortune befall the shamba.

ARCU used to provide credit to individual peasants to buy pigs, tractors and cattle. Since its demise, small farmers say that they cannot get credit. In fact individual credit is available although TRDB ceased giving individual credit in July 1976 in accordance with the national policy of encouraging ujamaa villages. National Bank of Commerce says it gives small loans to peasant farmers without requiring any security. The Bank had no figures available to indicate just how many farmers might in fact have ever received such loans. A small farmer's best bet for credit is the provision of inputs for certain crops. Coffee producers can get insecticide and fungicide on credit which is deducted from their payments when the

crop is sold. Under the National Maize Project in some villages, despite national policy to the contrary, farmers were able to get inputs on credit through the village. Of Shs 476,501/ loaned in the 1975/76 season, only Shs 196,529/10 has been repaid.

The DADO says that village credit is a major headache for Kilimo. In addition to the NMP debts, the office is owed Shs 80,220/- by ten villages for tractor hire service since 1974. Five of these villages have paid nothing at all.

TRDB makes loans for farm machinery, crop inputs, livestock, transportation and storage facilities.

When a village applied for a loan from TRDB, they must present a loan request signed by the secretary, chairperson and one committee member; the minutes of the village meeting at which it was decided to ask for a loan; and an application fee of Shs 50-500 to cover a feasibility study. A bank officer (either an economist or agronomist) meets with the committee, examines records and past performance, and talks to District officials to determine the profitability of the project. Loans up to Shs. 200,000/- may be approved by the Regional Loan Committee which consists of the Zonal National Bank of Commerce Officer, Regional Agricultural Development Officer, Regional Planning Officer, Regional Livestock Development Officer, and one MP from the Region appointed by the Minister of Finance.

The following village loans are currently out:

- (1) Mareu - 1973/74 loan for a tractor is being repaid on schedule. The village also has a 1975/76 loan for a maize mill.
- (2) King'ori has a loan for a maize mill which is proving to be profitable. The repayment schedule is being met.
- (3) Seela-Meru has a loan for a maize mill but are not repaying on schedule.

The following four loans are up for approval for 1977/78 ARUDECO - maize mill; Nshupu - maize mill; Makiba - tractor Ngarenanyuki ward - four villages have contributed Shs 203,000/- for a bus and are applying for 180,000/- more.

D. Delivery System

1. Crops

The provision of inputs is a critical problem. Farmers who have the cash can buy insecticide, herbicide, seeds, fungicide and fertilizer from TFA in Arusha town. Maize inputs are delivered to NMP villages where the farmers can buy them

generally through the Bwana Shamba. The Tanzanian Cotton Authority (TCA) delivers cotton inputs. The Tanzania Coffee Board delivers coffee inputs.

There are three major constraints on the delivery of the inputs accessibility to the distribution agent, transport and storage.

Maize, wheat and beans seeds are readily accessible because both foundation and certified seed are produced on the Arusha Seed Farm and sold to the Tanzania Seed Company in Arusha Town. In addition to the seed farm, Tan Seed obtains seed from Kenya (hybrids) and from contract growers including one Tanzanian estate owner in Usa River. Tan Seed in turn sells to the government, TFA and individual buyers but does not deliver. This year it sold to the Arusha RADO the following amounts of seed part of which was sold in Arumeru: Kenya Hybrid 632,127.5 tons; KH 622:241.5 tons; UCA 166 tons; Katumani 58 tons; 45 tons of sorghum and smaller amount of other seed for demonstration purposes. Fertilizer must come from Tanzania Fertilizer Company in Tanga and transport can be a problem.

Transport to the villages is a major headache. Tanzania Coffee Board has only 2 or 3 lorries for Arusha Region although it has applied for permission to purchase 5 more. NMP has had to rely on private lorries and this has posed a problem as private owners are often unwilling to risk their vehicles on rough roads. As of May 9, 1977, 25 percent of the NMP villages in Arumeru had not received their 1976/77 inputs according to the DADO. The planting date is January/February.

The constraint imposed by transport is aggravated by the lack of storage facilities meaning that delivery cannot be staggered over a long period without probable destruction or damage of the commodities. Only 14 villages in the District have godowns, most of them limited in their use as cotton stored there must be kept free from stain.

Machinery services can be rented from Kilimo at Shs. 70/- per acre for plowing; 35/- per acre for harrowing; 40/- per acre for planting and fertilizing; and 40/- per load for a tractor and trailer for harvesting. Private operators from Mwanza also provide tractor services at a higher price, but sooner than Kilimo which has a limited number of tractors.

2. Livestock and Poultry

Supplies for livestock are also a major problem. The first problem is obtaining the animals themselves. Once obtained from Kenya, they are now available only from local estates at Shs. 8,000-10,000 per dairy cow. Acaricide for the dips is another problem. According to the DLDO Kilimo has changed tender and the new supplier is delivering only 10 drums per

month instead of the requisite 20. Farmers can use a hand sprayer instead (in the coffee/banana zone this is the only option) at a cost of Shs 250/- for the sprayer and Shs.111/- for 5 litres of acaricide which will last 10 cattle 10 weeks according to TFA. Mineral licks are not available since the closing of the border. Farmers are substituting table salt which does not include all the necessary minerals. Brewer's yeast, a source of vitamin B-12, is obtainable from Tanzania Breweries but the supplies are inadequate. The proper feed for both cattle and poultry is not always available from NMC. Good quality baby chicks are no longer available since the closing of the border.

There is an artificial insemination program operating out of Usa River but the most optimistic estimate of its success rate is a dismal 40 percent. According to VIC personnel inseminators often arrive after the estrus period. Even if they arrive on time, the semen which is transported on motorbike in liquid nitrogen in a thermos flask is not always live. Artificial insemination is free but service by a local bull for Shs. 20-40 is generally a better bet. The DLDO feels 8 grade bulls, 2 in each of four centers to be used as breeding stock would be desirable.

A major problem is that of recurrent expenses. Mifugo cannot charge for dips and does not have the funds to make new dips operational. The DLDO estimates that operating costs could be met at a charge of =/20 per head and says that farmers would prefer to get the service at =/20 per head rather than not to get the free service. Charging for artificial insemination at the same rate as servicing by local bulls, might allow the purchase of landrovers and other equipment to make the program successful.

3. Agricultural Processing

The coffee processing industry appears to be functioning reasonably smoothly. Milk processing is operating smoothly and could be readily expanded. According to the DLDO livestock markets need to be improved with a ring and a shed for each market.

E. Marketing

Marketing of coffee and cotton is done by the Tanzanian Coffee Board and Tanzanian Cotton Authority respectively. Both appear to be doing a reasonable job although they suffer from transport constraints which are aggravated by the condition of the roads.

National Milling Corporation is the official buyer of food grains but has not always been able to fulfill its mandate. However, villages which have a transport problem such as Sakila

and parts of Maji ya Chai are often dependent on NMC to buy and transport their produce. There is a lot of smuggling in the area as the Kenya border is conveniently close and the price of maize is T. shs 150/- to 200/- as opposed to T. Shs 76/50 per 90 kilo bag. One person observed that if good roads were put into areas like Sakila and the price of maize remained low, the result would be an increase in smuggling.

Fruit and vegetables are sold in local markets, along the road and in the Arusha market. Marketing is largely a matter of farmer/village initiative. The major problem is to get produce to the main road where transport is accessible.

Tanzania Coffee Board maintains buying posts at Koimere, Sokon II Nkoanrua, Akheri, Seela, Poli, Ngyani, Leguruki, Ndoombo, Sing'isi, Olturoto, Mareu, Sakila, Mulala, Ngarenanyuki, King'ori, Malula, Mgejusosia, Ngaremtoni Juu, Maji ya Chai, Kikatiti, Leguruki Madukani, Nshupu, Nkoankali, Sanawani, Lepolosi, Kinanyi and Oldonyosamou.

Cattle are sold in weekly markets attended by TLMC, Tanganyika Packers and private buyers. Sales figures for 1976/77 are presented in Table 7. According to a district official, a conflict exists between buyers who find the quality of animals poor and seller who think the prices are too low. TLMC does very little buying in the Arumeru area due to poor quality animals. The Kisongo and Shamburai markets have been closed to buyers from Moshi, thus forcing both buyers and sellers to to other markets.

The provision of consumer items was in the past done by individual owners of small dukas and ARCUA run cooperative dukas. Since Operation Maduka all village shops are supposed to be cooperative efforts. At the moment there are 10 village and 5 worker run cooperative shops in the district. Ushirika and Ujamaa staff say that only a few of them are really functional. The problem is lack of trained managers, particularly people who can do bookkeeping. The District Ujamaa na Ushirika people have trained 60 people (30 villages) in a one month bookkeeping course. Oxfam and Danida are starting a 3 month course for training 6 people at a time in the village shop in Mareu. People also complain that Regional Trading Corporation (which is the major wholesale source) is not responsive to their wants. All shops suffer from periodic shortages of goods produced in the country due in part to malfunctions of the distribution system.

Pricing is set by Economic Committee of the Cabinet on a national basis. Export commodity prices paid the farmers are also set by the government but to an extent reflect the world market price. This year the price of cherry (unprocessed) coffee was Sh 1/80 per kilo (1/- in 1975/76). The price of parchment

coffee was Sh 9/- for the first two payments with the third payment expected to be 3/-. Last year's total price was 8/50 per kilo.

There is a general feeling that government prices are too low. This is reflected in the vigorous smuggling activity and black market. The DADO says that the low prices paid by NMC do not keep production down but they do affect the amount that is sold to NMC.

OTHER ECONOMIC ACTIVITIES

There are a number of cottage and small scale industries which could be undertaken in the district. A proposed tomato canning plant employing 82 people at Ngarenanyuki described above would require Shs 660,000/00 in loans to become operational. Other small enterprises could include the picking and packaging of bay leaves which grow on Mt. Meru; sewing clothes (particularly school uniforms); carpentry including making toys (wooden trucks, airplanes, and animals) and equipment (chairs, tables, benches, climbing apparatus) for the increasing number of schools and daycare centers; dolls could also be made for the schools. Oxploughs and windmills could be manufactured. An Arusha Cooperative is already manufacturing candles with a metal mold. The mold, locally made, costs Shs 1500/-. Two candle makers can make 1200 candles with a 4 hour burning time (longer, they claim, than the imported candles) a day which are sold to hotels at =/80 apiece.

Handmade paper can be produced in villages from paper scraps at a rate of 150-200 sheets per day. The grey board produced can be used for files, binding, light cartons, and shoe fillers. The equipment required, all locally made, is:

Hydro pulper with motor	experimental models
2 wooden storage vats	
lifting vats	2500/-large, 1500/-small
Hand press	7500/-
Drying rack	150/-
Calendering machines	
Guillotine	1500/-

To make handmade paper from fibers (wheat and rice straw, textile wastes, banana fiber) two additional pieces of machinery are required also locally made:

Cutter	400/-
Beater-roller	15,000/- to 20,000/-

Paper bags can be made as a cottage industry using glue and printers free waste paper.

A businessman of Arusha is currently producing paper bags and working on the hand paper production project with the Arusha prison. He is also manufacturing pottery, refractory bricks (using meerscham and kaolin), and wooden items including toys, hotel key tags, lampstands, rubber stamps, salt and pepper shakers. The Arusha school is manufacturing coconut shell items (earrings, pendants, key tags, bangles, forks, buttons) which require a hand saw, roller with sandpaper and varnish. All these could be manufactured in a village with primarily local made equipment.

It was pointed out that low tension insulators would make an excellent village industry. They require minimal skills as they are made with a press and are completely uniform. Tanesco would buy the entire production even some with defects as appearance is not important.

There is also available a proposal for the development of a lime-pozzolana industry, which is attached as Appendix D. Lime-pozzolana (pozzo lime) is a light-weight building material made of lime and pozzolana which occurs in the Oldonyosambu area. The bricks can be made with handpowered cinva rams which are being manufactured locally. Two men can make 250 blocks a day with a cinva ram. Such an industry not only would provide employment in an area desperately in need of economic alternatives, but also would make a contribution to many government programs by lowering the cost and increasing the availability of construction materials.

ECONOMIC SUPPORT INFRASTRUCTURE

Facilities available in villages are marked on the accompanying map and listed in Appendix B. As can be easily seen in Appendix B, facilities tend to be concentrated in the areas on the east side of the mountain and close to Arusha. Mukulat Division suffers particularly from lack of facilities.

A. Physical Infrastructure

There are 14 village godowns in the district. There are no ward or division transfer godowns. Petrol and diesel are readily available on the Mosm and Nairobi roads and in Arusha Town which is about 50 miles from the farthest point in the

District. Villages which have tractors have large storage tanks to which fuel is delivered by the petrol companies. There is a CCM office in at least every ward. Villages with tractors may have their own mechanics. The nearest major repair facilities are in Arusha town.

B. Transport System

Roads into the plains and up onto the mountains are generally of earth and deteriorate drastically during the rains. Some bridges wash out annually according to Ujenzi staff. While there is frequent and reasonably reliable transport between Moshi and Arusha and along the tarmac roads, villages off the tarmac have great difficulties. The poor condition of the roads make bus service unprofitable and sometimes impossible. As a result alternative means of transport have sprung up which are terribly expensive. For example, to get from Makiba to the tarmac road, a distance of 10 miles, costs Shs 30/- per person in a landrover and Shs 20/- in a trailer pulled by a tractor. The equivalent bus journey would cost around 2/- on a reasonable road.

The following road repairs and improvements have been proposed by the District Engineer. They are listed in order of priority.

- (1) Nduruma Road - 9 miles - Three bridges have washed out and must be replaced. Drainage must be built. Total cost: 287,500/-.
- (2) Roads to Nduruma villages: Nduruma, Muzimini, Marurani, Maji ya Moto. Includes a number of bridges. Cost for one bridge Shs 180,000/- excluding labor and transport.
- (3) Usa-Momella-Ngarenanyuki - 48 miles - requires 5 new bridges, murrum, 3 drifts and relocating part of the road. Total cost Shs 307,500/-.
- (4) Tengeru-Karangai-Mbuguni. The last five miles of this road involve negotiating a river bed, a bridge with collapsed approaches, and irrigation furrows crossing the road with wild abandon. The total estimate of Shs 37,000/- for murrum, chipping seems inadequate and was probably made before the damage of this rainy season.
- (5) Mringa-Likamba-Musa Kibaoni - needs three culverts, Shs 15,000/- for culverts only.
- (6) Oljoro - 22 miles - need to raise the road and apply murrum. Shs 125,000/- for murrum.
- (7) Kisonge-Monduli (Nengungu) 13 km - 4 culverts - total cost 250,000/-.

The total costs for the above roads is Shs. 1,202,500/-. The following roads are of lower priority.

(1) Makiba - Kikatiti - 10 miles - this road has been so badly washed in this rainy season that it is no longer wide enough for one vehicle and traffic must leave the road entirely in two stretches. Four culverts (shs 20 000/-) grading and murram have been proposed.

(2) Kikatiti-Sakila-Maereu-King'ori-Kati-Leguruki - requires 3 culverts (1,500/-).

(3) Ngarenanyuki-Oldonyosambu - requires 4 culverts (20,000/-) murram and grading.

(4) Other roads: Enaboishu, Ilboru, Ilkidinga.

Improvements on the road system would in itself be an enormous development aid given the productivity and initiative in the area.

There is direct rail linkage to Dar es Salaam and Tanga on East African Railways which maintains stations at Usa River and Arusha.⁵ In Dar there are connections with the Central Line to Mulanga and the Uhuru Line to Zambia. Access to Mombasa and to Nairobi via Voi is possible when the border is open.

The Moshi-Arusha Branch is a single track line. Because it has no passing loops daily traffic is restricted to approximately 4 trains per day in each direction. Usually one freight train averaging 150 tons passes in each direction per day. At the height of the harvest season, 3 to 4 trains with 700-800 tons each are supposed to travel the line each day.

Most inbound freight is oil, cement and manufactured items. Outbound freight is primarily agriculture items, particularly seed beans for transport to Tanga. Very little coffee moves from Arusha by rail. Sisal is loaded at the Usa River Station.

According to the Dutch team which did the Morogoro Regional Plan, the railway needs heavy reinvestment in tracks, wagons, and locomotives.

Air service to Dar is available on Air Tanzania from Kilimanjaro International Airport (KIA). The airport is equipped to handle 700 passengers per hour but in fact handled only 100-200 per day before the collapse of East African Airways. Some

Mail and air transport information is from United Republic of Tanzania. Ministry of Communications and Works n.d. Feasibility Study Kilimanjaro Area Development Potential and Feeder Roads Improvements Final Report Volume III Transportation. COWI Consult in collaboration with the Economist Intelligence Unit Ltd.

cargo (744 tons in 1974) went out by East African Airways - mostly game trophies, meerschaum pipes, vegetables, pyrethrum extract, and meat as well as personal effects. Incoming freight consisted of machinery spare parts (75), vegetable and flower seeds, newspapers and personal effects.

With the demise of East African Airways there is no direct international service from KIA. International exports would, in any event be hampered by the lack of sufficient cold storage capacity (100 m/ at present).

Bus service is available to most major cities. The national trucking service, National Road Haulage, has gone bankrupt leaving only private trucking firms operating. None of the available transport systems adhere to reliable timetables but buses are the least reliable. Both buses and drivers are often shockingly unsafe and passengers may be stranded for hours, sometimes days, for the lack of something as basic as a jack or a spare tire.

Arusha is linked by tarmac road with Nairobi when the border is open.

Transport is the chief problem of every government department. Every functional manager said that lack of transport reduced the amount of work that could be done. Ujenzi which is in charge of maintaining roads has 1 lorry, 2 trippers, 1 landrover, and shares the regional power grader. The lorry and the landrover are both in bad repair. Spares for the power grader generally came from Nairobi which may cause difficulties. In order to properly maintain the roads the Ujenzi staff estimate they need spares to keep the existing vehicles in working order plus an additional tipper, landrover, lorry, power grader, tractor and trailer. Ujenzi is also understaffed by 7 permanent staff (road inspector, road foreman, carpenter, stores attendant, mason, road overseer) and 7 laborers.

C. Communication

Nearly every village has at least one radio which is probably the most effective means of communication after personal contact. Radio programming includes a great deal of educational and politicizing material, but it does not seem to be effectively utilized with follow-up. There is a great potential for the organization of radio schools after the Venezuelan model.

Much of the population, particularly women, is still illiterate. Hence newspapers, posters and pamphlets are not particularly effective. A survey done in the region showed a very low readership of the agricultural magazine Ukima wa Sisasa. Posters appear mostly in government and party offices.

There is generally reliable albeit slow telephone and telegraph linkage between Arusha, Usa River and other areas in Tanzania and Kenya. Mail service is slow but generally reliable.

D. Education and Training Infrastructure

There are 114 government primary schools and one private boarding school in the district. No child is more than 3 kilometers from a primary school. Schools are being built in villages which do not have them now. The DEO expects that by November 1977 90 percent of all standard 1 age children will be in school in accordance with the national policy of universal primary education. Educational facilities are not adequate to meet the demand. There are 40 to 50 children per classroom. Space in the upper standards is severely limited as can be seen in Table 13. The school enrollment figures for 1976/77 are presented in Table 14. As can be seen, girls are under represented although not as badly as in the past. Part of the reason for the current situation according to the DEO is that the Masai and Waarusha are reluctant to educate their girls past Standard IV. However, of the 437 teachers in the district, 50 are Arusha women and he feels that they set a good example in the Arusha areas.

The number of district students accepted into government secondary schools has declined in the last seven years probably as a result of the attempt to equalize regional representation in the schools. (Parents from other areas sometimes deal with this problem by sending their children to a less developed region for Standard VII in the hopes that they will get into secondary school under that region's higher quota.) The number of girls has remained reasonably constant, however, and thus the proportion of girls has risen since 1971 as can be seen in Tables 15 and 16.

There are three secondary schools in the District, one government and two private, Ilboru, Makumira, and Enaboishu, with a total enrollment of 1,454. The majority of the private school enrollment (861) come from within the district. Two year technical training following standard 7 is available at Sing'isi, Mbuguni, Nduruma and Seliani. When it was visited in May, the Mbuguni school had 6 students, 3 teachers, and a small workshop with saws, hammers, a plane and a bench. The principal expressed a need for a modern workshop with modern tools. The Leguruki school is mission run. The Patandi Teachers College gives a two year course to Standard 7 leavers. There is a secretarial school for the EAC and a MATI at Tengeru, a College of Forestry at Olomotony and theological seminaries for every variety of religious sect. The Catholic Church maintains a Leadership Training Centre near Usa River. There are also facilities available at the Danish Volunteer

TABLE 13

GRADES AVAILABLE IN ARUMERU DISTRICT PRIMARY SCHOOLS
1976/1977

<u>Standards Available</u>	<u>Number of Schools</u>
Standards I - VII	60 (one with 2 streams)
Standards I - VI	5
Standards I- V	5
Standards I- IV	9
Standards I - III	13
Standards I - II	18
Standards I - only	4

Source: DEO

TABLE 14

ENROLLMENT IN ARUMERU DISTRICT PRIMARY SCHOOLS
1976/1977

<u>Standard</u>	<u>Boys</u>	<u>Girls</u>	<u>Percent Girls</u>	<u>Total</u>
I	4,003	3,389	46	7,392
II	3,902	3,373	46	7,275
III	2,944	2,309	44	5,253
IV	1,770	1,687	49	3,457
V	1,503	1,223	45	2,726
VI	1,475	1,052	42	2,527
VII	1,384	1,030	43	2,414
UFund	213	81	28	294
TOTAL	17,194	14,144		31,338

Source: DEO

TABLE 15

STUDENTS APPLYING AND ACCEPTED FOR SECONDARY SCHOOL BY SEX
1971/1976

<u>Year</u>	<u>Students Taking Test</u>			<u>Students Selected for Secondary School</u>		
	<u>Boys</u>	<u>Girls</u>	<u>Total</u>	<u>Boys</u>	<u>Girls</u>	<u>Total</u>
1971	773	305	1,078	157	33	190
1972	952	417	1,368	134	37	171
1973	1,112	583	1,695	77	30	107
1974	1,114	643	1,757	79	27	106
1975	1,288	867	2,155	77	34	111
1976	1,522	971	2,493	85	32	117

Source: DEO

TABLE 16

RELATIVE SCHOOL PERFORMANCE OF BOYS AND GIRLS

<u>Year</u>	<u>A</u>	<u>B</u>	<u>D</u>	<u>D</u>
1971	20.3	10.8	28.2	17.4
1972	14.1	8.9	30.5	21.6
1973	6.9	5.1	34.4	28.0
1974	7.1	12.3	36.6	25.5
1975	5.9	8.9	40.2	30.6
1976	5.6	9.8	38.9	27.3

- A. Percent of boys taking the test who are selected for secondary school.
- B. Percent of girls taking the test who are selected for secondary school.
- C. Percent of students taking the test who are girls.
- D. Percent of students selected for secondary school who are girls.

Training Center near Usa River. As noted above, a shop for training managers is being established in Meru.

The government has vigorously pushed a program of adult literacy. In theory everyone must attend these classes and employment in factories now requires literacy or training in literacy classes. In some villages non-attendance is sanctioned with a fine. There are no available data on the incidence or effect of these classes.

The government is encouraging the establishment of day care centers for children aged 2-7 staffed by teachers chosen from the village by parents and trained in a 3 month course at Tanga. There are 7 operating centers and 3 to be opened soon. Parents have been paying Sh 5/- a month per child but this fee is to be raised to Sh 10/- per month. The program has encountered difficulties because parents do not pay their fees. UNICEF provides some food for the program but transporting it to the villages poses a problem.

E. Power Resources

Arusha Town is electrified and power is being extended to other areas as rapidly as possible. The Ptandi-Akheri-Ndoombo area is about to be electrified. The electricity comes from the national hydro-electric grid. Most activities use diesel engines or hand labor as a power source.

F. Soil and Water Conservation

There is a need for water management all over the District. The plains area suffers from rampaging water which destroys roads when the rains are heavy and from lack of water in the dry season. Both water control and water storage are necessary for this area. It is possible that underground gravel storage pits might be more efficient than dams which have a high evaporation rate. Planting trees would also be useful and would provide much needed shade as well.

There are two sets of Forest Reserves in the District. The Mt. Meru Reserve is controlled by the Ministry of Natural Resources. The following areas of forest reserves are controlled by the District:

Sambasha - 5.2 hectares - under the control of Olmotony Forest Manager - has not been cultivated or grazed.

Ngurusambu - 5.6 hectares.

Kibwezi - 126.0 hectares - severely cultivated - scheduled for replanting in next financial year.

Sakila - 30 hectares - severely cultivated - not yet replanted.

Kiutu - 20.8 hectares - has been replanted.

Duluti - acres unknown - part has been cultivated - boundaries need to be replanted.

The following areas are planned as forest reserves but their status has not yet been published:

Usa Spring 20.8 hectares; Ngaresero 12.0 hectares; Tengeru 12.8 hectares; Sua 36 hectares, Karanga 16 hectares.

The bylaws governing the forest reserve provide a fine of 3/- for each sheep or goat and 5/- for each cow caught grazing on forest reserve land. The fine doubles if the animals are held overnight. On the second offense the fine is 10/- goat and 15/- cow. On the third offense one is taken into court.

Soil and water conservation is a critical problem in West Arumeru, Ngarenanyuki, and Kisongo. The problem stems from overgrazing, terrible farming practices, and destruction of the water shed by the wanton cutting down of living trees. Two proposals (cited above) have been made for this area.

A regional five million shilling proposal consists of four basic recommendations:

- (1) Crop Husbandry: Introduce drought tolerant crops such as millet and short season varieties of maize and beans. Pyrethrum would be grown as a cash crop above 5000 feet.
- (2) Destocking: Under present conditions ten acres of grazing land can support one cow or 5 sheep or goats. To reduce peasant holdings to the carrying capacity of the land would require destocking cattle by 50 percent and sheep and goats by 75 percent. The 1975 livestock destocking plan which was 30 percent for cattle and 40 percent for sheep and goats appears in Table 16. Although destocking has been declared essential for a number of years, nothing has been done to implement it.
- (3) Soil Conservation: Due to the sloping nature of the land and the easily eroded soils (sandy clays, loam and loam silt) in the area, there is a lot of erosion. All arable land (about 48,768 acres) needs to be contoured and terraced. Diversion ditches need to be dug at the foot of hills to reduce flooding. The 14 gullies in the area need to be stabilized by planting

sisal 30-50 feet along their sides and grass in them and by reducing the water velocity in them by constructing weirs. Grazing should be restricted to 15 to 60 feet and cultivation 60 yards from either side of the gullies.

- (4) Afforestation. Natural Resources officials estimate that 3,165,400 trees need to be planted on 5,000 acres of land. Natural Resources has sponsored tree planting in the past but the project has largely failed due to the wrong kind of trees being distributed and goats gobbling up the young seedlings. This year distributing trees to primary schools to be given to students to plant at home is being contemplated. Again goats may prove to be the Achilles Heel of the scheme as any kind of protective materials such as thorn tree branches is extremely difficult to get.

A second proposal prepared for the SIDA/SIDO Appropriate Technology Project is based on intensive and careful use of small areas of land. It consists of the following steps:

- (1) Water Management. Provision of new water sources which would be done with boreholes and windmills on the lower slopes. Protection of the watershed by excluding livestock and prohibiting tree cutting in the immediate area of a water source. Use claypot or trickle irrigation rather than furrow irrigation.
- (2) Crop Husbandry. Prohibition of tractor cultivation. Planting of lucerne for forage and fruit trees for better nutrition. Plant small plots of wheat, sorghum and millet. Practice crop rotation.
- (3) Livestock. Introduce good quality heifers to be green fed from garden plots. Offspring of family cows and a village bull will become village property and used to build up a dairy herd as well as for sales for meat and breeding purposes. Existing livestock to be gradually phased out.
- (4) Fuel. Plant family stands of trees for firewood. Introduce methane digesters (of manure) which produce gas and fertilizer to be used on garden plots.
- (5) Land Reclamation. Individual activities: terracing garden plots: tree planting (IF YOU CUT A TREE, PLANT A TREE) and nurturing around the home. Communal activities: terrace and plant strips of trees and cactus in particularly erosive areas. Weed and reseed former areas of cultivation with perennial grasses; Cenchrus Ciliaris, Chlois Gayana. Reseed ravines and gullies with leguminous shrubs. Exclude livestock to allow regeneration of natural grasslands and indigenous trees.

SOCIAL SUPPORT INFRASTRUCTURE

A. Health Care System

The major health problems are malaria, tuberculosis and parasites. There is a mission hospital at Nkoaranga and a hospital in Arusha Town. The road to Nkoaranga is abominable which makes access to the hospital difficult. There are dispensaries with the following staff in the following places: Mbuguni Rural Health Center - Medical Assistant (MA); Rural Medical Assistant (RMA), Dispensary Auxiliary (DA), 3 midwives; King'ori Madukani RMA, 2 midwives; Karangai RMA, 2 midwives; Old West Meru DA; Majengo DA; Musa DA; Olgila 2 DA; 2 midwives, Oklokola 2 DA, 2 nurse auxiliaries, midwife, Mwandet DA, Oldonyosambu RMA, DA, 2 midwives; Nduruma 3 DA, midwife; Ngarenanyuki RMA, 2 midwives; Kioga midwife; Private facilities; Momella Mateves, Selean, Lengijave, Leguruki.

The health system is based on local dispensaries which are able to administer basic medical services - first aid, treatment of malaria, midwives and so on. Hospital treatment is supposed to be obtainable only on referral by a dispensary, clinic or doctor. The intention is to provide basic medical services to everyone rather than sophisticated services to a few. All treatment at Government hospitals is free.

Treatment at mission facilities can be obtained for a small fee.

The approach to medical care is a good one which has greatly improved the level of health in the country. However, there is still room for improvement. It has often been noted that people will attend a mission facility if they can even though they must pay a fee. One of the reasons for this is that mission facilities generally have medicine and supplies such as sterile gauze and bandages when the government facilities don't.

One of the problems which limits the effectiveness of the government facilities is the simple lack of funds. Without money, they cannot buy supplies and without supplies, they are not effective. Local people say that villages are already paying for medical treatment to mission facilities, witch doctors, and purveyors of outdated medicines and would not object to paying a nominal fee in order to obtain better services from government facilities.

B. Water Supply System

One major water problem stems from the water rights settlers have for their farms. In Ngaremtony, Ilboru, Maji ya Chai and Mbuguni they draw so much water that the villages are left with an inadequate supply. Piped water supplied are also endangered by enterprising souls who punch holes in the plastic pipeline to create a drinking pool for their herds.

There are 5 boreholes in the district, each with a Lister engine. The rest of the water points are supplied by gravity feed. Five diesel engines are used at pumping stations on some of the lines. The district has some problems with spares and diesel but no engine was out of order for more than 3-4 weeks last year. Windmills are not a reasonable alternative because of the lack of wind during certain times of the year according to a Maji official. There are three dams in the district. One leaks, one is silted up, and the third is in good repair. It has been suggested that the people desilt the Kisongo Dam. However, Maji people point out that moving mud 20 feet deep by hand is a rather massive chore and they would prefer to build a new dam.

Funds have been requested for the following projects in order of priority:

- (1) Ngaremtony: Need to replace with metal pipe 7,000 feet of plastic pipe which has worn due to the pumping action of water which causes the pipe to rub against the sand in the trench.
- (2) King'ori Division: Coffee factory at Sakila village needs a water supply. This project is to be done in phases and will cost Shs. 650,000/-.
- (3) Olmotony: Due to increased water needs in the area a three inch pipeline is to be installed parallel to the present line and a pumping station added.
- (4) Oldonyosambu - an 8-1/2 mile pipeline, 20,000 gallon tank, and watering trough are to be built. Five miles of pipeline have been completed.
- (5) A 24 mile gravity feed pipeline from Mbuguni to Kikunguni with storage tanks and domestic points (public taps).

As do other departments, Maji suffers from recurrent budget problems. According to a Maji official it would be far better to use puncture proof metal pipe but the cost is currently prohibitive. A 1976/77 budget request for 274,000/- was submitted to cover such expenses as fuel, plastic pipe/coupling replacements, repairs to damaged storage tanks, nights out,

• etc. Only 13,000/- was received. Unlike town water systems which are metered so users are charged for the cost of the provision of water, use of rural systems is free. (People do contribute labor and money for the building of the rural systems.) Because maintenance is essential if water systems are to function, it may be necessary to institute a user's charge if budget needs cannot be met in other ways. Again, people are likely to be willing to contribute labor or pay a small fee rather than have no water at all.

C. Nutrition Services

Nutrition on the mountain where food and cash are plentiful appears to be reasonably good. People eat ugali and a loshoro, a dish of cooked maize mixed with bananas and milk. On the plains and in West Arumeru, food and cash are less plentiful and nutrition is correspondingly worse. The Arusha eat ugali, milk and occasionally meat. A soup may be made from meat for a very sick person. Kwashiokior is reported by lay observers to be common among children in these areas. Seven children are reported to have died of Kwashiokior in a three week period in Makiba.

The plan presented above if adopted in Oldonyosambu, would improve nutrition as it is aimed to increase available milk, meats, fruits and vegetables. Attempts to increase cereal production would alleviate the problem of under-nutrition (i.e., lack of calories) which is the major nutritional problem in much of Tanzania. An over emphasis on cash crops could have an adverse effect were present food crop acreage to be converted to cash crops.

There is an interest in good nutrition in the area. Some men have begged visitors to teach their wives good nutrition. However, it is a subject which must be approached with some delicacy as it is a great insult to suggest to someone that her child is not well because she is not feeding him/her properly. One way of improving nutrition is to have dispensaries readily available where children can be treated. When the seven children died in Makiba, one lived because the mother continued to walk four miles every day over burning hot dust to the dispensary to get red unga (milk powder with red coloring to prevent its use in tea) for her child. The other mothers made the terrible hike only once. If a dispensary were readily available, children could easily be given immediately necessary supplements and the mothers could be instructed in good nutrition without censure as a "way of helping the dawa to work." Nutrition would be the subject of adult literacy class reading.

Part of the problem is access to nutritional food, a problem which poultry, orchard, and garden projects would alleviate. Eggs used to be taboo, but this prohibition has largely died away. Some mothers actively seek out eggs for their children. There is still some prohibition against eating fish among the Waarusha although some people do eat it.

Any proposal for improved nutrition must take into account the workload of women. Nutritionists report that some foods which theoretically would be quite valuable, require so much energy and time for preparation that no net gain is made. For a while extension workers were being trained in nutrition and agriculture. Reports are that they spent nearly all their time in their offices knitting and gossiping. However, the combination is a sensible one and such people, if properly supervised and motivated, could launch an effective education/action program. School feeding programs can also serve as an example as well as having therapeutic value. The Maternal Child Health Program in Kilosa District has a program under which parents grow food for the day care center on a special shamba. Such a program (perhaps to be done by the children themselves in primary schools) could be undertaken here. If a demonstration poultry and dairy cow unit, properly supervised, were attached to the school, it could be even more effective. To the extent that nutrition can be improved by cash to buy food, any program which puts cash into the hands of women would be useful. This is a principle benefit of small industries and crafts projects.

D. Community Services Infrastructure

The district, particularly the mountain areas, is a veritable beehive of cooperative activity to create services. One could well begin with the Meru Land Case when the Wameru raised enough money to send two representatives to the United Nations to plead their case. They then formed the Meru Cooperative Union and proceeded to build roads, schools, bridges and an improved water system. Under Operation Bootstrap the people of Arumeru have built 10 classrooms and 12 teachers' quarters. Under the government school building program people have contributed labor and cash. People often contribute money and labor to get water. People near Oldonyosambu contributed Shs 76,000/- for a water system. At Sakila people have contributed Shs 66,000/- and will over a period of time contribute a total of Shs 325,000/- for a coffee factory water supply. The people of 4 villages in Ngarenanyuki Ward have contributed Shs 203,000/- for a bus. As noted above, the people of Makiba cleared 1000 acres of sisal and thorn trees by hand for a communal shamba, built a water tower by hand, and put one year's entire ujamaa earnings, towards buying a tractor.

Self-help, however, is not the end all and be all of development methods. There are endless possibly Apochryphal tales of self-help projects which ended up being more time consuming and more costly than if they had been done with hired skilled labor. One official says, "Self-help is just words. People might come out for half an hour and then go home. We can't force them to work on projects like digging a pipeline. You can't sack them if they don't work. I would like to give each laborer say 7 shillings a day. Now we hire no one except our skilled workers and we are dependent upon the villages for help. We are always losing time and money with this self-help thing." He went on to say that where the need is desperate, people do turn out.

Self-help and cooperative effort, then, is a useful approach but the need for the service must be felt by the people. It is also important that locally initiated projects not be interfered with from outside without complete consultation with the people. Many observers locally report a sense of frustration and resulting apathy when locally initiated projects are stopped by orders from above with no consultation.

SOCIO-POLITICAL SYSTEMS

A. Land Use and Water Rights

There are two kinds of land, alienated land and village land. Alienated land can be bought, sold and nationalized. Village land is allocated more or less according to traditional systems by the village council although land is allocated to non-traditional recipients such as the UWT and the ujamaa shamba.

Water use decisions are made by regional and district government officials for the most part.

B. Family Production Decision Making

For the most part, males are supreme. In general the male head of household makes all production and financial decisions although as a local pastor put it, "If he is a good husband, he will consult his wife." Women control the produce from the kitchen garden and theoretically could sell any surplus. They very seldom have a shamba of their own unless they are widowed or divorced and are therefore head of the household. It occasionally happens that a father will give his unwed daughter a shamba of her own but this is still rare

and was unheard of as recently as the late 50's. Women, of course, have practical decision making power over the way they actually do their tasks.

C. Patterns of Diffusion

Workers in the area suggest that the best way to introduce new practices is to discuss the problem with the village chairperson, secretary and a few elders. Let them come up with a solution and persuade the village. This is particularly relevant to the problem of destocking. A missionary living in the destocking area reckons that if the chairperson secretary, and council members could be convinced, other people would follow their example.

D. Patterns of Local Organization

With the demise of ARCU and the enactment of the Villages Act, considerable changes are being made in local organization. Ward and village level people simply say things are being reorganized and it is difficult to know how things will work. The proposed functioning of the Village Assembly and Village Council have been described above.

The Umoja wa Wanawake wa Tanzania (UWT), the national women's organization, functions at the District and village level. The organization has a district secretary who is a government employee and maintains an office at Patandi. There are 50 branches of the UWT with approximately 2900 members. The members appear to be somewhat better off than average. This may be an erroneous impression but it certainly would be consistent with the composition of the UWT in other areas. UWT officials say the membership is small (less than 5 percent of the potential) because women do not understand what the UWT is. They say they have no transport and therefore cannot get out to explain to the women. They also say that husbands actively discourage their wives from joining as they feel it would interfere with their work at home (i.e., dinner might be late). They say the men also fear the independence women might get by earning money through the UWT.

The UWT is involved in the small industries noted above (Akheri, Sing'isi, Poli) a duka (Nduruma) and in agricultural production. The yield on the one maize shamba visited was about 4-5 bags per acre which is about the average peasant yield. The women say they cannot get land for permanent crops (Mazao ya kuduma) which belong to the person who planted them. That is land given to the UWT for maize production could be taken back after the maize was harvested but land for coffee could not until the trees died.

The UWT runs leadership training seminars for village chairpersons, secretaries and members. At a recent 2 day seminar groups of women totalling 180 were trained in planning, government structure, politics, club structure, how to start a day care center and small industry development.

District officials say there are a lot of problems with the UWT and that the leadership is not particularly strong.

E. Equity

Major disparities in the district stem from disparities in natural resources, and historical differences. The mountain, for example, has been settled much longer than the plains for the simple reason that it is a much better place to live. People on the mountain are much better off than people on the plains due to coffee production. For example, a possibly out-of-date estimate of average annual per capita income is Shs. 800/-. According to a village chairperson on one road alone there are 1000 families prepared to spend Shs 3000/-, to have their houses electrified.

The discrepancies can best be reduced by helping other areas to develop their full potential. Another possibility would be to solve those problems which are hindering full exploitation of the coffee crops such as the terrible condition of the roads. The coffee then could be used as a general source of revenue for development.

POLITICAL AND ADMINISTRATIVE SYSTEMS

A. Information Flows

District and regional officials try to collect data for planning purposes. Nonetheless there is no consistent list of villages in the District. List of facilities included villages which appear on no other list. Some villages have more than one name. The most recent district map is hopelessly inaccurate with many villages omitted altogether and other villages misplaced. This particular problem could be solved once the registration of villages is completed.

Accuracy and amount of data collected vary by department. Maji and Ujenzi which have a reasonably simple problem of measuring stationary objects seem to have fairly reliable data. Educational statistics also have a good chance of being accurate. Kilimo has a difficult problem as the easiest way

to measure production is to measure sales and not all produce enters the official market. A real effort is being made by the DADO to collect information (he has reinstated the collection of rainfall data) and he seems to have a good sense of what might be inaccurate in the data there is. Data from the Livestock Department are suspect at best.

The national census will take place in 1978 and will provide demographic data for planning. A great deal of data is available in the old District books. Tengeru Reports, and innumerable consultants' reports which seem only to collect dust. (According to one observer, 3 separate, full blown water studies have been done in King'ori, none of them acted upon or referred to.) These could be collected, indexed, and used. Ten cell leaders could be used as a source of some current information.

B. Planning Capacity

The District Planning Officer who had been in the District for five years has just been transferred which has had the unfortunate effect of removing his expertise from the planning process. District officers at the functional manager level seem to have their own program priorities fairly firmly established.

There are two apparent weaknesses in the planning and implementation processes. While everyone seems reasonably agreed on geographic and program priorities in general terms, there seems in some cases to be a lack of detailed planning of how these can be successfully implemented. The destocking program seems to be a case in point. This may be a departmental weakness as other projects appear to be well thought out.

The second major problem of implementation is recurrent expenses. As the DLDO said, "We can build new dips but we can't make them operational because we don't have the funds." Every functional manager complained about the lack of money to meet recurrent expenses. Most had received only about half of their budget request. Until the problem of sources of revenue has been solved, this will continue to be a critical problem. The DLCO also pointed out that any money they might earn under the present system reverts to Treasury rather than being available to the department to meet expenses.

Finally, a critical shortage, particularly at the village level, is well trained, highly motivated personnel to make programs work.

APPENDIX A

FACILITIES AVAILABLE IN VILLAGES, ARUMERU DISTRICT

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TYL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
UWT			x					x		x			x	x	x	x	x	x	x	x
CCM Office	X	X				X		X		X			x	x	x	x	x	?		
Dispensary	x			x					x	x			X	Bldg	Bldg	X	X			
Primary School	X		X	X	X		X	X	X	X	X	X	X	Bldg	X				X	
Dip				x					x					X	Bldg	Share				
Post Office	X												X							x
Piped Water	X	X		X	X			X	X	X			X					X		
Well								X	X	X		X	Coming	X	Bad		X	X	X	X
Market (freq)	lw			lw				X (small)												
Maize Mill	X	X	X	X				lw		X							lw	lw		
Godown			X				X	X	X	X	X		X	X	X				X	
NMP	X	X	X	X	X		X	X		X			X							
Bwana Shamba				X			X	X		X	X		X	X						
Tractor	X						X	X					X							
Irrig. Land							X						Private				X	X		
Fish Pond		X											X	X		X	X	X		
Piggery													X							
Bakery									X					Private						
Tea Shop	X	X		X									X							
Carpenter													X							
Tailor	X	X		X				X	X				X		X	X	X			
Dukas (No.)	12		6	4	1	0	1	0	0	7	0	0	6	1	3	3	6	6	0	0
Bicycle Repair	X																			
Charcoal													X	X	X					
Bricks													X	X	X					
Petrol Pump	X									X			X			X				X
Beer Bar			X							X			X	X						
Pombe Shop	X	X	X	X			X	X		X	X	X	X							
Day Care Center										X	X	X	X							
Bati Roofs	X	X	X	X	X	X	X	X	X	X	X	X	X							
+ Bati Roofs	X	X	X	X	X	X	X	X	X	X	X	X	X				X	X	X	X
Cement Houses	X	X	X	X						X							X	X	X	X
+ Cement			X																	
Glass Windows			X																	
Bus Service	X	X	X					X	X	X			X	no	no	no	X	X	no	no
All Weather Roads	X	X	X						X	X			X	no	no	no	X	X	no	no
Church								X									X	X		
Mosque													X	X						

APPENDIX A (Continued)

KEY:

1. Usa)
2. Ngaresero (Nkoaranga Kata
3. Nshupa (1976))
4. Maji ya Chai) Maji ya Chai Kata
5. Kitefu)
6. Lekitatu Poli Kata
7. Sakila)
8. Kikatiti (Kikatiti Kata
9. Samaria (1976))
10. King'ori (1976)
11. Ngorudoto (Ngurdoto)
12. Imbaseny (new)
13. Mbuguni
14. Makiba)
15. Majengo (Majengo Kata
16. Patanumbe)
17. Oldonyo Sambu - Madukani)
18. Oldonyo Sambu - Centre - Mereu Juu (Oldonyo Sambu Kata
19. Oldonywas - Sura)
20. Mareu Chini

NOTE: This is not a proportional sample of village types. Neither the extremely rich nor the extremely poor areas are represented proportionally. Some omissions may have been made by the sources of information.

APPENDIX B

DISTRIBUTION OF SELECTED FACILITIES BY WARD

Moshon DivisionNduruma Ward

All 8 registered corporate bodies
 Operation Bootstrap - Nduruma
 Resident Bwana Shamba: Nduruma
 Godown: Nduruma
 Public Dip: Nduruma
 Technical School: Nduruma
 NMP: Nduruma
 Dispensary: Nduruma

Mlangarini Ward

All 3 registered corporate bodies
 Operation Bootstrap - Kiseriani (x2)
 Resident Bwana Shamba - Kiseriani
 Dips: Kiserianai

Sokon Ward

All 7 registered corporate bodies
 Coffee/buying posts Sokon II
 Village Shop: Sokon
 Operation Bootstrap-Sokon Sasi, Bangata
 Resident Bwana Shamba: Sokon
 Godown: Sokon II
 Fish Ponds: Oldadai, Bangata

Mbuguni DivisionKikwe Ward

2 regist-ered corporate bodies/3
 SIDO Project: Karangai
 Resident Bwana Shamba: Kikwe
 Dips: Karangai, Kikwe
 Fish Ponds: Kikwe
 NMP: Kikwe
 Dispensary: Karangai

Mbuguni Ward

4 Registered Corporate bodies/5
 Operation Bootstrap: Mbuguni
 Resident Bwana Shamba: Mbuguni
 Godown: Mbuguni
 Dips: Mbuguni, Shambarai
 Fish Pond: Mbuguni
 Technical School: Mbuguni

Majengo Ward

1 Registered corporate body/3
 Appropriate technology Project: Majengo
 Dip: Majengo
 NMP: Makiba
 Dispensary: Majengo

Mukulat DivisionMateves Ward

Dispensary: Mateves

Oldonyosambu Ward

Coffee Buying Post Oldonyosambu
 Appropriate Technology Project: Oldonyosambu
 Dip: Oldonyosambu
 Dispensary: Oldonyosambu

Olkokola Ward

Operation Bootstrap: Olkokola
 Dispensary: Olkokola

Kisongo Ward
Musa Ward

Operation Bootstrap: Nengungu
 Dips: Nengungu
 Dispensary: Musa

APPENDIX B (Continued)

Poli DivisionAkheri Ward

4 Reg. Corp. Bodies/6
 Buying Posts: Akheri,
 Ndoombo
 Village owned shop:
 Akheri
 SIDO Project: Akheri
 Resident Bwana Shamba:
 Akheri
 Godown: Akheri
 Fish Pond: Akheri
 Teacher's College:
 Patandi

Nkoanranaga Ward

6 Reg. Corp. Bodies/6
 Buying Posts: Nshupu
 Nkoankoli
 Village owned Shop:
 Ng'ani
 Daycare: Usa River
 SIDO Project: Nkoankoli
 Nshupu
 Resident Bwana Shamba:
 Nkoaranga
 NMP: Nshupu, Nkoankili,
 Ngaresero
 Hospital: Nkoaranga

Nkoanrua Ward

3 Reg. Corp. bodies/4
 Buying Post: Nkoanrua
 Village owned shop:
 Nkoanrua
 Resident Bwana Shamba:
 Nkoanrua
 Godown: Nkoanrua

Poli Ward

3 Reg. Corp. Bodies/4
 Dip: Lekitatu
 Dispensary: Old West
 Meru
 SIDO Project: Poli

Songoro Ward

1 Reg. Corp. Body/4
 Buhing Post: Mulala
 Village owned shop:
 Mulala
 Resident Bwana Shamba:
 Songoro
 Dip: Sura

Seela/Sing'isi Ward

Buhing Post: Seela,
 Sing'isi
 Daycare: Sing'isi
 Appropriate Technology
 Project: Poli ya Kara
 Sing'isi
 SIDO Project: Sing'isi
 Resident Bwana Shamba:
 Seela
 Godown: Seela
 Technical School: Sing'isi

King'ori DivisionKing'ori Ward

3 Reg. Corp. bodies/4
 Buying Posts: Malula,
 King'ori, Ngejusosia,
 Mareu
 Daycare: Mareu
 SIDO Project: Mareu
 Resident Bwana Shamba:
 Mareu
 Godown: King'ori
 Dips: King'ori, Malula
 NMP: Negjusocia, Mareu
 King'ori
 Dispensary: King'ori

Ngarenanyuki Ward

3 Reg. Corp. bodies/3
 Dips: Ulwiro,
 Olkung'wado
 Dispensary:
 Ngarenanyuki

Leguruki Ward

2 Reg. Corp. Bodies/2
 Buying Post: Leuruki
 Village owned store:
 Leguruki
 Operation Bootstrap:
 Nkwasega
 Resident Bwana Shamba:
 Leguruki
 Godown: Leguruki
 Dip: Leguruki
 Technical School:
 Leguruki
 NMP: Nkwasega
 Dispensary: Leguruki

APPENDIX B (Continued)

Maji ya Chai Ward

1 Reg. Corp. Body/4
 Buying Post: Maji ya Chai
 Resident Bwana Shamba:
 Maji ya Chai
 Dips: Maji ya Chai
 NMP: Maji ya Chai, Kitefu kwa
 Ugoro, Ngurdoto

Kikatiti Ward

3 Reg. Corp. Bodies/3
 Buying Post: Kikatiti, Samaria,
 Sakila
 Operation Bootstrap: Kikatiti
 Resident Bwana Shamba: Kikatiti
 Godown: Kikatiti, Sakila
 Dips: Kikatiti, Maroroni
 Fishponds: Maroroni
 NMP: Maroroni, Kikatiti, Sakila

Enaboishu DivisionLoruvani Ward

3 Reg. Corp. Bodies/7
 Secondary School:
 Enaboishu
 Dispensary: Olgila

Oljoro Ward

Daycare: Oljoro
 SIDO Project: Oljoro
 Resident Bwana Shamba:
 Oljoro
 Dip: Oljoro

Kimunyak Ward

1 Reg. Corp. Body/3
 Village owned shop: Olevolos
 Daycare: Olmotony Forest

N.B. Not all villages which have facilities are listed due to incomplete ward lists.

APPENDIX C

VILLAGE POPULATION, ARUMERU DISTRICT

<u>Division</u>	<u>Ward</u>	<u>Villages</u>	<u>Households</u>
Moshono	Nduruma	1. Nduruma	460
		2. Mungushi	251
		3. Bwawani	434
		4. Mavinuni	335
		5. Themis ya Simba	320
		6. Msimuni	343
		7. Kigongenye	300
		8. Maji ya Moto	380
	Mlangarini	9. Kiserian	454
		10. Manyire	494
		11. Mlangarini	494
Sokon	12. Sokon	450	
	13. Bangata	287	
	14. Sekei	286	
	15. Sasi	278	
	16. Oldadai	297	
	17. Nyiresi	270	
	18. Midawe	283	
	Mbuguni	Kikwe	19. Kikwe
20. Karangai			290
21. Maweni			329
Mbunguni	Mbunguni	22. Mbuguni	592
		23. Shambarai Burka	482
		24. Mikungani	560
		25. Kikuletwa	305
		26. Msitu wa Mbege	260
		Majengo	Majengo
28. Patanumbe	397		
29. Majenge	450		
Poli	Akheri	30. Kimundo	254
		31. Ndoombo - Nkoarsam	280
		32. Patandi	280
		33. Akheri	450
		34. Ndoombo - Mfuleni	350
		35. Nguruma	250
Nkoaranga	Nkoaranga	36. Nkoanekoli	255
		37. Nshupu	284
		38. Usa	395
		39. Ngaresere	456
		40. Ngyani	321
		41. Nkoaranga	372

APPENDIX C (Continued)

<u>Division</u>	<u>Ward</u>	<u>Villages</u>	<u>Households</u>
Poli (Cont'd)	Nkoanrua	42. Ambureni Meivare	388
		43. Leita Nkwaamala	325
		44. Kipande Nkoavele	305
		45. Nkoanrua	290
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	Poli	46. Ndatu	397
		47. Lorouwa	255
		48. Manyata Lekitatu	296
		49. Njoro	383
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	Songoro	50. Songoro	376
		51. Sura	251
		52. Mulala	380
		53. Kilinga	273
<hr/>			
	Seela/Sing'isi	54. Seela	400
		55. Sing'isi	377
<hr/>			
Mukulat	Mateves	56. Mateves	387
		57. Lemugur	401
		58. Ngorbor	309
<hr/>			
	Oldonyosambu	59. Oldonyosambu	330
		60. Olmringaringa	421
		61. Lomonyo	561
		62. Lesinen	572
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	Olkokola	63. Olmwingeni	430
		64. Olkokola Chini	430
		65. Ilkurot	578
		66. Matim	307
		67. Lengijave	307
		68. Olkokola	307
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	Kisongo	69. Lesirai	342
		70. Lovilukyny	414
		71. Ilkerin	240
		72. Engorora	280
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	Musa	73. Oloitushula	342
		74. Nengungu	542
		75. Olchorovos	250
		76. Likamba	371
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APPENDIX C (Continued)

<u>Division</u>	<u>Ward</u>	<u>Villages</u>	<u>Households</u>
King'ori	King'ori	77. Ngejusosia	290
		78. Malula	250
		79. King'ori	400
		80. Mareu	280
	Ngarenanyuki	81. Olkungwado	377
		82. Uwire	360
		83. Ngabebe	270
	Leguruki	84. Leguruki	366
		85. Nkwasenga	288
	Maji ya Chai	86. Maji ya Chai	290
		87. Kitefu	200
		88. Kwa Ugoro	290
		89. Ngurdoto	339
	Kikatiti	90. Samaria	250
		91. Sakila	550
		92. Maroroni	468
Enaboishu	Loruvani	93. Moivo	465
		94. Ilkurorit	364
		95. Oltuleloi	364
		96. Ilkirevi	354
		97. Olgilai	261
		98. Kivulul	399
		100. Oldonyo Sapuk	374
	Oljoro	101. Terat	284
		102. Nadosoito	443
		103. Olasiti	300
		104. Oljoro	300
		105. Nkonoo	270
	Kimunyak	106. Engare Olmotony	450
		107. Olevolos	350
		108. Olmotonyi	450

APPENDIX D

PROPOSAL FOR DEVELOPMENT OF LIME-POZZOLANA INDUSTRY

This project aims at introducing a fifth building material which will be cheaper than all of the above with the exception of mud and yet have a strength roughly 50 percent that of portland cement. In other words it will be used as a cement substitute in 60 percent of the building done in Tanzania while maintaining the same building standards as cement. Its use will be particularly applicable to rural areas where engineering standards do not require the use of such a strong building material as cement.

This building material hereafter referred to as pozzo-lime is made up of two raw materials which occur in plentiful supply in many rural areas of Tanzania. The first is lime which occurs in many of the plains soils and the second is pozzolana which is commonly found in the tuff soils and rocks of volcanic regions. The extensive use of pozzo-lime mixtures dates back to Ancient Rome where much of the Roman Empire was built with a material made up of lime and volcanic ash from Mt. Vesuvius. Pozzolana is an amorphous material composed mostly of silica and Alumina and has a crystalline structure such that when mixed with lime and water forms a very tight bond, much stronger than their combined individual strengths.

Test results of natural limestone carried out by the Mineral Resources Division Dodoma, and initial field surveys of pozzolanic materials have indicated a number of deposits of each in Arusha Region which would be suitable for small scale exploitation.

The technology involved is simple and easily understood. Already in Tanzania there are a number of villages established in the production of burnt lime. Aside from burning the lime there is little else to do except mixing in proper proportions and this can be easily taught.

Work needs to be done to (a) find out the appropriate uses and mixtures of pozzolana and lime in Tanzania (b) transfer the technology to rural communities who can make use of them. This will be the aim of the project.

The project will run for two years starting tentatively in March 1977 and the project holder will be the Manager of SIDO's Technical Services in Dar es Salaam.

SIDO will appoint to the project one qualified Civil Engineer with some building experience, and one person with technical college or similar training in building or Civil Engineering. The Civil Engineer will need to be recruited from outside

Tanzania, ideally through a volunteer agency (VSO, CUSO) or through ITDG Ltd., of London. The Technical College graduate will come from SIDO's own staff.

For the establishment of lime kilns SIDO's lime specialist (Ndugu Ikomba) will work alongside the project team during a part of the projects duration.

Daily labor will be employed as required for transport of materials, construction work, etc.

A vehicle will be needed to provide essential mobility. Technical support and detailed specification of the program will be provided by ITDG Ltd., through Dr. Spence, pozzo-lime consultant who will visit the project twice for the purpose. The Civil Engineer will keep a detailed photographic and written record of the project and make a report at its conclusion for publication by ITDG.

The work program will be divided into two phases:

- Technology Development
- Extension.

Technology Development Phase (six to nine months)

During this phase methods of exploitation of the available raw materials will be investigated, and experiments carried out on different ways of using lime and pozzolana in building. The project will at this stage be located in one or more rural localities close to Arusha, since it will be necessary to have ready access of supplies, lab facilities and technical services. During this phase the tasks will be:

1. Select a suitable location for a lime kiln. Construct a lime kiln and study its operation over a period of several weeks to obtain best possible efficiency. The operation of the kiln will then be turned over to an entrepreneur or community identified by SIDO and trained in lime kiln operation.
2. Select a suitable location for obtaining pozzolana. Investigate alternative results of mixing lime and pozzolana for standardized results.

3. To carry out experiments in burning lime and pozzolana for the following building used:

- Mortars for brickwork and blockwork;
- Internal and external renderings for bricks and mud wells;
- Stabilized soil (Cinva Ram) blockmaking;
- Flooring;
- Concrete

These experiments will culminate in the planning of demonstration building, programs. During this phase there will also be close collaboration with SIDO's Arusha Appropriate Technology project.

Extension Phase (15 to 18 months)

During this phase, the project will move successively from village to village spending a period of approximately three months in each of three or four localities where suitable conditions exist. Places so far identified are:

1. Gallapo Village, Hanang District;
2. Maskaroda Village, Mbulu District;
3. Mto wa Mbu area, Mondulu District;
4. Oldonyosambu Village, Arumeru District;
5. Shambarai area, Kitoto District.

In each location the tasks will be:

1. Location samples of raw materials and fuel;
2. Establish a lime kiln, train local villagers in lime production and hand over kiln;
3. Demonstrate use of lime or pozzolana in building and train persons and builders from local villages in its uses.

The project will be concluded with the writing of a report for which a period of one month will be allocated.

Budget

1. Capital:

	T. SHS.	
a. Lime kiln 4 @ 30,000/-	120,000	
b. Vehicle (Landrover)	100,000	
c. Ball Mill (for grinding)	40,000	
d. Cinva rams 2 @ 2,500/-	5,000	
e. Ancillary equipment	15,000	
f. Lab equipment	15,000	
g. Camping equipment	5,000	
	<u>300,000</u>	300,000

2. Recurrent:

	Year 1	Year 2
a. Salary: Engineer	15,600	15,600
Counterpart	10,000	10,000
Lime specialist (1/2 time)	5,000	5,000
b. Vehicle - running cost	48,000	48,000
c. Premises (rental)	18,000	18,000
d. Tool replacement, spares, technical services	5,000	5,000
e. Hired labor	2,400	2,400
f. Travelling expenses (2x50/- day)	7,500	7,500
g. Expatriate accommodations	24,000	24,000
h. Technical advisers visits	23,000	23,000
i. Photography and documentation	17,500	17,500
	<u>176,000</u>	<u>176,000</u>

Notes on Budget:

- Detailed figures in this budget may be altered in the final analysis as firmer information becomes available, but the categories of expenditure are correctly defined.
- It is not at present known what type of grinding equipment will be needed for pozzolana production thus only one ball mill has been included for pozzolana in the estimates; if grinding equipment is needed in more than one plant a further amount may be needed.
- The vehicle is a high percentage of capital costs but its value will not be much less at the end of the second year, and thus it will remain as an asset to SIDO or the donor. The same applies to the other equipment.
- Item (g) expatriate accommodation could be reduced or eliminated if Government housing is ready and available.

APPENDIX D (Continued)

BUDGET	<u>Capital</u>	<u>Year 1</u>	<u>Year 2</u>	<u>Total</u>	<u>Percent</u>
SIDO Construction		46,500	46,500	93,000	14
Vol. Contribution		15,600	15,600	31,700	5
Donor Agency Contribution	<u>300,000</u>	<u>113,900</u>	<u>113,900</u>	<u>527,800</u>	<u>81</u>
TOTAL	300,00	176,000	176,000	652,000	100

J. Tomlecho (SIDO Arusha) Robin Spence (ITDG) December 8, 1976

Development of Lime Pozzolana in Arusha Region

James Tomecho
Robin Spence