

RECENT CHANGES IN CROP PATTERNS IN THE KILIMANJARO REGION OF TANZANIA: THE DECLINE OF COFFEE AND THE RISE OF MAIZE AND RICE

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ABSTRACT Peasant households in Tanzania have a variety of income sources. However, establishing a crop in the peasant farming culture requires much investment, and the decline of a crop that is a source of livelihood can cause much misery. Widespread social and economic changes in the peasant society and in the regional society as a whole have led to a decline in coffee crops in Kilimanjaro since the 1970s, despite the fact that coffee is its principal cash crop. This paper explores the decline of coffee and the ascendancy of rice and maize as major crops in the Kilimanjaro region. The driving forces behind these changes in crop culture are considered. The argument is made that wider institutional changes, in addition to internal changes in peasant households, have contributed to the decline of coffee and the rise of maize and rice as the principal crops.

Key Words: Coffee; Small farmers; Inheritance; Population; Institutional change.

INTRODUCTION

Coffee, maize, and rice are long-time crops of Tanzania. Coffee was one of the first crops grown specifically for the market by peasants and large-scale farmers starting in the days of German East Africa (Deutsch-Ostafrika), when the country was a German colony. Early reports show that coffee exports from German East Africa in 1899 totaled 50 tons and were worth £4,817. In 1912, the coffee export was 1,575 tons and was worth £95,150 (Calvert, 1917: 71). In 1961 and 1971, Tanganyika produced 27,000 and 47,000 tons, respectively, and in 1981, coffee output reached 67,000 tons. In 1991, 2001, 2003, and 2004, coffee exports totaled 30,730; 58,100; 52,400; and 54,000 tons, respectively (Bank of Tanzania, 2003: 81; 2006: 32). Rice and maize output is more difficult to measure because these crops are consumed extensively on the farm, and their trade in the local, national, and international markets is less structured than that of coffee.

Rice is grown in many areas of Tanzania. Before Tanzania became a German colony in 1884, the Rufiji river flood plains and delta were important areas for rice production. In the 1870s, Joseph Thompson was extremely impressed by agricultural practices in the Rufiji river delta and flood plains. Much food (rice, maize, beans, and sesame seed) was exported from the villages between the Rufiji delta to Zanzibar; this area was referred to as “Little Calcutta” because of its large rice export industry (Kjekshus, 1996: 32).

Tanzanian imports of large quantities of food began for the first time in 1972 and continued until 1985. These imports, which included food aid, consisted

mostly of maize, but some rice was also imported. Some rice and wheat have been imported since that time, but it is also possible that some rice (including rice from the Kilimanjaro region) has been unofficially exported to Kenya and other countries. Total rice production was 614,000 tons in 1993/94; 550,800 tons in 1996/97; 476,000 tons in 1999/2000; 960,600 tons in 2001/02; and 586,000 tons in 2003/04 (Bank of Tanzania, 2003; 2006).

Maize is now the staple food of the impoverished majority of the Tanzanian population, whereas the small middle class and the tiny upper class consume rice and wheat. Since the turn of the 19th century, maize has slowly replaced millet and sorghum as the principal grain. It was also an important export crop in the 1950s and 1960s. In 1968/69, maize exports stood at 52,000 tons, and in 1970/71, they reached 53,000 tons (Lofchie, 1978: 454).

A drought afflicted Tanzania in 2005. In 2006, Tanzanian newspapers and radios reported that large amounts of maize and rice were being imported and that the importers were receiving tax relief from the government. However, 1974/75, during which 317,000 metric tons of maize were imported, remains the record year for maize imports (Loftchie, 1978: 454). This extensive import was a result of crop failures caused by the socialist (*ujamaa*) farming experiments and by the drought of the previous year.

Kilimanjaro peasants now produce only about 5,000 tons of coffee per year, which is less than half the yearly amount produced, on average, between the 1950s and the early 1990s. Although peasants in the Mbeya and Ruvuma regions have continued to produce coffee at the same level, some peasants in the Kilimanjaro region have uprooted their coffee plants (Mhando, 2005: 51–54) and have switched either to growing vegetables or to raising dairy cows.

THE DECLINE OF COFFEE IN THE KILIMANJARO REGION SINCE THE 1970S

Signs that the coffee crop in the Kilimanjaro region was in decline first emerged in the 1970s, when the neglect of some coffee farms became apparent (Maghimbi, 1992: 26–28). Low prices have frequently been cited as the primary cause of the stagnation and decline in Tanzanian coffee production. A clear decrease in coffee output in Kilimanjaro has been observed since 1981/82 (Mhando, 2005: 53). A relative increase in output that occurred in 1996/97 was a brief deviation from the general trend.

Although this “low price” thesis may be valid, its explanatory value is limited; peasants in Ruvuma and Mbeya regions have been able to maintain their coffee output, and production has increased. In some countries, notably Vietnam, coffee output increased from nothing in 1970 to 11,000 tons in 2002 (Mhando, 2005: 50, 53). Thus, other reasons must also exist for the decline in coffee production in the Kilimanjaro region. Here, I attempt to explore these reasons.

The institution of land tenure for Tanzanian peasants has been weak since the days of colonialism. Because the male children must share their father’s land, a peasant coffee farm in Kilimanjaro dwindles in size with each generation, espe-

Table 1. Size of Peasants Farms in Moshi District (Now Hai, Siha, Moshi and Rombo Districts) in 1930.

Size of Farm	% of coffee growers
≤0.5 acre	60.00%
≤1.0 acre	24.00%
≤1.5 acre	8.00%
≤2.0 acre	4.00%
>2.0 acre	4.00%
	100.00%

Source: McCarthy, D.M.P. 1982. *Colonial Bureaucracy and Creating Underdevelopment: Tanganyika 1914–1940*, p. 101. Iowa State University Press, Ames.
 Rodney, W. 1980. The Political Economy of Colonial Tanganyika. In (M.H.Y. Kaniki, ed.) *Tanzania Under Colonial Rule*, p. 157. Longman, London.

Note: * Total number of coffee growers is 13,000.

Table 2. Coffee Trees Owned by Each Peasant in Moshi District in 1936.

No. of Trees owned by each peasant	Number of Peasants	Percent
1–500	16,074	74
501–1,000	3,988	18
1,001–1,500	1,082	5
1,501–2,000	292	1.5
2,001 and above	301	1.5
Total	21,737	100

Source: McCarthy, D.M.P. 1982. *Colonial Bureaucracy and Creating Underdevelopment: Tanganyika 1914–1940*, p. 101. Iowa State University Press, Ames.
 Rodney, W. 1980. The Political Economy of Colonial Tanganyika. In (M.H.Y. Kaniki, ed.) *Tanzania Under Colonial Rule*, p. 157. Longman, London.

cially when the father has no land other than the mixed coffee/banana farm where the family lives. Quite often, the youngest son is favored, receiving a larger share of his father's plot of land (called the "kihamba" or "mghunda" in the native languages). However, farms have dwindled in size to the point that the returns for most peasants are likely to be very small, even when prices are fair or high.

Peasant inheritance customs in Kilimanjaro share one basic principle (Faith, 1966: 76): they place great importance on the concept of "keeping the name on the land," meaning that established holdings are passed down along the male bloodline. This custom divides the land into smaller and smaller parcels while promoting an attachment to economically unviable plots of land. Since acquisition of more land and creation of rural jobs is difficult for even the most efficient and entrepreneurial peasants, this system restricts the expansion of productive activities and the accumulation of wealth.

Currently, coffee farms are very small in the Kilimanjaro region, and all peasant farms are very small in Tanzania, even in areas with much unoccupied fertile land and with enough rainfall to raise at least one crop per year. Peasant farms were already very small in the 1930s, and some data from that period will help

Table 3. Tanzania Mainland in 1975: Size of Peasant Farms.

crop	Number of smallholders (peasant)	Average size of Farm (ha)	Net Income per Farm (Tshs.)
Coffee	260,000	0.6	1,650
Cotton	440,000	1.25	788
Tobacco	29,000	0.8	2,480
Maize	1,075,000	1	470
Rice	200,000	0.7	581
Tea	30,000	0.3	510

Source: International Labour Office 1978. *Towards Self-Reliance: Development, Employment and Equity Issues in Tanzania*, p. 253. ILO JASPA, Addis Ababa.

us to understand how the institution of tenure has been the cause of the decline of coffee in the region (Table 1 & 2). These data indicates that the average peasant farm in 1930s Kilimanjaro spanned 0.73 acres. The national picture for the 1970s indicates the dominance of small farms, as shown in Table 3.

Coffee farms in Kilimanjaro are currently smaller than the national average size of 0.6 acres, since larger farms in other coffee-growing regions (Bukoba, Mbeya, Songea) have pushed up the national average. Since the 1970s, generational subdivision of peasant farms in Kilimanjaro has increased because demographic changes have resulted in many more peasant children. In such situations, potential coffee farmers (i.e., the sons of older peasants) are likely to abandon coffee farming in lieu of other activities and to remain on their parents' tiny farms only as a last resort. In an earlier paper, I found that some coffee-farming peasants in the Kilimanjaro region actually face acute labor shortages because so many adult children migrate to other places, such as towns, to look for work (Maghimbi, 1992: 18–25). Thus, the tiny farms are retained for the sake of custom, but little or no investment is made in them.

The coffee farms of the Kilimanjaro peasants are very small and are scattered throughout the mountains in places like Machame, Kibosho, Uru, Old Moshi, Kirua Vunjo, Kilema, Marangu, Mwika, Rombo, Ugweno, Gonja, Mbaga, and Mamba. (Three areas are known as "Mamba": one in the Moshi Rural district, one in the Same district, and a village in Ugweno of the Mwanga district.) Generational subdivision of these farms continues, and low prices alone cannot explain this behavior, since peasants are likely to cut their production costs when prices are low (e.g., by using their own cattle manure instead of factory-made fertilizers). When farms are tiny, and when the land has no value as collateral, a variety of economic and social factors can cause a young potential coffee-growing peasant to abandon his family's coffee farm. One such factor may be that the male heads of peasant families do not groom at least one son to take over the farm when he grows up. This behavior is common among the Chagga, Gweno, and Asu tribes who occupy the coffee-growing zones in the Kilimanjaro region. The Kilimanjaro population has been rapidly increasing since the 1960s, and the institution of the large family where land for growing coffee is scarce has helped to reduce the positive dynamics of the coffee economy.

Table 4. Population Change in Kilimanjaro Region.

Year	1967	1978	1988	2002
Total Population	652,722	902,437	1,104,673	1,381,149
Population Density	49	68	83	104

Source: Tanzania, United Republic of. 2003. *2002 Population and Housing Census General Report*, pp. 2–7. Central Census Office, National Bureau of Statistics, Dar es Salaam.

Note: 1) Intercensal growth rate 1978–1988=2.1, 1988–2002=1.6.

2) Average household size (2002)=4.6

The data imply that family coffee plants now grow on very small farms of less than 0.73 acres (i.e., the 1930 average). I recently observed that some family coffee farms in the Moshi rural district and the Hai district are so small that further subdivision is nearly impossible in practice. In such case, even if one son were groomed to take over the family's coffee farm (where coffee was planted intermingled with bananas), output would be likely to stagnate or decline. In such cases, both the physical and social conditions of production are very unstable, and even if intensive farming could be practiced, no technical or financial capacity to improve productivity exists.

The coffee cooperatives were strong marketing institutions that understood the functioning of world markets. The 1976 abolition of these strong institutions damaged an already weakening economy and eliminated the possibility of diversification into more profitable export crops such as flowers. When the cooperatives were reintroduced in 1984, the damage had already been done. Thus, even the problem of low coffee prices and high input prices, which has been mentioned by some researchers (e.g., Mhando, 2005), is an institutional problem.

The pre-abolition (pre-1976) cooperatives were able to buy inputs in bulk and from well known lower-price suppliers and, thus, to reduce production costs for the coffee-growing peasants. These organizations worked diligently to establish markets for their constituents so that, in years of low global demand, their members would not be thrown out of production. For example, in 1955, the KNCU (Kilimanjaro Native Cooperative Union) organized an around-the-world trip to market the coffee grown in Kilimanjaro and the rest of Tanganyika (TNA 5/24/32). During this trip, the KNCU received the support of the BNCU (Bukoba Native Cooperative Union). The chairman and the economic adviser of the KNCU were joined by the chairman of the BNCU and the Moshi district officer, who was also the chairman of the Moshi Native Coffee Board and represented the government of Tanganyika. These four men formed the Tanganyika Goodwill Coffee Mission (hereafter, the Mission), which visited Britain, Switzerland, Germany, Canada, and the United States, distributing coffee samples and meeting with 158 coffee-trading companies in these countries. In addition, the Mission presented the film "Tanganyika Today" and distributed KNCU-produced pamphlets about Tanganyika coffee. The Mission traveled 26,000 miles by air and also traveled by train in the United States. The four members of the Mission visited coffee-processing factories in these five countries, which constituted an important market for Tanganyikan coffee (TNA 5/24/32). Thus, the cooperatives had a good understanding of fair trade and worked hard to achieve it.

Many attempts to recreate strong marketing institutions for peasant coffee and other peasant crops have been made. Several acts of Parliament have been repealed and enacted. The most recent act of this kind is the Cooperative Societies Act of 2003 (Act No. 20 of 2003, Revised Edition, 2004). Peasant cooperatives remain very weak in marketing and input supply, however.

Only upland coffee (mild Arabica) is grown in the Kilimanjaro region (Photo 3-1 & 3-2). This coffee is grown primarily at an altitude of 3,000 to 5,000 feet above sea level. Not much maize is grown in this geographical zone, and rice is normally not grown at all. Thus, these three crops generally do not compete for land. Coffee does not grow in the lowlands where rice and maize are the main crops. The small amount of maize grown in the highland areas can also be grown on coffee/banana farms without significantly affecting the output of coffee or bananas. In fact, maize and beans are quite often grown on the coffee/banana farms in the highlands of Kilimanjaro.

That recent changes in crop patterns have favored maize and rice production does not necessarily imply that coffee was physically displaced by these crops. Rather, many peasant farmers now put more effort into growing maize and rice in other places (the lowlands). Some of these peasants and a few commercial farmers have abandoned their coffee farms in the mountains, and now put most of their time and economic effort into growing maize and rice in the lowlands.

THE ASCENT OF RICE

Rice has always been grown in the flood plains and river valleys of the Kilimanjaro lowlands. Very high-quality rice continues to be grown in the Kisiwani, Gonja, Ndungu, and Kihurio areas in the Same district. This rice cultivation dates from about 100 years ago, and the high-quality rice from these areas was famous in the town of Tanga before the 1950s. In the areas of Ugweno and Usangi, rice has been grown in the Butu flood plain for about the last 100 years. Rice cultivation near the town of Moshi is more recent (within the last 50 years) and has become commonplace in villages like Chekereni, Mabogini, Rau River, Njoro, Kikavu, Oria, and Kahe.

Rice cultivation has diverted much labor and capital from coffee cultivation in the mountains since September 1978, when the governments of Tanzania and Japan agreed to establish the KADC (Kilimanjaro Agricultural Development Center) to administer Japanese government-funded agricultural projects in the region (JICA and GT, 1990; Omari, 1991). The KADC started the Lower Moshi Irrigation Project (LMIP) in 1981. The first phase of the LMIP was planned to cover the period from October 1982 to 1985. In 1982, a pilot rice farm was established in the village of Chekereni with the aid of the Japanese government, which provided a grant of 74,000,000 yen, and the Tanzanian government, which provided TShs. 1,000,000 (JICA and GT, 1990; Omari, 1991).

According to JICA and GT (1990) and Omari (1991), the main work on the LMIP started in May 1984. Four villages (Oria, Chekereni, Mabogini, and Rau River) were covered. Peasant farms were leveled to allow for smooth irrigation,

and irrigation canals were built. A total of 924.01 hectares of land were leveled in the four villages, and high-yield rice varieties were introduced (Photo 3-3). In 1985, the Japanese government provided tractors for the LMIP to rent to the rice growers. The name of the KADC was changed to KADP (Kilimanjaro Agricultural Development Project) in February 1986. The next year (May 1987), the basic infrastructure of the LMIP was completed; the Japanese government made another, 1,700,000,000 yen grant to the project in 1988. Storage (post-harvest) facilities were built in the village of Chekereni in 1988 using a grant of 5,500,000,000 yen that was made by the Japanese government to the Tanzanian government. In December of the same year (1988), the Japanese government made a further grant of 200,000,000 yen to the Tanzanian government for the purchase of spare Japanese tractor parts for the LMIP. Japanese government involvement in the LMIP was slated to end in March 1991, when the KADP was supposed to be ceded to the Tanzanian government. However, to allow the Tanzanians more time to prepare for taking over this large-scale irrigation project, the Japanese government agreed to extend its involvement in the project until March 1993.

About 2,000 families (households) grow rice in the villages of Mabogini, Chekereni, Rau River, and Oria. Although about 1,100 hectares can be cultivated to grow three crops of rice annually, the Tanzanian peasant and commercial farmers participating in the LMIP are not able to grow three crops, and only one or two crops are grown annually. Not every household grows rice, and in the 1990s, nearly half of the households in the four villages had no rice farms. About 9,000 tons of rice are produced annually in these four villages (Omari, 1991; JICA and GT, 1990). Currently, a similar but smaller rice project is underway in the Ndungu area of the Same district; this project was started after the LMIP.

As indicated above, rice does not compete with mountain Arabica for land. However, I have met rice farmers (both peasants and commercial farmers) who have homes and coffee farms in the mountain zones of the Kilimanjaro region. No attempt has been made to count these peasants (the majority) and commercial farmers. However, the majority of the rice-growing peasants and commercial farmers in the villages of Mabogini, Oria, Rau River, and Chekereni come from the coffee-growing zone of the Kilimanjaro region. Thus, rice has replaced coffee to some extent because less investment is made in the coffee farms in the mountains.

Because the rice market is less regulated than the coffee market, rice growers are able to speculate more in the rice market. Some rice is allegedly illegally exported to Kenya when prices are higher on that side of the border (the Kilimanjaro region borders Kenya). Some rice growers have accumulated enough land to undertake commercial rice growing in the lowlands of the Kilimanjaro region, including the LMIP area (Photo 3-4). These growers are not likely to invest in the tiny coffee plots in the mountains, and some have permanent homes near their rice farms and in the town of Moshi. These growers consider their tiny coffee plots in the mountains to be lacking in economic value, and they think of their mountain homes and farms as burial sites or as emergency shelters. They are not prepared to sell their tiny plots, for the cultural reason noted above: the land must be passed down along the male bloodline.

THE UBIQUITOUS PRESENCE OF MAIZE

In June 2006, I visited the Kilimanjaro region. At that time, the long rains had just ended, and white maize was ripening in all of the farmed areas in the lowlands and midlands (2,500 to 3,000 feet above sea level). Some maize could also be seen in the tiny farms in the mountains, where it is usually grown together with other crops, such as coffee and bananas. However, in the mountains, unlike in the lowlands and the midlands, little maize was grown although it was obviously the principal crop in the region. In the midlands, it competed somewhat with coffee for land and labor and appeared to have the upper hand. The midlands of Kilimanjaro contain some plantations (large estates), and these plantations were dominated by coffee.

Both peasant and commercial farmers confirmed the dominance of maize during the main farming season (the long rains, which fall from March through June) every year (Photo 3-5). Even in some rice farms, maize is grown and the rice crop is grown after the maize is harvested. Thus, in the area of the LMIP, maize and rice compete for the same land. No current data are available, but data for earlier periods indicates that per-acre production of white maize was greater than that of rice. Thus, more rice is produced only because it appears to be more valuable than white maize.

During the short rainy season, maize is also grown in the high-altitude region of Kilimanjaro (3,000 to 6,000 feet above sea level), where it does not compete with rice. Sometimes the maize is grown on the coffee/banana farms so that households can have supplies of green maize and of dry maize for flour. In the Same district, a considerable amount of mountain land is still used for growing maize and beans and is never planted with coffee. Such planting behavior appears to be a survival strategy. However, the bulk of the maize is grown in the lowlands surrounding the Kilimanjaro and Pare mountains.

The mountain area of the Kilimanjaro region is now a net maize importer. Much maize is imported from the Simanjiro and Kiteto districts in the Manyara

Table 5. Rice and Maize Production in LMIP Area (Oria, Chekereni, Rau River and Mabogini Villages).

Year	Average output per hectare in tons		Output in tons	
	Maize	Rice	Maize	Rice
1985	7	n.a.	n.a.	655
1986	7	2.5	1,138	3,908
1987	6.5	2	1,800	5,767
1988	6.7	2.5	2,250	8,582
1989	6.25	2	2,800	6,329
1990	6	2	1,800	8,982

Source: Japan International Cooperation Agency (JICA) & the Government of Tanzania (GT) 1990. *Note of Understanding of Joint Evaluation Report on Kilimanjaro Development Project*. Unpublished.

Omari, C.K. 1991. *A Short Report on the Future of Lower Moshi Irrigation Project*. Report for JICA, 30th June 1991, Dar es Salaam.

region. The Kiteto district produces a surplus of about 25,000 tons of maize annually, and this maize is exported to Dar es Salaam, the Kilimanjaro and Arusha regions, and other places. Large-scale, shifting cultivation of maize is undertaken by migrant commercial farmers in the Kiteto district. They use no fertilizers and normally cultivate the land only once before moving on to open new farms. In 2000/02, a commercial maize farmer in Kiteto would ordinarily invest TShs. 1,950,000 in a farm of 40 hectares and earn a return of TShs. 12,000,000 from white maize, with a net profit of TShs. 10,050,000 (House, 2002: 37).

Such farmers (sometimes called *Benas* because some of them are actually the *Bena* people from *Njombe*) have established a large-scale, shifting cultivation pattern for maize in the southern part of the Kiteto district and are able to compete for land with the *Maasai* nomadic pastoralists who keep cattle. A similar struggle between maize and cattle plays out in the lowlands of the Kilimanjaro district. Nomadic pastoralism is expanding rapidly in the Same district in the lowlands, and my own estimate is that 500,000 cattle are kept by *Pare* and *Maasai* nomadic pastoralists in the dry plains in this district.

CONCLUSION

Cultural tradition assigns the male heads of peasant families in the Kilimanjaro region primary responsibility for deciding how family coffee (and banana) farms are to be run, but there is no indication that a male head of household currently prepares at least one of his sons (or daughters) to take over the responsibility of managing the family coffee farm when he is too old to continue doing so. Given this pattern and the small size of most farms, all the sons of a given coffee planter may leave home. In such cases, when the father is too old or dies, the coffee is not properly managed or the coffee plants also die; I have witnessed such cases. Any unmarried daughters in the family typically show little interest in the family farm, because they consider the farm to be the property of their brothers, especially of the youngest brother. At the same time, great importance is attached to keeping the family name on the land by making sure that the land is passed down through the generations among the men of the family.

Most of the coffee trees in the Kilimanjaro region are very old. Some, like the trees in the area of *Kilema*, are over 100 years old. Revival of the coffee industry will require an extensive, organized effort to uproot the old trees and plant new, higher-yield coffee plants. The institutions of the 1950s and 1960s were able to produce coffee seedlings and to employ coffee instructors. The *Moshi* Native Coffee Board established coffee nurseries to ensure that only good quality coffee beans were planted. It employed 66 coffee instructors, and over 200 casual laborers tended the nurseries. The *Bukoba* Native Coffee Board issued 2,000,000 coffee seedlings between 1945 and 1953, and it maintained a staff of 100 coffee instructors and over 100 nurserymen (Swynerton and Bennet, 1948; *Bukoba Native Coffee Board Annual Reports 1949–1953*).

My conclusion is that the recent lack of historically strong institutions, such as the pre-abolition cooperative unions like the *KNCU*, the *BNCU*, and the *Vuas*u,

has contributed to the disinterest that peasants have shown toward coffee in both the Kilimanjaro region and other places. Instead, peasants have been attracted to the opportunities to produce maize and rice and to raise dairy cows.

Maize and rice farming takes place on those pieces of land where traditionalism has not been as institutionalized as in the mountains, and these crops may yield higher returns than coffee. The record high prices of rice and maize this year (2006), which follow the drought of 2005, mean that for the first time in Tanzanian history, white maize flour sells at a higher price per kilogram than that of wheat flour. These trends may underlie the popularity of maize and rice among planters and the corresponding abandonment or reduced use of the tiny coffee plots (Photo 3-6).

Maize planting could be encouraged and supported by the authorities as the basis for industrialization. The potential for the expansion of maize and rice planting is great, as these crops are staple foods with a large market in a rapidly growing population. Maize can also be used to make maize oil, animal feed, and alcoholic drinks, including beer and spirits. Currently, the maize oil consumed in Tanzania is imported from Kenya and other countries. It is difficult to see how coffee might regain its status as the principal crop among peasants in the absence of land consolidation measures or evolution of the land market. The more efficient peasants and commercial farmers would need to buy the tiny coffee farms (in addition to other farms) that are currently neglected. For this to happen, peasant farmers would need to change their views about having many children and to adopt the practice of grooming one child to take over the family coffee farm. The custom of clinging to uneconomical plots of land should be discouraged. Peasants should not be afraid to sell land if they can improve their standards of living by moving elsewhere.

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Photo 3-1: Coffee field of Tanzania Coffee Research Institute (TaCRI) in Lyamungu, Moshi District (Jul.2003).



Photo 3-2: Coffee with banana, and irrigation facility in Moshi District (Dec.2002).



Photo 3-3: Rice at Lower Moshi Irrigation Project site with Mt.Kilimanjaro (Sept.1997).



Photo 3-4: Rice at a small-scale irrigation project site in Kivulini Village, Mwanga District (Dec.2006).



Photo 3-5: Maize planted at a field in the lowland of the Northern Highlands (Jul.2004).



Photo 3-6: Maize planted at a former coffee field near TaCRI in Moshi District (Jul.2003).