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An Assessment of How Land Use and Productivity Has Changed in Villages Surrounding Mazumbai in the West Usambara Mountains, Tanzania: Specifically the Original Tea Plot Allocations Received by Members of the Sagara Group in 1991

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SIT Study Abroad

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Abstract

Tea is a valuable cash crop that is being influenced not only by individual farmers, but also local organizations, NGOs and even government information and regulations to encourage tea production in Tanzania. Small-scale tea farmers, like the Sagara Group, are a small, but important part of the tea industry. The Sagara Group, former workers united under the Mazumbai Tea Estate, was formed in 1964. The Group consists of 103 members that received a share of tea in 1991 when co-management of the estate was not efficient anymore. The group members (36 original members and 63 members that represent deceased original members) are located in villages of Mgwashi, Sagara, Mayo, Kizanda and Kwabosa surrounding the premises of Mazumbai. The purpose of this study was to look at how land use and productivity has changed the original tea plot allocations of the Sagara Group over time. Semi-structured interviews were used to collect data about the individual past and present land use and future goals for improving productivity. It was found that changes in land use are being made to the original tea plots through the addition of various crops. Statistics showed that there have been changes in productivity due to the increase in income, amount of monthly harvest, and available government knowledge. As far as the future for the tea industry, interviewees plan to use inputs on crops and purchase more land for tea.

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Introduction

Agriculture occupies a very important place in the lives of Tanzanians as well the national economy. Overall, agriculture contributes to about 45 percent of Tanzania's GDP. Agriculture brings approximately 66 percent of foreign exchange and provides the majority of raw materials for local industries (Ministry of Agriculture, 2008). Low productivity; under-utilization of the available land, water and human resources as well as low incomes and profitability have remained the key components of agriculture in the country. It provides full time employment to over 70 per cent of the population as well as the main resource for food for the country. Tanzania's main agricultural exports include tobacco leaves, cashew nuts, coffee, cotton, tea, maize, sisal and pulses (Ministry of Agriculture, 2008). With tea being a traditional export crop, it is one of the main agricultural occupations in the country produced by both companies and individuals.

Both large-scale farms and small-scale farms produce tea in Tanzania. The majority of the crop is produced by large-scale estates, which are increasing in number as a result of positive policy reforms that encouraged private sector investments. Tea production is labor intensive and offers many rural people (youth and women in particular) employment, as both farms and processing plants are located in the rural areas. Tanzania produces both organic and non-organic tea grown in Mbeya, Iringa, Tanga and Kagera regions.

In 1904, German settlers introduced the tea crop, *Camellia sinensis* L., to Tanzania (Moller, 2007). It was the first experimental tea in the country and was planted in two places: 1) the Agricultural Research Station in Amani in the Usambara Mountains and 2) Kyimbila Mission in the Rungwe district in the Southern Highlands (Carr et al., 1992). Commercial tea production began in 1926 and in 1929 a land development survey commission recommended that coffee plants should be replaced with tea in Mufindi and Tukuyu (Moller, 2007). Between 1930 and 1934, free cuttings and seed were allotted to interested settlers to start tea plots and in 1930, a small tea factory was opened in Mufundi (Carr et al., 1992). By 1934, 1000ha of tea had been planted in Tanzania, producing twenty tons of processed tea, of which 9.3 tons was exported (Carr et al., 1992). The beginning of the Second World War in 1939 led to German tea estates being taken over by the British. More tea was planted, and by 1950 annual production in Mufindi, Tukuyu, and the Usambaras alone had reached approximately 900 tons. In 1956, Mufindi by itself was producing 1700 tons of tea annually. (Carr et al., 1992).

Shortly after Tanzania's independence in 1961, smallholders began producing tea because all of the large-scale commercial farms were in the hands of foreign settlers. In

1968, the Tanzania Tea Authority was formed to manage the planting and processing of tea, mainly for smallholders. In 2002, Tanzania's fifth largest export crop was tea, providing an annual foreign exchange revenue of over US $30 million. (Moller, 2007) Tea is among cash crops in Tanzania whose production has maintained an upward trend for several years. It was 92,876 tons in 1990 and estimated 134,378 tons in 2004 (Ministry of Agriculture, 2008). In Tanzania, the total area cultivated with tea is estimated at 23,300 ha across the country (Moller, 2007).

Larger tea estate owners' dominate the country's tea production and marketing, which sometimes frustrates efforts of small-holder tea growers' to process and market their tea. These small-holders frequently face low prices for tea sold to the manufacturers and have limited access to production inputs, extension and research services. (Ministry of Agriculture, 2008) In the smallholder sector by contrast, yields have generally remained low. At around 400-500 kg/ha, low yields are largely due to financial and infrastructural constraints on maintaining crops and ultimately production, which have also limited the uptake of new technology (Carr et al., 1992).

Small-holder tea farmers, like those in the West Usambaras, face different challenges in the course of production. There are many constraints on production such as availability and cost of credit, labor input, the relationship between tea and other crops, modes and regularity of payment, and availability of transportation (Carr et al., 1992). Similarly, other issues such as drought tolerance, the ability to grow at low temperatures, drought mitigation and irrigation are important factors for both large and small-scale farmers (Carr et al., 1992).

An example of a smallholder tea cooperative in the West Usambaras is the Sagara Group (See Appendix A). In 1946, John Tanner moved to what is now known as the Mazumbai Research Station, directly outside of Mazumbai Forest Reserve. In 1961, he began Sagara Estate Limited, a tea company that began with 55ha and eventually accumulated another 78ha. He initially employed 150 workers. During that year, he made all of the workers shareholders of the estate, a collective group that became known as The Sagara Group. Tanner paid tsh.80 per month as a salary, however, each worker had to pay tsh.20 each month to continue to be a member of Sagara Estate Ltd due to government policy. (Mhema, pers. comm., October 2009)

Soon after establishment, John Tanner established Mazumbai Estate Limited to produce coffee and quinine and the workers from Sagara Limited were divided among the companies (47 at Mazumbai and 103 at Sagara). Over the years, Tanner and the Group (104 members including Tanner) were able to expand the tea plantation under

Group management. In 1981, Tanner stopped paying the workers altogether due to the dismal state of the economy. In1982, Tanner left the estate to the Group as he moved back to his homeland of Switzerland, however, the tsh.20 was still being paid monthly to the government. Outside labor was hired by the Group to help supervise the growing estate, but such a large co-management of the area was not as efficient as in the past and Sagara Limited failed to work together cooperatively. (Mhema, pers. comm., October 2009)

In 1991, the tea estate was split into individual plots, all of varying size (¾ha to 3ha), to eliminate collective maintenance. In 2001, Sagara Limited sent an application to the government to be associated with Sagara village so that they would not have to pay any money to the government. Since approval, they are now referred to as the Sagara Group (not Sagara Estate Limited) and are considered a part of Sagara Village. (Mhema, pers. comm., October 2009)

This study looked at how land use and productivity has changed the original tea plot allocations of the Sagara Group. Tea is a valuable cash crop that has been influenced not only by individual farmers, but also various organizations, NGOs and even government influences to encourage tea production in the region. Various factors have had an impact on tea crop production since 1991 for members of The Sagara Group because of land changes and methods for producing tea. Interviews about current and future practices, and collections of historical data on tea plots were analyzed to see how land use and tea productivity has distinctly changed in the Mazumbai region.

It was predicted that the land use would be different than when members initially received the tea plots due to the development of the country and that additions would be made to the tea plots due to an increase in population and thus a higher demand for food and supplies. It was predicted that income from both tea and the plot would have increased from the past because of the increasing tea production and industry in the country and that harvest would be higher currently because of more in-depth knowledge about caring for the crops over generations. It was also predicted that input use would be minimal due to the expense in such a rural area and that because of the location, NGO and company assistance would influence production more than government regulations.

Study Site

The Eastern Arc Mountains are a chain of mountains that begin in the southern Taita Hills of Kenya and extend to the Udzungwa Mountains in south-central Tanzania (Burgess et al., 2007). Within this stretch of mountains that uplifted more than 30 million years ago in the Lushoto District, lie the West Usambara Mountains (Burgess et al., 2007).

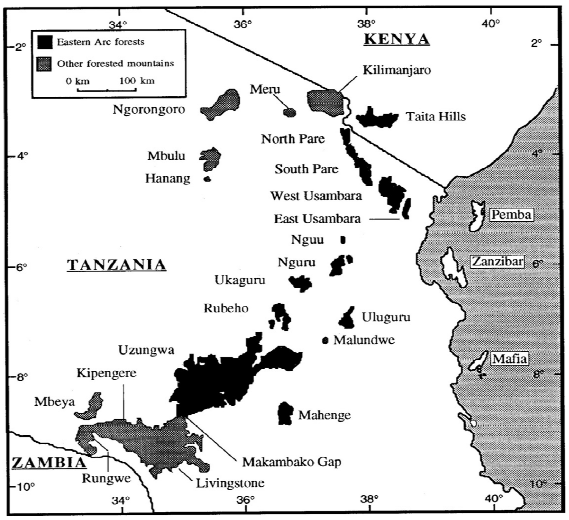

Figure 1A

Figure 1A. Map of Eastern Arc Mountains in Tanzania, specifically the West Usambara area (Burgess et al., 2007).

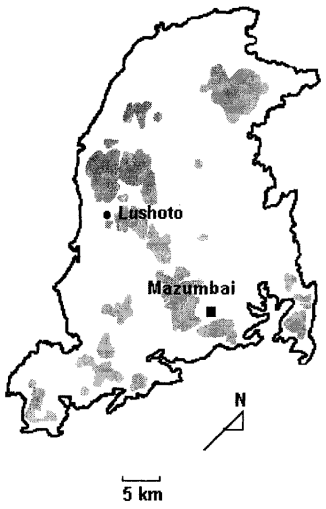

Figure 1B

Figure 1B. Location of Mazumbai in the West Usambara Mountains (Mrema, 1998).

Repetitive tectonic activities that originally formed the West Usambaras have created high hills with very steep valleys that are both long convex and short concave. The West Usambaras are humid, unlike the dry areas that directly surround the mountains, and receive more than 50 percent of the area's total rainfall during March and April. The mountains have a stable climatic history in comparison to other East African environments (Conte, 2004). With this stable climate, the forests within the West Usambaras contain a vast number of endemic species: over 97 vertebrates (72 of which are threatened by extinction), 68 tree species, and hundreds of shrubs and herbs, exhibiting high biodiversity (Arc Journal 2005).

The rainforests found in the West Usambaras exhibit how rich and diverse habitats are rapidly transforming due to human-induced changes made to the land (Conte, 2004). For centuries humans have been altering the natural landscape and ecological system of forests, particularly in the West Usambaras. Only 6.7% of the forests in the Eastern Arc Mountains remained by 2000, of which only 16.7% was protected (Primack, 2000) Mazumbai Forest Reserve is one of the few pristine montane rain forest ecosystems that remains in the West Usambaras (Kiparu, pers. comm., September 2009). Farmers have immigrated into the Eastern Arc Mountains to find more productive and dependable land to cultivate (Conte, 2004). Areas surrounding the Reserve have been cleared for lumber and civilization, while being cultivated for various crops and plantations (Mrecha, pers. comm., September 2009).

Non-governmental organizations (NGOs) play a role in villages across Tanzania by providing necessary information, tools, and administrative skills to develop and implement management plans on a particular issue. The Tanzanian Forest Conservation Group (TFCG) is an NGO whose mission is to endorse conserving forests high in biodiversity in Tanzania across the Eastern Arc Mountains. TFCG promotes research, environmental education, networking, community outreach and development in various forms to reach this goal. (TFCG, 2009)

This study was carried out in local villages of Mgwashi, Kizanda, and Sagara, all of which surround Mazumbai Forest Reserve (See Appendix D). Mazumbai is located at 4°50'S and 38°30'E and the villages are within a 9 kilometer radius from the Reserve (Mrema, 1998). These villages were chosen because the majority (98 out of 103) of Sagara Group workers reside within these boundaries (Mhema, pers. comm. September, 2009). Tea is considered the most profitable cash crop in the area, however, the majority of tea farmers cultivate other crops for both income and food (Usufuwandi, Sabuni, pers. comm., 2009). Due to the shortage of land in the surrounding areas, villagers only grow tea if there is more land available than what is needed to grow crops to sustain their families (Sabuni, pers. comm., 2009). As the climate begins to change more drastically (longer droughts), villagers are being advised about land where food crops do not thrive and to replace it with tea (Sabuni, pers. comm., 2009).

Mayo village was formed in 1972 and consisted of 200 villagers at the time. As the population began to increase, the village expanded to encompass fifteen hamlets. Due to rapid population growth, Mayo was split further into two separate villages, Mayo and Kizanda, in July 2009. Mayo now currently consists of 300 households and 1,200 villagers between 6 hamlets. Kizanda, or Mayo ward, represents 450 households, 1,800

people within nine hamlets. Agriculture is the main economic income and roughly 1/10 of both Mayo and Kizanda villagers have been cultivating tea since the 1970's. Tea production is changing, yet limited, due to climatic factors (especially droughts) and the expansion of plot sizes by villagers. (Usufuwandi, pers. comm., 2009)

Sagara village was formed in 1999. 3,012 villagers in 492 households are amongst the five hamlets (Handei, Kwemashai, Kweshashi, Kwemtono, and Mazumbai) in the area. Agriculture is the main source of income, with tea being the most profitable cash crop. Approximately half of the villagers grow tea and have been farming tea since the 1970's, before the village was founded. Tea production has increased over time in the village and even with harsh climate conditions; tea still provides more harvest than other crops. (Sabuni, pers. comm. 2009).

Only 36 of the original 103 Sagara Group members are alive, however the Group's membership is still 103. One child of a deceased member has been "adopted" into the group to partake in meetings and activities (Mhema, pers. comm., September, 2009). The group members are spread out across the Mazumbai region and received a tea plot ranging from ¾ hectare to 3 hectares (¾ha: 1%, 1/76; 1ha: 83%, 63/76; 1¼ha: 1%, 1/76, 1½ha: 5%, 4/76; 2ha: 8%, 6/76; 3ha: 1%, 1/76) (Jensen, 2009). The Sagara Group's tea plots consist of three varieties of tea: assam, china, and karicho (originated in Kenya) and plots are generally a mix of all varieties (Mhema, pers. comm., September, 2009).

Twenty-six percent (5/19) of the original members interviewed owned tea before receiving this plot in 1991. Original members claimed that difficulty with participating in farm work due to aging and little money were the main problems when initially receiving the plot. In the past, 95% (18/19) of original members did not use any sort of input on their tea crops besides natural cow manure. Tea was the main source of income in the past for 95% (18/19) of the original members, while present day for all interviewed Sagara Group members (original and adopted) it is considered the main income source for 97% (74/76). (Jensen, 2009)

Adopted members joined the Sagara group from 1972-2009, depending on when they inherited the land from the original member (most often right before the original member passed away). 100% (57/57) of the inherited tea plots are still owned within the family. Forty-seven percent (27/57) of the inherited land has been divided into 2-7 shares, depending on the number people remaining in the family. The main changes in maintaining tea crops that adopted members have changed from the original members were: weeding more often (89%; 51/57), cutting plants to encourage growth, and adding fertilizer while 9% (5/57) claimed there was no difference in maintenance. (Jensen, 2009)

Methods

This study was conducted over a period of 16 days from November 9th, 2009 through November 25th, 2009 in the West Usambara Mountains of Tanzania. Data was collected from villagers in the surrounding areas of Mazumbai Forest Reserve, specifically the villages of Mgwashi, Sagara, and Kizanda. The sample frame consisted of the 103 Sagara Group members located in the West Usambara Mountains; a group formed when the workers became shareholders of a large tea estate directly outside of Mazumbai Forest Reserve. The sample population was composed of the number of Sagara Group members that I could logistically interview in the time frame of my study. Non-random sampling was utilized to specifically choose members of The Sagara Group for interviews. Using my raw data, descriptive statistics were used to analyze the data.

Services of a translator, a Form 4 student in the area, were used for 16 days to assist with collecting data from key informant and semi-structured interviews. The majority of interviews were conducted in Kisambaa (local language), with the rest in Kiswahili, depending on the language preference of the interviewee. Translations were done orally and after each question, while responses were written immediately.

A series of key informant interviews were conducted from October 12th – October 14th 2009 with the village executive officers of Mayo and Sagara, the Agricultural Extension Officer of the Mazumbai region, the Secretary of the Sagara Group, and the Manager of Mazumbai Forest Reserve Saidi Kiparu. Key informant interviews carried out with the village executive officers of Sagara, Mayo were used to gain an understanding of each village's history and the importance of tea as a cash crop in the region. An interview with the Agricultural Extension Officer provided information about local laws about growing, maintaining and producing tea. The Sagara Group secretary and Mr. Kiparu allowed for more in depth history and current status of the group.

Semi-structured interviews conducted with members of the Sagara group (n=76) located in various villages surrounding Mazumbai (See Appendix B, Appendix C). Nineteen original members (all male, ages 50-100) and 57 adopted members (54 males ages 25-67, 3 females ages 51-54) were interviewed. Out of the adopted male members, 51 were sons and 3 were grandsons of the original member. Out of the adopted female members, 2 were daughters and 1 was the wife of the original member. An "original member" was defined as one of the 103 original Sagara Group members that personally received a share of tea when the estate was divided in 1991. "Adopted members" were defined as current Sagara Group members that inherited the original plot of land from an original member. Interview questions focused on original tea plots, land use and productivity changes over the past years. Various types questions were asked including

yes/no (questions limited to an affirmative/negative response), open-ended (questions with no limited response or supplied answers to choose from), and scales (questions involving a ranking system from 1-5). Questions were specifically focused on the past history (land use, income source before tea plot), present usage (current maintenance of plot/productivity of land owned), and future goals (plans of use for tea plot) of the tea plot that was received in 1991.

Results and Discussion

This study looked at how land use and productivity has changed the original tea plot allocations of the Sagara Group. Nonrandom, semi-structured interviews were conducted with 76 of the 103 Sagara Group members (19 original members, 57 adopted members). Data collected consisted of tea plot history, land use (additions to tea plot, inputs), productivity impacts (NGOs, companies, government laws) and future goals for land and the tea industry.

I predicted that the land use would be different currently than when members initially received the tea plots due to the development of the country and that additions would be made to the tea plots due to an increase in population and thus a higher demand for food and supplies. This prediction was somewhat supported by the data collected (Figure 1, Figure 2, Table 1). Forty-three percent (8/19) of the original members had made crop additions to their plots within the first 5 years of individually owning it. Changes were possibly made because tea prices at the time were extremely low and profit was minimal. In 1996, the farmers received tsh.50 per kilogram in comparison to the current price of tsh.100-160 per kilogram (Mhema, pers. comm. September, 2009)

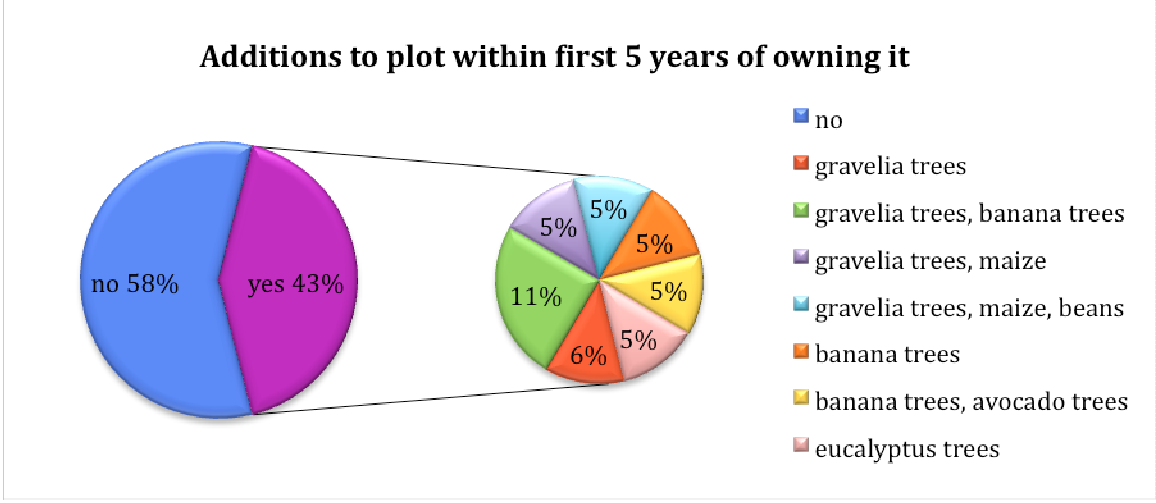

Figure 1. Representation of original Sagara Group member's response to Original Past Question #4: "Did you add anything besides tea to the plot within the first 5 years of owning it? If so, what and why." Data collected from semi-structured interviews (original members n=19) with translator in Sagara, Kizanda and Mgwashi villages, November, Tanzania 2009.

Present-day, seventy-four percent (56/76) of the Sagara members maintain a crop other than tea in their original tea plot, even though the original plots contained strictly tea and some natural trees when initially distributed in 1991 (Figure 1). Percentages of tea versus other crops in the same plot were rather distributed with the most common

percentage being 70% (11/76) tea and 30% other crops (Figure 2). These changes are similar to those of the original members, most likely due to the demand to meet basic needs for food and income.

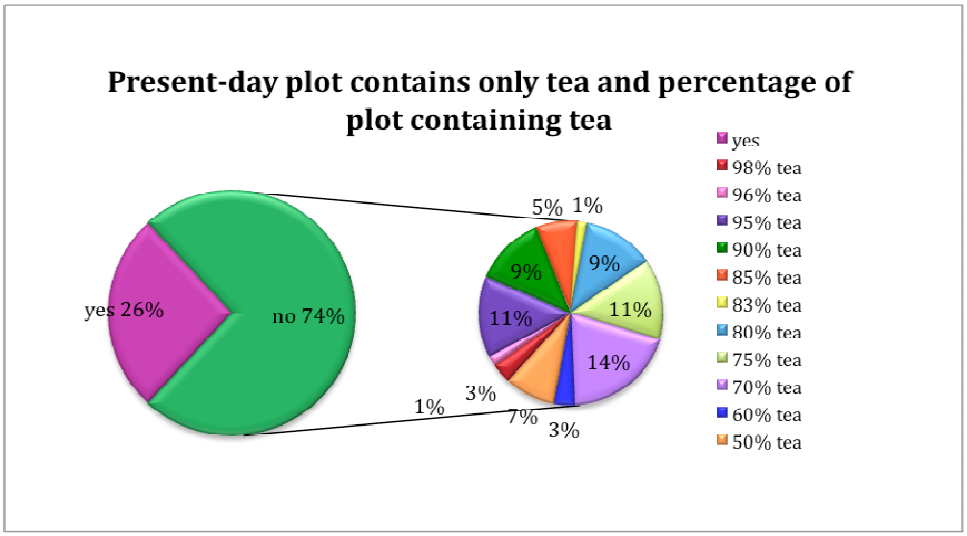

Figure 2. Representation of the percentage of tea plots containing only tea currently and percentage of tea currently in original tea plots containing something other than tea among the Sagara Group members. Data collected from semi-structured interviews (original members n=19, adopted members n=57) with translator in Sagara, Kizanda, and Mgwashi villages, November, Tanzania 2009.

Addition to tea plot	Reason why
gravelia trees	Shade (8); Lumber (5), lumber/firewood (3), lumber/shade (3); lumber/keep soil from eroding (1)
gravelia trees, banana trees	lumber, food (2); lumber/shade, food (2); shade, food/selling (2); firewood, food (1); shade/firewood, food (1)
gravelia trees, banana trees, avocado trees	lumber, food, food (1); shade, food, food (1)
gravelia trees, avocado trees	shade, food (1)
gravelia trees, banana trees, maize	shade, food, food (1)
gravelia trees, banana trees, maize, quinine trees	firewood, food, food, selling (1)
gravelia trees, banana trees, eucalyptus trees	shade, food, shade (1)
gravelia trees, maize, beans	shade, food (1)
gravelia trees, maize, coffee	lumber, food, selling (1)
gravelia trees, maize	lumber, food (1)
gravelia trees, quinine trees	shade, shade (2)
gravelia trees, cloves	shade, food/sell (1)
gravelia trees, watta trees	shade, shade (1)
gravelia trees, agropass trees	lumber, lumber (1)
banana trees	food/selling (4); boundary (1)
banana trees, avocado trees	food, food (1)
banana trees, maize	shade/food, food (1)
agropass trees, banana trees, avocado trees	firewood, food, food (1)
agropass trees, quinine trees	lumber, sell bark (1)
beans	natural fertilizer, food (1)

Table 1. Additions made to original tea plots and the main reasons for the additions among the members of the Sagara Group. Data collected from semi-structured interviews (original members n=19, adopted members n=57) with translator in Sagara, Kizanda, and Mgwashi villages, November, Tanzania 2009.

Gravelia trees were the most common addition to the plot with 75% (42/56) of the members adding the trees to their plots mainly for shade and lumber (Table 1). Members claimed that shade was important to increase harvest and produce higher-quality plants. Trees are planted for lumber on local farms because much of the surrounding area is protected (Baga Forest Reserve, Mazumbai Forest Reserve, and Kisimia-Gonja Forest Reserve) and regulations restrict access to the forests for firewood and lumber (See Appendix B) (Kiparu, pers. comm., 2009). The range and combination of crops made by all current members (Table 2) is expanding as time goes on when comped to the original member additions (Figure 1).

Harvest within the Mazumbai region ranges from 70kg – 2000kg per month (Figure 3). Harvest most likely varied so vastly for two main reasons: the age of plants and replacement of crops. How often a farmer can harvest tea is influenced by the age of the crops (Mhema, pers. comm. 2009). Older tea and tea that had not been cut or pruned at a younger age can be harvested on average twice a month. Young plants that are cut and pruned every 3 years can be harvested every week, allowing for the potential of a greater harvest (Mhema, pers. comm. September, 2009). If dead plants are not replaced by new crops, the amount of harvest is not at its potential during the year. Farmers are encouraged to replace dead crops and plant crops where there is space to maximize income (interviewees, 2009).

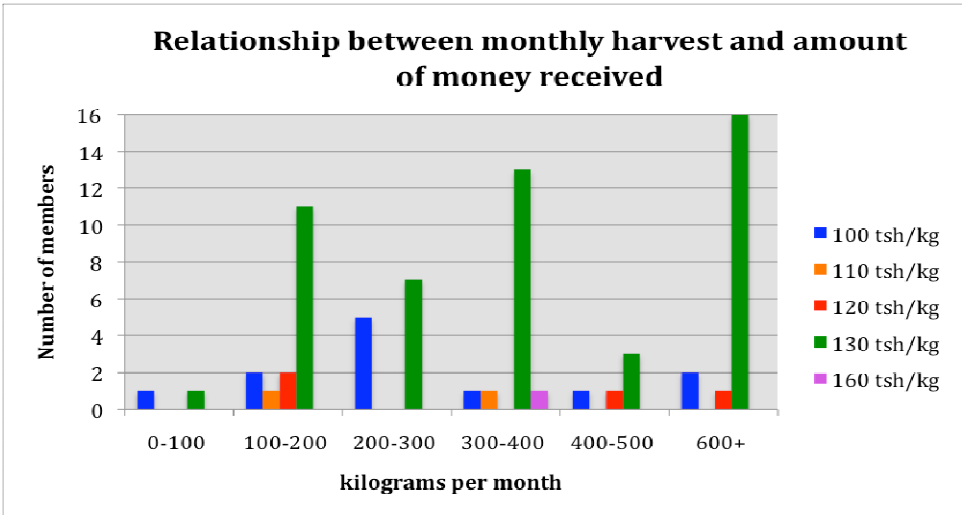

Figure 3. Comparison between the number of kilograms harvested per month and the amount of shillings received for one kilogram.Data collected from semi-structured interviews (original members n=19, adopted members n=57) with translator in Sagara, Kizanda, and Mgwashi villages, November, Tanzania 2009.

Harvest varies among the Group members and my prediction that harvest would be higher currently because of more in-depth knowledge about caring for the crops from previous generations was supported, however, not strongly by my data (Figure 3, Figure

4). Fifty-three percent (40/76) Group members stated that tea harvest was higher currently than in the past (average of the past 2-5 years). Harvest may be higher presently because of better maintenance of the crops and the surrounding plot. More routine care, including weeding and cutting, is claimed to produce a better harvest (interviewees, 2009). Also, for many original members, children harvest the crops now. Difficulty participating in work was one of the main initial problems for original members when first receiving the tea plot, which may contribute to low harvest in the past. Difficulty with maintaining a plot due to old age contributes to neglect or not as thorough of maintenance that regularly occurs with agricultural cultivation (Kiparu, pers. comm. 2009).

Tea harvest was higher in the past for 47% (36/76) of the farmers. Harvest may have been higher in the past due to the fact that tea crops were younger and producing more at the time and with the lack of maintenance, harvest severely decreases. Also, the original plot was initially completed dedicated to the cultivation of tea without any additions of other crops. It was only after the farmers divided the tea estate that farmers could choose to maintain their plot on an individual basis (Mhema, pers. comm. September, 2009).

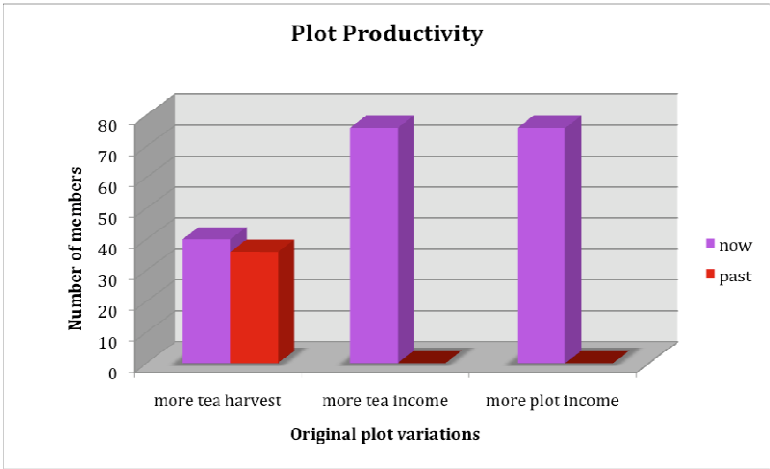

Figure 4. Comparison of present and past amount of harvest, tea income, and plot income (not only tea) on original tea plot. Data collected from semi-structured interviews (original members n=19, adopted members n=57) with translator in Sagara, Kizanda, Mgwashi, and Mayo villages, November, Tanzania 2009.

It was predicted that income from tea would be higher than in the past, which was supported according to the data collected (Figure 3, Figure 4). There has been a rising tea price trend in Tanzania, suggesting that prices were low and stable during pre-first generation economic reforms soon after independence. In general there has been an increasing price of tea in the domestic market during first generation economic reforms. Tea prices started to increase during middle 1990s. One hundred percent (76/76) of the members claimed that tea income was higher now than in the past (average of the past 2-

5 years) (Figure 4). Just as land changes were made due to low tea prices at the time, income has steadily risen over the years from tsh.50 in 1996 to an average of tsh.130 in 2009 (Mhema, pers. comm. September, 2009). Around the Mazumbai region farmers receive different prices for tea leaves, ranging from tsh.100 – tsh.160 per kilogram (Figure 3). Tea factories in the area determine prices for tea leaves based on the quality that they judge a farmers raw products to be (Mhema, pers. comm. September, 2009). Tea leaf quality is heavily influenced on crop maintenance. Cutting and pruning crops to encourage growth, and weeding to improve soil conditions provide a better harvest according to the majority of the members of the Sagara Group (interviewees, 2009).

Overall plot income was determined by income received from all plot contents and not only tea crops in the original plot. One hundred percent (76/76) of the Group members receive more plot income now than in the past (average of past 2-5 years) (Figure 4). Many added plot contents are utilized for extra income (trees, cloves, quinine, bananas, etc.) and provide a little flexibility by not having a farmer depend solely on one crop (interviewees, 2009). Plot income in the past was mostly dependent on tea crops, which offered little income due to low prices.

The prediction that input use would be minimal due to the expense in such a rural area was supported by my data (Figure 5). Only 5% (4/76) of the Sagara members use chemicals and/or inputs on their tea crops. Of the 95% (72/76) that do not use inputs the main reason was that they were too expensive (86%, 65/72). Out of those that did use inputs, Gramerson and Roundup were the two brands used, cost tsh6000 and tsh9000 respectively and were applied every 3 to 6 months (Jensen, 2009).

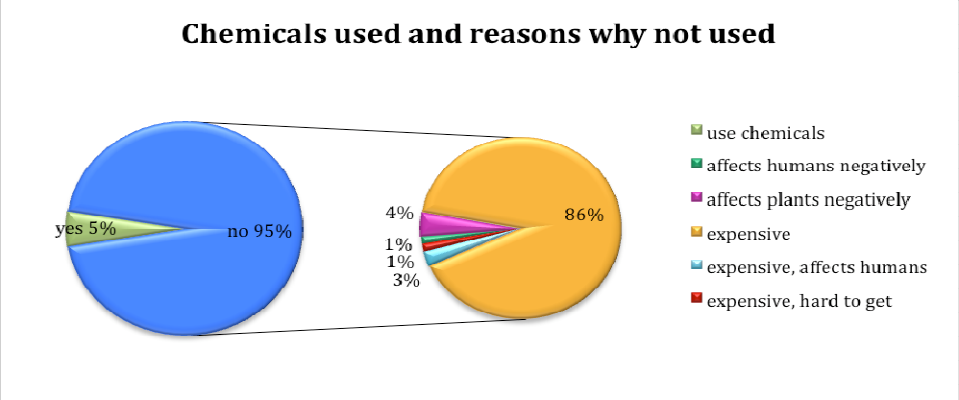

Figure 5. Representation of Sagara Group member responses to Present Question #4:" Do you use pesticides, chemicals and/or other inputs on the tea crops? If no, why not?" Data collected from semi-structured interviews (original members n=19, adopted members n=57) with translator in Sagara, Kizanda, and Mgwashi villages, November, Tanzania 2009.

In a rural agricultural area, inputs are a rare commodity because of the lack of availability and more so because of the impoverish community. In order to increase

yields and output levels in crop production, the access and use of improved seeds, fertilizers and inputs is necessary. Even when inputs are available the economic benefits may not reach full potential because of inappropriate use and/or the combination of crops with low genetic potential. With heavy reliance on and continued use of hand hoes, rural farmers are limited by acreage that can be cultivated. (Ministry of Agriculture, 2008)

The prediction that NGO and company assistance would influence tea production more than government assistance and regulations because of the rural location for agricultural cultivation was not supported by the data collected. Overall, 33% (25/76) of Group members have been assisted by an organization (either an NGO or company)(Figure 6, Table 2) and 59% (45/76) have been assisted in some way by the government (Figure 8, Table 3).

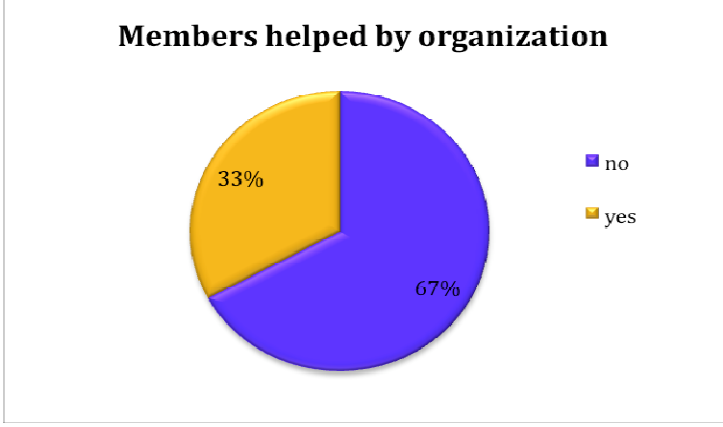

Figure 6. Representation of Sagara Group members that have been assisted by an organization (information, free seeds, loan, etc). Data collected from semi-structured interviews (original members n=19, adopted members n=57) with translator in Sagara, Kizanda, and Mgwashi villages, November, Tanzania 2009.

Organization	Type of help received	Year
Amani Tea Factory	free seeds (3)	1991, 1999 (2)
Mponde Tea Factory	free seeds (3)	2004 (3)
TFCG	free seeds	2006
TRIT	free seeds (2)	2006, 2009
Amani, Mponde	A:free seeds, fertilizer, M: tsh20000 loan	2006, 2004
Amani, Mponde	A:free seeds, M: tsh25000 loan/info: how to weed/apply fertilizer	2006, 2007
Amani	free seeds, watering can	2002
Amani	free seeds, info: how to plant seeds (2)	2006, 2007
Amani	info how to plant tea (2)	2007, 2008
Amani	info: how to take care of tea	2000
Mponde	info: if you have land plant tea	2005
UTEGA	info: replace dead plants	2006
Mponde	tsh25000 loan (3)	2005 (2), 2007
Mponde	tsh25000 loan, information about how to apply fertilizer	1997
Mponde Tea Factory, UTEGA	M:tsh25000 loan, U: info to use manure, weed more	2006, 2008
Amani	provides crops	2006

Table 2. Organization, type of assistance, and year of assistance for the members of the Sagara Group that have been assisted by an organization (33%, 25/76) . Data collected from semi-structured interviews (original members n=19, adopted members n=57) with translator in Sagara, Kizanda, and Mgwashi villages, November, Tanzania 2009.

Five different organizations have assisted Sagara Group members: 4 companies (Amani Tea Factory, Mponde Tea Factory, Tea Research Institute of Tanzania-TRIT, and United Tea Gathers Association-UTEGA) and 1 NGO (Tanzania Forest Conservation Group-TFCG) (Table 2). The two local tea factories play the largest role with assisting tea farmers through free seeds, information, and loans to improve tea fields and promote better harvest. Tea leaves are collected every Tuesday, Thursday, and Friday of each week, thus factories interact more with individual farmers weighing tea leaves and paying them (Juma, pers. comm. 2009). TFCG, the only NGO mentioned in my study, assisted 1% (1/76) of the Group members. NGOs are present in the regions, but because my study extended to the specific locations of farmers associated with the Sagara Group living in 5 different villages, it is possible that NGOs influence was not accurately depicted through my study.

I had predicted that government assistance and regulation would have the least impact on Sagara Group members because of rural location, however, my data did not support this hypothesis. Fifty-nine percent (45/76) of the members have been assisted by receiving information from the government while 0% have received any sort of subsidies from the government (Figure 8, Table 3). The agricultural extension officer of the district (in charge of 8 neighboring villages) is the main source of government information for the villagers (interviewees, 2009). The most common piece of information, received by 29% (13/45) of those that were assisted, was to plant tea in order to get income. Due to the changing climate in the region (a rather recent occurrence) farmers were encouraged to plant tea for its hearty qualities and ability to grow in conditions unfavorable for many other crops (Juma, 2009). Government information has been received from 1992 – 2009, suggesting a more recent approach to assisting villagers with knowledge about growing, maintaining, and producing tea.

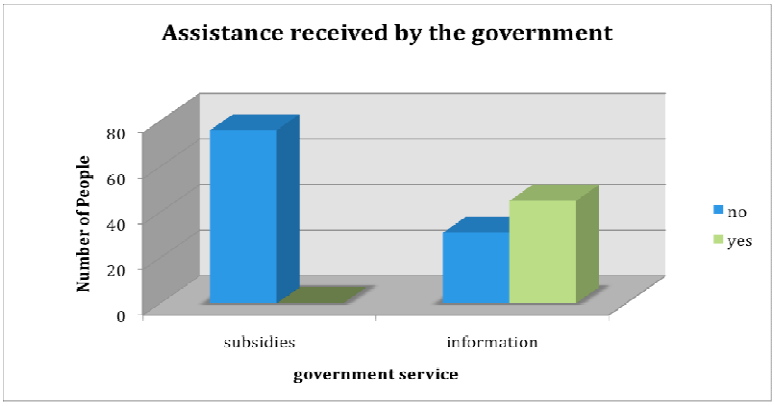

Figure 7. Comparison of government services received by members of the Sagara Group.
Data collected from semi-structured interviews (original members n=19, adopted members n=57) with translator in Sagara, Kizanda, and Mgwashi villages, November, Tanzania 2009.

Government information	Year
plant tea to get income (13)	2001 - 2008
plant tea to get income, weed more (3)	1992- 2008
plant tea to get income, replace dead plants (2)	2005-2006
plant tea to get income, borrow government loan (2)	2008
plant tea to get income, plant trees for shade (1)	2007
plant tea for income, remove dead plants (1)	2006
weed more (4)	1995 - 2008
weed more, replace dead plants (1)	2005-2007
weed more, how to plant tea, cut tea (1)	2007
weed more, cut more (1)	2009
replace dead crops, how to plant tea (2)	2005 - 2007
replace dead plants (3)	2006 - 2008
replace dead plants, borrow government loan (1)	2005
replace dead plants, how to cut (1)	2005
how to plant tea (4)	1992 - 2006
borrow government loan, use fertilizer (1)	1999
how to weed, harvest more often (1)	2005
plant more tea to educate children about growing (1)	2006

Table 3. Type of government information received, and year of assistance for the members of the Sagara Group that have been assisted by the government (59%, 45/76) . Data collected from semi-structured interviews (original members n=19, adopted members n=57) with translator in Sagara, Kizanda, and Mgwashi villages, November, Tanzania 2009.

Eighty percent (60/76) of Sagara Group members said there were government laws when asked if there were any (Figure 8). Out of those that claimed tea laws exist, not weeding was the most common response. According to the Agricultural Extension Officer of the area, there are three laws with regards to tea production and maintenance (Juma, pers. comm. 2009). 1) Any farmer who does not maintain, tend, and manage his farm will receive a government fine of tsh.300000, prison for 1 year, or both. 2) Feeding cows on tea plots is not allowed, fine unknown. 3) Burning any part of a tea plot is not allowed, fine unknown. (Juma, pers. comm. 2009) I was told by the AEO that copies of these laws could be obtained in Lushoto, TZ at the District Agricultural Office. At the Lushoto Office I was told there were no laws or regulations specifically for tea, only crops. I was not able to obtain any copies or even see laws about crops due to the current revisions taking place. (Jensen, pers. obs., 2009)

The confusion and miscommunication about regulations are due to the lack of local and regional government infrastructure. Some laws produced in urban areas have not been transferred to rural agricultural areas, specifically at the local government levels, where the bulk of implementation would take place to improve agricultural harvest instead of where the laws are produced (Ministry of Agriculture, 2008). Some local laws could also be made up due to small-scale corruption in rural communities.

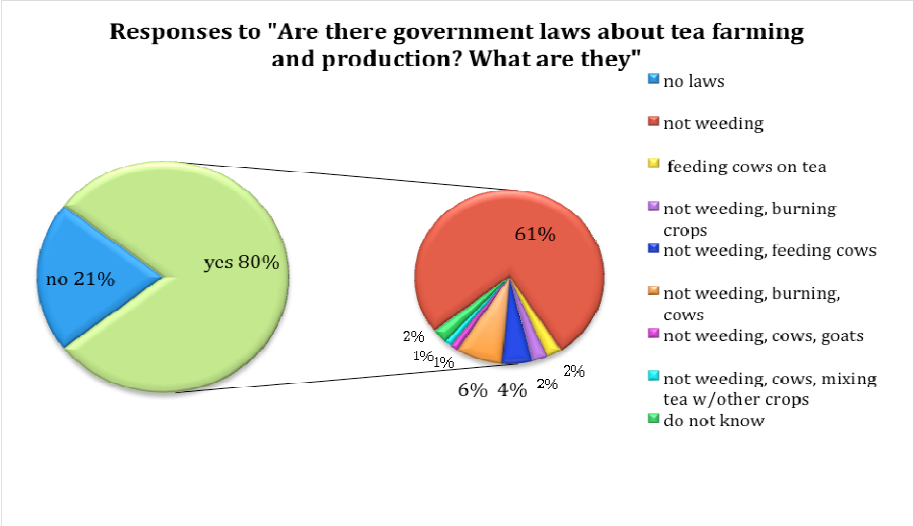

Figure 8. Representation of Sagara Group member responses to Present Question #7: "Are there any government laws about growing, maintaining or producing tea? If yes, what are they?" Data collected from semi-structured interviews (original members n=19, adopted members n=57) with translator in Sagara, Kizanda, and Mgwashi villages, November, Tanzania 2009.

Seventy-six percent (58/76) of Group members said that organization, including NGOs and companies, are not at all important in influencing individual decisions regarding tea production (Figure 9). Even some of those that were assisted by an organization (frees seeds, information, loans) still ranked organization influence as not at all important (33%, 25/76 have been assisted by an organization; Figure 6).

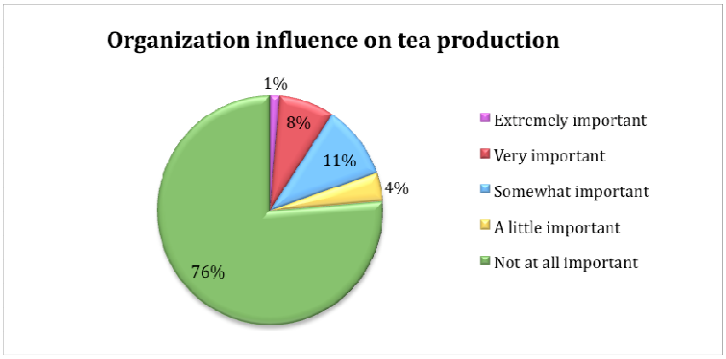

Figure 9. Representation of Sagara Group member's ranking of the importance of organization (company and/or NGO) influence on tea production. Data collected from semi-structured interviews (original members n=19, adopted members n=57) with translator in Sagara, Kizanda, and Mgwashi villages, November, Tanzania 2009.

Thirty-seven percent (28/76) of Group members said that the government law was extremely important in impacting individual decisions made about tea (Figure 10). Thirty-seven percent (28/76) also claimed that the government law was very important. Government law was more influential than organizations because there are direct consequences that occur on a local level, even though the laws are not readily defined for the area.

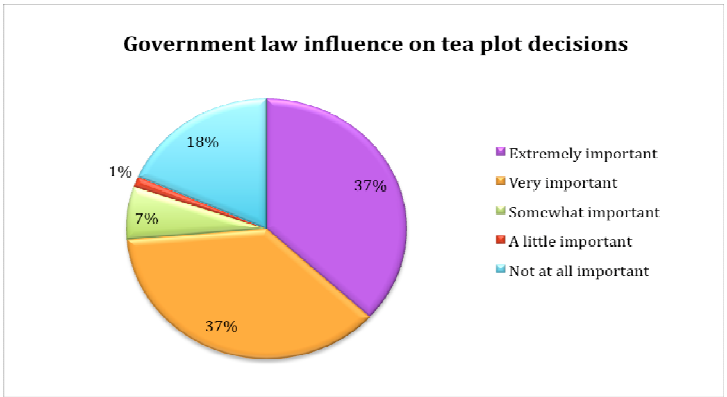

Figure 10. Representation of Sagara Group member's ranking of the importance of government (subsidies/information) influence on tea production. Data collected from semi-structured interviews (original members n=19, adopted members n=57) with translator in Sagara, Kizanda, and Mgwashi villages, November, Tanzania 2009.

Interviewees were asked a series of questions about future tea plans and thoughts on their individual plot (Figure, 11, Figure 12) and for the tea industry as a whole (Figure 13). Ninety-nine percent (75/76) are planning keeping all of their original plot within the next 5 years and 67% (51/76) are doing so because of income (Figure 11). One member (1%) is planning on selling 50% (1/2ha) within the next 5 years to get money for his children's education (Jensen, 2009). Income and family inheritance are the two most common responses given. Tea is the main sources of income and that source of income in rural communities is generally handed down to family members as original caretakers age.

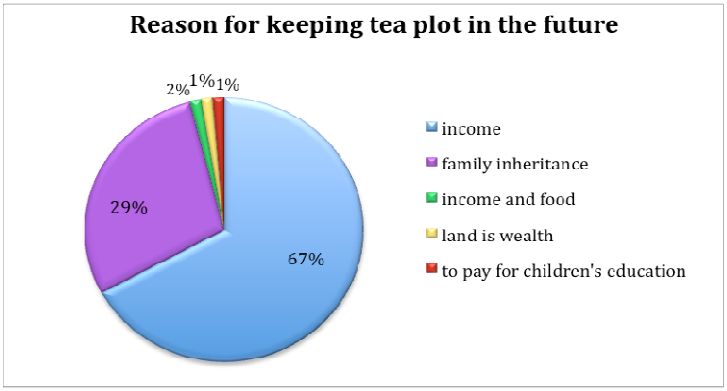

*Figure 11. Follow-up response to Future Question #1: "How much of your original plot do you plan on keeping in the next 5 years? **Why**?" Data collected from semi-structured interviews (original members n=19, adopted members n=57) with translator in Sagara, Kizanda, and Mgwashi villages, November, Tanzania 2009.*

Sagara Group members plan on using inputs and purchasing land in the future (Figure 12). Ninety-one percent (69/76) of members plan to use inputs within the next five years. Knowledge about chemicals is becoming more prominent in the region, but income is the

limiting factor in obtaining supplies like this. Future goals are represented by such a large majority planning to switch over to increase crop production. Ninety-one percent (69/76) of members also plan to purchase land for tea production because it is the main source of income for their families in the area.

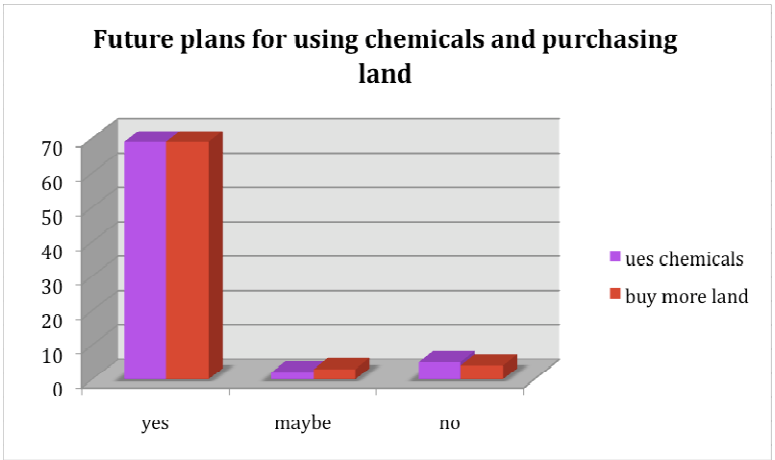

Figure 12. Respresentation of Sagara Group member responses to future question #2: "Do you plan on using chemicals, pesticides, or other inputs on your tea crops in the next 5 years?" and future question #3: "Do plan on purchasing more land for tea production?" Data collected from semi-structured interviews (original members n=19, adopted members n=57) with translator in Sagara, Kizanda, and Mgwashi villages, November, Tanzania 2009.

When asked what the future of tea production would be like, 80% (61/76) of respondents said "extremely successful", with the next largest percentage reflecting "very successful" (Figure 13). These predictions were made looking more at a local level than national level becase that is all that the majority of the villagers know. Tea is one of the largest agricultural crops within the region, so since so many farmers grow it, the tea industry will thrive.

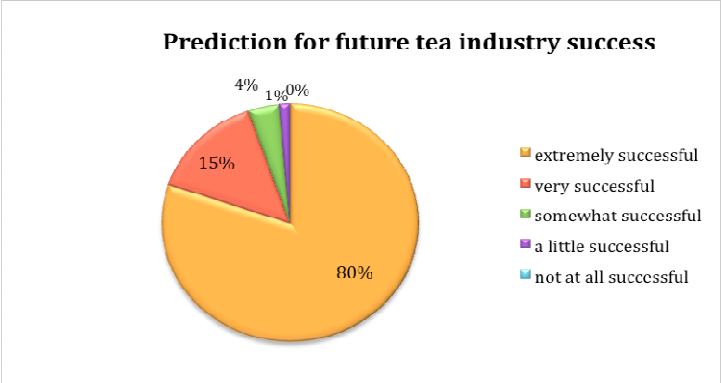

Figure 13. Respresentation of Sagara Group member ranked responses to future question #4: "What do you think the future of tea production will be like?" Data collected from semi-structured interviews (original members n=19, adopted members n=57) with translator in Sagara, Kizanda, and Mgwashi villages, November, Tanzania 2009.

Limitations and Biases

- **Services of a translator:**
  - interviews were not only translated in between 2 languages (English and Kiswahili), but also between 3 languages for most cases (English, Kiswahili, and Kisambaa)
  - Scale questions were most influenced by my translator by suggesting numbers to choose to interviewees based on what he thought I wanted to hear. My translator became more knowledgeable of the subject matter, my intentions, and understood the questions more in depth as more interviews took place.

- Not knowing more history about the original member's tea plots made it harder to draw conclusions about differences seen over time since the number of original interviewees was much smaller than the adopted interviewees.

- The rains had just arrived when getting started on my project, so finding and meeting people before heading off to their farms proved to be difficult in an agricultural community, especially with long walks to the villages in the morning. Members needed to be talked to at least a day in advance to see if they would be willing to be interviewed and stay home until I arrived the following day. Appointments often times fell through and few interviews could be conducted in a day.

- My time frame for the study made it logistically difficult to even approach all Sagara Group members, let alone interview them.

Recommendations

- Compare the three largest agricultural products in the area: Look at history and land use changes between each other and how the production of the crop has changed over time.

- Organization perspective on tea: visit the major tea factories (Amani, Mponde) to compare their collection processes, outreach to villagers, payment differences etc.

- Income is becoming an increasingly important and limiting factor in tea production for local farmers (from what I found). Look more into monetary reasons for productivity and land use changes.
- Investigate crop laws in Lushoto (District Agricultural Office) and then compare local government knowledge to regional laws.

Conclusion

This study showed that land use and productivity has changed the original tea plots of the Sagara Group members in various ways. Additions of other crops have been made to the plots for both food and another source of income. These changes are being made to meet basic needs as a subsistence farmer. For members, tea income has increased (tsh.100-160 now) as well as overall plot income. For half of the Group, the amount of harvest has increased from the past, while for the other half it has decreased because young crops, pruning, and cutting are autonomous factors that allow for a tea farmer to reach maximum productivity of a plot. Inputs are hardly being used on crops, although a higher percentage of members are utilizing them now than before. Organization help (mainly from Tea factories) is less common than government help. It is for the most part not at all important for making tea decisions. Government information is the only assistance received, however, like organizations, assistance is a development that began influencing Sagara members recently (organization help early 2000s, government info 1992-2009). There are many claimed laws, which are important for making decisions about land, but no actual laws according to the Regional office in Lushoto. Because the members plan to purchase more land and use more inputs on crops, they hope that the future of the tea industry accordingly proliferates to accommodate the increased costs. There is a certain capacity for production with limited money and access to information. As development continues, especially in urban areas where globalized markets are advancing, rural communities are going to need to find alternatives for production to alleviate the continually growing poverty.

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Appendix A: Sagara Group Members

No.	Original Member	Adopted Member	Village	Hamlet
1	Lawrence Kijazi	[redacted]	Sagara	Handei
2	Chirispas Msangazi	Devid Msangazi	Sagara	Handei
3	Hamza Mzengawewi	Mhimu Mzengawewi	Kizanda	Buai
4	Rafael Kijazi	Ernest Kijazi	Sagara	Handei
5	Abraham Gendo	[redacted]	Sagara	Mazumbai
6	Iddi Gendo		Kizanda	Buai
7	Ally Gendo		Kizanda	Buai
8	Shabani Kigoo		Kizanda	Buai
9	Hauseni Msagati	Chales Msagati	Kizanda	Kwekulo
10	Samwel Mpalahole	Gideon Mpalahole	Sagara	Kwemashai
11	Hasani Msigiti	Issa Msigiti	Sagara	Handei
12	Mafingo Kingazi	Kidungwe Msigiti	Kwabosa	
13	Abedi Mhema	Kasina Abedi	Kizanda	Kwekulo
14	Athumani Makasi	Ramadhani Makasi	Kizanda	Kizanda
15	Mussa Singano	[redacted]	Kizanda	Kwekulo
16	Hamza Kanick	Yose Kanick	Sagara	Mazumbai
17	Wiliam Kanick	John Kanick	Sagara	Mazumbai
18	Aloys Kanick	Jeremia Kanick	Sagara	Handei
19	Rashidi Mhema	[redacted]	Kizanda	Shangawei
20	Mndoa Mhema	Richard Mhema	Sagara	Mazumbai
21	Mgala Sabuni	Salumu Nkaya	Sagara	Handei
22	Mhilu Sabuni	Rogers Mandia	Sagara	Mazumbai
23	Iddi Dhahau		Nkongohi	
24	Mnkande Dhahabu	Stefano Kiondo	Mgwashi	
25	Shatu Mtali	[redacted]	Sagara	Kweshashi
26	Issa Magongo		Sagara	Kwemashai
27	Faru Sangoda		Sagara	Kwemtono
28	Omari Msigiti		Malomboi	
29	Kipili Mtali	Ijumaa Mtali	Sagara	Handei
30	Kibiriti Mtali	Chales Nguzo	Sagara	
31	Msumari Mtali	Zuberi Mtali	Sagara	Kwemashai
32	Selemani Mtali	Athumani Mtali	Sagara	Kweshashi
33	Juma Mkangala	Sadick Mkangala	Kwabosa	Chumbageni
34	Hasani Mkangala	[redacted]	Kwabosa	Chumbageni
35	Danieli Hozza	Hesioni Hozza	Kizanda	Kizanda
36	Hamisi Magwiza	Tullo Magwiza	Kwabosa	Kwemvumo
37	Nasoro Nkoba	Mndoa Nkoba	Kwabosa	Chumbageni
38	Mohamed Jambia	Shabani Jambia	Kwabosa	
39	Mussa Jambia	Kilua Jambia	Kwabosa	
40	Salehe Sheng'oto	Ally Salehe	Sagara	Handei
41	Musa Shewali	Joseph Shewali	Sagara	Kisiwani

42	Yusufu Shewali		Sagara	Kisiwani
43	Sabuni Mtali	Hesioni Mtali	Sagara	Handei
44	Hesioni Mtali		Sagara	Handei
45	Chales Mtali	Augustino Mtali	Sagara	Handei
46	Majumbe Mdamanyi	Abasi Mdamanyi	Sagara	Kweshashi
47	Magembe Kolindi	Ally Kolindi [rep]	Mgwashi	
48	Omari Singano	Mraji Omari	Sagara	Kweshashi - Kwemigambo
49	Tamilwai Ponda	Iddi Ponda	Kizanda	Nkaloi
50	Mnkande Zayumba	Pascal Zayumba	Sagara	Kwemashai
51	Ramadhani Nyiaghulo	Mambazi Nyiaghulo	Sagara	Mazumbai
52	Ntemo Sabuni		Kizanda	Kizanda
53	Omari Kanju	Gideon Kanju	Sagara	Kwemashai
54	Amiri Kanju	Hatibu Kanju	Sagara	Kwemashai
55	Frances Shechambo		Sagara	Kisiwani
56	Hizza Ponda	Shemisea Ponda	Sagara	Handei
57	Saidi Shedafa	Hatibu Shedafa	Kwabosa	Chumbageni
58	Hauseni Msumari	Godfrey Msumari	Kizanda	Buai
59	Rajabu Kofia	Issa Rajabu	Kizanda	Buai
60	Abdalah Mhina	Rajabu Abdalah	Kizanda	Kianga
61	Athumani Mjachakwe		Sagara	Mazumbai
62	Omari Hizza	Rajabu Omari	Mayo	Kwanyundo
63	Saidi Shechonge	Bakari Shechonge	Mayo	Kizara A
64	Eneah Mtangi		Sagara	Mazumbai
65	Stefano Paula	Juma Mussa	Kizanda	Kwekulo
66	Athumani Chakusaga	Edina Chakusaga	Kizanda	Buai
67	Yusufu Shekalaghe		Kizanda	Buai
68	Juma Msumari		Kizanda	Kizanda
69	Frank Ngotonyingi	Yosia Ngotonyingi	Sagara	Kwemashai
70	Kidungwe Msigiti		Sagara	Kweshashi
71	Salimu Msigiti	Zefania Msigiti	Sagara	Kweshashi
72	Hasani Shechambo	Sostan Shechambo	Sagara	Kisiwani
73	Hauseni Shechambo	Yohana Shechambo	Sagara	Kisiwani
74	Leopord Msangula	John Msangula	Sagara	Mazumbai
75	Stefano Mandia		Sagara	Mazumbai
76	Bakari Wagheni		Kwabosa	
77	Mwanyemi Walisha	Kristofa Walisha	Sagara	Mazumbai
78	Juma Singano	Hassani Juma	Kizanda	Kwekulo
79	Saidi Mtali		Sagara	Handei
80	Preliminary		Sagara	Handei

81	Senkondo Sebarua	Hatibu Shedafa	Malomboi	
82	Stefano Ponda	Tobius Ponda	Sagara	Handei
83	Amiri Sen'genge	Issa Mtana	Kizanda	Sandazi
84	Hausenia Kilua	Waziri Hauseni	Kizanda	Buai
85	Rashidi Shekivuli	Ayubu Msagati	Galambo	
86	Mohamed Kipingu	[redacted]	Mgwashi	
87	Samwel Zayumba	[redacted]	Sagara	Kwemashai
88	Michael Ngotonyingi	Frances Ngotonyingi	Sagara	Kwemashai
89	Abdalah Faru	Faru Abdalah	Kizanda	Ghangawei
90	Juma Gendo	Imamu Juma	Kizanda	Buai
91	Mohamedi Hizza	Anja Hizza	Mayo	Nkaloi
92	Ramadhani Shedafa	Mamjata Shedafa	Kwabosa	
93	Amiri Mhema	Abasi Mhema	Kizanda	Kizanda
94	Omari Singano	Ally Omari	Kizanda	Kwekulo
95	Hasani Jambia		Kwabosa	
96	Amiri Shemoka	[redacted]	Kwabosa	
97	Isumael Nguzo		Sagara	Kweshashi - Kwemigambo
98	Manenga Ponda		Sagara	Maumbai - Karanga
99	Hasani Mgala	[redacted]	Sagara	Handei
100	Rashidi Shebaya		Sagara	Kwemashai
101	Ernest Kijazi		Sagara	Kwemashai
102	Michael Msigiti	Isaka Msigiti	Sagara	Kwemashai
103	Julius Mhema	[redacted]	Sagara	Mazumbai

Appendix B: Original Member – Sagara Group Survey

Name:
Age:
Main source of income:
Relationship to original tea plot owner:

PAST

1. What was the size of the original tea plot from John Tanner? **[acres, number of plants]**
2. Was the tea plot given to you the first tea plot you owned?
    a. No →
        i. Amount dedicated to tea **[acre]**
        ii. Number of plants
3. When first receiving the plot, what problems were there in maintaining the crops? **Explain.**
4. Did you grow anything besides tea on the plot for the first 5 years of owning it?
    a. Yes →
        i. What
        ii. Why
5. Did the government provide you with subsidies/money specifically for tea?
6. Did the government provide you with any information about tea production?
    a. Did any other organization assist you with tea production?
7. Did you use chemicals, pesticides, and/or other inputs on the tea crops?
    a. Yes →
        i. Brand
        ii. How often it was applied
        iii. Cost **[tsh/L]**
8. How was the productivity of your plot? **SCALE**

1	**2**	**3**	**4**	**5**
Extremely Important	Very important	Somewhat important	A little important	Not at all important

9. Was tea the main source of income for you?
    a. No → Rank sources and where tea fits in

PRESENT

1. What was the size of the original tea plot? **[acre]**
    a. How much of the original plot do you still own? **[percentage]**
2. Is there any part of the original plot used for other purposes?
    a. Yes →
        i. What- crops, trees, buildings, etc **[specific species]**
        ii. Number of each species
        iii. Why
        iv. Year
3. What percentage of the plot is tea?

a. Percentage of non-tea area

4. Do you use pesticides, chemicals and/or other inputs on the tea crops?
   a. Yes →
      i. Brand
      ii. How often it is applied
      iii. Cost **[tsh/L]**
5. How much tea do you harvest each month? **[kg/month, tsh/kg]**
   a. In comparison to 5 years ago, is the amount of harvest more or less NOW?
6. Have you been assisted by an NGO with regards to tea production? **[name, how helped, year]**
   a. Have you been assisted by any other organization with regards to tea production? **[name, how helped, year]**
7. Are there any government laws about growing, maintaining or producing tea?
   a. Yes →
      i. What are they
      ii. Fines/consequences
8. Does the government provide you with any subsidies/money? **[what, year]**
   a. Does the government provide you with any information about tea? **[what info, year]**
9. Are you making more income from growing tea now or in the past? (ONLY TEA)
10. Are you making more income from your plot now or in the past? (ENTIRE ORIGINAL PLOT)
11. How important are NGOs in influencing your tea production? **SCALE**

1	**2**	**3**	**4**	**5**
Extremely Important	Very important	Somewhat important	A little important	Not at all important

12. How important is the government law in making decisions about tea crops on your land? **SCALE**

1	**2**	**3**	**4**	**5**
Extremely Important	Very important	Somewhat important	A little important	Not at all important

13. Do you harvest your own tea crops or pay for labor?
14. What other crops do you grow besides tea?
    a. On all of your land, what percentage is strictly tea and what percentage is other crops?

FUTURE

1. How much of your original plot do you plan on keeping in the next 5 years? **[percentage]**
   a. Why
2. Do you plan on using chemicals, pesticides, or other inputs on your tea crops in the next 5 years?
3. Do you plan on purchasing more land for tea production in the next 5 years?
4. What do you think the future of tea production will be like? **SCALE**

1	**2**	**3**	**4**	**5**
Extremely	Very	Somewhat	A little	Not at all

Successful	Successful	Successful	Successful	Successful

Appendix C: Adopted Member – Sagara Group Survey

Name:
Age:
Main source of income:
Relationship to original tea plot owner:

PAST

1. What year did you become a member of the Sagara Group? **[year]**

2. Who owns the original tea plot now? **[self, family, other]**

3. Has the original tea plot been divided amongst many people?
    a. Yes →
        i. Number of people
        ii. Relationship to original member
        iii. Size of each plot **[acre]**
        iv. Number of plants on each divided plot

4. How do you manage the tea plot differently than the original member?

PRESENT

5. What was the size of the original tea plot? **[acre]**
    a. How much of the original plot do you still own? **[percentage]**

6. What percentage of the plot is tea?
    a. Percentage of non-tea area

7. Is there any part of the original plot used for other purposes?
    a. Yes →
        i. What- crops, trees, buildings, etc **[specific species]**
        ii. Number of each species
        iii. Why
        iv. Year

8. Do you use pesticides, chemicals and/or other inputs on the tea crops?
    a. Yes →
        i. Brand
        ii. How often it is applied
        iii. Cost **[tsh/L]**

9. How much tea do you harvest each month? **[kg/month, tsh/kg]**
    a. In comparison to 5 years ago, is the amount of harvest more or less NOW?

10. Have you been assisted by an NGO with regards to tea production? **[name, how helped, year]**
    a. Have you been assisted by any other organization with regards to tea production? **[name, how helped, year]**

11. Are there any government laws about growing, maintaining or producing tea?
    a. Yes →
        i. What are they
        ii. Fines/consequences

12. Does the government provide you with any subsidies/money? **Explain.**
    a. Does the government provide you with any information about tea? **Explain.**

13. Are you making more income from growing tea now or in the past? (ONLY TEA)

14. Are you making more income from your plot now or in the past? (ENTIRE ORIGINAL PLOT)

15. How important are NGOs in influencing your tea production? **SCALE**

1	**2**	**3**	**4**	**5**
Extremely Important	Very important	Somewhat important	A little important	Not at all important

16. How important is the government law in making decisions about tea crops on your land? **SCALE**

1	**2**	**3**	**4**	**5**
Extremely Important	Very important	Somewhat important	A little important	Not at all important

17. Do you harvest your own tea crops or pay for labor?

18. On all of your land, what percentage is strictly tea and what percentage is other crops?

FUTURE

1. How much of your original plot do you plan on keeping in the next 5 years? **[percentage]**
    a. Why
2. Do you plan on using chemicals, pesticides, or other inputs on your tea crops in the next 5 years?
3. Do you plan on purchasing more land for tea production in the next 5 years?
4. What do you think the future of tea production will be like? **SCALE**

1	**2**	**3**	**4**	**5**
Extremely Successful	Very Successful	Somewhat Successful	A little Successful	Not at all Successful

Appendix D: Map of Lushoto District and Forest Reserves