

FORMATIVE EVALUATION OF THE MOUNT KILIMANJARO ROOTS & SHOOTS
COMMUNITY-BASED CONSERVATION PROJECT:
Recommendations to re-integrate participatory approaches into the program

by

Angela Gorzcya
Dr. Charlotte Clark, Advisor
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Abstract

The purpose of my Masters project was to conduct a formative evaluation of the Mount Kilimanjaro Roots & Shoots Community-based Conservation Partnership Project (Conservation Site) in Northeast Tanzania. After one year of operation in 2008, Roots and Shoots staff sought to assess the Conservation Site's initial progress in providing demonstration workshops on tree nurseries, beekeeping, fuel-efficient stoves, and fish farming to the students, teachers and members of the Mweka Village. A formative evaluation was especially pertinent because Roots & Shoots made significant changes to the original Community-based initiative for the Conservation Site. Due to a limitation in human and financial resources, Roots & Shoots did not conduct a Community assessment before the Conservation Site was established in 2007.

I implemented a participatory survey that focused on three research questions: Awareness/Adoption of selected sustainable practices, Conservation Site Awareness/Participation and Conservation Site Effectiveness/Recommendations. The 223 participants were selected using the snowball method. I coded the responses to the questions in the NVivo8 qualitative data software program and calculated the frequencies. Chi-square analyses were conducted to test for significant associations between participant demographics and environmental behavior.

The results of this evaluation indicate the Conservation Site's limited progress in engaging the Community and promoting the adoption of the four activities. Beekeeping and tree nurseries were more familiar and established, while a minority of the sample was aware of and using the recently introduced activities, fish farming (42 %) and fuel-efficient stoves (30 %). Only 40 percent of the sample was familiar with the conservation site. The respondents' main recommendations for the Conservation Site were to improve Community participation, outreach and management. Education, property size, years lived in village, age and gender were demographic variables that were found to be significantly associated with environmental behavior. The results of this formative evaluation are indicative of the lack of Community involvement during the formulation and implementation stages of the Conservation Site. I encourage Roots & Shoots to reintegrate participatory approaches at the Conservation Site through training of trainer seminars, a Conservation Site board of Community stakeholders, and a participatory rural appraisal.

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Introduction

The Community-based Conservation Partnership Project (hereafter called the Conservation Site) is a grassroots, Community-based conservation site in Northeast Tanzania. This pilot conservation site is located in Mweka Village at the base of Mount Kilimanjaro, and was established to serve as a platform for students and teachers “to raise Community awareness of the importance of conservation and to enhance skills within the Community for the sustainable use of natural resources (Roots & Shoots Northern Zonal Office 2007).” The Conservation Site also provides opportunities for visitors, educators, researchers and development partners to explore conservation issues and to engage with the local Community.

The Conservation Site was jointly sponsored by Roots & Shoots and Global Explorers. Roots & Shoots is a program established by the Jane Goodall Institute to mobilize youth in conservation activism. Global Explorers is an organization that facilitates education and travel experiences for youth around international conservation. In 2008, after one year of operation, Roots and Shoots staff sought to describe and assess the effectiveness of the Conservation Site’s short-term objectives “to provide ongoing extension demonstration services to the students, teachers and members of the Community (Roots & Shoots Northern Zonal Office 2007).” Formative evaluations are intended to describe and assess program effectiveness in order to improve a project’s final impact (Rossman and Rallis 2003). I conducted such an assessment for this Master’s Project.

In this study I evaluated the Conservation Site’s short-term objectives to engage in Community outreach during the implementation phase of the Roots & Shoots Conservation Site. For the purpose of this study, short-term refers to the first year the Conservation Site was

functional, which was from January 2008 to December 2008. I addressed three research questions:

- (1) Awareness/Adoption of selected sustainable practices: Do individuals in the Community incorporate Conservation Site activities (tree nurseries, beekeeping, aquaculture, use of fuel-efficient stoves) into their homes?
- (2) Conservation Site Awareness/Participation: Has the Community been informed about the Conservation Site? Does the Community understand the purpose of the Conservation Site?
- (3) Conservation Site Effectiveness/Recommendations: Does the Community feel the Conservation Site is serving their needs? How can the demonstration services of the Conservation Site be improved?

The results of this assessment can be used by Roots & Shoots staff to measure progress during a future final impact evaluation.

Program History

The Roots & Shoots/Global Explorers Community-based Conservation Partnership was founded through a collaboration of The Jane Goodall Institute and Global Explorers. The Jane Goodall Institute's overall mission is to "empower people to make a difference for all living things" and to build upon Dr. Jane Goodall's scientific work (Institute 2009). The Institute carries out this mission by supporting research, public education and advocacy for the protection of primate populations in nature and captivity, encouraging communities to adopt sustainable resource use for the conservation of primate habitat and developing a network of concerned youth, who are committed to caring for the people, animals and the environment (Institute 2009).

In 1991, the Jane Goodall Institute assembled a network of concerned youth in a program known as Roots & Shoots, which now has thousands of participants in almost 100 countries (Roots & Shoots Northern Zonal Office 2007; Institute 2009). The mission of Roots and Shoots is to "foster respect and compassion for all living things, to promote understanding of all cultures and beliefs and to inspire each individual to take action to make the world a better place for

people, animals and the environment (Program 2009).” Roots & Shoots implements this mission by motivating youth to identify problems in their Community and to design service projects “to implement positive change (Program 2009).” Based on Dr. Goodall’s teaching (Program 2009), Roots & Shoots uses a methodology of knowledge, compassion and action to empower youth,

Only if we understand, can we care;
Only if we care, will we help;
Only if we help, shall all be saved.

-Jane Goodall, Ph.D., DBE

The program became active in the Mount Kilimanjaro region in 1996 when Roots & Shoots clubs were established at the local schools in Mweka Village. The five active clubs in Mweka Village include Omi primary school, Mweka primary school, Boreni primary school, Sungu secondary school, and Nsoo secondary school. In 2006, the concept for the Community site was born from a Root & Shoots student and teacher initiative to create a Community tree nursery for Mweka Village.

The Conservation Site was established in January of 2007 by Roots & Shoots in partnership with Global Explorers, a US-based non-profit organization dedicated to developing enriched abroad experiences for American students by including science, culture, service, and leadership opportunities. Through this partnership, the Conservation Site provides a platform for Roots & Students from the United States & Tanzania to work together towards greater environmental and cultural understanding. The Conservation Site is located at the base of Mount Kilimanjaro, within Olele Sub-village of Mweka Village, Moshi District, Tanzania (Image 1), and serves the seven sub-villages of Mweka Village. The Conservation Site’s purpose is to use sustainable development principles to simultaneously improve environmental conservation around Mount Kilimanjaro National park as well as the livelihoods of its local Community. The

Conservation Site is also designed to host national and international visitors and researchers. It began as a pilot project, but is now being replicated at other locations in Tanzania.

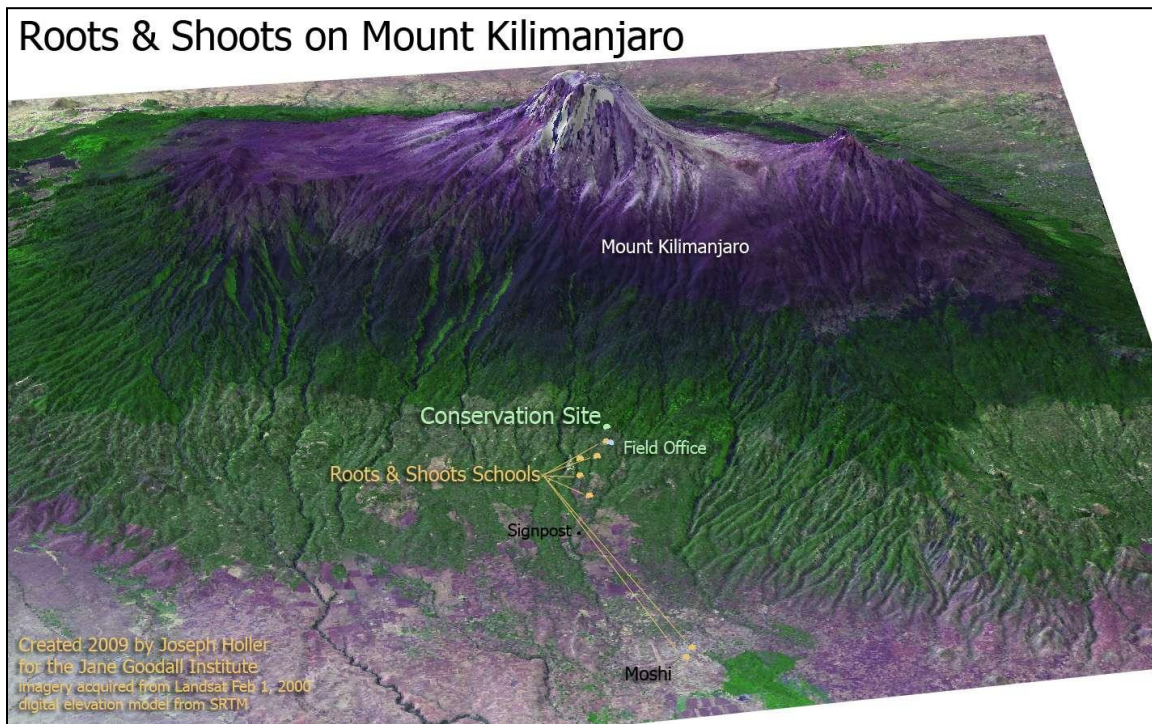


Image 1. A Landsat DEM produced by Joseph Holler illustrating the location of the Conservation Site and the associated schools in Mweka and Moshi.

The cosponsors of the Conservation Site expanded the original concept of the Community tree nursery to include beekeeping, fuel-efficient stoves, and fish farming. Field demonstrations of these four sustainability activities are the main approach to providing students, teachers and members of the Community with education on their construction and use. According to the 2007 proposal to implement the Conservation Site, “the practices are intended to address the issue of land compatibility and provision of sound conservation alternatives that encourages the use of indigenous species to eradicate invasive species, and promote conservation of catchment forests and watershed areas of Mweka Village (Roots & Shoots Northern Zonal Office 2007).”

The Roots & Shoots organization believes that after providing students with education and training in natural resource management, the students will have the power to change their families' environmental practices. Recently the focus at the Conservation Site has broadened to educate and train adult Community groups to further influence individual household behaviors.

The Roots & Shoots Northern Zonal Office employs only one paid staff member at the Conservation Site, the Site manager. The primary responsibilities of the Site manager are to maintain the Conservation Site's facilities. Due to the lack of trainers in the Mweka Village during 2008, the Conservation Site manager was also responsible for the bulk of Community outreach. To address this problem, a training of trainers workshop was conducted in May 2008 to build the capacity of students and teachers to educate the Community at large on the programs at the Conservation Site.

This four year collaboration will run until December 30, 2010, at which time the Mweka Village government and Community will become jointly responsible for the Conservation Site. Organizers hope that eco-tourism and other activities will generate revenue to maintain the Conservation Site's activities and outreach programs.

In 2008, about one-quarter of the two acre site was developed, including demonstration area, and an outdoor classroom with one large and three small banana leaf thatched huts above the FES to allow lessons to continue during the rainy season (Image 2). The site contains five tree nursery plots maintained by Omi primary school, Sungu primary school, Sungu secondary school, Mweka primary school, the sole Mweka Village Community group and the Conservation Site manager. A large pond was developed for aquaculture of adult breeding fish, and a small pond was built to contain the young fish for distribution to the Community. The Conservation

Site contains one modern and two customary log beehives, and 10 additional modern hives are planned. Eight FES are present at the Conservation Site for demonstrations.



Image 2. Photographs highlighting the Conservation site lay out of the fish ponds, tree nurseries, fuel efficient stoves, beehives and outdoor classroom.

Tree nurseries

The tree nursery plots at the Conservation site contain a diversity of species grown for multiple purposes such as food, fodder, wildlife, fuel and timber. The seedlings are raised in polyethylene plastic tubing within a soil medium of dirt and manure. Seedlings at the site are distributed to schools, the Community, and planted along riparian areas. The tree nursery plots at the Conservation Site are intended to encourage Villagers to start their own tree nurseries at their homes using locally available material for containers such as banana leaves. Tree nursery

projects are long established in Mweka Village because farmers in the village follow a best practice to start their coffee crops as seedlings in containers.

Beekeeping

The Conservation Site provides training on two types of hives. The customary, hollow log hive has been practiced in Mweka Village for generations. A modern hive constructed from lumber is also on display. The hives are colonized by stinging African Honey Bees. The hives are baited with fragrant herbs to attract the bees. The hives require trees because they are positioned on tree branches.

Fuel efficient stoves

The conventional stove in Mweka Village consists of an open fire with three stones that provide a base for one pot; the wood is burned directly below. This model is considered to be inefficient. The fuel efficient stove model displayed at the Conservation site is intended to provide good transference of heat through “improved by insulating the heat from the outside of the stove, shortening the fire flow path, and reducing the distance between the flame and pot (Organization 2006).” Roots & Shoots introduced this technology to the Mweka Village. The Conservation Site stove model was selected to be practical. The majority of the materials needed to construct the stove are accessible in nature: clay, manure, water, rocks and chicken wire. The model can also be designed to accommodate for more than one pot. Chimneys can also be integrated into the model to reduce smoke inhalation. This is an important issue in Mweka Village because the Community typically cooks inside. Demonstrations at the Conservation site include stove construction and cooking lessons.

Fish farming

Roots & Shoots also introduced fish farming to Mweka Village. Fish farming is possible on the slopes of Mount Kilimanjaro due to the abundance of perennial streams. Ponds are created by excavating dirt to form shallow depressions. Traditional irrigation ditches are re-directed to flow into the ponds and maintain a constant water level. The fish ponds at the Conservation Site raise Tilapia and distribute the fish to Community members who invest in their own fish ponds.

Background

Community-based environmental management projects serve to empower local people to take action to conserve their natural resources while improving their Community's welfare (Campbell and Vainio-Mattila 2003; Chambers 2007). This bottom-up, decentralized approach to Community-based conservation involves participants in each stage of the program's development. Top-down approaches are exclusionary in that the projects are conceived, implemented and evaluated by outside agencies and their teams of experts (Campbell and Vainio-Mattila 2003). Community-oriented programs emerged in response to the shortcomings of mainstream integrated conservation and to development projects that did not deliver adequate incentives to engage the Community (Kapoor 2001).

Due to the popularity of Community-based environmental management (CBEM), many top-down projects use this buzzword, but do not incorporate authentic Community participation during implementation (McDuff 2001; Brown 2002). Kapoor (2001) framed the issue well when he stated, "Many commentators point out that while some groups and institutions have taken up these approaches, some have not and many are doing so only partially or in stages... participation thereby becomes a simple 'add-on' to programming." Did the Community-based Conservation Site sponsored by Roots & Shoots and Global Explorers fall into this trap?

In order to prepare for my survey of the Conservation site, I did background research into methods for assessing Community-based projects. The CBEM framework can be used to analyze the level of participation in each of the project stages: conception, formulation, implementation, operations and evaluation (Community-Based Environmental Management 2007). Once each of these stages has been considered, the overall project can be accurately classified along the continuum of Community participation (Campbell and Vainio-Mattila 2003). By exploring the

role of the Community in the conservation site's background within the CBEM framework, I was able to rank the Conservation Site along the IAP2 Public Participation Spectrum. This exercise was beneficial because the process helped me to understand the context of my survey's responses for how to improve the Conservation Site.

CBEM evaluation considers five phases of a project: conception, formulation, implementation, operation, and evaluation. First, the evaluation focuses on how the project coordinators' identified and defined who constitutes the Community in their program. Awareness of the project coordinators' methods for assessing the Community's needs, concerns and traditional knowledge is also important for evaluating the project's conception for Community participation. The next stage to examine in the CBEM framework is the formulation stage. Understanding the process behind the establishment of the objectives for the program and how the activities were chosen to achieve those objectives can give insight into the degree of Community participation involved. Third, the implementation of the program needs to be looked at carefully in terms of which stakeholders were involved and what was their role in developing the program. The subsequent component to scrutinize is how the project functioned while operational. If the project was evaluated, the final step to study is how the evaluation was conducted. After discerning the level of Community engagement in each component of the CBEM framework, the overall project can be classified along the public participation spectrum (Dalton 2000).

The five categories in the public participation spectrum developed by the International Association for Public Participation include inform, consult, involve, collaborate and empower (Table 1). The inform category describes the typical top-down approach for projects that are introduced to communities for the sake of education without seeking their input during the earlier

or later stages of the project cycle. As you move to the right of the spectrum, the level of Community participation increases with empower as the uppermost classification. Under empowerment, the project coordinators' hand over the control of the decision making to the Community. This classification embodies the bottom-up approach (Dalton 2000).

The CBEM framework presents multiple opportunities for conservation projects to involve the public throughout the project cycle. Community-based conservation programs are characterized by substantial participation and control over the process. Community involvement contributes to the overall success of the project (Byers 1996).

Participation during the conception stage

Participation is crucial during the conception stage of the project. The role of Community is often oversimplified as if a group constitutes a homogenous body, when in reality “the range of different actors who have influence over and who are affected by management of natural resources in conservation may be much broader, and will be socially differentiated in a number of ways, including ethnicity, gender, religion, caste, and in economic and political terms” (Kapoor 2001; Brown 2002). By involving the public at this early point in the project development, a more accurate depiction of the stakeholders can be acknowledged, rather than speculated. After the appropriate stakeholders are identified, their needs and concerns can be addressed.

IAP2 Public Participation Spectrum

Developed by the International Association for Public Participation

INCREASING LEVEL OF PUBLIC IMPACT				
INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
Public Participation Goal:	Public Participation Goal:	Public Participation Goal:	Public Participation Goal:	Public Participation Goal:
To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision-making in the hands of the public.
Promise to the Public:	Promise to the Public:	Promise to the Public:	Promise to the Public:	Promise to the Public:
We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for direct advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.
Example Techniques to Consider:	Example Techniques to Consider:	Example Techniques to Consider:	Example Techniques to Consider:	Example Techniques to Consider:
<ul style="list-style-type: none"> ● Fact sheets ● Web sites ● Open houses 	<ul style="list-style-type: none"> ● Public comment ● Focus groups ● Surveys ● Public meetings 	<ul style="list-style-type: none"> ● Workshops ● Deliberate polling 	<ul style="list-style-type: none"> ● Citizen Advisory Committees ● Consensus-building ● Participatory decision-making 	<ul style="list-style-type: none"> ● Citizen juries ● Ballots ● Delegated decisions

Table 1. The public participation spectrum describes different classes of participatory involvement in a project.

According to Byers (1996) the assessment phase of project development is important and often overlooked. After a comprehensive, two year study of successful and failed conservation projects, he concluded that “the earliest stages of the process for understanding and influencing

conservation behaviors are the weakest. Too often conservation projects have started implementing activities without careful attention to assessment and research, only to run into problems later. Without adequate assessment, activities are unlikely to be as effective as could be” (Byers 1996; Curti and Valdez 2009).

Furthermore, the use of participatory methods is a requisite of the assessment process in order to incorporate local knowledge, experience and creativity during the project’s conception ((Byers 1996; Kapoor 2001). Participatory Rural Appraisal (PRA) is an ideal participatory technique for assessments that uses a family of approaches and methods to enable people to share, enhance, and analyze their knowledge of life and conditions in an informal and inclusive environment (Chambers 2007). The recommended activities for assessment move beyond surveys and interviews into more alternative activities, such as direct observation, focus groups, and the development of seasonal calendars, matrix rankings, transect walks, historical timelines, linkage diagrams and Community mapping. Participatory rural appraisals can be conducted to understand locally adapted technical approaches to problems in order to decide whether the introduction of new technology is appropriate or to simply improve the current approach. Therefore, consideration of the traditional knowledge, needs and concerns of the local populations is important when conceptualizing conservation programs in a Community in order to increase the likelihood that the projects will be well received by the intended participants.

Participation during the formulation stage

The Community needs to have the authority to make decisions during the formulation stage, this control in shaping the final project is key to encouraging ownership (Kapoor 2001). The Community becomes invested in the program as they observe how their opinions and suggestions have influenced the planning process (Campbell and Vainio-Mattila 2003). On the

contrary, Fien (2001) in an evaluation of the WWF's education programs reinforced a top-down approach to the formulation stage. He concluded that it was not possible for the local people to be involved in the development and implementation of conservation programs unless the people were already educated, skilled and motivated. Fien's point is negated in the bottom-up approach that succeeds in empowering people during the actual process of project development by fostering motivation through participation and by providing education and training in new skills in the early stages of conception and formulation (Chambers 2007).

Participation during the implementation stage

Participation during the implementation stage is influenced by three critical factors that determine the success of communities adopting new activities. First, the Villagers need to be presented with a flexible model that can be adapted by the Community to meet their needs (Fujisaka 1989). Individual groups can then try it out, experiment with the technology and improve the model (Shiferaw, Okello et al. 2009).

A second critical factor for encouraging individuals to adopt new conservation activities is group formation. Group members raise awareness about the need for conservation, disseminate information about new ideas, and can provide farmer-to-farmer training and assistance to their families and neighbors (Cramb 2006). The probability of a farmer adopting soil conservation strategies in the Southern Philippines was increased by six times if the farmer had attended a public training and was a member of a Landcare program group (Cramb 2006). Conservation programs with a group structure are taking advantage of the benefits of social capital. The role of Community norms, networks, trust, reciprocity and collective action that are present in social capital can be channeled to accelerate the spread of sustainable conservation activities (Cramb

2006). The farmers who have successfully adopted new technologies can be recruited to transfer this technology to their neighbors because they are trusted, have clout.

A third critical factor is the provision of incentives, although this factor can be controversial. The cost of adopting a new, sustainable technology is an important factor for whether an individual participates in a conservation program (Shiferaw, Okello et al. 2009). The benefits to the participant's livelihood and local environment need to outweigh the costs. Incentives can be offered as means to alleviate the costs. For example, members of Landcare groups implemented soil conservation measures like contour hedgerows on their farms in anticipation of receiving free fruit seedlings (Cramb 2006). Meanwhile Fujisaka (1989) argues that the role of incentives should be limited to the sharing of time and intellectual property rather than actual materials. The positive and negative impacts from the use of incentives need to be deliberated before implementation.

Participation in the evaluation stage

Evaluations are useful throughout the duration of a program. Evaluations of the initial implementation phase can measure progress on the short term objectives to spread awareness, knowledge and change attitudes in a Community (Curti and Valdez 2009).

The significance of this information is highlighted in a study by Durrant (2008) that reflected on the Community's attitudes towards the Kilimanjaro National Park and Forest reserve's Community Conservation Service program (CCS). The CCS program's goal was to increase support for conservation by spending a portion of the National Park's profits within in the Community on development projects like schools and bridges. Durrant's interviews with the Villagers made clear that they did not understand the objectives of the program and that support for conservation was not increasing as a result of their efforts. The CCS program strategy

needed to be adjusted to spend money on development projects that were directly related to conservation in order for the Community to gain a better grasp of the program's purpose (Durrant and Durrant 2008).

Overall progress can be monitored by reissuing the evaluation survey in the future and comparing responses. Due to the short term nature of government or NGO funded programs, most long term impacts that result from putting learning into action are not measured in formal program evaluations (Fien, Scott et al. 2001). Enhanced awareness from education can create a supportive context for long term conservation impacts to occur. These long term conservation impacts can be observed by measuring indicators of concrete environmental change that are connected to the program's objectives, such as decreased reliance on forest extraction for daily needs.

Involving the Community in the evaluation stage can have a host of positive implications. Past research in the Kilimanjaro region has reflected on the effect of using outsiders as the interviewers in a survey. The level of trust between the interviewer and the respondent can influence the response rate, the quality of the answers and the overall attitude towards the survey (Durrant and Durrant 2008). Additionally when educated students serve as interviewers, respondents may feel intimidated by their status and try to give the "right" answer to avoid embarrassment, introducing a prestige bias into the results (Curti and Valdez 2009). These issues can be resolved by training individual Community members to conduct the evaluation. The advice and conclusions from a participatory evaluation will be taken more seriously than a report from an outside expert's evaluation (Fien, Scott et al. 2001). Kapoor (2001) reported, "Participation enhances iterative programming to allow for dynamic learningand

programmes can, therefore, become more flexible, and activities and resources can be re-oriented mid-stream if needs be.”

McDuff (2001) developed a model for participatory evaluation that illustrates how an external facilitator and Community both bring valuable knowledge to the table (Figure 1). By working together they can develop a successful, iterative participatory evaluation program that produces practical results. Participatory evaluation can enhance the sustainability of the program by engaging the Community in a continual process of solution finding for their natural resource management issues (McDuff 2001; Campbell and Vainio-Mattila 2003).

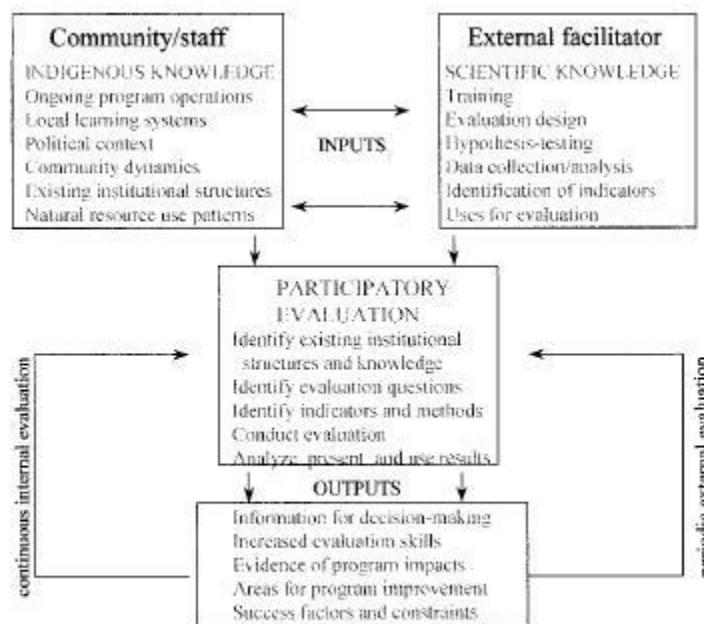


Figure 1. Conceptual model for participatory evaluation.

Participation in CBEM framework

Participation in each stage of the project cycle can empower individuals to take on conservation issues and adopt projects that are supported by outside institutions. Community ownership of a project is less likely to occur in top-down programs introduced from outside agencies. Ownership of a program is established when (1) the participants influence the conception as well as the implementation and operations and maintenance of a development

project; (2) the organization and staff that influence the project are based in the host country and represent the interests of the participants; (3) and transparency and mutual accountability exists among the various stakeholders (Campbell and Vainio-Mattila 2003). Likewise commitment towards a project is established during the project cycle (Campbell and Vainio-Mattila 2003). Ownership and commitment are two factors that can help to secure the sustainability of conservation programs.

Framing Roots & Shoots as a Community-based program

The Roots & Shoots Conservation Site embodies elements of both the top-down and bottom-up approaches to environmental management according to the CBEM framework. The Conservation Site holds weight as a Community-based conservation program because the conception of the Conservation Site was envisioned by the Community. The critical assessment stage emphasized by Byers (1996) during the conception stage was actually skipped due to a limitation in human and financial resources (Lim 2007). Instead, Roots & Shoots chose to present a set of conventional income generating activities to complement the Community tree nursery idea as the basis for the Conservation Site rather than receive input from the Community. Therefore, Community participation was absent during the assessment and formulation stages of the project. The Community was informed during the implementation phase through visits to the Conservation Site to receive conservation education and training in groups from the Conservation Site manager, but did not have role in the decision-making. In summary the Conservation Site used top-down approaches during the formulation and implementation stages and bottom-up approaches during parts of the conception stage.

For these reasons, the Roots & Shoots Conservation Site does not meet all the requirements of the empower classification under the public participation spectrum. Authentic

Community-based environmental management would fall under the empowerment category, with the Community having the authority to make decisions that will be endorsed by the supporting organization. Based on the current performance of the Roots & Shoots organization, the Conservation Site program belongs in the consulting category because this environmental NGO chose to inform, rather to work with the public throughout the process to ensure that their needs and concerns were understood and considered.

The lack of participation in the formulation and implementation stages of the project may affect the program's ultimate success. Because Roots and Shoots omitted the assessment of the Community, the organization cannot be 100% confident that the current programs at the Conservation Site are addressing the Community's concerns and environmental issues. Furthermore, can Roots & Shoots be certain that the Community will be committed to continuing the project when the Conservation Site is handed off to the Mweka Village government and Community? By skipping participation in the formulation stage, Roots & Shoots missed opportunities to foster ownership of the site.

An evaluation of the implementation phase can assess the Conservation Site's initial progress. A survey can verify that the conservation program is meeting the Community's needs and concerns for their livelihoods and local environment. A survey could also gauge the Community's awareness and understanding of the Conservation Site. Finally, the evaluation could also assess if the Conservation Site is effective in incentivizing the Community to adopt the programs at their homes.

A survey could also serve an additional goal to increase Community participation and control over the Conservation Site programs. Rather than use outside researchers, the evaluation process could reach out to the Community and be conducted through more participatory

techniques. A participatory survey could involve the local Villagers as interviewers. Logistically the training of Villagers is more complicated, but Community participation will serve to improve the integrity of the survey by backing the questions with a familiar and trusted face. In essence the Conservation Site will begin to re-incorporate participation in the evaluation stage of the project cycle. Ownership over the site could spread if the Community observes how their suggestions influenced the adaptive management of the Conservation Site. By reinstating practical Community involvement, the Conservation Site could move up the next rung of participation ladder to the involvement category.

Methods & Procedures

The Roots & Shoots staff were interested in obtaining evaluation information in 2008 – approximately mid-way through the project period. No baseline data had been collected prior to this evaluation, so no comparison to the pre-Site situation could be made. Nonetheless, staff believed that collection of primary data in 2008 would provide a useful formative evaluation on which to base modifications and improvements for the remainder of the project period. Staff intend to do a summative evaluation after the project is complete in 2010.

Therefore, this formative evaluation consisted primarily of a survey I conducted in all of the sub-villages; I also collected observational data. The relevance of a survey has been acknowledged in past Roots & Shoots reports. In the 2008 Proposal for the Implementation of the Roots & Shoots Conservation Site in Kilimanjaro, Tanzania, a base line survey was proposed and accounted for in a detailed budget (although it was never implemented). The results were expected to provide in-depth feedback on the initial success of the project and its activities (Roots & Shoots Northern Zonal Office 2007).

The purpose of this participatory survey was to determine the Mweka Village's understanding and interest in the Conservation Site's projects, to examine the adoption of the programs in Mweka Village's homes and to gauge whether the Conservation Site was meeting the Community's needs.

Survey Summary

The survey was composed of seven sections. A brief introduction was given to the survey participants and informed consent was obtained before conducting the survey (Appendix A). Questions in the first section of the survey were related to the participant's background history. Section two focused on the participant's familiarity with Roots & Shoots Conservation Site's

purpose and activities as well as their personal experiences at the Roots & Shoots Conservation Site. The heart of the survey, sections three through six delved into participant understanding of the Conservation Site activities: fuel-efficient stoves, tree nurseries, beekeeping and fish farming. In order to evaluate whether the participant understood the rationale for each activity, questions probed how a particular activity could influence their families and the environment. Interest in the Roots & Shoots site activities was gauged by how many people practiced these activities at their homes. If a participant did not pursue an activity, he or she was asked to explain the reasons why. The final section of the survey solicited suggestions to improve the Conservation Site if they felt the Conservation Site did not satisfy their needs or provide effective options to improve the environment or their families lives (See Appendix B).

The survey was composed of standardized open-ended questions and the nominal responses were coded into unordered categories. Interval data was collected for questions regarding age, years lived in Mweka Village and income. Leading questions in sections three through six were avoided by asking about the impacts of the Conservation Site activities on families and the environment using the verb “influence” which has a neutral connotation. One question was duplicated from a similar Roots & Shoots study to make practical comparisons within the organization (J.G.I.-Tanzania. 2008).

Sample Selection

Participants were selected through the snowball method in each sub-village. The snowball method generates a non-probability sample because the process of selecting participants is not random. The snowball method involves interviewing one participant and inquiring if they know another individual who would qualify as a respondent and so on.

The target sample population consisted of people ages eighteen years and older living in Mweka Village. The 2006 census data developed by the Mweka Village office listed 920 families and the break down by sub-village. My sampling strategy was designed to interview 278 families with one person per family in Mweka Village. My target sample size was calculated using the formula for small populations with a five percent acceptable margin of error (Rea and Parker 2005). To ensure that my target sample population represented the seven sub-villages, I stratified the sample to make it representative of the seven sub-villages in Mweka (Table 2).

Sub-village	Number of families in 2006	Number of Surveys
Omi	58	18
Olele	70	21
Kifura	167	51
Kichao	214	64
Mweka Juu	106	32
Mweka Chini	193	58
Orera	112	34
Total	920	278

Table 2. The target number of surveys for each sub-village based on the 2006 village census.

Survey Procedure

After writing a formal letter to the Mweka Village office to receive permission to conduct the survey, I asked for their assistance in identifying Villagers to function as the interviewers for this survey. As an outsider I did not feel comfortable selecting the interviewers because I was still getting to know the Community. I did provide the Mweka Village chairman and executive officer with a description of ideal interviewers: literate, good writing skills, men and women, one interviewer from each sub-village and respected in the Community. The Mweka Village office chose three men and four women from each of the seven sub-villages to conduct the survey.

Training

I hosted a one-day training workshop to prepare the interviewers for conducting the survey. The Conservation Site manager was also present to act as a translator when I had difficulty conversing about topics in Swahili. While implementing the survey, the interviewers were representing the Roots & Shoots program, so first on the agenda was to introduce the organization and give an explain of the Conservation Site. The training was held at the Conservation Site so the interviewers were able to get experience the Conservation Site firsthand. I informed the interviewers of the research objectives and why I had recruited them to conduct the survey rather than myself as a foreigner. The next topic on the agenda was defining the role of the interviewers and my expectations for their work.

The second half of the training involved a review of the survey. After the interviewers were acquainted with the questions, the procedures for how to ask a question and record the answers were gone through. This section went into detail about how to proceed with skip patterns that were nested within the survey. One section of the training was devoted to reviewing the protocol for what to do before starting the survey: first introduce the survey and sponsors, read the speech on informed consent, then obtain their permission and ask if they have further questions (Appendix A).

One point during the training session was to stress the ethics over respondent gender and age. We emphasized that we wanted men and women, ages eighteen and above to participate. Therefore, if a woman was selected to be the participant, her husband may be present in the room, but he should not be answering for his wife. Additionally a young person is capable of responding to the survey as long as they were above the age of seventeen.

The last section of the training covered the logistics of the survey. We reviewed a one time lump payment scheme to be received after the interviewers completed their allotted surveys.

This method allowed the interviewer to establish their own schedule that worked around their daily routine. The survey schedule was also distributed that included the dates of the pretest and the time period for the official survey. The one day training did not allow time for a skills test or role playing with the survey questions.

Pretest

After the training, a pretest was implemented for five days in order to identify and correct for any problems with the data collection, survey construction or confusing questions before formal data collection began. The pretest involved expert review by my surveys professor and master's project advisor, examination of the interviewers' data notebooks and supervised interviews in the field. Upon the completion of the survey corrections, the official survey commenced for four weeks.

Each interviewer was compensated \$40.00 USD at the completion of the survey. In addition, an appreciation lunch was held for the Roots & Shoots staff, volunteers and interviewers who dedicated their time to the survey process. The research period lasted for four weeks from mid-November to mid-December 2008.

Survey Implementation

The survey was implemented as face-to-face interviews out of necessity (Appendix B). While Villagers in theory had access to the internet in Moshi town, most target participants were unfamiliar with this technology. Likewise, there was also no formal mailing system except for the Mweka Village office mailbox in Moshi town. Despite the fact that most Villagers owned cell phones, Mweka Village did not maintain a telephone directory for the Community that I could have used to randomly select survey participants. A phone survey also would have been biased against the inclusion of the older participants who may not have used this technology.

Face to face interviews were cheaper than telephone surveys, provided better access to the target population and control over who participated in the study. Additionally, I did not expect the Community to be familiar with written surveys. I felt that by training a few Villagers to implement the study, I would get superior results over a paper survey.

Potential Sampling Biases

The interviewers could have introduced sampling biases into the study. A possible shortcoming of the study may have occurred if the interviewers did not strictly adhere to the sampling strategy. There are other biases that are inherent to the snowball method. The process calls for respondents to recommend potential respondents in their social network, so potential respondents who are more isolated in the population will be left out of the survey sample. Respondents in the study may have been naturally inclined to recommend people in their respective age range to take the survey. Additionally, survey participants may have had a tendency to recommend interviewers representing Roots & Shoots to potential respondents who would speak positively of the Conservation Site.

The time of day that the interviewers surveyed Mweka Village may have affected the sample. During the week students are at school during the day and most Villagers are busy with farm chores during the early morning and evening. I feel that if more students were included in the sample, knowledge of the Conservation Site would have increased because the program began in the primary and secondary schools. Having an older sample may affect the data on adoption in two different facets. An older population may mean less likelihood to adopt new projects or more free time to try new things. Or an older population may enhance the likelihood to try new activities because they have more free time to experiment.

Face to face interviewers can introduce another potential bias where any reaction from the interviewer to a respondent's answer could affect the respondent's future responses and damage the validity of the survey. In general because the survey participant's responses were not private as in a written survey but shared with the interviewer, the respondents may have altered their answers to gain perceived approval from the interviewer.

I encountered an unanticipated language barrier that biased responses to my survey. In Mweka Village, people are taught their native Chagga language before learning Swahili, the official language of Tanzania. As an elementary Swahili student, the people in Mweka Village appeared to be fluent in Swahili and I did not see any harm in conducting the survey in Swahili. During the translation of my data I stumbled across words I did not recognize in Swahili. A Swahili Professor reviewed my data and helped me to remove the responses that were not in Swahili from my analysis.

Data Analysis

The results of the survey were recorded on paper in Tanzania, and then translated after my return to the United States. I developed a Mweka Village profile using summary statistics based on the participant demographics section. I compiled data on people's awareness of the Conservation Site's purpose and activities. I coded the answers to the open-ended questions in NVivo8 qualitative data analysis software and developed frequencies of the participants' opinions.

Results from data collected using the snowball method are typically not intended to be used for generalizing beyond the sample itself. Since the probability of equal selection among the potential respondents is not certain, the data cannot be analyzed in the context of a normal distribution (Rea and Parker 2005). Nevertheless, my target sample size was larger and more

representative of the Community than typical surveys using the snowball method which may have reduced bias (Atkinson and Flint 2001). For instance, Atkinson and Flint (2001) discussed a study conducted by Pollak and Schlitz in 1988 that produced representative proportions for age, class and size of town of residence from a large sample that was selected using the snowball method. Statistical analysis on samples collected using the snowball method is permitted and generalizations can be made to Mweka Village as a “crude rule of thumb” of significance (Garson 2009). I found multiple studies by Mayerhofer (2009), Gortmaker (2006), Ei-Sayyed (2008), Fischer (2006), Kerr (2009), Siqueira (2007) and Northern (2009) that performed statistical analyses, like chi-square tests, on samples that were selected using the snowball method.

I used chi-square tests to link my nominal demographic data to my nominal environmental behavior data. Chi square analyses are conducted to test the significance of relationships between a categorical predictor variable and a categorical dependent variable in a contingency table:

$$X^2 = \sum \frac{(o - e)^2}{e}$$

The chi square test of significance measures the difference between the frequencies that are obtained from the sample survey and those that were expected to be obtained if there were no differences among the categories of the dependent variable. Cramer’s Phi was also calculated to measure the strength of the statistically significant relationships:

$$\phi = \sqrt{\frac{\chi^2}{N}}$$

Only the significant relationships were included in the results section with a margin of error of five percent.

Pretest results

The expert review portion of the pretest provided suggestions on two questions in the survey.

One suggestion was to change the wording of my question regarding property size to emphasize the word own. Another suggestion was that if I included anticipated answers below the survey questions to make the data collection easier for the interviewers, I needed to make sure that the interviewers did not read off the list of potential responses.

During the supervised interviews, I observed the interviewer's and the respondent's behavior. Even though the survey included reminders to not read the responses below a given question aloud, some interviewers continued to do so. Therefore, I decided to remove the anticipated responses in order to avoid biasing the answers. The entire survey was rewritten to include open-ended responses. Listening to the survey also helped me to realize that some questions in section two were not in order and I rearranged the questions to make them more logical. I also realized the survey contained vague questions that did not distinguish between tree nurseries in general and those at the Conservation Site in Swahili. I changed the questions to include more specific references to the Conservation Site to eliminate this confusion. Additionally, I observed that the interviewers were neglecting to follow the original random sampling protocol and forgetting to read the survey introduction and informed consent. I realized that the interviewers did not comprehend the rationale behind the random sampling protocol and due to short time frame to conduct the study, I discarded this sampling frame. I chose the snowball method instead in an effort to make the participant selection process simpler and increase the likelihood that the interviewers would follow the protocol. When I distributed the final version of the survey to the interviewers, I attached to survey introduction and informed consent form to the front to increase the likelihood that they read the documents to the participants.

The data collected by the interviewers during the pretest was also very insightful. The interviewers did not understand the skip patterns within the survey. I adjusted the survey to reduce the number of skips and at the next meeting spent more time clarifying the skip pattern process for the remaining relevant questions. While giving one on one feedback to the interviewers, one of the interviewers brought to my attention that the font was too small so this survey feature was also adjusted. One question in sections three through six was also eliminated because the responses were not providing new information. I also added an informative paragraph in section seven that explained the purpose and activities of the Roots & Shoots Conservation Site before asking the participants to make suggestions to improve the Conservation Site. This additional information allowed more significant responses to be gathered.

Study improvements

The significance of the chi-squares tests can be strengthened if the subtotals for the two categories were more balanced. Significant relationships between the independent and dependent variables may have occurred because one of the independent variables had a much smaller sample size.

When collecting data in Mweka Village in the future rather than summarizing the data by primary, secondary or no schooling, more detail should be asked by finding out more detail about the highest grade completed in primary school.

Similarly more detail can be gleaned from the income variable if the brackets for income had been smaller. While I intended to get exact incomes, some respondents felt more comfortable providing a range of their income.

Results

The results section will first summarize participant demographics. Second, I will discuss participants' interest in sustainable activities in general. Third, I will explore participant awareness of selected sustainable activities and their adoption of each: tree nurseries, beekeeping, fuel-efficient stoves, and fish ponds. In addition, the participant's understanding of the influence of these selected activities on families and the environment are reported. Fourth, I will review the survey sample's awareness and participation at the Conservation Site. Fifth, I will summarize the participants' opinions on the effectiveness of the Conservation Site's for improving the environment and families' lives as well as suggestions to develop this project. Finally, I will identify significant relationships between the demographic data and participant responses.

Participant Demographics

The sample population was composed of 223 people, roughly half men and half women (Figure 2). The highest proportion of the participants lived in Kifura sub-village and the lowest proportion of the participants lived in Omi sub-village (Figure 3). The histogram of age resembles a normal distribution (Figure 4). The mean age for this sample population was 44. The oldest participant was 96 years old and the youngest was 18 years old. Of the 221 participants who reported how long they lived in the Mweka Village, only 23.5 percent did not live in Mweka Village their entire lives. The average number of years lived in the Mweka Village for this subpopulation is 36 years. Catholicism is the dominant religion of the survey participants (Figure 5). The majority of the respondents had some level of education (Figure 6). Over 75 percent of the respondents did not study beyond primary school. Only 1 percent of the sample population attended college. Farming is the primary occupation, followed by the respondents

who raised livestock (Figure 7). Twenty-five percent of the participants engaged in more than one of the occupations listed in Figure 7. According to Figure 9, over half the survey participants earned more than 100,000 Tanzanian shillings. The exchange rate for US dollars to Tanzanian shillings (TSh) in October 2009 is \$1 is equal to 1300 TSh. These four income brackets can be further summarized by ranking the lowest income level as a one and the highest a four. The mean income in this scenario is three. This value is skewed due to one outlier participant who earned 4 million TSh; therefore the median is more accurate at 2.47. Land ownership is skewed to the right (Figure 10). The median value for number of acres owned is 1.25.

Summary of Participant Demographics.

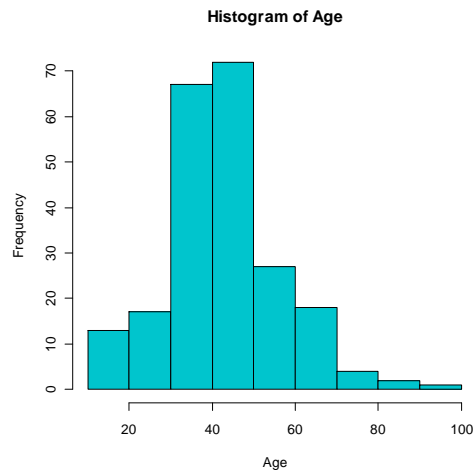


Figure 4. A summary of age distribution in the survey population (n=221).

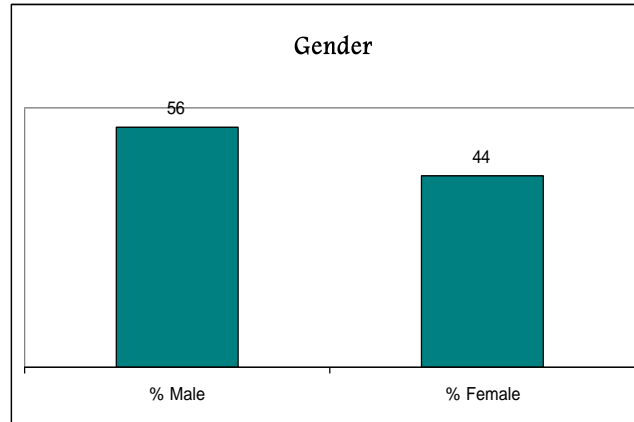


Figure 2. Summary of gender (n=221).

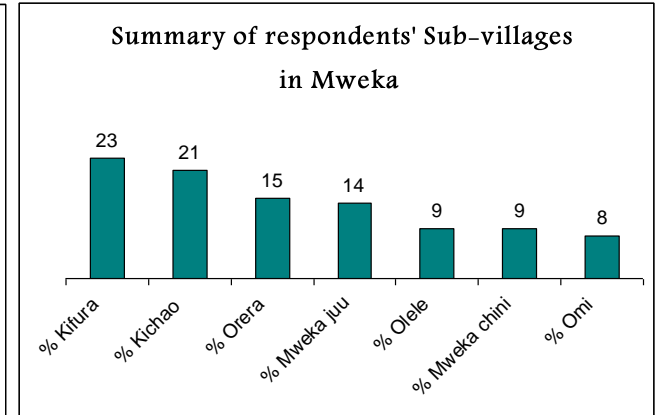


Figure 3. Participants grouped by their sub-villages (n=223).

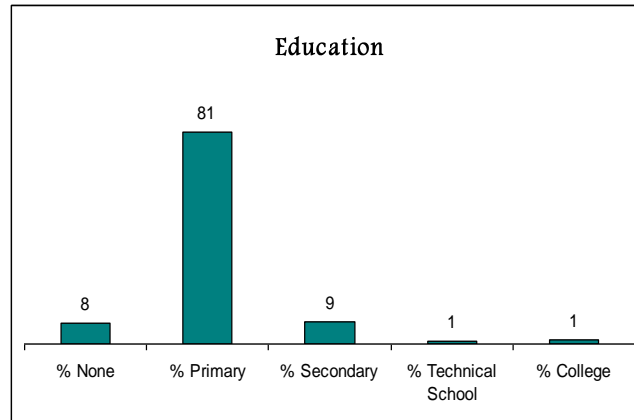


Figure 5. Summary of the highest level of education each participant received (n=221).

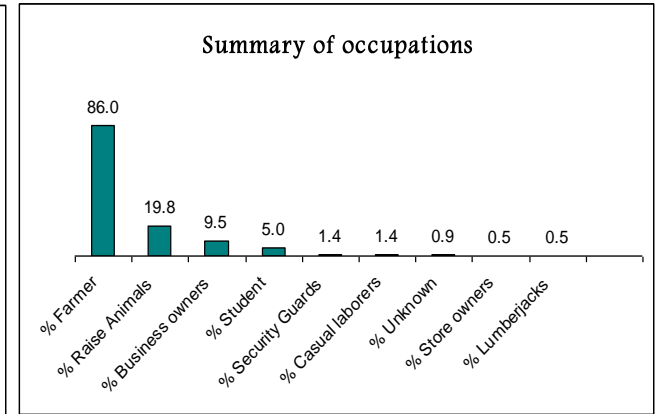


Figure 6. Summary of survey participant occupations (n=222).

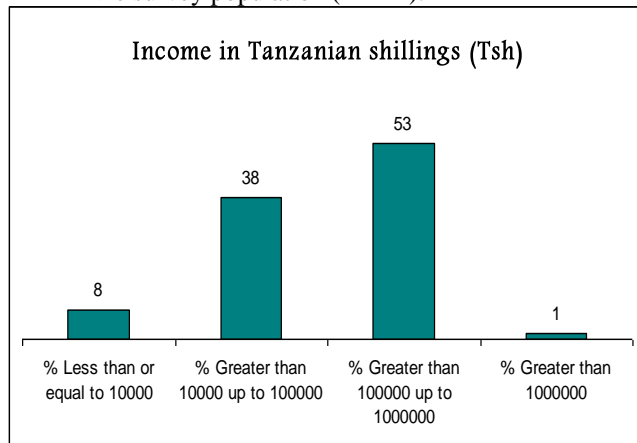


Figure 7. A summary of the participants' income for one year broken into four categories (n=215).

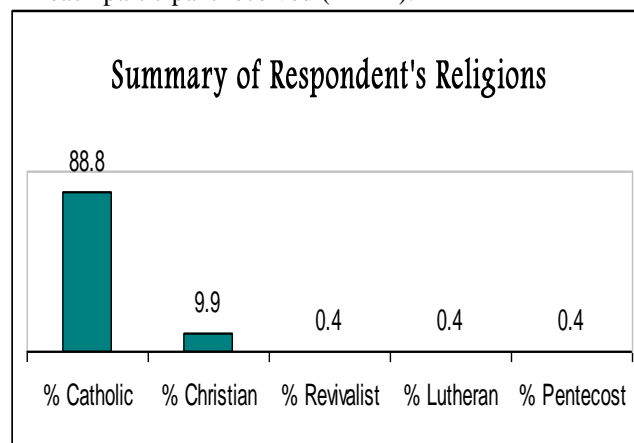


Figure 8. Summary of the respondent's religions in percent (n=223)

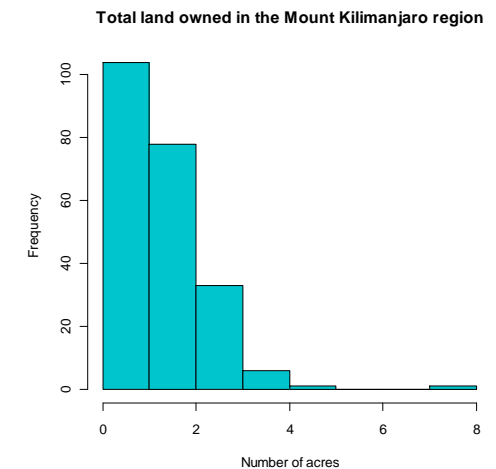


Figure 9. The total land owned by the respondents in the Mount Kilimanjaro region (n=223).

Interest in sustainable activities

There was substantial support (91 percent) within the survey population for engaging in new economic activities to protect the Mount Kilimanjaro region (Figure 10). Lack of land (52 percent) was the leading obstacle preventing individuals from pursuing sustainable conservation activities in Table 3. Lack of money (47 percent) was the second most popular obstacle. A tenth of the participants surveyed mentioned they needed to receive instruction before they had the capacity to pursue new endeavors. Infrequent responses stated by less than 5 percent of the participants included lack of ideas, lack of water and lack of strength. The second question had a larger sample size because some respondents answered question two rather than responding yes or no for question one.

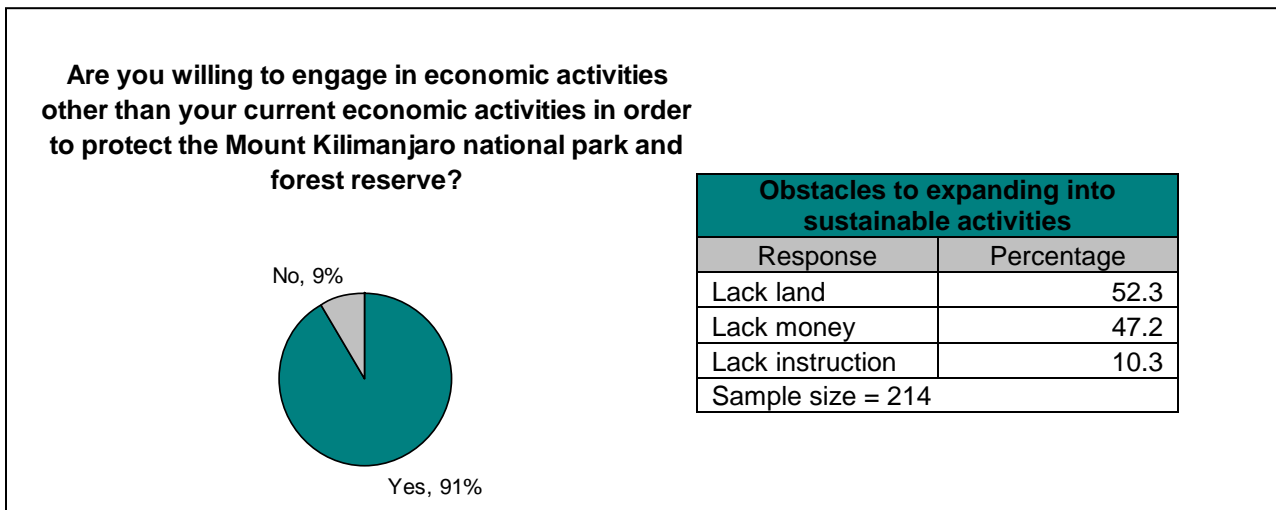


Figure 10. Summarizes the respondents' interest in starting new economic activities that will contribute to the conservation of the Mount Kilimanjaro region (n=208).

Table 3. Summary of obstacles that keep participants from trying new sustainable activities (n=214).

Awareness of selected sustainable activities

The survey participants' knowledge of tree nurseries, beekeeping, fuel-efficient stoves, and fish farming is highlighted in Figure 11. Tree nurseries were the most well-known of the four activities (82 percent). Almost three-quarters of the respondents are familiar with

beekeeping (70 percent). Less than fifty percent of the survey participants were aware of fish farming (42 percent). Only a minority of the respondents had been exposed to fuel-efficient stoves (30 percent).

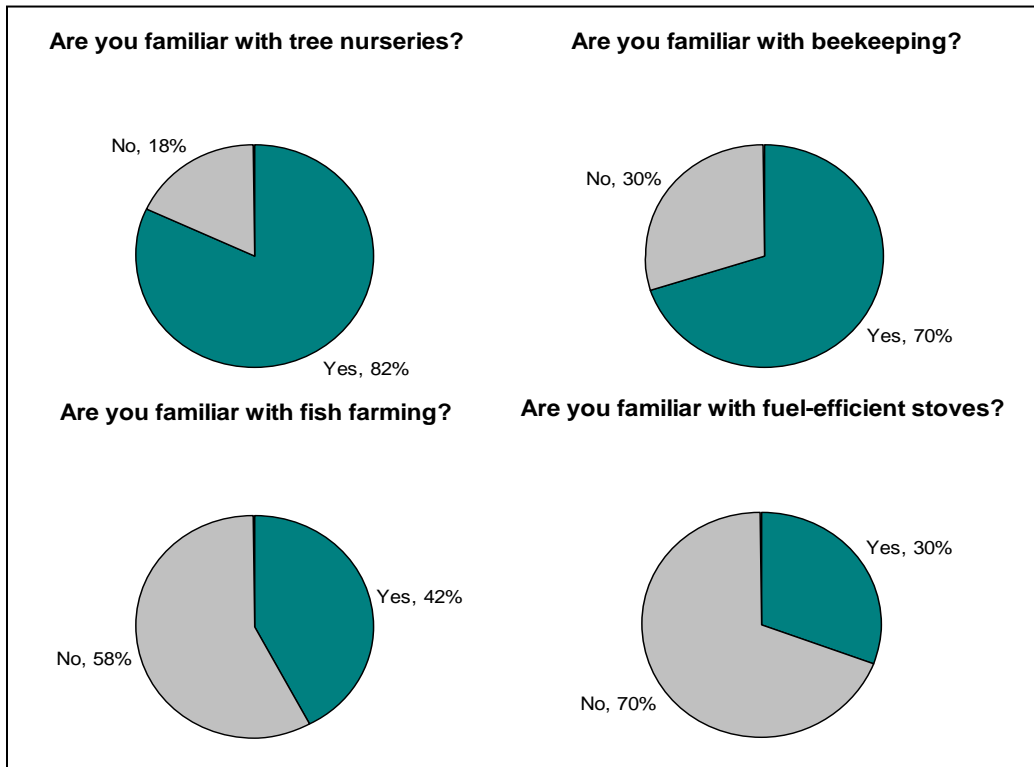


Figure 11. Summarizes the number of respondents who are familiar with tree nurseries (n=223), beekeeping (n=223), and fish farming (n=222) and fuel-efficient stoves (n=223).

Adoption of sustainable activities

Figure 12 summarizes how many people practiced tree nurseries, beekeeping, fuel-efficient stoves, and fish farming at their homes based on the subpopulation that was aware of these four activities. Beekeeping was the most established activity in Mweka Village. While the majority of the respondents in the survey had heard of tree nurseries, less than half engaged in this activity at their homes (48 percent). Of the 94 participants who were knowledgeable of fish farming, only 12% owned a fish pond at their homes. Only nine percent of the respondents who were aware of fuel-efficient stoves used them for cooking in their homes.

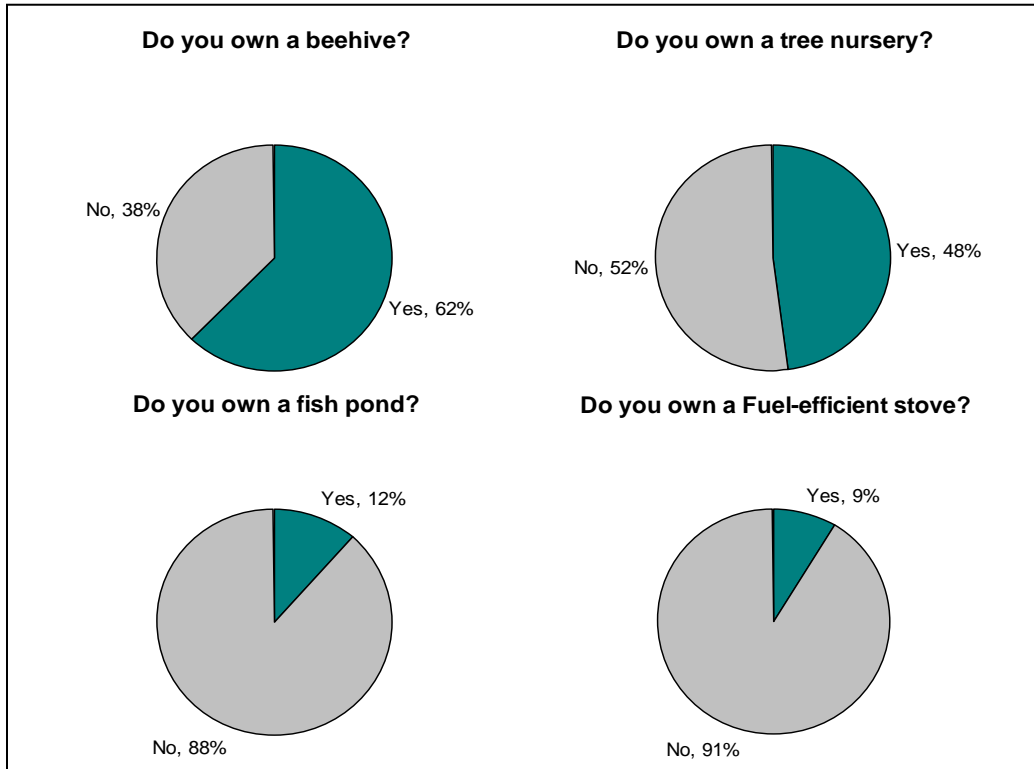


Figure 12. Summarizes the respondents who own beehives (n=153), tree nurseries (n=181), fish ponds (n=94) and fuel-efficient stoves at their homes (n=68).

The foremost reason survey participants did not own a tree nursery, beehive, fuel-efficient stove or fish pond in Table 4 was that they did not know how to construct the projects and needed instructions on how to maintain the activity. Lack of money was the second most common explanation for being unable to own one of these activities. Lack of land was an issue for both tree nurseries and fish ponds. Finally, the section on fish farming introduced new reasons for why survey participants do not perform an activity: they lack water and fish.

Table 4. Percentage summary of the main reasons why survey participants do not own fuel-efficient stoves, tree nurseries, fish ponds and beehives.

Summary of reasons respondents do not own a fuel-efficient stove		Summary of reasons respondents do not own a beehive	
Response	Percentage	Response	Percentage
Lack instruction	77.1	Lack money	53.7
Lack money	31.1	Lack instruction	47.8
Sample size = 61		Sample size = 67	

Summary of reasons respondents do not own a tree nursery		Summary of reasons respondents do not own a fish pond	
Response	Percentage	Response	Percentage
Lack instruction	69.1	Lack instruction	54.3
Lack money	35.1	Lack money	33.3
Lack land	8.2	Lack fish	13.6
Sample size = 97		Lack water	7.4
		Lack land	4.9
		Sample size = 81	

Several atypical reasons for not adopting these four activities were reported by fewer than five percent of the subpopulations. Three respondents expressed interest in owning their own tree nursery, but were unable to in the past due to one of the three reasons listed above. One participant reported that he used to own a tree nursery, but it was destroyed by other people. A unique reason for not wanting a beehive is that one farmer felt bees were too fierce. Another farmer was interested in having a beehive but lacked trees to host a hive. In regards to fuel-efficient stoves, some respondents stressed that one lesson is not enough; they needed *more lessons* to master this craft. One individual claimed to prefer the traditional Chagga stove. Another response deserving attention was a participant who lacked the materials to create a fuel-efficient stove. Less than five percent of the participants felt that fish farming was an unnecessary project or they lacked the time.

Influence of Tree nurseries on Families

The typical responses for the influence of tree nurseries on families were associated with Community development three-quarters of the time; however some participants discussed environmental impacts instead (Table 5). Overall, one fifth of the participants focused on the potential income generated from tree nurseries. The remaining responses reported in Table 5 focused on the specific benefits in family consumption gained from tree nurseries. Access to firewood was the greatest impact of tree nurseries on families in this study, followed by access to timber, the benefits of improving health from fruit, increase income and fodder (Table 5). Access to seedlings, shade and more spare time were each mentioned by participants with a frequency less than five percent. A unique but infrequent response was that tree nurseries have no influence on families (2.2 percent).

Table 5. Summarizes the most frequently mentioned impacts of tree nurseries on families.

Summary of tree nursery impacts on families	
Response	Percentage
Firewood	47.0
Timber	43.7
Health	34.4
Income	20.8
Fodder	7.5
Sample size = 183	

Influence of Tree nurseries on the Environment

The dominant responses for the impact of tree nurseries on the environment in Table 6 focused on environmental topics, a negligible amount of Community issues surfaced (3 percent). Improving the weather and maintaining the water sources by planting trees were the dominant responses. The third most popular answer was a positive environmental benefit, but these answers were fairly ambiguous. The category titled “improves the weather” included issues like correcting the weather, bringing more rain and cleaning the air. References to tree nurseries

making the environment more attractive, preventing soil erosion and helping wildlife appeared in less than five percent of the responses. About five percent of the sample population did not answer this question, but requested more education on tree nurseries instead.

Table 6. Percentage summaries of the impact of tree nurseries on the environment.

Summary of tree nursery impacts on the environment	
Response	Percentage
Improves weather	43.7
Maintains the water sources	32.8
Improve environment	23.5
Protects the forest	14.8
Sample size = 183	

Additional comments for tree nurseries included advice for maintaining a diversity of seedlings in a tree nursery. People felt that tree nurseries were important because of their value for helping the Community. Tree nurseries were regarded as the “source of having the best environment.” One person felt that tree nurseries should not be used to grow timber. Participants also emphasized the need to increase the marketing of tree nurseries and to put greater efforts into educating their fellow Community members on this activity. The main focus of last minute thoughts on this subject was the demand for education on tree nurseries.

Influence of Beekeeping on Families

Beekeeping was seen primarily as a source of medicine (36.5 percent) and nutrition (33.3 percent) for families (Table 7). Increased income from the sale of honey is another major influence on families in Mweka Village (32.1 percent). Many people understood the role of bees in pollinating flora. One-fifth of this sample was able to provide a more refined answer that bees increase the yields of their crops and trees. Less than five percent of the data reported by participants’ reflected their concern that bees are fierce and that some people did not understand

how beekeeping could impact a family. Less than five percent of the respondents mentioned the practical use of the honeycomb to create candles.

Table 7. Summary of impacts of beekeeping on families as a percentage.

Summary of beekeeping impacts on families	
Response	Percentage
Medicine	36.5
Nutrition	33.3
Increase income	32.1
Pollination	24.4
Increase crops and trees	19.2
Sample size = 156	

Influence of Beekeeping on the Environment

The three general themes of forest protection, pollination and do not harm described the main impacts of beekeeping on the environment (Table 8). More than one fifth of the respondents recognized the role of bees as pollinators. An additional one fourth of the survey participants understood that bees functioned as pollinators but also stress the added value of bees increasing the crops and trees in the area. Beekeeping was believed to have a neutral impact on the environment by 18 percent of the respondents who states that bees do not harm the environment. The final two categories “bees are fierce” and “protect the forest” are related. About ten percent of the survey participants gave a broad statement that bees are fierce. The other interviewees felt that bees protect the forest (15 percent) because they attack people who cut down trees, and are indirectly describing the bees as “fierce.” Notable comments that each had a frequency of less than five percent include that beekeeping is important to maintain bees in an area and that some people were unaware of the impacts of beekeeping on the environment.

Table 8. Summary table of the impacts of beekeeping on the environment in percent

Summary of beekeeping impacts on the environment	
Response	Percentage
Increase crop and tree yield	26.3
Pollinate	23.7
Does not harm	17.9
Protect the forest	15.4
Bees are fierce	9.6
Sample size = 156	

Influence of Fuel-efficient stoves on Families

The use of less firewood was reported as the most popular impact of fuel-efficient stoves on families (Table 9). The second frequent response of more spare time was directly related to the use of less firewood because the respondents stated that they needed to take fewer trips to the forest to gather firewood. The respondents appreciated this influence on their families because fuel-efficient stoves allow for more time for on the farm. One student said that fuel-efficient stoves gave him more opportunities to study. One-fifth of the sample felt a high regard for this activity, but did not give a specific influence for fuel-efficient stoves on families. Less time spent cooking was the fourth greatest impact of fuel-efficient stoves on family. The survey participants voiced concerns that the stoves are poor quality that will not persist for long (7.2 percent). Finally, fuel-efficient stoves are also appreciated because they incorporate chimneys that reduce health risks from smoke exposure (5.8 percent). There were multiple respondents who could not provide an impact of fuel-efficient stoves on their families.

Table 9. Percentage summary of all impacts of fuel-efficient stoves on families

Summary of fuel-efficient stove impacts on families	
Response	Percentage
Less firewood	47.8
More spare time	37.7
Beneficial	21.7
Cooks faster	10.1
Stove quality	7.2
Less smoke	5.8
Sample size = 69	

Influence of Fuel-efficient stoves on the Environment

About three quarters of the respondents recognized that fuel-efficient stoves can contribute to forest conservation by using less wood (Table 10). More than a quarter of the respondents did not commit to a specific answer and spoke about fuel-efficient stoves helping the environment in general or at least not harming the environment.

Table 10. Percentage summaries of impacts of fuel-efficient stoves on the environment

Summary of fuel-efficient stoves impacts on the environment	
Response	Percentage
Forest	73.5
Environment	26.5
I do not know	4.4
Sample size = 68	

Influence of Fish Farming on Families

The most common impact of fish farming the participants recognized was the nutritional value of the fish protein and vitamins to sustain a healthy family (69 percent) in Table 11. One farmer stated that fish is “the *best* source of nutrition for the family.” The second largest impact was the potential for generating income from sale of fish (49 percent). The food category was developed from responses (17.4 percent) that were more general than the nutrition comments. Several participants also recognized that fish can be served to chicken as animal feed. Some participants felt that fish farming is an ideal project because the activity does not cost anything to

manage unlike other animal raising activities. Less than five percent of the farmers mentioned that they did not know of any impacts.

Table 11. Summary of the impacts of beekeeping on families by percentage.

Summary of fish farming impacts on families	
Response	Percentage
Nutrition	69.6
Income	48.9
Food	17.4
No costs	5.4
Chicken feed	5.4
Sample size = 92	

Influence of Fish Farming on the Environment

According to the majority of the respondents, fish farming had a positive influence on the environment and did not cause any harm (Table 12). Another one quarter of the respondents recognized that fish ponds reduce water, but this category did not have a negative connotation. The categories for retaining water, helping the environment and protecting the water were reported with similar frequencies. Other notes about the impact of fish farming included that this activity used little water (one individual) and was considered an easy activity (four individuals). Another 4 percent did not know how fish farming could impact the environment.

Table 12. Summary of the impacts of fish farming on the environment by percentage.

Summary of fish farming impacts on the environment	
Response	Percentage
Does not harm the environment	58.2
Reduces water	19.8
Retains water	7.7
Helps environment	7.7
Protects the water	5.5
Sample size = 91	

Additional comments included a discussion on the advantages of a fish pond. Participants mentioned that fish do not need to be taken to the forest like cattle, fish mature quickly and do not take long to cook. One individual stated that there is no obstacle to raising fish.

Overall interest in selected sustainable activities

One unexpected response from the question *Anything else?* was an expressed interest from survey participants in desiring to acquire these projects after taking the survey (Table 13). The participants asked questions like “where can I get one? Who is an expert?”

Table 13. Summary of participants who expressed interest in the four activities at the Conservation Site.

Interest in selected sustainable activities	
Activity	Number of People
Tree Nurseries	4
Beekeeping	10
Fuel Efficient Stoves	9
Fish Farming	8

Awareness of the Roots & Shoots Conservation Site

The majority of the respondents were not aware of the Conservation Site before taking this survey (61 percent) in Figure 13. Of the respondents who were familiar with the Conservation Site (39 percent), only a minority correctly identified the purpose to help the Community and the environment (24.4 percent) in Table 14. The proportion of the respondents who gave the incomplete answer “to help the environment” outweighed the proportion of respondents who gave the incomplete answer “to help the Community.” Responses that were coded to the response “to help the Community” included bringing development, progress and increasing income. Answers that consisted of protecting, caring, improving and building the environment were coded to the response “to help the environment.” Over fifteen percent of the respondents also mentioned education which was an unexpected response to this question because this is more of a means to an end. Three respondents skipped this question.

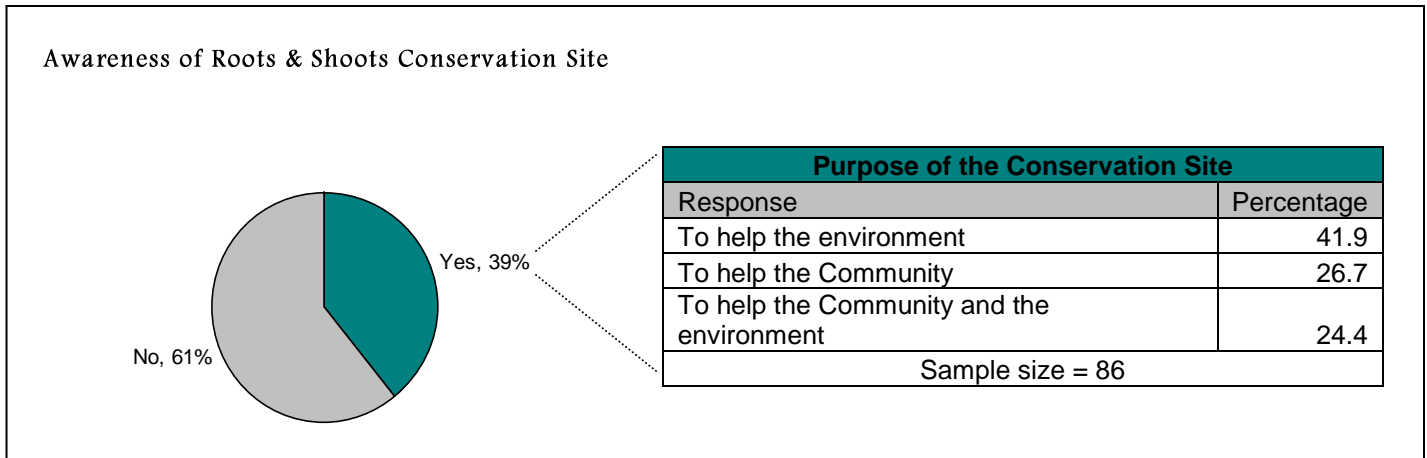


Figure 13. Awareness of the Conservation Site (n=223).

Table 14. Percentage summary of the expected responses to the purpose of the Conservation Site

The majority of the survey participants who had heard of the Conservation Site could mention at least one activity (Figure14). Over half of the respondents could name four activities or more. Less than ten percent of this subpopulation was unable to name one activity. The participants were able to identify tree nurseries, fish farming and fuel-efficient stoves at similar frequencies (Figure 15). However, beekeeping a staple program at the Conservation Site was mentioned less often than the other three. Chicken raising and environmental education were mentioned by less than 5 percent of the survey participants as activities at the Conservation Site.

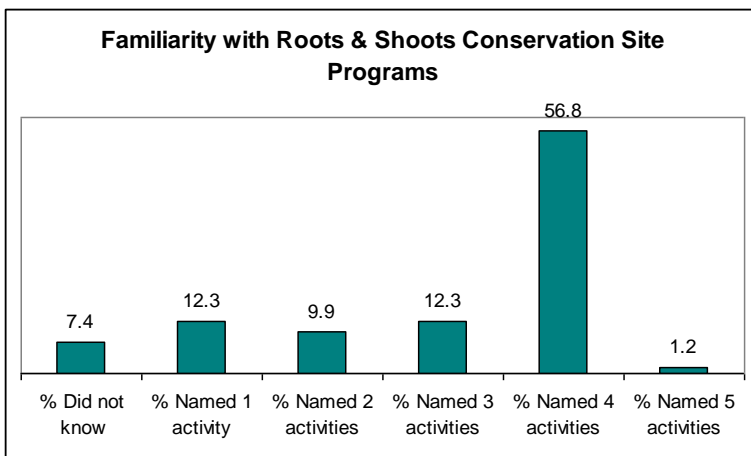


Figure 14. Summarizes the participants' knowledge of the Conservation Site programs (n=81).

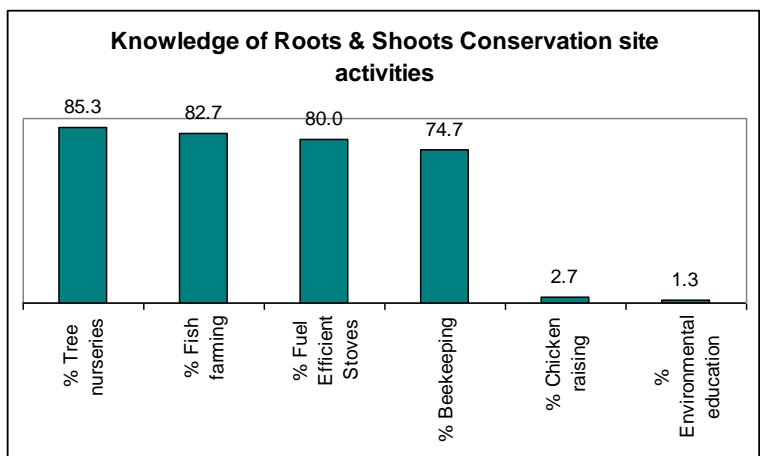


Figure 15. Summarizes the frequency that each activity was mentioned by the participants (n=75).

Participation at the Conservation Site

Almost three quarters of the people who had heard of the Conservation Site, had also visited the demonstration area (Figure 16). Only a tenth of the respondents who visited the Conservation Site did not share their experience with their families (Figure 17).

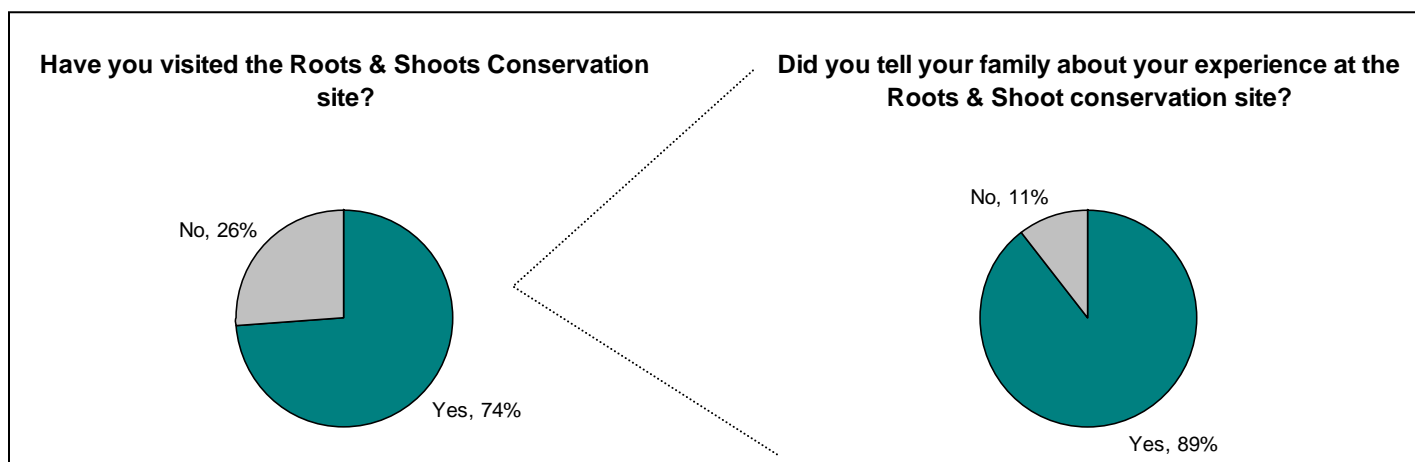


Figure 16. Summarizes how many participants have visited the Conservation Site (n=87).

Figure 17. Summarizes how many visitors shared their experience with their families (n=57)

In general, the majority of the participants' experiences at the Conservation Site involved instruction (93.4 %). On the other hand, two of the respondents did not receive any training at all, but only looked around the site. Only one respondent mentioned doing an applied conservation activity (tree planting) that was not directly related to maintaining the demonstration area. The tree nursery was the most common experience. Fuel-efficient stove lessons were taught the least. Three respondents had received training on all four of the activities listed in Table 15 at the Conservation Site. Three participants skipped this question.

Table 15. Summaries of the four main responses that describe the respondents experiences at the Conservation Site.

Educational experience at the Conservation Site	
Response	Percentage
Tree nursery	65.6
Fish farming	23.0
Beekeeping	14.8
Fuel-efficient stoves	9.8
Sample size = 61	

Participant Satisfaction with the Conservation Site

The overwhelming majority indicated that the Conservation Site was not meeting their needs in Figure 18. The top response in Table 16 represents participants who could not give an adequate response because they were unfamiliar with the Roots & Shoots site. These participants wanted to visit and learn about the Conservation Site’s purpose before answering this question. A tenth of the participants recommended that the site expand its area. Another frequent response was the Conservation Site needed to increase efforts to market their activities within Mweka Village which will put more pressure on the Community to participate. The respect and care category refers to the way Roots & Shoots treats the local Villagers and environment on a daily basis. Cooperation, conservation, concerned leaders, increased education for the Community and new projects were suggested to help the Conservation Site satisfy the Villagers’ needs by less than 5% of the participants. One individual alluded to the fact that the site cannot satisfy their needs even with changes.

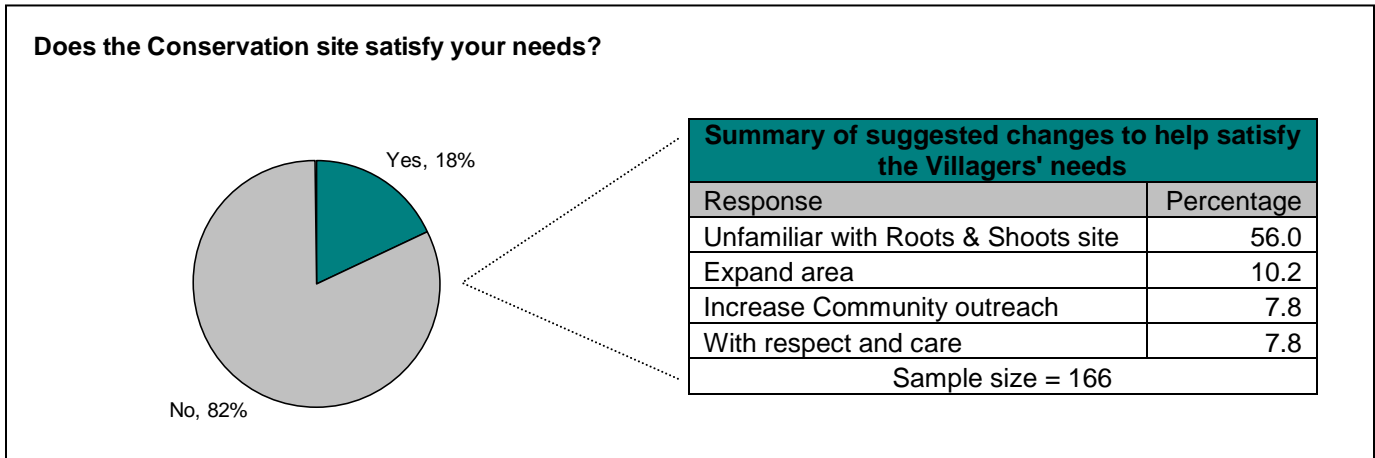


Figure 18. Summarizes whether the Conservation Site meets the needs of the respondents.

Table 16. Summary of suggested changes to help satisfy the Villagers' needs by percentages.

Effectiveness of the Conservation Site on the Environment and Community

The responses to whether the Conservation Site was providing effective options to improve lives were inconclusive with nearly a fifty-fifty split between people who felt their lives were positively influenced by the Conservation Site and people who felt the Conservation Site did not improve their lives (Figure 19). The opinion that the Conservation Site was providing effective options to improve their lives was favored by only six percent.

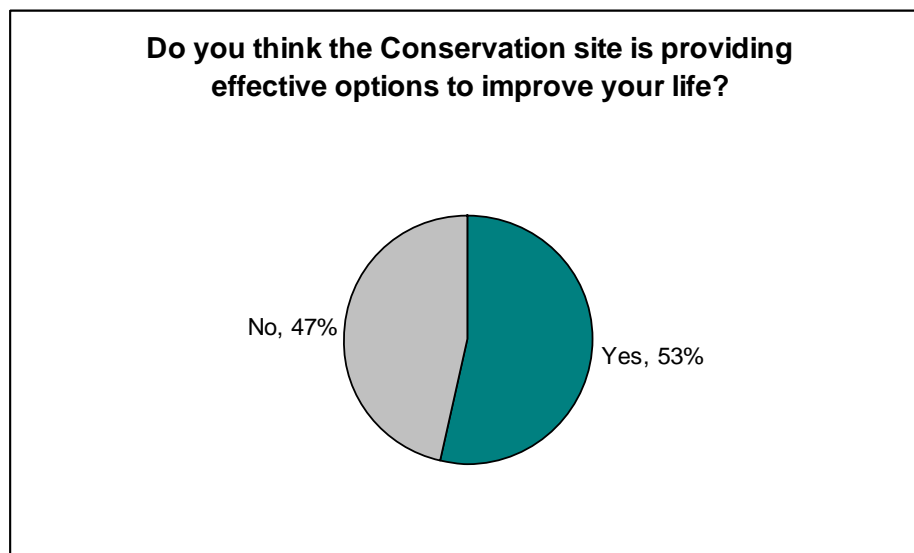


Figure 19. Summarizes the responses to whether the Conservation Site is improving the lives of the respondents (n=208).

In contrast to the previous question, the respondents overwhelmingly felt that the Conservation Site was providing effective options to improve their environment (Figure 20).

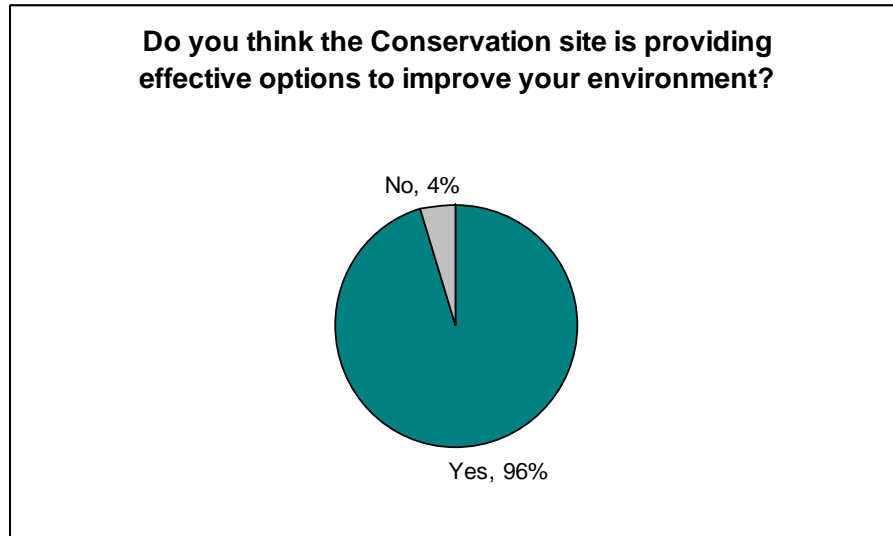


Figure 21. Summarizes the responses to whether the Conservation Site is improve the environment of the respondents (n=204).

Suggestions to help the Conservation Site develop

Suggestions to improve the Conservation Site covered a range of topics like the management of the site and human resources, site projects and Community relations (Table 17). Increasing conservation was the most frequently repeated answer. Improving education was another substantially supported recommendation. However, the participants' responses did not specify whether the site needed to improve the quality of the instruction or the amount trainings given at the Conservation Site and in the Community. Over ten percent of the respondents emphasized that Conservation Site should have access to water to maintain the fish ponds and tree nurseries (14 percent). Popular responses for how to run the Conservation were related to having good management (12 percent), volunteers (7 percent) and donors (six percent) to support the projects. The need for Community participation was reflected in the responses related to cooperation (8 percent), cooperation with the Community (12 percent) and caring (8 percent).

Protection was an unanticipated answer stemming from participants who recommended the Conservation Site needed to be guarded (11 percent). Less than five percent of the survey participants made suggestions for the Root & Shoots staff such as having more experts present at the Conservation Site, doing more work in the Community and at the site, encouraging more Community groups and providing incentives for the Community members to get involved. Other infrequent responses regarding the Conservation Site management were to increase access to fodder, to have more tree nursery supplies, to plant more trees and to increase the number of projects at the site like soil conservation. One common response stressed making compost a primary Conservation Site activity (11 percent). Additional recommendations included building cooperation *within* the Community to create solidarity. The unfamiliar category included participants who could not answer the question adequately because they were not familiar with the Roots & Shoots site.

Table 17. Summary of recommendations to improve the Conservation Site by percentages

Summary of recommendations to improve the Conservation Site	
Response	Percentage
Conservation	30.1
Education	17.1
Water	14.0
Cooperation with the Community	12.4
Management	11.9
Compost	11.4
Protection	10.9
Cooperation	8.3
With caring	7.8
More volunteers	6.7
Unaware	6.2
Donors	5.7
Sample size = 193	

Chi-square Analyses

Significant relationships were found between the demographic data and the other variables in the study. Table 18 highlights the six variables that were significantly correlated to education.

Aware of Roots & Shoots site	Education	
	Primary School or no schooling	Secondary school or higher
Yes	35.0%	79.2%
No	65.0%	20.8%
Totals	197	24

Significance: Moderate association
 $X^2 = 17.395$, $\Phi = 0.28$

Visited Roots & Shoots site	Education	
	Primary School or no schooling	Secondary school or higher
Yes	67.6%	94.7%
No	32.4%	5.3%
Totals	68	19

Significance: Moderate association
 $X^2 = 5.604$, $\Phi = 0.25$

Familiar with FES	Education	
	Primary School or no schooling	Secondary school or higher
Yes	24.9%	79.2%
No	75.1%	20.8%
Totals	197	24

Significance: Moderate association
 $X^2 = 29.605$, $\Phi = 0.37$

The calculated chi-square is statistically significant ($X^2 = 17.4$), indicating a moderate association between education and awareness of the Roots & Shoots Conservation Site ($\Phi = 0.3$). Participants with a secondary education or higher tended to have a higher probability of being familiar with the Conservation Site. Another significant relationship ($X^2 = 5.6$) was established between the education level of participants and Roots & Shoots Conservation Site visits. Most of the participants who went on to secondary school were more likely to have visited the Conservation Site. A moderate association linked these two variables ($\Phi = 0.3$). The relationship between secondary educations increasing the likelihood that participants were familiar with fuel-efficient stoves was even more significant ($X^2 = 29.6$). This significant relationship was measured to have a moderate association ($\Phi = 0.4$).

Respondents with a secondary education or higher were more familiar with fish farming than respondents with a primary education or no schooling in Table 18. The calculated chi-

Table 18. Cross-tabulations with education and dependent variables.

Education		
Familiar with fish farming	Primary School or no schooling	Secondary school or higher
Yes	37.2%	87.5%
No	62.8%	12.5%
Totals	197	24
Significance: Moderate association $X^2 = 22.067$, Phi = 0.32		
Satisfied with Roots & Shoots site	Primary School or no schooling	Secondary school or higher
Yes	15.1%	41.7%
No	84.9%	58.3%
Totals	186	24
Significance: Moderate association $X^2 = 10.158$, Phi = 0.22		
Improves family	Primary School or no schooling	Secondary school or higher
Yes	50.5%	75.0%
No	49.5%	25.0%
Totals	182	24
Significance: Weak Association $X^2 = 5.094$, Phi = 0.16		

square for this relationship is significant ($X^2 = 22.1$) with a moderate association (Phi = 0.3). Participants with a primary education or no schooling were significantly less likely to be satisfied with the Roots & Shoots Conservation Site ($X^2 = 10.2$). The strength of this relationship was calculated at a moderate association. The chi-square test of significance ($X^2 = 5.1$) between the variables for the education of the

respondent and their opinion of the impact of the Conservation Site on families established a statistically significant relationship. A weak association was obtained for participants with a secondary school education or higher to be more likely to report that the Conservation Site helped families to progress (Phi = 0.2).

Table 19 summarizes the two significant cross tabulations for property owned in the Mount Kilimanjaro region. The chi-square test was significant for the property size and beehive

Table 19. Cross-tabulations with property size and dependent variables.

Property in the Mount Kilimanjaro region		
Own beehive	Own less than or equal to 1 acre	Own more than 1 acre
Yes	52.1%	70.7%
No	47.9%	29.3%
Totals	71	82
Significance: Weak association $X^2 = 5.604$, $\Phi = 0.19$		
Interested in sustainable activities	Own less than or equal to 1 acre	Own more than 1 acre
Yes	84.5%	97.3%
No	15.5%	2.7%
Totals	97	111
Significance: Moderate association $X^2 = 10.664$, $\Phi = 0.23$		

owners ($X^2 = 5.6$). The respondents

who owned more than one acre were

weakly associated to owning a beehive

($\Phi = 0.2$). Significant differences were

obtained for property size and interest

in sustainable activities ($X^2 = 10.7$).

Survey participants who owned less

than one acre were more likely to be

uninterested in pursuing sustainable

activities while the converse was true for participants who owned more than one acre. This trend

had a moderate association ($\Phi = 0.2$).

Table 20 reports the two significant contingency tables for the variable years lived in Village. The chi-square test was significant for the cross tabulation between years in Village Table 20. Cross-tabulations with years in Village and dependent variables.

Improves Family	Years in Village	
	Did not live entire life in village	Lived entire in village
Yes	38.5%	58.1%
No	61.5%	41.9%
Totals	52	155

Significance: Weak Association
 $X^2 = 6.009$, $\Phi = 0.17$

Familiar with Fuel-efficient stoves	Years in Village	
	Did not live entire life in village	Lived entire in village
Yes	15.4%	35.5%
No	84.6%	64.5%
Totals	52	169

Significance: Moderate association
 $X^2 = 7.556$, $\Phi = 0.18$

and the dependent variable improves family ($X^2 = 6.0$). The relationship between participants who did not live in Mweka Village their entire lives and felt that the Conservation Site did not improve their families' lives was weakly associated ($\Phi = 0.2$). There was a significant difference between the

respondents who lived in Mweka Village their entire lives. People who lived in Mweka village their entire lives were more knowledgeable of fuel-efficient stoves ($X^2 = 7.6$, $\Phi = 0.2$). Similarly more respondents who moved to Mweka Village were less aware of fuel-efficient stoves than expected.

Table 21 highlights the two significant cross tabulations for the independent variable age.

A chi-square test established a significant relationship between the variables age and own a

Table 21. Cross-tabulations with age and dependent variables.

Age		
Own a bee hive	Less than or equal to 44 years of age	More than 44 years of age
Yes	50.6%	78.1%
No	49.4%	21.9%
Totals	89	64
Significance: Moderate association $X^2 = 12.016$, $\Phi = 0.28$		
Familiar with fish farming	Less than or equal to 44 years of age	More than 44 years of age
Yes	50.0%	32.7%
No	50.0%	67.3%
Totals	122	98
Significance: Weak association $X^2 = 6.701$, $\Phi = 0.17$		

bee hive ($X^2 = 2.0$).

Participants were found to be more

likely to own a beehive if they were

above 44 years of age than was

expected. This trend in the data was

moderately associated ($\Phi = 0.3$).

A statistically significant chi-square

was also calculated for the variable

age and familiarity with fish

farming. The younger respondents were more familiar with fish farming, while the older

respondents were less familiar with fish farming than expected ($X^2 = 6.7$). This relationship was

weakly associated ($\Phi = 0.2$).

Table 22 contains the two statistically significant cross tabulations for the independent variable gender. More males were reported as beehive owners and fewer females were reported

Table 22. Cross-tabulations with gender and dependent variables

Gender		
Own a beehive	Male	Female
Yes	70.1%	50.8%
No	29.9%	49.2%
Totals	87	65
Significance: Moderate association $X^2 = 5.901$, $\Phi = 0.20$		
Own a fish pond	Male	Female
Yes	19.6%	2.4%
No	80.4%	97.6%
Totals	51	42
Significance: Moderate association $X^2 = 6.554$, $\Phi = 0.27$		

as beehive owners than expected. This

significant chi-square test ($X^2 = 5.9$)

was moderately associated ($\Phi = 0.2$).

The significant contingency table for

gender and owning a fish pond ($X^2 =$

6.6, ($\Phi = 0.3$)) follows the same trend

as the previous chi-square test.

Discussion

Interest in sustainable activities

The overwhelming majority of the survey participants expressed an interest in pursuing new sustainable activities to conserve Mount Kilimanjaro National Park and Forest Reserve. The chi-square analysis indicated a trend that people with more than one acre were more likely to be interested in trying new sustainable activities than people who owned less than an acre. The Conservation Site should account for this information by endorsing a wide-range of sustainable projects, including projects that do not require a lot of land. With this approach the Conservation Site will be relevant to more people. Since the respondents mainly worked the land as farmers or raised livestock, the projects at the site are amenable to their occupations. An unexpected benefit of conducting this survey was the interest fostered from asking about these four activities.

Adoption of selected sustainable activities

Beekeeping was the most established activity in Mweka Village. The acceptance of this activity cannot be attributed solely to the demonstration workshops provided by the Conservation Site. Beekeeping using natural, hollowed out logs for hives is a Chagga custom, including an alcoholic drink made from honey. However, the Conservation Site has brought Mweka Village innovation by introducing the modern hive. Tree nurseries in Mweka Village homes are also abundant because this is a common practice for coffee production. Fish ponds and fuel-efficient stoves are newer projects introduced by Roots & Shoots to Mweka Village and the low percent of adoption give a better estimate of how the Conservation Site is influencing the Community.

People with more land may be more likely to own beehives because they have more room to grow trees around their farms that can host the bee hives. The sample population that was

older than forty four may be more likely to own beehives because they have greater chances of owning property and are more accustomed to the time-honored ways of Chagga life. The results of the chi-square tests that indicated more men own beehives and fish ponds than women suggests that beekeeping may be more of a man's task and responsibility.

Summary of obstacles to adopting selected sustainable activities

Obstacles to participation in Beekeeping

Some of the respondents were hesitant to own a beehive because they felt that bees were too fierce. One potential solution to encourage more people to invest in this activity is to purchase protective clothing that can be shared at the Conservation Site. This gear may give people a sense of security to overcome their fear of being stung. Using *Melipona*, a stingless bee species that is native to the Mount Kilimanjaro region, offers an alternative to the stinging bees.

Obstacles for participation in Fuel-efficient stoves

Only one person admitted to preferring the conventional stove. A prestige bias may have led the participants to shy away from this preference for the typical stove used in the village. The individual who stated they preferred the conventional stove may need more education on the air quality benefit and reduced dependence on firewood that are characteristic of the fuel-efficient stove.

Obstacles to participation in Fish farming

The Conservation Site made an assumption that everyone in the Mweka Village had access to water when they included fish farming as one of the projects. Four out of the five respondents who stated they lacked water lived in Kifura, so this activity may not be appropriate in this sub-village. The 2007 Proposal indicates that activities were meant to be compatible with the land; however the survey indicates there is a subpopulation that cannot apply this activity no

matter how educated they are. The Conservation Site needs to consider this and promote other sustainable activities in areas without direct access to water. Another option is for a group of neighbors to pool their money and install a pipe to bring water to their homes. A final solution is to create communal fish ponds that are supported by the Villagers without water at their homes.

Common obstacles to participation in the four selected activities

Common obstacles to owning one these four projects were lack of land, money and education.

Lack of land was a problem attributed to fish farming and tree nurseries. This issue of lack of land was confirmed by the majority of the population only owning 0 to 1 acre of land in the participant demographic section of the results. Lack of land is a serious issue for the Conservation Site to contend with due to the customs for inheriting land in Mweka Village. The father divides the land between his sons, so with each passing generation the land holdings become smaller and smaller, forcing some family members to move to the city as the population grows.

Communal land needs to be set aside for the tree nurseries and fish farming activities if the Conservation Site is serious about promoting them in Mweka Village. Community conservation events can also be organized for people who lack land participate in activities like restoration plantings in the Mount Kilimajaro Forest Reserve. Beekeeping (as long as trees are present) and fuel-efficient stoves are feasible for Villagers without a lot of land. Another option is to introduce new projects at the Conservation Site that do not require a lot of land. A final opportunity for Community members without land is to form cooperatives with their neighbors for activities like beekeeping. The people who cannot raise the bees themselves can help manufacture the honey or candles at a group facility.

The other popular obstacle that survey participants voiced was that they lacked the money to pursue these four projects. This justification is a perceived obstacle, but not a real barrier. These activities were selected to be compatible for the land and the targeted users. Beekeeping could get expensive if an individual wanted to buy a modern hive; however the traditional hive requires only a natural log. The fuel-efficient stove model is also based on natural materials. Therefore not having the materials for a fuel-efficient stove was another false obstacle mentioned by a respondent. Fish ponds are free of costs because the Conservation Site provides the young fish (another perceived obstacle). Tree nurseries are often constructed using plastic bags to germinate the seeds, but a customary container for the soil uses banana leaves which are abundant in Mweka Village. At the root of these false obstacles is the need for more education.

Education was the final obstacle to owning one of these four activities. Conservation Site manager can provide more workshops on these selected activities to eliminate this obstacle with the dissemination of knowledge. Furthermore, the trainings need to highlight these perceived obstacles in order to enhance adoption of these selected activities. The most efficient use of the Conservation Site manager's time is to focus on providing demonstrations to the Community on the nontraditional projects like fish farming and fuel-efficient stoves. Since a large number of the survey participants are familiar with tree nurseries, more Community members should be trained to lead demonstration workshops to improve Community outreach. In reality, the Conservation Site manager could use more support to ensure that sufficient education and Community outreach is occurring in Mweka Village.

An exciting finding was that some of the obstacles were related. When the projects at the Conservation Site are applied in the homes they can create positive feedback loops. For example,

one farmer stated that he could not own a beehive because he lacked trees. By investing in a tree nursery he will be able to host a hive within five years. The bees will then pollinate the farmer's crops and planted trees. The bees may also provide a new source of food for a farmer's chickens. The chickens can then fertilize a farmer's field. Similarly, if a farmer has a fish pond, the manure from the chickens can feed the fish. The fish can also be fed to the chickens for food.

Understanding of selected sustainable activities

Tree nurseries

The survey participants were the most familiar with tree nurseries out of the four activities provided by the Conservation Site. Survey participants valued and understood the multiple purposes of tree nurseries to provide food, fuel, shade and building materials. The respondents were better acquainted with the diversity of influences of tree nurseries on families than the environment. Therefore, future trainings on tree nurseries need to stress the positive impacts of tree nurseries on the environment.

The categories for improving the weather and maintaining the water sources under the impacts of tree nurseries on the environment were most likely based on personal experiences. Mweka Village has witnessed a change in climate after farmers switched from coffee crops to corn. The farmers cut down the tree canopy that used to shade their coffee crops in order to let sunlight reach the corn. This land use change has altered and reduced the rainfall during the rainy seasons. Hence, the farmers believe that by replanting the trees they can improve the weather. The respondents also understand the positive impacts of trees along the watershed for increasing access to groundwater and preventing soil erosion.

Participants did not specify whether the category titled protecting the forest was a reference to tree nurseries providing resources that negate the need to gather materials in the

forest or that tree nurseries protect the forest by providing seedlings for restoration. A native versus exotic tree discussion was oddly absent from this section on tree nurseries. Although, one individual stressed the need for nurseries to include a diversity of tree seedlings, trainings need to emphasize tree nursery plans that include an array of fruit and nut trees, native and timber species.

Beekeeping

Beekeeping was the second most familiar activity in the survey.

The participants understood that bees were beneficial to their farms as pollinators, food for their chickens and positively influenced their families by providing a source of food and medicine. The honey was also seen as an income generator to meet their families other needs. Further education could focus on candle making from the wax. This activity is especially relevant to Mweka Village because the Community relies on candles as a source of light during the night.

A negative influence of beekeeping on families was that bees are fierce. This implies that bees can have a negative influence on families because they are risky to be around.

Participants felt that bees were guardians of the trees when they are disturbed. The respondents also understood their role as pollinators in dispersing the pollen of flowers and trees to encourage seed production. The natural bee populations that live in the forest are the stinging variety and can be a nuisance for people harvesting firewood and lumber.

Fuel-efficient stoves

Compared to tree nurseries, fuel-efficient stoves are not well understood. By incorporating Roots & Shoots clubs into the schools, the Roots & Shoots program is effectively increasing awareness of this sustainable activity. More secondary school students were aware of

the fuel-efficient stoves than the rest of the survey sample. More outreach to the Community is needed to raise awareness for this project. One interesting chi-square result was that people who lived in Mweka Village their entire lives were more likely to be familiar with fuel-efficient stoves. This trend may be indicative of the importance of a strong social network in Community life. If you are a lifer you may be more connected to changes in Mweka Village like the introduction of a stove that benefits the Community and the environment.

Multiple participants questioned the usefulness of fuel-efficient stoves. I witnessed the stoves cracking after more than one use myself. This implies a negative influence for families because once the stoves crack they lose their efficiency. The manager of the Conservation Site should collaborate with other nonprofits promoting the adoption of fuel-efficient stoves to find best practices that increase the durability of the stoves.

The two greatest impacts of fuel-efficient stoves on the environment and families that were cited in this study were directly related. The respondents realized that the stoves were beneficial because they ultimately use less wood. The need for less wood improves the quality of life for the women and reduces the level of degradation in the forest. Since the women spend a great deal of time making multiple trips to the forest in one day, a reduced need for firewood opens up more of their day to spend on the farm.

The stoves can also cook meals faster by conserving more heat and simultaneously heating multiple pots. More education is needed to increase awareness of the health benefits from improved air quality in homes with fuel-efficient stove models that include chimneys.

Fish farming

Less than half of the sample was familiar with fish farming. Respondents with a secondary education were more likely to be familiar with fish farming than the rest of the

sample. This trend is more indicative of Roots & Shoots' success with reaching out to the schools in Mweka Village. Prior to the establishment of the Roots & Shoots site, fish farming was not present in the seven sub-villages.

Overall this survey confirmed that people in this Mweka Village like fish! The respondents recognized the nutritional benefits and the properties of fish to create a glue and medicine. Additionally, fish that the family does not consume can be used to supplement their income. Some participants described fish ponds as cost free--the fish eat manure, plant material and algae and plant material, the water is free and manual labor to dig the pond just take time.

One potential negative influence of fish farming on families was left unmentioned by participants. Skin exposure to water while collecting the fish can cause people to fall sick due to the harmful bacteria in the water from the manure. This may be due to a lack of awareness about how infections can spread. This issue can be avoided by purchasing a communal pair of waders that is shared among fish pond owners.

The survey participants did not feel that fish farming had a negative influence on the environment even though it reduced available water. One take on the issue was that fish ponds reduce the available water in the environment for people downstream. While this may cause short term conflicts when water is diverted from the small irrigation channels and a neighbor goes without water for a few hours, in the future water availability may become a more serious matter. The conservation site is currently recommending fish farming as a sustainable activity. Yet, there is a controversy over how the water sources will respond if the glaciers of Mount Kilimanjaro melt in the future. Therefore the Villagers need to be made aware that the current sustainability may be tenuous fifty years from now.

In general there was a small group of people who were aware of these four activities, but did not know how fuel-efficient stoves, tree nurseries, beekeeping and fish farming influenced families. As well as individuals who were unable to think of how beekeeping and fish farming could influence the environment.

Awareness and Understanding of the Conservation Site

Many survey participants did not know about the Conservation Site so the existence of the Conservation Site needs to be better advertised. More Community outreach is also needed to make Mweka Village more aware of the Conservation's site purpose to help the Community and the environment. According to the results of the participant demographics, secondary students were a minority in the sample. Only 1 of the 11 students had not heard of the Conservation Site. If more students were surveyed, the sample awareness of the Conservation Site may have increased.

Knowledge of the activities provided by the Conservation Site also leaves room for improvement. Chicken-raising is a recent addition to the Conservation Site so only recent visitors would be aware of this change. Beekeeping may have been mentioned less often as a Conservation Site project because the hives are obscured in the trees at the back of the Conservation Site, unlike the prominently displayed fish ponds. People will not know that this project is present unless they receive a demonstration at the Conservation Site or a model hive is displayed in a more conspicuous location at the Conservation Site.

Participation at the Conservation Site

The majority of the survey participants who had heard of the Conservation Site had also visited the Conservation Site. More people need to be encouraged to visit the Conservation Site more frequently to spread the word. People will not stumble upon the site unless they were

intending to visit the Conservation Site. The Conservation Site is in a remote location, bordering the Mount Kilimanjaro Forest Reserve which is a 15 minute walk from the center of Mweka Village.

Roots & Shoots will be pleased that the majority of the respondents who visited the Conservation Site told their families about their experience. The Roots & Shoots staff hoped that the demonstration services would have a multiplier effect in the Community and influence more people as information spread through social capital.

The Conservation Site manager needs to provide a more balanced number of demonstrations for each of the activities at the Conservation Site. According to visitor descriptions of their experiences at the Conservation Site, the majority of the trainings focused on the tree nurseries. There needs to be more workshops related to fish farming and beekeeping. Additionally, most of the “trainings” dealt with maintaining and expanding the current tree nurseries. More useful trainings would include how to set up a project and discuss how the activity benefits the environment and Community.

Recommendations to improve the Conservation Site

The respondents’ recommendations to improve the Conservation Site can be boiled down to three major themes: Community participation, Community outreach, and Conservation Site Management. The following recommendations will be highlighted by verbatim quotes taken from the survey participants. The quotes are presented in italics in text boxes below each recommendation.

Integrate Community Participation

The Community and Roots & Shoots did not appear to be working together as one cohesive unit. The Community insisted that the Conservation Site can improve in the future by removing this disconnect.

Cooperation between Roots & Shoots leaders and the Community in this work (Respondent 22)
To be shoulder to shoulder (Respondent 24)
To have good intentions (Respondent 144)

These responses reflect how the Community-based element of the Conservation Site has been neglected. The Conservation Site needs to find opportunities to enhance the Community's involvement in the programs and management of the Conservation Site. The absence of public participation during the formulation of this project led to a dearth of collaborations between the Community and Roots & Shoots during the Conservation Site's implementation phase. One possible solution is to create a board of different stakeholders to work with the Site manager in making collaborative decisions that affect the Conservation Site. This step will build trust and remove any concerns that the Conservation Site does not have good intentions. Furthermore, the respondents also voiced the need for solidarity to improve the conservation site. The solidarity point verifies the literature in the background section that stressed not all communities act as one. A board that encompassed a variety of stakeholders who hold different opinions and interests would foster solidarity within the Community.

Community Outreach

Since knowledge of the Conservation Site is not widespread in the Community, the Conservation Site manager and the engaged Community at the Conservation Site need to promote the Conservation Site to their neighbors, friends, and family. The positive influences of the Conservation Site's activities on families and the environment reported during the survey can be used to market this program to Mweka Village. Many of the survey participants suggested that publicizing the Conservation's Site purpose to the Community is a crucial step for helping to improve the Conservation Site.

The leaders of Roots & Shoots can give seminars from time to time so that we can understand the mission of Conservation Site (Respondent 91)
The Conservation Site can progress by teaching the Community about the Roots & Shoots Conservation Site (Respondent 60)

Since the dominant religion is Catholicism in the Community, the church can be used as a means to access the Community and spread the message about the conservation site. The bonds formed within this faith Community can provide the backbone for future groups that can visit the Conservation Site. Focusing on faith could help build cooperation within the Community at the Conservation Site.

The survey participants also requested additional trainings on the four activities exhibited at the Conservation Site. These trainings need to be divided between the Conservation Site and the seven sub-villages. The Conservation Site manager should be relieved of some of his responsibilities for offering workshops. Instead Roots & Shoots should invest in more training of trainer seminars for motivated Community members who want to get more involved at the Conservation Site. The frequency of trainings in the past year was not sufficient to satisfy the interest of the survey participants:

We ask to receive education from the leaders of Roots & Shoots (Respondent 98)
We ask the leaders of the Conservation Site to visit [our sub-villages], give advice and seminars from time to time (Respondent 100)
We ask to receive education about fish farms, fuel efficient stoves, tree nurseries and beekeeping (Respondent 42)

Finally, the respondents expressed a demand for the Conservation Site to take on a more prominent role in influencing the Community's environmental behavior. Bolstering the awareness of the Conservation Site and sustainable practices will place more pressure on the Community to incorporate environmentally friendly measures in to their daily lives. The Conservation Site is expected to go beyond its main responsibility of education and implement conservation measures in the local area through a sustained effort.

To increase efforts in environmental conservation (Respondent 33)
Try hard to increase tree nurseries in homes (Respondent 169)
By caring for the forest (Respondent 49)
Plant trees (Respondent 147)
Increase trees (Respondent 204)

Best practices that were recommended to get more Community involved at the Conservation Site included providing incentives and promoting the formation of groups to spread the social capital.

Conservation Site Management

The respondents encouraged two significant changes in the management of the Conservation Site: enhanced leadership and an expansion of the selected activities endorsed at the Conservation Site.

The suggestions below indicate reservations about the Conservation Site manager's knowledge of conservation.

There is a wish to have environmental experts (Respondent 145)
My suggestion is for the Conservation Site to have the best workers (110)

This issue can be addressed by presenting workshops on how to network with environmental nonprofits, government programs and universities to help them pursue unfamiliar conservation projects in the future. This will build the Community's capacity to identify and collaborate with experts after Roots & Shoots has transferred control of the Conservation Site to the Community and Village government.

The current relationships between the Community and Roots & Shoots leaders leaves room for improvement. The Community is not confident that the Conservation Site's leaders have their best interests at heart.

<p><i>Concerned leaders (Respondent 24)</i> <i>To care together with the Community(Respondent 40)</i></p>

These suggestions to improve the quality of leadership at the Conservation Site may have been said due to past unsatisfactory experiences at the site. Or these feelings may have been expressed because the survey participants have not spent enough time interacting with the Conservation Site manager. Positive impressions of the Conservation Site's leaders can be encouraged by creating additional opportunities for collaboration and information exchange with Roots & Shoots and the Site manager with the Community. The increase in interaction might alleviate the Community's concerns.

A final cluster of recommendations related to improving the management of the Conservation Site focused on developing the program's activities. The responses hinted at an interest in new activities at the Conservation Site.

With development (Respondent 46)
To expand activities at the Conservation Site (Respondent 61)
By increasing other projects(Respondent 42)
Compost (Respondent 151)
Fodder (Respondent 212)

Other management advice included expanding the Conservation Site from the current two acres. Increasing the area may have been suggested so that more activities can be present or more land is needed for the current activities to be effective. A third possibility may be that the participants misunderstood the question and were referencing the need to have more land at their homes.

Access to water came up during the study because when the Conservation Site was first established a controversy developed over the diversion of water for the fish ponds at the site from irate Villagers who lived downstream. Now that there is more widespread understanding of the Conservation Site's well meaning intentions, more survey participants are supportive.

Other respondents recognized the value of the Conservation Site's activities and felt that people with bad intentions like vandalism could cause potential harm. Therefore the survey participants recommend having security to watch over the site during the night. Security guards are common in homes and businesses in cities and towns.

The majority of the respondents felt their needs were not being satisfied by the Conservation Site. The survey participants' responses to how the Conservation Site can change to satisfy their needs did not glean appropriate responses. More time needs to be spent on this question in the future. The question may need to be phrased differently because the answers were not directly related to changes at the site.

Only half of the sample population felt the Conservation Site was providing effective options to improve their families' livelihoods. This response is indicative of a Community's reaction to a project that did not involve them during the project formulation. If Roots & Shoots were to sponsor a participatory rural appraisal the Community would finally have the opportunity to voice their ideas for the Conservation Site. This activity would also serve to demonstrate that this organization is concerned about their needs and provide a new outlet for Community participation at the site. This statistic may be biased because many people were unfamiliar with the Conservation Site except for the information provided in a brief paragraph during the survey.

Conclusion

The survey demonstrated that the general knowledge and application of the four sustainable activities (tree nurseries, beekeeping, fuel efficient stoves and fish farming) in the Community were not widespread. Of the four activities, the Community had a higher awareness of the long-established activities (tree nurseries and beekeeping) while the sample's familiarity with the more recently introduced activities (fish farming and fuel efficient stoves) was inadequate. The likelihood of adopting these activities in Mweka Village followed a similar trend as the level of awareness in the Community. However, the number of people who owned beehives trumped the number of people who owned tree nurseries. The Community recognized lack of money, education and land as three major obstacles to adopting these sustainable activities. Overall, the survey participants, who were familiar with the four selected activities at the Conservation, understood the positive influences of these activities on their families and the environment. The interest in all four selected activities was palpable. Although the number of people who adopted fish ponds in their homes were few and far between, fish farming was warmly received by the Community.

The Conservation Site has lots of room to grow and make an impact in the Community in terms of awareness and participation at the Conservation Site before December 2010. Only a minority of the sample population had heard of the Conservation Site and could identify its purpose. The lack of awareness in regards to fuel efficient stoves and fish farming, the two activities the Conservation Site introduced to the Community, implies that the Conservation Site is not effectively meeting its short-term objectives to conduct educational workshops. As the least familiar of the four activities, fuel efficient stoves and fish farming can be used to gauge the overall influence of the Conservation Site in the Community in the future. Since the survey

sample was not 100 percent aware of any of the four activities at the Conservation Site, there is a need for educational workshops to continue to be offered in the Community for each activity.

However, more workshops should be offered on fish keeping and fuel efficient stoves.

Interest in the sustainable activities needs to be fostered through well-rounded workshops that address the benefits for families and the environment and obstacles to adoption that were voiced by the survey participants. The Conservation Site needs to create innovative options for Villagers who do not own large properties, but are still interested in generating sustainable incomes and contributing to the conservation of the Mount Kilimanjaro region. The interest expressed by the survey participants in sustainable, income generating activities confirms that the Conservation Site fills a true niche in the Mweka Village.

The main recommendations to improve Community participation, Community outreach and the management of the Conservation Site reflect a lack of Community involvement after the Roots & Shoots students and teachers proposed the original concept for a Community tree nursery. These issues may not have arisen if the Community had remained involved during the formulation and implementation stages of the project. The Conservation Site needs to re-integrate participatory approaches in order to become an authentic Community-based project.

Awareness of a true Community-based Conservation Site should be ubiquitous in the Community. Yet in the case of Mweka Village the Conservation Site needs better marketing. Respondents stressed the need for more education on the purpose and activities promoted at the Conservation Site. More training of trainers will increase the site's capabilities to offer more workshops at the Conservation Site and in the seven sub-villages of Mweka. This will also provide more opportunities for empowered Villagers to take on a more active role at the Conservation Site. With more workshops the project will increase its impact. Survey

participants recognized that the Conservation Site will only be effective if the whole Community rallies around the Conservation Site and increases conservation efforts in solidarity.

I recommend that Roots & Shoots encourages the Community to form a board of diverse stakeholders with the Conservation Site manager. The board should make decisions on how to run the Conservation Site together. This will address the need for the increased cooperation between the Community and Roots & Shoots site leaders and prove that leaders of Roots & Shoots are concerned about the opinions of the Community.

My final advice is for Roots & Shoots to conduct a participatory rural appraisal of Mweka Village as soon as possible. This activity can further explore why the Community did not feel the Conservation Site was effective in meeting their needs and identify new activities that need to be pursued at the Conservation Site. Additionally, this process will reinforce to the Community that the leaders of Roots & Shoots do care.

The Conservation Site will have the potential to make progress in Mweka Village if Roots & Shoots implements these suggestions. Re-integrating participatory approaches at the Conservation Site will encourage the Community to become more invested and feel “shoulder to shoulder” with Roots & Shoots. As a result, the Conservation Site will become more effective in meetings its objects to “raise Community awareness of the importance of conservation and to enhance skills within the Community for the sustainable use of natural resources.” These measures will improve the likelihood that the Conservation Site project will be sustained as a treasured resource in 2010 when Roots & Shoots transfers control to the Community and Mweka Village government.

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Appendix A. Invitations and Informed consent

English Version

Hello (or Good Evening/Afternoon). My name is X from Y village, and I am working with Angela, an advanced student at Duke University in the USA.

I'm conducting a 20 minute survey on Mweka community's needs and understanding of the local environment and the Roots & Shoots Conservation Site, and would really appreciate your input on this topic. Are you interested?

If yes, great, this survey is a joint research effort between the Nicholas School at Duke University and Roots & Shoots. Your household was selected at random from a village map. For this survey I need to talk to someone who is in secondary school or an adult who is a resident of this household. Do you fit this description?

If no: Is there someone else I could speak to who is in secondary school or an adult who is a resident of this household?

If the participant is a high school student under 18 years of age, ask for oral permission from a guardian before administering survey.

I want to emphasize that I will not be writing down your name or address with your responses. I will be asking for your age, village, street name, and other information, but Angela will not link this information to anything you say when she writes her report or talks with people about what we learn. No one will be able to know who gave which answers. Also, there are no correct or incorrect answers, and please tell me if you would like me to repeat any question or if you want to skip a question. You may also choose to end the survey at any time.

The survey results will be used to develop a recommendation report for the Roots & Shoots Conservation Site and presented at village and R&S club meetings.

Do you have any questions for me?

Shall we go ahead with the survey questions?

Swahili Version

Habari za asubuhi/mchana/jioni? Jina langu ni _____ kutoka kijiji cha Mweka. Ninafanya kazi na Angela, ambaye ni mwanafunzi katika chuo kikuu cha Duke nchini Marekani.

Ninafanya kazi ukaguzi wa dakika ishirini kuhusu mahitaji ya jamii ya Mweka na uelewa na kitalu cha miti cha Roots & Shoots. Nitashukuru mchango wako juu ya hili. Je, uko tayari?

Kama uko tayari, vizuri. Ukaguzi huu ni muunganiko wa jitihada za utafiti kati ya shule ya Nicholas iliyopo chuo kikuu cha Duke na Taasisi ya Roots & Shoots. Nyumba yako ilichaguliwa bila utaratibu. Kwenye ukaguzi huu nahitaji kuongea na mtu aliye shule ya sekondari au mtu mzima anaeishi katika nyumba yako. Umeelewa maelezo hayo?

Kama hapana: Kuna mtu mwingine mnaweza kuongea nae alie shule ya sekondari au aliye mtu mzima aneishi nyumbani kwako?

Kama mshiriki yuko elimu ya juu chini ya miaka 18 unahitaji kuomba ruhusa kutoka kwa mlezi kabla ya kumingiza katika ukaguzi huu.

Ninatilia mkazo kuwa sitaandika jina lako au anwani pamoja na majibu yako. Maswala nitakayouliza ni miaka yako, kitongoji na mtaa utokao na taarifa nyinginezo. Ila Angela hatausisha taarifa hizo na jambo utakaloongea pale atapokuwa anandika ripoti yake au anaongea na watu kuhusu alilojifunza. Hamna mtu atakaeweza kujua nani katoa jibu Fulani. Pia hakuna jibu zuri na baya, yote ni majibu na utaniambia kama kuna swali unataka nirudie au kuna swali niliruke. Na unaruhusa ya kukatisha ukaguzi muda wowote utakaojisikia.

Majibu ya ukaguzi yatatumika kuendeleza mapendekezo ya ripoti ya Taasisi ya Roots & Shoots na yatawasilishwa katika kijiji na katika vikao vya klabu cha Roots & Shoots.

Je, una maswali yoyote?

Tuendeleo na maswali ya ukaguzi?

Appendix B. Survey

English Version

Section 1. Demographics

- 1) Gender:
- 2) Which sub-village do you live in?
- 3) How many years have you lived in your sub-village?
- 4) What economic activities you participate in?
- 5) How much land in acres does your family own in this village?
- 6) Do you own another property in the Mount Kilimanjaro region and how many acres is this property?
- 7) Please list how your family's total property in the Mount Kilimanjaro region is divided by use and how many acres is dedicated to this activity:
- 8) What is your religion?
- 9) What is the highest level of education you have completed?
- 10) How old are you?
- 11) What is your family's total income earned over the last 12 months (Tsh)?

Section 2.

- 1) Are you familiar with the Roots & Shoots Conservation Site?
****If the answer is no, move on to Section 3. Fuel-Efficient Stoves****
- 2) Please, explain the purpose of the Roots & Shoots Conservation Site:
- 3) Please list the activities that are being taught at the Roots & Shoots Conservation Site:
- 4) Have you visited the Roots & Shoots Conservation Site?
****If the answer is no, move on to question six****
- 5) Please describe your experience:

6) Did you share what you learned at the Roots & Shoots Conservation Site with your family?

Section 3. Fuel-Efficient Stoves

1) Are you familiar with fuel-efficient stoves?

****If the answer is no, move on to Section 4. Tree Nurseries****

2) How can fuel-efficient stoves influence your family?

3) Also, how can fuel-efficient stoves influence the environment?

4) Do you have a fuel-efficient stove at your house?

5) If no, why don't you have a fuel-efficient stove at your house?

6) Any further comments about fuel-efficient stoves?

Section 4. Tree Nurseries

1) Are you familiar with any tree nurseries?

****If the answer is no, move on to Section 5. Beekeeping****

2) How can tree nurseries influence your family?

3) Also, how can tree nurseries influence the environment?

4) Do you have a tree nursery at your house?

5) If no, why don't you have a tree nursery at your house?

6) Any further comments about tree nurseries?

Section 5. Beekeeping

1) Are you familiar with beekeeping?

****If the answer is no, move on to Section 6. Fish farming****

2) How can beekeeping influence your family?

- 3) Also, how can beekeeping influence the environment?
 - 4) Do you have a bee hive at your house?
 - 5) If no, why don't you have a bee hive at your house?
 - 6) Any further comments about beekeeping?
-

Section 6. Fish farming

- 1) Are you familiar with fish farming?
- **If the answer is no, move on to Section 7.****
- 2) How can fish farming influence your family?
 - 3) Also, how can fish farming influence the environment?
 - 4) Do you have a fish pond at your house?
 - 5) If no, why don't you have a fish pond at your house?
 - 6) Any further comments about fish farming?
-

Section 7.

- 1) Are you willing to engage in economic activities other than your current economic activities in order to protect the Mount Kilimanjaro National Park and Forest Reserve?
- 2) Why have you not diversified your economic activities to protect the Mount Kilimanjaro National Park and Forest Reserve?

Please, read first: The Roots & Shoots Conservation Site is near the forest of the sub-village of Olele. At the Conservation Site there are different activities like beekeeping, fish farming, tree nurseries and fuel-efficient stoves.

- 3) Does the Conservation Site satisfy your needs?
- 4) If no, how can the Conservation Site change in the future to satisfy your needs?
- 5) Do you think the Conservation Site is providing effective options to improve your life?
- 6) Do you think the Conservation Site is providing effective options to improve your

environment?

7) Please give your suggestions for how the Conservation Site can progress in the future.

Swahili Version

Sehemu 1. Historia fupi

- 1) Jinsia (**Hutasema kwa sauti, andika namba ya jibu**):
- 2) Unaishi katika kitongoji gani?
- 3) Umeishi kwenye kijiji hiki kwa miaka mingapi?
- 4) Unajishughulisha na shughuli gani kiuchumi ?
- 5) Eneo la shamba lako lina ukubwa wa heka ngapi hapa kijijini? (**andika namba ya heka**)
- 6) Una eneo lingine katika mkoa wa Kilimanjaro na lina ukubwa gani? (**andika namba ya heka**)
- 7) Kwa ujumla familia yako ina heka katika mkoa Kilimanjaro, na ni heka ngapi zinazotumika kwa: (**andika zinazotumika na heka ngapi**)
- 8) Dini yako ni ipi?
- 9) Umesoma mpaka darasa la ngapi?
- 10) Una umri gani?
- 11) Je, kipato chako kwa mwaka moja ni shilingi ngapi?

Sehemu 2.

1) Unafahamu chochote kuhusu Kitalu cha miti ya Roots & Shoots?

****Kama hapana, endelea Sehemu 3. Majiko sanifu****

2) Tafadhali, elezea madhumuni ya Kitalu cha miti ya Roots & Shoots:

3) Tafadhali, taja shughuli zinazofanyika katika Kitalu cha miti ya Roots & Shoots hiki?

4) Ulishawahi kutembelea Kitalu cha miti ya Roots & Shoots?

****Kama ndiyo, endelea na maswali mawili ya fuatayo****

5) Tafadhali elezea ulipata uzoefu gani :

6) Umeshirikisha familia yako kuhusu kile ulichojifunza katika Kitalu cha miti ya Roots & Shoots?

Sehemu 3. Jiko sanifu

1) Unafahamu kuhusu majiko sanifu?

****Kama hapana, endelea Sehemu 4. Kitalu cha miti****

2) Ni kwa namna gani majiko sanifu yamevutia kuelekea msimamo fulani katika familia yako?

3) Pia, ni kwa namna gani majiko sanifu yamevutia kuelekea msimamo fulani katika mazingira kwa ujumla?

4) Una jiko sanifu nyumbani kwako?

5) Kama hapana, kwa nini huna jiko sanifu nyumbani kwako?

6) Kama una kitu kingine kuhusu majiko sanifu elezea:

Sehemu 4. Kitalu cha miti

1) Unafahamu kuhusu kitalu cha miti chochote?

****Kama hapana, endelea Sehemu 5. Ufugaji wa nyuki****

2) Ni kwa namna gani kitalu cha miti kimevutia kuelekea msimamo fulani katika familia yako?

3) Pia, ni kwa namna gani kitalu cha miti kimevutia kuelekea msimamo fulani katika mazingira kwa ujumla?

4) Una kitalu cha miti nyumbani kwako?

5) Kama hapana, kwa nini huna kitalu cha miti nyumbani kwako?

6) Kama una kitu kingine kuhusu kitalu cha miti elezea:

Sehemu 5. Ufugaji wa nyuki

1) Unafahamu kuhusu ufugaji wa nyuki?

****Kama hapana, endelea Sehemu 6. Ufugaji wa samaki****

2) Ni kwa namna gani ufugaji wa nyuki umevutia kuelekea msimamo fulani katika familia yako?

3) Pia, ni kwa namna gani ufugaji wa nyuki umevutia kuelekea msimamo fulani katika mazingira kwa ujumla?

4) Una mzinga wa nyuki nyumbani kwako?

5) Kama hapana, kwa nini huna mzinga wa nyuki nyumbani kwako?

6) Kama una kitu kingine kuhusu ufugaji wa nyuki elezea:

Sehemu 6. Ufugaji wa samaki

1) Unafahamu kuhusu ufugaji wa samaki?

****Kama hapana, endelea Sehemu 7.****

2) Ni kwa namna gani ufugaji wa samaki umevutia kuelekea msimamo fulani katika familia yako?

3) Pia, ni kwa namna gani ufugaji wa samaki umevutia kuelekea msimamo fulani katika mazingira kwa ujumla?

4) Una bwawa la samaki nyumbani kwako?

5) Kama hapana, kwa nini huna bwawa la samaki nyumbani kwako?

6) Kama una kitu kingine kuhusu ufugaji wa samaki elezea:

Sehemu 7.

1) Unataka kufanya shughuli nyingine za kiuchumi tofauti na unazofanya sasa hivi ili kulinda na kutunza hifadhi ya Mlima Kilimanjaro?

2) Kwa nini hukupanua shughuli zako za kiuchumi ili kufadhi Mlima Kilimanjaro?

Tafadhali, soma kwanza: Kitalu cha miti ya Roots & Shoots ni karibu na msituni katika kitongoji cha Olele. Kitalu cha miti ya Roots & Shoots kuna shughuli mbalimbali kama ufugaji wa nyuki,

ufugaji wa samaki, kitalu cha miti na majiko sanifu.

- 3) Je, Kitalu cha miti ya Roots & Shoots kimeweza kutosheleza mahitaji yako?
 - 4) Kama hapana, Kitalu cha miti ya Roots & Shoots kitabadilishaje kutosheleza mahitaji yako?
 - 5) Unafikiri kitalu cha miti ya Roots & Shoots kimekupatia matokeo kuinua hali ya maisha yako?
 - 6) Pia, unafikiri Kitalu cha miti ya Roots & Shoots kimekupatia matokeo kuinua hali ya mazingira?
 - 7) Ni kwa namna gani kitalu cha miti ya Roots & Shoots kimeweza kuendelea kwa kutoa mapendekezo yako au maoni.
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