



**Introducing Sustainable Agriculture Techniques to the
Ingui Tuareg Community of Northern Niger**

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Table of Contents

1. Problem Statement.....	10
1.1. Problem Tree Analysis.....	12
2. Review of Literature.....	12
2.1. Water Harvesting.....	13
2.2. Sustainable Management of Groundwater.....	14
2.3. Drip Irrigation Systems.....	15
2.4. Drip Irrigation in Sub-Saharan Africa.....	17
2.5. Conclusion.....	19
3. Community Needs Assessment.....	20
3.1. Stakeholder Analysis.....	20
3.1.1. Who are the Most Important Stakeholders?.....	20
3.1.2. What is the Stakeholders' Knowledge of the Proposed Project?.....	21
3.1.3. What are the Stakeholders' Positions on the Specific Project?.....	21
3.1.4. What do the Stakeholders See as Possible Advantages/Disadvantages of the Proposed Project?.....	22
3.1.5. Which Stakeholders Might Form an Alliance?.....	23
3.2. SWOT Analysis.....	24
3.3. Purpose of the Community Needs Assessment.....	24
3.4. Research Questions.....	25
3.5. Methodology of Community Needs Assessment.....	25
3.5.1. Qualitative Methods.....	25
3.5.2. Data Collection and Sampling Methods.....	25
3.6. Tools Used for Data Collection.....	27
3.6.1. Data Analysis.....	27
3.7. Results.....	27
3.7.1. An Identified Need for New Agricultural Technologies.....	27
3.7.2. Ideas for Improving Agricultural Production in the Eyes of the Ingui Community.....	28
3.7.3. Ingui Community Members are Ready and Willing to Try New Techniques.....	30
3.7.4. Varied Ideas for Targeting Who Should Learn the New Techniques First.....	31

4.	Project Design	33
4.1.	Project Overview	33
4.2.	Project Goal	34
4.3.	Project Objectives	34
4.4.	Logic Model	34
4.5.	Host organization	36
4.5.1.	Organizational Overview	36
4.5.2.	Organizational Structure	37
4.5.3.	Staff	37
4.6.	Implementation Plan	38
4.6.1.	Implementation Plan	39
4.6.2.	Project Implementation: August 2009 to April 2010	39
4.7.	Budget	43
5.	Monitoring and Evaluation	43
5.1.	Monitoring	43
5.1.1.	Expected Result 1: Access to nutritious locally grown foods for students at Ingui School is improved through the development of a school garden.	44
5.1.2.	Expected Result 2: Agricultural production is reinforced through the promotion and use of sustainable agricultural techniques.	47
5.1.3.	Expected Result 3: Economic capacity of the Ingui school is improved.	48
5.2.	Evaluation	51
5.2.1.	Conceptual Framework and Theory of Change	52
5.2.2.	Evaluation Objectives	53
5.2.3.	Evaluation Hypothesis	54
5.2.4.	Evaluation Methodology	54
5.2.5.	Data Collection Tools	55
5.2.6.	Data Analysis	55
5.2.7.	Summary of Findings	56
5.2.8.	Sustainability Plan	61
6.	Lessons Learnt	63
6.1.	Project Success	63

6.1.1.	Flexibility Was Essential	63
6.1.2.	Revisions Were Worth It	64
6.1.3.	Community Participation Created Ownership	64
6.2.	Constraints.....	65
6.2.1.	Insecurity.....	65
6.2.2.	Political Instability	65
6.2.3.	Low-Literacy.....	66
6.2.4.	Limited Time for Evaluation	67
7.	Recommendations.....	67
7.1.	Increase Number of Program Beneficiaries	68
7.2.	Ensure Proper Time is allotted for Project Evaluation.....	68
7.3.	Conduct Refresher Trainings	68
7.4.	Continue Investing in Drip Irrigation Technology.....	69
8.	References.....	70
9.	Appendices.....	72
A.	Problem Tree Analysis	72
B.	Stakeholders Analysis	73
C.	SWOT Analysis.....	74
D.	Interview guide for community surveys.....	75
E.	Interview guide for key informant interviews.....	78
F.	Community forum questions guide.....	81
G.	Household survey for final evaluation	83
H.	Sustainable agriculture training Pre and Post test for gardener, students, parents and faculty	86
I.	Business management Pre and Post test for garden committee, students, parents and faculty	89
J.	Sustainable Agriculture Training Pre and Post Test Results Scores.....	92
K.	Business Management Training Pre and Post Test Results Scores.....	93
L.	Questionnaire for garden management committee.....	95
M.	Implementation Plan	97
N.	Monitoring Plan.....	99

Abstract

The goal of this project was to introduce and provide training in sustainable agricultural irrigation techniques to students and parents at the Ingui School in order to meet the short-term food security needs of students and to provide an additional source of economic revenue for the Ingui School. This report provides detailed information on the problems facing the Ingui community, and project development, implementation, monitoring and evaluation. Results of the project evaluation indicate that project beneficiaries had increased knowledge of drip irrigation technology and business management skills. In addition, results indicated that the majority of garden produce was being consumed by schoolchildren, providing them with health and nutritious food. Finally, due to the short duration of the project, data was insufficient to evaluate the change in school revenue from the sale of garden produce. Overall, the project was successful in that all activities were implemented and the majority of project targets met.

i. List of Tables

Table 1: Logic Model.....	35
Table 2: Budget (Training)	43
Table 3: Budget (Materials for Garden and enclosure)	43
Table 4: Budget (Equipment for a 2,000 Meter Garden).....	43
Table 5: Total Budget for Garden.....	43
Table 6: Stakeholder Analysis	73
Table 7: Sustainable Agriculture Training Pre and Post Test Results Scores	92
Table 8: Business Management Training Pre and Post Test Result Scores.....	93
Table 9: Garden Budget and Report Inputs and Outputs.....	96

ii. List of Figures

Figure 1: Conceptual Framework	52
Figure 2: Problem Tree Analysis	72

iii. List of Symbols Abbreviations and Nomenclature

ALIN-EA	Arid Lands Information Network Eastern Africa
AMG	African Market Garden
CNA	Community Needs Assessment
ICRISAT	International Crops Institute for the Semi-Arid Tropics
IDE	International Development Enterprises
M&E	Monitoring and Evaluation
NGO	Non-Governmental Organization
RAIN	Rain for the Sahel and Sahara
SHA	Stakeholder Analysis
SWOT	Strengths, Weaknesses, Opportunities, Threats
UN	United Nations
UNICEF	United Nations Children's Fund
USD	United States Dollars
WFS	World Food Summit

1. Problem Statement

Niger is one of the poorest and least developed countries in the world, with over 80 percent of its territory covered by the Sahara desert, and much of the rest threatened by periodic drought and desertification (World Bank, 2009). The economy is concentrated around subsistence and some export agriculture clustered in the more fertile south, and the export of raw materials—especially uranium ore. Niger remains handicapped by its landlocked position, poor education, infrastructure, health care, and environmental degradation.

The Tuareg are a nomadic pastoralist people. Today they are mostly found in West Africa, with approximately 1.5 million Tuaregs (approximately 10 percent of Niger's population) currently living in Niger (UN, 2008). With little primary education, Niger has one of the lowest literacy rates in the world. Its health system is basic and disease is widespread. Among the nomadic Tuareg, the literacy rate is less than 15 percent (UNICEF, 2009). In a country where opportunities for jobs or higher education are achingly rare, many are beginning to realize that education is vital, especially for children, in order to find alternative ways to support themselves. Even the many Tuaregs who wish to remain nomadic herders have a need to be literate in order to engage in the national dialogue and to attain the skills necessary to make life on the fringes of the desert sustainable.

Many Tuaregs cannot afford to send their children to school. In addition to the costs of education, there are the costs of food, living, quarters, and potable water. Many areas where schools are located do not have wells for drinking water. Unfortunately, many Tuareg herders are forced to choose between sending their children to school and keeping them at home to help with their animals in order to earn enough money to survive.

As pastoralists, the Tuaregs have an economy based on livestock breeding, trading, and agriculture. Niger's rainfall patterns are often erratic and unpredictable and it has been difficult for the Tuaregs to survive in the hostile desert environment. Over recent years however, depletion of water by the uranium exploitation process combined with the effects of climate change are threatening their ability to subsist. This is exacerbated by the increased rate of desertification thought to be the result of global warming. Lack of water forces the Tuareg to compete with southern farming communities for scarce resources and this has led to tensions and clashes between these communities. The precise levels of environmental and social impact of the mining industry have proved difficult to monitor due to governmental obstruction (World Bank, 2009).

Modern agricultural techniques have been developed to tackle water resource issues similar to those in Niger. Unfortunately, most Tuaregs continue to use traditional agricultural production techniques. This is likely due to the fact that many are unaware of the nature of these new techniques or that they are unable to access to this knowledge through schools or trainings due to cost-related issues.

Promoting the use of more agricultural techniques that are more modern, but geared towards sustainability in unstable environments where access to water is often unpredictable and changes. From year to year, may be able to address some of the main problems facing Tuareg communities: agriculture, education, and poverty. The purpose of adapting sustainable agricultural practices is to develop better ways of ensuring that agricultural yields are sufficient to meet the needs of individuals and additionally to produce a surplus that can be sold in order to generate revenue. Introducing these techniques to Tuareg populations must be implemented through detailed comprehensive trainings and educational sessions. If these new methods are

applied and practiced correctly and appropriate for the cultural context, then it may be able to ultimately break the cycle of poverty for Tuaregs, as they will yield larger harvests and be able to sell more crops, inevitably earning a more stable source of revenue.

1.1. Problem Tree Analysis

The purpose of this project is to introduce sustainable agricultural irrigation techniques, which will help mitigate poverty and improve individual and community development in Tuareg populations by providing economic opportunities through agricultural production. The project will incorporate components that will help target some of the main problems facing Tuareg communities in Niger today: poverty, access to water, and poor agricultural harvests.

These issues, as outlined in the problem tree analysis (Appendix A), are problems at the heart of the Ingui community. Poverty, along with climate change, both cause limited access to water. Climate change, unpredictable droughts, and limited access to water lead to poor agricultural harvests. Poor harvests, in return have negative effects such as inadequate availability of food and children dropping out of schools to work to help earn money to purchase food for their families. Also, these two effects may lead to other problems such as malnutrition, high child mortality, and low enrollment for school-aged children. Therefore, in order to intervene at the roots of these problems, the proposed project will target the four issues mentioned above.

2. Review of Literature

A review of literature was conducted in order to deeper examine the theoretical backgrounds and practical applications of various sustainable agricultural practices and techniques. Special attention was paid towards environmental contexts similar to those in

northern Niger, where rainfall is sporadic and access to ground water can be difficult. The information collected during the review of literature was analyzed and synthesized in relation to the research problem, which can be found below. This information was helpful during the process of identifying the technique to use for the proposed project.

2.1. Water Harvesting

In light of growing scarcity and competition for limited water resources in dry and arid environments, new and innovative techniques for developing and using water for agricultural and food production are constantly being developed and are widely varied. Water harvesting is an old technique based on the reliance of regular rain-water for crop production that has evolved over time and is yielding positive results in agricultural production. Rainwater harvesting is the process of concentrating and conserving rainfall runoff in the field or in storage structures, such as tanks or ponds, in order to mitigate the unpredictability of rainfall patterns and dry spells that characterize regions such as the Sahel. A growing number of studies (Ngigi, 2002; Rockstrom ,Barron and Fox., 2001; WFS, 1996) have shown that the yield and reliability of agricultural production can be significantly improved with water harvesting.

In 1996, The World Food Summit (WFS) cited three to fourfold yield increases with drip irrigation or hand-watering, made possible by water harvesting for dry land farming in Burkina Faso, Kenya, and Sudan. Farmers in Burkina Faso served as an example where water harvesting was used to improve production and increase income (WFS, 1996). The WFS constructed water harvesting schemes and trained local farmers in the technique. Farmers in rural villages with little access to ground water were using an improved version of their traditional water-harvesting techniques that involved simple stone bunds to collect rainwater and later be used in a drip irrigation system.

The potential benefits of water-harvesting techniques include: low-cost, labor saving techniques; low-maintenance required for water storage basins; and environmental benefits with reduced reliance on ground-water sources (Ngigi, 2002). However, there are some potential disadvantages for using this type of agricultural technique. Social and economic conditions within a given community might not accept the technique (WFS, 1996). In addition, this technique assumes that for a given area there will at least be some rainfall activity. In regions close to the Sahara Desert, regions where Tuareg populations reside, rainfall may only occur once or twice each year, which would make even this technology very difficult to rely on.

2.2. Sustainable Management of Groundwater

In countries with high levels of rural poverty, groundwater development offers an opportunity for promoting food and improving agricultural livelihoods. Simple and affordable innovations in water-lifting technologies, such as the treadle pump and the motor-pump technologies have the potential to improve dramatically poor, rural populations' access to groundwater, as was witnessed in countries including Bangladesh, India, and some parts of West Africa such as Nigeria, Niger and Chad (Shah & al., 2000; Purkey & Vermillion, 1995). These studies revealed that the capital requirements for installing groundwater irrigation are generally low and productivity is generally high.

Shallow aquifers and tube wells for semi-deep water tables are common groundwater management techniques used in West Africa (Purkey & Vermillion, 1995). These technologies use electronic or gasoline motors/pumps to pump water out of the tubes or aquifers. One advantage of shallow aquifers and tube wells is that they allow easy access to water sources at a low capital. The National Fadama Development Project of the Government of Nigeria is one example of aquifer development. The project was aimed at accelerating inland valley

development through small-scale irrigation as well as 50,000 tube wells to irrigate 100,000 hectares of land. The program was based on the use of a simple technology for drilling tube wells and improved irrigation management through water user associations (WFS, 1996). These lift irrigation technologies were widely accepted and successful in Nigeria. However, two problems were found associated with the motor/pump tube-wells and aquifers. First, some of the farmers lacked proper training in managing and maintaining these technologies. Second, the WFS noted that there was a possibility for over exploitation of groundwater resources if the technology was widespread in a certain area, resulting in groundwater depletion (WFS, 1996).

In northern regions of Niger, where Tuareg communities reign, access to ground water is difficult due to the deepness of the groundwater tables. Most communities do not have access to shallow aquifers and wells require deep digging in order to ensure they will be filled with water. In the minority of communities who may have access to shallow aquifers or shallow water tables, this type of technology may yield successful results. However, due to the fact that this is contrary to the majority, it may be more appropriate to seek another technique that could be applied specifically to northern Niger.

2.3. Drip Irrigation Systems

Drip irrigation is a water saving technology that delivers water through small holes or emitters in plastic tubes that are installed on/below the soil surface. Water flow rates are slow in drip irrigation systems and regular application is the basic concept underlying this method to supply the amount of water needed by the plant (Dasberg & Or, 1999). Drip irrigation systems became popular with the mass production of plastic tubes cheaply. According to Postel & al. (2001), the rapid expansion of drip irrigation systems in Australia, Israel, Mexico, South Africa

and the US was attributable to the higher crop yields and water use efficiencies gained by drip irrigation.

In a study conducted by Sijali in 2001, a number of advantages of the drip irrigation technology were highlighted. (Sijali, 2001). First, drip irrigation applies water more evenly than other irrigation methods and has higher crop yields than regular hand-watering systems. Second, water is more efficiently used. Because of the partial soil wetting rather than saturation, less water is lost by direct evaporation from the soil surface (Sijali, 2001). For areas similar to Niger where water is a scarce resource and wells dry up quickly, this an important advantage. Another advantage is that in drip-irrigated gardens; the number of weeds is reduced, meaning that the amount of labor spent on pulling weeds is also reduced.

The primary disadvantage of drip irrigation systems are cost and management. Conventional drip irrigation systems typically start at \$1500 USD per hectare. This however, is changing. Drip irrigation systems also need to be continually monitored and maintained, as their success depends upon good water management (Sijali, 2001). Maintenance and understanding of the technology of the drip irrigation system is imperative to success.

Chapin Watermatics, International Development Enterprises (IDE), and Netafim are three actors who have made pioneering efforts towards reducing the cost of drip irrigation systems. All of these have developed and launched versions of drip systems, which are now showing promise for raising the water efficiency, land productivity, and incomes of smallholders (Shah & Keller, 2002). For example, IDE in India promotes drip kits costing 80 percent less than conventional drip systems and has witnessed a shift from subsistence farming to higher value production. India have seen a doubling of the income of poor farmers, in addition to an enhancement in household food security and improved nutritional status (IDE, 2004).

Drip irrigation technology frees farmers from reliance on rain-fed farming. For Tuareg farmers in Niger, where rainwater is unpredictable, this is a plus. Also, these systems enable farmers to cultivate year-round and grow a wider variety of crops. In the Nigerien context, this good irrigation technology and agricultural practice would have to be coupled with dedicated participation and understanding by farmers in order for the technology to be successful.

2.4. Drip Irrigation in Sub-Saharan Africa

There have been some examples of successful irrigation implementations in Sub-Saharan African countries. In Zimbabwe, production by smallholder irrigators increased 300 percent over rain-fed agriculture (Chitsiko and Mudima, 2002). Arid Lands Information Network Eastern Africa (ALIN-EA) arranged an experience-sharing workshop in 1998 that brought together drip irrigation users and officials from governments and NGOs (ALIN-EA, 2002). Following the workshop, the use of drip irrigation gained momentum and many organizations are now promoting the technology in Kenya and Tanzania. (ALIN-EA, 2002).

In West Africa as well, drip irrigation technology has expanded. An interview with Dr. William Dar, Director of The International Crops Institute for the Semi-Arid Tropics (ICRISAT), provided great insight into the use of drip irrigation in the region. ICRISAT has been a pioneer for introducing drip irrigation agriculture and training in West Africa. ICRISAT serves nine West African countries and is headquartered in Niamey, Niger. Through the help of its expert staff, ICRISAT has developed and implemented the “African Market Garden (AMG)”, which is based on a low-pressure drip irrigation system and combined with a comprehensive crop husbandry training package (Dar, 2009).

Dr. Dar explained that the AMG “meets the challenges of poverty alleviation, malnutrition, and coping with climate change, including depletion of water resources and

desertification. It generates income for small producers, contributes to better nutrition, and mitigates the effects of climate change through the use of irrigation” (Dar, 2009 p 98). In addition to installing the drip irrigation systems, technical experts from ICRISAT teach beneficiary communities about the technology, maintenance and operations management, and improved gardening techniques such as crop rotation/diversification. This extra training helps to ensure sustainability so that local users have the capacity to manage the system on their own (Dar, 2009).

The advanced horticulture technology has all the advantages of pressured drip irrigation, including accurate and equal distribution of water in the field, no wetting of leaves and soil, and application of fertilizers with the water, but at a fraction of the cost. Dr. Dar revealed that for optimal performance and sustainability of an AMG, it should be installed in clusters, one plot beside the other in the field (Dar, 2009). ICRISAT’s AMGs require only one-meter pressure for operation, which means that low-capacity resources can be used to pump water into the field. In Ghana, AMGs have used hydraulic pressure from shallow dams, in Benin many AMGs use artesian aquifers, and in Niger, where sunlight is in abundance, AMGs use solar energy and solar driven water pumps (Dar, 2009). The solar energy systems are relatively cheap and require little maintenance. In total, over the last six years, approximately 2,500 AMGs were disseminated across the nine countries that ICRISAT works in. In the upcoming year, 400 AMGs are set to be installed in Senegal, with hundreds of other requests for orders already being made (Dar, 2009).

The examples in both East Africa and West Africa indicate that the popularity of drip irrigation technology is growing in Sub-Saharan Africa and regions where land conditions are harsh, weather patterns are random, and where communities depend upon agricultural production for their livelihoods. The success of this type of system in these countries is also applicable to

the Nigerien context. Similar success in Tuareg communities in the north is also likely. Since solar power is so abundant in Niger, the use of solar energy to pump water into the irrigation systems is appropriate. However, one drawback of this may be the technical maintenance required to fix or repair solar panels, as education and knowledge of this type of technology are very low among the Tuareg and learning the required technical skills necessary for maintenance may be difficult.

2.5. Conclusion

In this review of literature, various agricultural techniques and their field application of those techniques were discussed in order shed light on what type of intervention may be appropriate for Tuareg communities in Niger. First, water harvesting, a technique for storing and reusing rainwater, was discussed. Although this technique has been popular and successful in other parts of Africa, further analysis and taking into account unpredictable rainfall led to the belief that this intervention may not have the same success in northern Niger nor be appropriate for this project.

Next, the sustainable management of groundwater through the use of the techniques of aquifers and tube wells was reviewed. Again, although this technology was successful in Nigeria and other countries around the world, it may not be the right intervention in northern Niger, where water tables are far below the ground and deeper drilling is required.

Finally, drip irrigation technology was introduced and the use of drip irrigation systems through the 'African Market Garden' was discussed in detail. This type of agricultural technology and the AMG combined with proper agricultural training has yielded great success and popularity in both West Africa and in particular Niger. Taking into consideration the environment and the agricultural problems facing Tuareg communities, this technology has the

potential to be a sustainable solution for improving agricultural production for these communities.

3. Community Needs Assessment

The community needs assessment was conducted in October and November 2009. As part of the community needs assessment, a stakeholder analysis and a strengths, weaknesses, opportunities, and threats (SWOT) analysis was conducted. The results of the CNA, the SHA, and the SWOT analysis are described in the sections below.

3.1. Stakeholder Analysis

For the proposed project, a stakeholder analysis (SHA) was conducted. SHA chart is included as Appendix B. The results of the stakeholder analysis are detailed below.

3.1.1. Who are the Most Important Stakeholders?

The main stakeholders in this project include the host organization Rain for the Sahel and Sahara (RAIN), Ingui—a Tuareg community in RAIN’s program coverage area, the local government of Niger, other civic organizations and partner organizations of RAIN, and prospective donors (Appendix B). These main stakeholders were categorized into three power groups: Group 1—those who have leadership/high power; Group 2—those who have leadership/medium power; and Group 3—those who do not have leadership but have high to medium power.

- Group 1: The local government of Niger and the Tuareg community
- Group 2: The host organization
- Group 3: Prospective donors and other civic organizations/partner organizations

3.1.2. What are the Stakeholders' Knowledge of the Proposed Project?

Prior to the community needs assessment, the stakeholders' knowledge of the proposed project was low, especially for stakeholders falling into Group 1 and Group 3. Group 2, the host organization, had a greater general knowledge of the proposed project due to the fact that the program was developed by a member of the host organization's staff. Due to the low-level of knowledge about the project, a communication strategy was developed that was aimed especially towards the members in Group 1, the local government and the Tuareg community. During the community needs assessment, the proposed project was presented to both the community and local leaders. Upon collection of their specific input regarding the project, a finalized proposal will again be presented to these actors in order to clarify that all parties have a generalized knowledge about the project and also to reduce any opposition that may arise to the proposed project.

3.1.3. What are the Stakeholders' Positions on the Specific Project?

The main stakeholders hold different positions related to the proposed project. The local government will serve as a 'facilitator' to the project, because they will serve as an intermediary between the host organization and the community, but they will not be directly implementing the project. The community will act as an 'implementer' because they will in part be responsible for project implementation and manage many activities associated with the project. The community will also act as 'beneficiary' because they are the actors who directly benefit from the project. The host organization will hold the position of providing 'technical services' and be the 'direct implementer' of the project. The organization will also be responsible for maintaining project monitoring and evaluation. The prospective donor will act as the 'funding mechanism' for the

project. The donor is responsible for providing the funding and also monitoring the submitted project reports.

3.1.4. What do the Stakeholders See as Possible Advantages/Disadvantages of the Proposed Project?

The local government

Advantages:

- Include the sustainable agricultural technique used in the intervention into the national agricultural country strategy and best-practices guidelines;
- Project success may eventually improve national data and agricultural production statistics for the region;
- Project success may also eventually be included into the national poverty reduction strategy
- Increase agricultural production may stimulate the local economy

Disadvantages:

- The government will not be directly implementing the project, so it will not be able to manage the project directly or benefit directly

The community

Advantages:

- Learn a new agricultural production technique
- Potentially, if successful, communities will be able to increase their agricultural production and ability to sell and generate income from agriculture
- The host organization will provide all project related materials so they will benefit from free materials and free training (no direct cost to community)

Disadvantages:

- Use of new agricultural production techniques fail during implementation and negatively affect community's agricultural yield/production

Host Organization

Advantages:

- Widen organization's zones of intervention and create new relationships with community
- Organization gains more experience in Niger working with Tuareg communities

Disadvantages:

- Intervention failure or problems encountered during intervention may cost the host organization or cause problems between host and donor
- Problems encountered could weaken relationships between communities and organization or hurt organization's reputation

Donor

Advantages:

- Possible positive impact funded project may have on targeted population

Disadvantages:

- Possible misuse of funds or project failure resulting in loss of anticipated results/impact

3.1.5. Which Stakeholders Might Form an Alliance?

Many possible alliances were formed between stakeholders. The local government and the host organization may form a possible alliance, where eventually similar projects would be introduced into other communities within the same department that are under the jurisdiction of the same governing body. Another possible alliance is between the host organization and the community, where similar projects to the proposed may be duplicated in the same community. Also, the host organization may form an alliance with the donor. If the results of the proposed

project are positive, the donor may want to fund other projects of the host organization in the future. Finally, alliances were formed and strengthened between the local government and the community, in that these parties will need to work in harmony in order for the intervention to be successful.

3.2. SWOT Analysis

A SWOT analysis for the proposed project was conducted to evaluate the strengths, weaknesses, opportunities, and threats involved in the project (Appendix C). Project objectives were specified and internal and external factors were identified that were considered favorable and unfavorable to achieving the project objectives. The major finding from the SWOT analysis is that despite some of the possible threats and weaknesses associated with the project, the strengths and opportunities outweigh these. Overall, the SWOT analysis revealed that the project overall was considered as favorable towards achieving the project objectives.

3.3. Purpose of the Community Needs Assessment

In order to assess the specific needs of the Tuareg communities where the project will be implemented, a community needs assessment (CNA) was conducted in Ingui, the targeted Tuareg community that will benefit from the proposed project prior to its start. The main purpose of the CNA was to gain direct input and ideas from the community members in Ingui, so that the final project proposal takes into account the community's direct needs and priorities. The CNA analysis for this project incorporated three different techniques to assess the needs of the community: Public forums, key informant interviews, and a community survey.

3.4. Research Questions

A number of research questions were developed to guide the CNA. These research questions included:

1. Is there an immediate need for a transition from traditional agriculture system to new agricultural production techniques within the community of Ingui? (Based on prior experience in the region in similar communities, the review of literature, and host organizational knowledge/experience in Niger, it was assumed that the answer to this question was yes in order to develop the remaining questions).
2. If there is a need for new techniques, what techniques would be environmentally and culturally appropriate for a community such as Ingui?
3. Is the targeted community willing to and capable of adopting these new techniques and participate in implementing them?
4. Who in the community should learn these new techniques and through what means?

3.5. Methodology of Community Needs Assessment

3.5.1. Qualitative Methods

The qualitative method employed for this study was semi-structured interviews, semi-structured public forums, and a community survey. The interview questionnaires, public forum, and community survey were written in English and translated into French, Zarma or Hausa by the evaluator during the interview, of who is fluent in both local Nigerien languages and French.

3.5.2. Data Collection and Sampling Methods

Key Informant Interviews: First, information was collected from key informants in the community. These informants are residents who know the needs of the community. Informants

were chosen by the host organization. Key informants were interviewed by the sponsoring organization and the data collected from the interviews were analyzed and presented back to the community, in order to encourage more participation from others. This approach is relatively low in cost and involves community leaders and officials from the very beginning stages of the project.

Public Forums: The second technique that was used for the needs assessment is the public forum approach, where two large public meetings were held in order to gain information from a wide range of community residents concerning issues and needs facing the community. This technique provides an opportunity for citizens to actively participate in the needs assessment process.

Community Member Interviews: A community questionnaire was also developed and interviews were conducted with specific households in the community of Ingui. Stratified systematic sampling was used, a probability sampling method where households were divided into subgroups by neighborhood and then a systematic sample was taken in each subgroup. This sampling method assures that the survey represents not only the overall population of Ingui, but also the key subgroups of the population. Due to limited staff and time restrictions, 30 households were selected and interviewed. However, it is important to note that this does not present statistically generalizable information, but a vivid picture of what measures members of the Ingui community would like to see taken in their community. This survey helped collect data on the current status and situation in the community regarding agricultural production, education

and health status, local capacity, and general information on the village. The survey will be conducted post-intervention as well.¹

3.6. Tools Used for Data Collection

Interview guides and a list of developed questions were used as the main tools for data collection during the CNA. For detailed versions of the various tools, please refer to Appendices D, E and F.

3.6.1. Data Analysis

The host organization's Program Director input data into a Microsoft Excel database. Data analysis was conducted by the Program Director, who identified themes that emerged from the raw data.

3.7. Results

The results of the data analysis yielded answers to the four main research questions. Key themes and findings related to these answers are highlighted below.

3.7.1. An Identified Need for New Agricultural Technologies

Across all interviews and the community forum, people expressed that there was a need for new and improved agricultural technologies and practices in the Ingui Community. Many people spoke of the hardships that the community has faced in recent years: extensive droughts, inadequate rainfall and unpredictable weather patterns, a water-well that frequently dries up with

¹ Because the majority of Tuaregs in the communities in the implementation area are illiterate, it was not wise to use the surveying techniques that required participants to write their answers down. The open discussion format proved to be more useful and generated more comprehensive data on the needs of the community.

too much use, poor agricultural production, and hunger. The link between access to adequate water sources and agricultural production was well understood. One community member stated,

“We are subsistence farmers, but our crops will not grow because we there is not enough water. Aman, Iman. Water is life. We need help accessing water. But that is not the only thing we need. For generations my Tuareg brothers have struggled like me. Maybe it is the way we try to grow our crops that also does not work. Sometimes there is water, but we still barely have enough to eat and do not have anything to sell in the markets. I do not know the solution, but I think that with RAIN’s help, we can find one together” (Community Member, Personal Communication, October 2009).

Many of the community leaders interviewed during key informant interviews also stressed the need for new agricultural practices in their community. The village chief of Ingui explained,

“I have traveled throughout my country, to the south near the river and seen many farmers using techniques that we do not have. They do not rely only on the rain. They use equipment and tools that makes their work easier on them and makes their gardens greener. We too could be successful if we had the right help. We do not have access to water and we do not know how to use all of the tools that they have. But, we can learn. We just do not have enough money to start this on our own.” (Village chief, Personal Communication, October 2009).

3.7.2. Ideas for Improving Agricultural Production in the Eyes of the Ingui Community

During the community needs assessment, key informants and members of the Ingui residents were asked to give their opinions and ideas on what they would like to see done to improve agricultural production in their community. The most frequently stated idea was to

build water well in Ingui in order to ensure regular access to water that could be used for agricultural production. Some of the key informants that were interviewed indicated that gaining or improving access to water was the first step in the process. When the community was asked which type of well they would like, responses indicated that a deep well was needed. A few community members brought up the notion that having to draw water by hand was time-consuming and difficult. This activity is the primary responsibility of the women in the community.

We need a well, but it takes a long time to draw water by hand. The women in our community have many other duties to do during the day, like care for the children, cook, and take care of the home. I have heard that there are wells that make it easier and faster for the women to collect water. I think this will be helpful in Ingui (Community Member, Personal Communication, and October 2009).

Another idea that surfaced was crop diversification. Data revealed that a number of Ingui residents want to diversify the types of crops that they produce. In particular, people mentioned that vegetable production was low. Millet is the main crop produced in the Tuareg community because of its resilience and ability to grow in dry, arid environments. Unfortunately, it has proven difficult for community residents to produce a wide-variety of vegetables because seeds are difficult to find or too expensive and many crops fail to thrive because of the harsh environmental conditions. During the public forum, one woman explained,

Last year my husband purchased seeds to grow lettuce. Nothing grew because the rain did not come. We almost never are able to give vegetables to our children. (Community Member, Personal Communication, October 2009).

A local farmer in the community brought forth the idea of a communal land plot for agriculture during the public forum. His idea to improve the agricultural production in the region was to first build a well on a plot of land that would be designated for communal use. He explained that whoever wanted to use the well could pay a small fee to use a portion of the land. Everyone who paid would have equal land portions and could use the water for his garden. The money would go towards the community. Upon hearing his suggestion, a number of other community members agreed that this could be a successful strategy.

Another topic discussed during the public forum and some of the key informant interviews was education, including the reasons why many Tuareg children do not regularly attend school. Residents revealed that, because subsistence farming served as a primary livelihood for most Ingui residents, it is important that children help in the fields when they are young so that they too learn how to do it. In addition, paying to send their children to school is often too expensive for parents in Ingui. It is also common for adult males in Ingui to go on exode², travel on caravans, or travel for long periods of time. The females are left at home and children are expected to help with producing crops and caring for animals. This is another reason why they do not go to school and are an important part of agricultural production in Ingui.

3.7.3. Ingui Community Members are Ready and Willing to Try New Techniques

Based on the information listed above and further anecdotal evidence obtained from interviews and forums, in general Ingui community members were open to trying new agricultural technologies that may be more of a sustainable alternative to their present agricultural practices. The majority of people indicated that they were not satisfied with their current agricultural crop yields. Many people also cited dissatisfaction with current crop

² Rural – Urban migrations.

watering methods. It seemed important to community members that they receive adequate training in the use of any of these new techniques as well. Some felt that without it, the introduction of new technologies or equipment unfamiliar to the Ingui community would be a waste. Said one man during the community forum,

“If we change our traditions to something new, we need to first learn about why this new thing will help us and how to do it correctly. I have heard of NGO’s bringing their modern techniques to villages but not supporting the community afterwards. They give a donation of equipment and leave without teaching the community what to do with it. We do not want that to happen in Ingui. Teach us!” (Community Member, Personal Communication, October 2009).

3.7.4. Varied Ideas for Targeting Who Should Learn the New Techniques First

When asked the question who should directly benefit from support and training in new agricultural techniques, Responses from the interviews and the public forum were varied. One idea that frequently came up was to train all of the male farmers/agriculture producers in the Ingui community. Some explained that since they were the main people responsible for production and spend the most time in the fields, should be the ones learn any new agricultural techniques. Another suggestion given was that any community members who were interested should be able to learn about the new techniques, including both men and women. That way, everyone in the community could be involved if they wanted to.

Related to the previously mentioned fact that school-age Tuareg children often hold a key part in agricultural production, two key informants suggested that it might be useful to focus on teaching any new agricultural skills or practices to the children/youth in the community, as they may be more open to learning new techniques. The village chief explained,

“I am old and so are my brothers. Our children are ready to learn! They can help us change our ways. But it will be easier to show them the way first” (Village chief, Personal Communication, October 2009).

Said a local religious leader,

“Our children are the future; they should be the ones to learn the new practices” (Religious leader, Personal Communication, October 2009).

The project was developed based on the information gathered and results of the CNA and in collaboration with the review and analysis of researching the related literature. In addition, it was also important to take into account the mission and experience of the host organization when developing the project intervention. As responses indicated during the CNA, the need for improved technology, including improved access to water is high in the Ingui community. Access to water became a key pillar of the proposed project and an intervention was designed around the idea of increasing access to water for agricultural production. In addition, the need for good and thorough training in these new practices was also clear. This was taken into account and training became a key component of the project.

Taking into consideration the needs of the community, including the point that was made about youth education in Ingui and the fact that youth play an important role in agricultural production, in addition to the host organization’s experience working closely with schools, the idea to implement the project at the Ingui School was formed. Due to financial limitations and time limitations, it was not possible to design a large scale project where every person in the Ingui community was a direct beneficiary of the program. Instead, it was determined that the project could serve as an example of the possible outcomes of the new agricultural technology for the community. The idea is that the host organization will help the school develop a garden,

teach students and others the new technology, and the crops produced can be consumed by students and any additional crops can be sold, generating revenue for the school that can be used for garden maintenance and to pay for children's school fees.

Finally, with the information and examples studied during the literature review and after learning more about the situation in Ingui during the CNA, it seemed appropriate to try to introduce drip irrigation technology for the school garden and to follow the structure of the African Market Garden, as this has already been successful in Niger and in similar arid environments.

4. Project Design

4.1. Project Overview

Based on information collected from the literature review and the input that was provided during the community needs assessment, the proposed project focuses on building a technologically and environmentally sound agriculture system at Ingui's primary/secondary school. This system will incorporate drip irrigation and crop diversification techniques, which will be introduced and promoted to school children, school officials, and parents of the schoolchildren. This school garden is based upon the African Market Garden, a model of drip irrigation agriculture developed by ICRISAT (refer to literature review for more information). RAIN will help the Ingui School create a school garden that is maintained using sustainable drip irrigation agriculture and water management techniques. The food from this garden will be initially used to meet the nutritious needs of the school children. Any extra crops produced will then be sold in local markets, generating a profit that can be used to support the garden (maintenance, tools) and/or go towards school fees for students. A successful school garden will

inevitably serve as a model garden and serve as an example that encourages gardening and use of sustainable agriculture techniques among the rest of the Tuareg community.

4.2. Project Goal

The goal of the ‘Sustainable Agriculture Project’ is to introduce and provide training in sustainable agricultural irrigation techniques to students and parents of students who attend the Ingui School, in order to meet short-term food security needs of students and provide an additional source of economic revenue for the school.

4.3. Project Objectives

The objectives of the ‘Sustainable Agriculture Project’ include:

1. Increase access to and availability of nutritious locally grown foods for students attending the school in Ingui through the development of a school garden.
2. Reinforce agricultural production through the promotion and use of sustainable agricultural irrigation techniques to create a market garden at the school in Ingui.
3. Improve the economic capacity of the Ingui School.

4.4. Logic Model

SITUATION: The Ingui community is dependent on agriculture for survival. However, the community has limited access to water and rainfall patterns are unpredictable and insufficient. The traditional agricultural practices used are insufficient for agricultural production. People do not produce enough food to meet their family’s needs and do not produce enough crops to sell, exacerbating the issue of poverty. People in the Ingui community have a great need for new and improved agricultural practices, skills, and techniques in order to save their livelihoods.^{3 4}

³ **Assumptions:** Once the garden is established and yields crops, the school will use those crops; People will volunteer to be on the Garden Committee.

⁴ **External Factors:** Political environment, economic activity in areas, climate/environment, family circumstance

Table 1: Logic Model

INPUTS	OUTPUTS		OUTCOMES		
	Activities	Beneficiaries	Short-term	Medium-term	Long-term
-Technical Expertise -NGO staff -Community volunteers -Financing -Time -Drip Irrigation Technology -Garden Equipment -Assistance from local/regional governmental authorities	<ol style="list-style-type: none"> 1. Introduce intervention to community 2. Choose volunteer committee to manage garden 3. Train committee on garden management and M&E of project activities 4. Build well and install irrigation system and plant garden 5. Train gardener in drip irrigation and garden management 6. Train school children/parents/school authorities on drip irrigation, business management 	<p>Direct:</p> <ul style="list-style-type: none"> -School children -Teachers -School authorities -Parents of school children <p>Indirect:</p> <ul style="list-style-type: none"> -Entire Ingui community -Other communities surrounding Ingui 	<ol style="list-style-type: none"> 1. Committee learns garden management and knows how to monitor the garden development 2. Gardner, school children, parents, authorities, and committee improve knowledge of modern agricultural practices (drip irrigation technology) 3. Gardener, school children, parents, authorities learn business management skills and methods (marketing, money management, budgeting, etc.) 	<ol style="list-style-type: none"> 1. School garden provides nutritional food for school children and faculty 2. Crops produced in school garden are sold and provide source of revenue for school, to purchase school supplies and garden supplies 3. Those trained in new technology share knowledge with other community members and others begin using similar practices/techniques 	<ol style="list-style-type: none"> 1. Poverty in the Ingui community is mitigated by improved agricultural production 2. Community development is increased in the Ingui community through increased economic opportunity. 3. Increased educational attainment among the community.

4.5. Host organization

4.5.1. Organizational Overview

RAIN seeks to develop programs in all regions of Niger with nomadic populations including Agadez, Tillaberi, Tahoua and Zinder. They are evaluating the possibility of expanding to Mali and Burkina Faso as well. The total estimated nomadic population of these areas is 4,000,000 people.

The nomads of the Sahel and Sahara have been increasingly marginalized; RAIN is at the vanguard in serving their needs. Since its inception in 2002, RAIN's programs, staff, partnering and fund raising have achieved measured growth, sustained community trust and participation, and foundation support. RAIN's proven success with educational and other programs that increase livelihoods and preserve nomadic heritage in these remote regions is vital given the lack of governmental or nongovernmental services to these badly underserved regions. With literacy rates for children and adults under 15 percent and the increasing aridity of the West African Sahel, the need is great.

RAIN's mission addresses education, agriculture and water access and improved livelihoods through income-producing enterprises. These programs are not independent priorities but interrelated components in their vision of a vitalized society whose members -- young and old -- earn livings, enjoy food and water security, preserve their traditions and are positively engaged in the civil society of their countries. Literacy and basic education are the foundation upon which prosperous communities are built.

Their interests lie in defining the components of the education desired by and useful to nomadic peoples -- reading, writing, arithmetic and what else? How can communities improve

and support their schools? In a population in which fewer than fifteen percent of parents send their children to school, what can we do to show them the benefits of education?

In response to these questions, RAIN and many nomadic volunteers and partners have offered germane and sustainable ideas. The result is a variety of school-supporting programs. These activities, along with volunteer roles, draw uneducated parents and others into the school environment where they experience the value of education and gain the confidence to enroll in literacy classes.

RAIN's 2009/2010 Programs Include:

- Education—health education, scholarship/mentoring, adult literacy, teacher training, traditional and vocational skills
- Agriculture—garden programs
- Water security—wells for drinking water and irrigation
- Income-generating activities—women's artisan cooperatives and community enterprises

4.5.2. Organizational Structure

RAIN is overseen by a board of directors. The Executive Director reports directly to the board of directors. All USA country staff report directly to the Executive Director. The Director of Programs in Niger also reports directly to the Executive Director. The in-country staff in Niger report directly to the Director of Programs.

4.5.3. Staff

Location: USA

- Executive Director
- Administrative Assistant

- Part-time position for fundraising, publicity
- Volunteers

Location: Niger

- Director of Programs
- Education Coordinator
- School Garden Coordinator
- Enterprise Coordinator
- Administrative and Program Assistants
- Consultants
- Support Staff

4.6. Implementation Plan

The school garden project engaged school children, school faculty, and parents of school children directly in the implementation process. Development in the Ingui community will not be sustainable over the long-term without direct community input, support and ownership. These three principles served as the driving forces behind this intervention.

From August 2009 to April 2010, implementation for the project introducing sustainable agricultural techniques to the Ingui community in Niger occurred. The current section provides a detailed analysis of the project implementation plan, including a description of each activity and an identification of project related concerns.

4.6.1. Implementation Plan

The implementation plan underwent several changes, edits, and adjustments over the course of project implementation. The finalized version of the project implementation plan can be found in Appendix K.

4.6.2. Project Implementation: August 2009 to April 2010

Stakeholders' Meetings. From August-September 2010, the stakeholders' analysis was conducted in order to identify the different stakeholders involved in the project and share information between actors about the project. The stakeholders involved included: RAIN, the Ingui community, the local government, local traditional leaders, school officials, and the parents of the Ingui school children.

Community Needs Assessment. The community needs assessment (CNA) consisted of a series of key informant interviews, public forums, and community member interviews that were conducted from October through November 2009. Specific results of the CNA can be found in the CNA report.

Project Development and Finalization. Project development and finalization occurred from September 2009 through December 2009. During this period, the project proposal underwent a number of different drafts and changes based of input from the community needs assessment and stakeholders' analysis.

Community Assembly. The community assembly was held in Ingui in December 2009 to present a synthesis of the results from the community needs assessment and to present the overall project, including project goals, objectives, and activities.

Development of Protocol Agreement. From November to December 2009, the Program Director developed and finalized a protocol agreement to be signed between RAIN and the

volunteer garden management committee, establishing the rules and the procedures of the partnership agreement. The protocol underwent several drafts and was scheduled to be signed in January 2010, but was not actually signed until February 2010 due to security reasons.

Logistics Planning Meeting. This meeting was held with the school authorities in order to ensure complete understanding about the project, expectations of the school and responsibilities designated to school authorities, and to coordinate other logistical issues related to the project implementation. The meeting was held in December 2009.

Recruitment of Local Gardener and Garden Management Committee. In January 2010, a local gardener was recruited in order to manage the school garden created under the project. Several candidates applied for this position. Representatives from the Ingui community were in charge of the recruitment/selection committee. In addition, representatives from the Ingui community also recruited volunteer parents/school staff/community members to form a school garden management committee. The recruitment/selection process for the school garden management committee was also completed in January 2010.

Open School Savings Account. This activity has not yet been completed, although it was planned to be completed in January 2010. The process of opening a savings account was initiated in January 2010, however upon learning about specific criteria and requirements by the bank to open an account, the process was slowed down. RAIN worked with the school and the garden management committee to secure all necessary legal paperwork and documentation so that they could open a savings account by the end of March 2010.

Recruit Volunteers for Garden Construction. In order to assist with garden development, volunteer parents of school children were recruited by the school garden management committee by the end of January 2010. This was one of the first tasks completed by the garden

management committee. 10 volunteers were selected to assist with the construction/development of the school garden.

Sign Agreement/Contract with Agricultural Technical Services. In December 2009, the Program Director met with representatives from the Ministry of Agriculture's technical services department in order to sign an agreement and contract with them. The technical service assistants were hired by the organization to conduct trainings for the gardener and students/staff/parents in sustainable agricultural techniques and the use of drip-irrigation systems.

Training in Sustainable Gardening Techniques. Although both the trainings of the school gardener and of students/staff/parents in sustainable agricultural techniques and the use of drip-irrigation systems was originally scheduled for February 2010, the trainings did not end up being initiated until March 2010. The delays in the training were caused by the limited availability of the Ministry of Agriculture technical service assistants.

Well Construction. Well-digging and cistern construction was initiated in February 2010 by the volunteer parents with assistance from the agricultural coordinator and the organization. Construction was completed in the beginning of March 2010.

Installation of Irrigation System. Installation of the drip irrigation system occurred in March 2010 by the volunteer parents with assistance from the agricultural coordinator, the organization, and the Ministry of Agriculture technical services.

Garden Enclosure Construction. The volunteer parents constructed the garden enclosure (a fence-like structure) in February 2010. The enclosure was built to protect the garden from animals and any intruders.

Seed Planting. This activity was scheduled to be implemented in early March 2010, but was launched by mid-March and completed by the end of March.

Garden Monitoring. The gardener monitored the garden and tended to the soil, preparing it for seed planting. The gardener started monitoring the garden at the beginning of March 2010.

Training in Sustainable Agriculture Techniques. The training of the gardener and school students/staff/parents on sustainable agricultural techniques was completed by the end of March 2010.

Seed Planting. Seeds were planted over a two week period from mid-March to the end of March 2010. The gardener was the primary party responsible for this activity, however students, staff, and parents were also be asked to participate in planting the garden.

Garden Monitoring and Watering. The gardener was responsible for continuing to directly monitor plant growth and the overall functionality of the school garden from March through May 2010. He also ensured that the garden was regularly watered over this period.

Training in Business Management. Business management training for the school garden management committee and students/staff/parents began and was completed in April 2010.

Management of Garden Expenses. With the support of RAIN's economic coordinator, the garden management committee monitored and managed all expenses related to the school garden. This began in April 2010 and continued into May 2010 and they were able to use their training in business management to develop a budget and tracking system for the garden.

Evaluation of Project. Evaluation of the project began in April 2010 and continued through May 2010.

4.7. Budget

The project budget has been broken into three main components: trainings, materials for garden enclosure and garden equipment. The School Market Garden budget was developed to take into account garden construction and irrigation, fencing to repel animals, trees and plants to create a natural windscreen and long term animal barrier, plants and seeds, tools, equipment, training programs for gardeners and garden committees and transport of materials.

Table 2: Budget (Training)

Item	Total
Total Part 1:	\$1,210.00

Table 3: Budget (Materials for Garden and enclosure)

Item	Total
Total Part 2:	\$5,312.50

Table 4: Budget (Equipment for a 2,000 Meter Garden)

Item	Total
Total Part 3:	\$11,980.20

Table 5: Total Budget for Garden

Part 1: Trainings	\$1,210.00
Part 2: Enclosure for garden	\$5,312.50
Part 3: Equipment for garden	\$11,980.20
GRAND TOTAL	\$18,502.70

5. Monitoring and Evaluation

5.1. Monitoring

Project activities were regularly monitored in order to track project progress, identify any implementation problems and ensure project success. Appendix L presents the detailed monitoring plan that was used to monitor and track project activities. The indicators that were

monitored for this project can be found in the monitoring plan and outlined in the narrative below, which describes the progress of each indicator that was monitored during this project.

5.1.1. Expected Result 1: Access to nutritious locally grown foods for students at Ingui School is improved through the development of a school garden.

Indicator 1.1: Hold Community Assembly. One community assembly was held in Ingui in December 2009 to present a synthesis of the results from the community needs assessment and to present the overall project, including project goals, objectives, and activities. A large number of community members attended the assembly, including local leaders, elders, school officials, school parents, and even school children. This indicator was monitored once and the target was met for this indicator.

Indicator 1.2 and 1.3: Recruitment of Local Gardener and Garden Management Committee. In January 2010, a local gardener was recruited in order to manage the school garden created under the project. Several candidates applied for this position. Representatives from the Ingui community were in charge of the recruitment/selection committee. In addition, representatives from the Ingui community also recruited volunteer parents/school staff/community members to form a school garden management committee. The recruitment/selection process for the school garden management committee was also completed in January 2010. The indicator was monitored once as it was a single event and the target was met.

Indicator 1.4: Protocol Agreement Signed between RAIN and Garden Committee. From November to December 2009, the Program Director developed and finalized a protocol agreement to be signed between RAIN and the volunteer garden management committee, establishing the rules and the procedures of the partnership agreement. The protocol underwent

several drafts and was scheduled to be signed in January 2010, but was not actually signed until February 2010 due to security reasons. This indicator was monitored once as it was a single event and the target met for this indicator.

Indicator 1.5: Open School Savings Account. The process of opening a savings account was initiated in January 2010, however upon learning about specific criteria and requirements by the bank to open an account, the process was slowed down. RAIN worked with the school and the garden management committee to secure all necessary legal paperwork and documentation so that they could open a savings account by the end of March 2010. This indicator was monitored monthly until the account was successfully opened and the target for the indicator met by project evaluation.

Indicator 1.6: Recruit Volunteers for Garden Construction. In order to assist with garden development, volunteer parents of school children were recruited by the school garden management committee by the end of January 2010. This was one of the first tasks completed by the garden management committee. A total of 12 volunteers were selected to assist with the construction/development of the school garden. This indicator was monitored once and target of recruiting 12 volunteers was met.

Indicator 1.7: Construct Well. Well-digging and cistern construction was initiated in February 2010 by the volunteer parents with assistance from the agricultural coordinator and the organization. Construction was completed in the beginning of March 2010. This indicator was monitored on a monthly basis until the activity was completed and the target of successfully constructing a well was met.

Indicator 1.8: Install Irrigation System. Installation of the drip irrigation system occurred in March 2010 by the volunteer parents with assistance from the agricultural

coordinator, the organization, and the Ministry of Agriculture technical services. This indicator was monitored on a monthly basis until completion of the activity and program target met.

Indicator 1.9: Construct Garden Enclosure. The volunteer parents constructed the garden enclosure (a fence-like structure) in February 2010. The enclosure was built to protect the garden from animals and any intruders. The indicator was monitored during the first two months of program implementation and the project target of constructing a garden enclosure was met.

Indicator 1.10: Plant Seeds in Garden. This activity was scheduled to be implemented in early March 2010, but was launched by mid-March and completed by the end of March. The gardener was the primary party responsible for this activity, however students, staff, and parents were also be asked to participate in planting the garden. A large variety of vegetables and some fruits were planted in the garden, including tomatoes, lettuce, moringa, peppers, onions, potatoes, carrots, sweet potatoes, and cabbage. The indicator was monitored on a monthly basis during the period from March to April. The project target of planting the entire garden was achieved.

Indicator 1.11 and 1.12: Monitor and Water Garden. The gardener monitored the garden and tended to the soil, preparing it for seed planting. The gardener started monitoring the garden at the beginning of March 2010. The gardener was responsible for continuing to directly monitor plant growth and the overall functionality of the school garden from March through May 2010. He also ensured that the garden was regularly watered over this period. This indicator was monitored on a monthly basis. The target of monitoring and watering the garden on a monthly basis was achieved by the time of project evaluation.

5.1.2. Expected Result 2: Agricultural Production was Reinforced through the Promotion and use of Sustainable Agricultural Techniques.

Indicator 2.1 and 2.2: Gardener and Students/Parents/Faculty Trained on Sustainable Gardening Techniques. Although both the trainings of the school gardener and of students/staff/parents (30 in total) in sustainable agricultural techniques and the use of drip-irrigation systems was originally scheduled for February 2010, the trainings did not end up being initiated until March 2010. The delays in the training were caused by the limited availability of the Ministry of Agriculture technical service assistants. Topics covered during the training included theoretical information on drip irrigation systems and use in Sahelian regions, gardening and planting techniques for drip irrigated land including crop rotation and diversification, sustainable management of natural resources including organic pest control and composting methods, and maintenance and repair of system. All participants conducted a training pre-test so that the project could measure their scores before and after training to identify knowledge acquired. The training of the gardener and school students/staff/parents on sustainable agricultural techniques was completed by the end of March 2010. The indicator was tracked during the period from February through March 2010 and by training the gardener, the project target was reached.

Indicator 2.3: Gardener passes sustainable gardening training post-test. Following the gardening training, the gardener was asked to participate in a training post-test. This indicator was tracked in March 2010. The gardener passed the test of 100 percent, successfully meeting the project target.

Indicator 2.4: Students/Parents/School Faculty pass sustainable gardening training post-test. Following the gardening training, the 30 students, parents and staff was asked to

participate in training post-test. The results of this test were compared to the pre-test in order to identify knowledge acquired by the students, staff, and parents. The indicator was measured in March 2010. Unfortunately, the project target of having all students, staff, and parents pass the test with a score of 80 percent or higher was not met. 26 out of the 30 trained passed the test with this score. However, upon further analysis, it was detected that those who did not pass, all received scores of 75 percent, meaning that they missed the passing grade by one point. Furthermore, it was also identified that these non-passing scores came from students between the ages of 9 and 12, suggesting that age may have been a factor. In the future, the age differences of participants should be accounted for and reflected by adapting training materials accordingly.

5.1.3. Expected Result 3: Economic capacity of the Ingui school is improved.

Indicator 3.1: Garden committee trained in business management. Business management training for the school garden committee (nine committee members) occurred in April 2010 and was led by RAIN staff. The indicator was monitored for the month of April. A key focus during the training was on group management and also teamwork, including democratic decision making. Business training also included topics such as budgeting, marketing, money-management techniques, and management. The committee also received training on the program M&E plan and reporting methods, as they helped conduct regular M&E on garden development for the organization, as RAIN staff were not always be in the field on a regular basis. All nine of the garden committee members received training, meeting the program target.

Indicator 3.2: Garden committee passes training post test. Following the business training, garden committee members were asked to participate in a training post-test to test their skills and knowledge acquired from the training. The results of the training post-test were

compared to the pre-test given to committee members prior to training. A passing grade was 80 percent. This indicator was tracked following business management training of the garden committee in April 2010. The program target of having all nine committee members pass the post-training test was successfully met for this indicator.

Indicator 3.3: Garden committee establishes a budget and financial plan for the school garden. This indicator was not tracked until the final project evaluation at the end of April 2010, after garden construction was completed, seeds were planted, and the garden committee trained in business management. The target of having an established budget and financial plan was achieved for this indicator by the time of evaluation.

Indicator 3.4: Ingui School Earns Revenue from Sale of Garden Goods. In addition to tracking the budget and financial plan, the project also tracked how much revenue was earned by the school from the sale of garden goods. This indicator was also measured during the final project evaluation as it was contingent upon completion of garden construction and plants being harvested from the garden. The information available on this indicator was insufficient during the time of evaluation, therefore the target of increasing income by \$200 was unmet. Part of this was due to the short duration of the project. In order to better measure this indicator, the host organization will continue to monitor and measure this indicator until December 2010.

Indicator 3.5: Students/Parents/School Faculty trained in Business Management. This training occurred over a three-day period and was less extensive than the training for the garden management committee. Many of the training topics were the same; however this training was less extensive and more practical. Training modules included budgeting, marketing, money-management techniques, and general management skills. The training occurred in April 2010

and a total of 30 people participated in the training. The indicator was monitored during the month of April. The program target of training 30 people in business management was achieved.

Indicator 3.6: Students/Parents/School Faculty pass training post-test. Similar to the garden management committee, those students, parents and school faculty members trained in business management were also asked to participate in a training post-test to test their acquired knowledge. This indicator was monitored during the month of April when training occurred. Of the 30 participants, 25 passed the training post-test with a score of 80 percent or higher. As was the case for the low scorers on the agricultural training, the majority (three out of five) of the low scores were from young children. This is something that should also be taken into account when developing future training pre and post tests.

The project implementation and monitoring plans experienced a number of changes from the start of project conception and into project implementation. The project was originally conceived during the summer of 2009. However, over the period from August 2009-December 2009, the project was still in the development phase. Upon receiving feedback from the stakeholders' analysis and analyzing the results of the community needs assessment, the project was adjusted to focus on developing a school garden, instead of many small gardens in the Ingui community. The majority of the specific activities in the project implementation plan related to the garden project were incorporated and detailed into the implementation plan in mid-October/early-November of 2009. An additional set of changes and editions were made to the implementation plan in January 2010.

From the period of January 2010 to May 2010 a few delays occurred in relation to the implementation of certain activities. The protocol agreement established between RAIN (the host organization) and the garden management committee was originally scheduled for January

2010, but was not signed until February 2010. This delay was caused by security issues in the Ingui region that prohibited RAIN staff from traveling into the field until two weeks after originally planned. All of the scheduled training sessions (trainings for gardener and parents/staff/faculty in drip irrigation and sustainable gardening and the trainings for garden management committee/parents/staff/faculty in business management) had to be pushed back a month from their originally planned time. This was due to the availability of the technical service assistants who were contracted to lead the gardening training. The business management training was delayed a month because RAIN was in the process of hiring a new Economic Coordinator, the person responsible for leading this training.

In general, the project monitoring plan and reports guided activities, ensuring a smooth activity roll-out process. Regular project monitoring allowed for the above listed changes to be made accordingly and ensured that activities were completed even if they were changed or delayed. Although a few changes were made to the implementation plan, the majority of the planned activities were carried out as originally planned and all activities under the project accomplished.

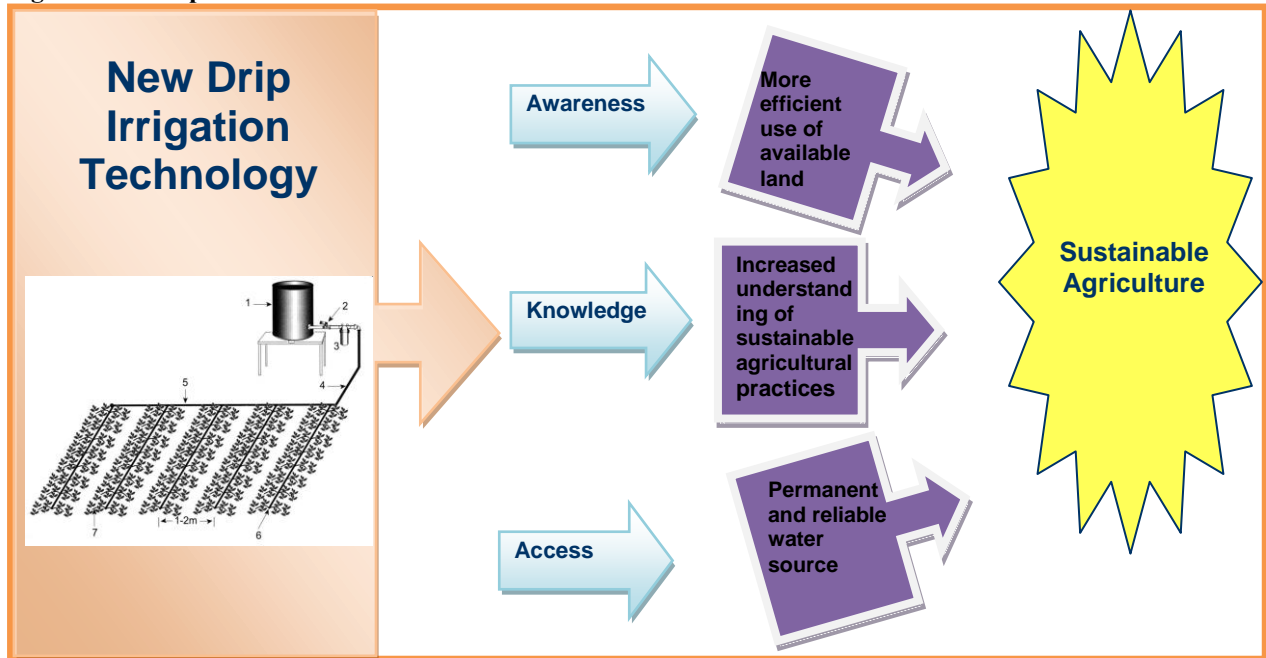
5.2. Evaluation

In August 2009, implementation for the project ‘Introducing sustainable agricultural techniques to the Ingui community in Niger’ began and was completed in April 2010. The final phase of the project required a detailed evaluation of the project in order to have overall feedback on this intervention. During the evaluation, information was collected to identify project outcomes and project impact in the Ingui community. The information below describes the project evaluation plan, including a description of the project’s conceptual framework, evaluation objectives, hypotheses, variables and indicators for measuring impact, methodology

to be used, the tools to be used and the future steps towards final completion of the evaluation plan.

5.2.1. Conceptual Framework and Theory of Change

Figure 1: Conceptual Framework



The conceptual framework for the project is pictured in the figure above. This framework visually describes how the intervention was expected to change the undesirable conditions in the Ingui community to more desirable conditions and the outcomes that will result from this change. The theory of change is described below.

This project introduced drip irrigation technology to the Ingui school with the primary intent of introducing sustainable gardening technique to the school and community. A gardener, garden management committee, school children, parents, and school authorities were trained on drip irrigation technology and business management under the project. The intervention directly addressed the undesirable conditions of limited access to water, limited knowledge of sustainable agriculture and modern technologies, and limited awareness of land use in Sahelian

environments. One of the anticipated outcomes as demonstrated in the conceptual framework is that members of the Ingui community will have improved knowledge about drip irrigation, a sustainable agricultural method. Another anticipated outcome is that access to water at the school will be increased, as the drip irrigation technology requires a cistern to be built. Those trained in the improved technology will be able to share their knowledge with other community members, enabling Ingui community members to use those techniques in future planting/harvest periods to improve agricultural yields even in drought periods. Provided trainings will also improve awareness on efficient use of land for agricultural farming. The longer-term outcomes described in the conceptual framework is that the project will help the Ingui community adopt agricultural methods that are sustainable and able to meet their household needs, as well as their livelihoods needs.

5.2.2. Evaluation Objectives

The objectives of the project evaluation were determined based on the outcomes of the Logic Model, which can be found in the project proposal. The objectives of the evaluation were:

1. To assess the garden committees management skills and ability to monitor and manage garden development, school garden budget, and financial plan.
2. To evaluate level of knowledge acquired by gardener, school children, parents, school authorities, garden committee and community of drip irrigation technology.
3. To assess garden production and monitor crop sale/consumption.
4. To assess changes in school revenue from sale of garden crops and track what revenue has been used for.

5.2.3. Evaluation Hypothesis

There were three hypotheses for the evaluation. The first hypothesis was that the development of a school garden at the Ingui School would be capable of supporting school children's nutritional needs. The second hypothesis was that the school garden would serve as a source of more reliable income. The final hypothesis was that the school garden would increase the use of sustainable agricultural techniques, including drip irrigation technologies.

5.2.4. Evaluation Methodology

The evaluation methodology used for the evaluation included a combination of evaluation methods such as household surveys, pre and post training tests, and a survey for the garden management committee. In addition, the program monitoring plan and the indicators tracked during program implementation were also used to evaluate the project. Both qualitative and quantitative data was collected and analyzed during the evaluation. Data collection was completed by the beginning of May 2010.

Household Surveys. Household surveys were conducted using a simple random sampling, targeting 10 percent of households in Ingui community (of which, 50 percent were households with school children attending school and 50 percent were households without children at the school). These surveys examined community awareness of the project, any knowledge acquired about drip irrigation/sustainable agriculture, and project impact in the community. Refer to Appendix G for the household survey.

Pre and Post Training Tests. Pre and post training tests were given to participants of the gardening techniques training and business management training. Tests were given to each participant and average scores compared from the pre and post tests. The aim of training tests was to evaluate the knowledge acquired during trainings by students, school faculty, parents, the

school gardener, and the school garden management committee. Refer to Appendix H for the test that was used at the gardening techniques training and Appendix I for the test that was used at the business management training. Refer to Appendix J and K for the results of both pre and post training tests.

Garden Management Committee Survey. A short survey was developed for the garden management committee in order to track the sale of garden produce and revenue, garden expenses, and development of a business plan. Refer to Appendix L for the survey that was given to the garden management committee during program evaluation.

5.2.5. Data Collection Tools

The tools that were used for data collection included survey, focus group, and interview guides with targeted questions. Also, monitoring tools such as the monitoring report, pre and post training tests and indicator table were used as part of the evaluation. Refer to Appendices G-H- for the various tools that were used for data collection.

5.2.6. Data Analysis

Following the completion of data collection, all information gathered was analyzed using a variety of methods, including summarizing findings from qualitative and quantitative data and also using Excel to manage data. The RAIN Program Director, Economic Coordinator, and Agricultural Coordinator were responsible for managing various components of the data analysis. A report of evaluation results and summary findings was developed upon the completion of the analysis and is highlighted below.

5.2.7. Summary of Findings

The findings from the project evaluation reveal that overall the “Sustainable Agriculture Project” was successful at meeting program targets and indicators and that the majority of evaluation objectives were met. One of the key findings was that trainings sponsored under the project were successful at improving knowledge of drip irrigation technologies and even community members that did not participate in the training learned about these technologies from others. Garden produce was primarily consumed to meet the nutritional needs of school children. Excess produce was sold at local markets and small profit had been made by the time of project evaluation. The garden management committee was effectively managing garden budget and finances. Finally, the garden was being properly maintained by the gardener and garden management committee, which resulted in high production of garden crops. These specific results of these findings are outlined in the sections below.

Knowledge and Awareness about Project and Drip Irrigation Technology. General knowledge of the project was widespread. Results of the community surveys indicated that over 90 percent of those community members surveyed had at least some indications about the project and knew it was sponsored by RAIN. Community impressions of the project were also very positive. Over 85 percent of those surveyed indicated that they thought the project was beneficial to their school and their community and would like to see a similar project implemented in their community in the future. Community knowledge and awareness of drip irrigation technology also improved from prior to the start of the project. About 60 percent of those surveyed during project evaluation could describe the technology and some of its benefits, compared to only about 3 percent of those surveyed during the community needs assessment. These results indicate that community members (many of which were not direct program

beneficiaries and who did not have a student at the Ingui School) were engaged in the project and learned from their peers about the sustainable agriculture technique introduced by the project. Knowledge transfer from direct project beneficiaries to non-direct project beneficiaries occurred, as was hoped for.

In order to evaluate the knowledge acquired by direct program beneficiaries including the gardener, students, school faculty members and parents on drip irrigation technology, scores from the sustainable garden techniques pre and post training tests were compared. The school gardener passed the post-test with a score of 100 percent, compared to his pre-test score of 33 percent. The program target for this indicator was met, as the gardener passed the post-test with a score over 80 percent.

Only four out of the thirty participants of the student/faculty/parent training received scores lower than 80 percent, all having received scores of 75 percent. The average pre-test score was 9 percent, compared to the average post-test score of 91 percent. Although the program target for this indicator, which required that all participants pass the training with a score of at least 80%, was not met, the training was still successful in transferring new knowledge to all participants. Moreover, the program originally planned to train only 20 students/faculty/parents instead of 30. When individual test results were analyzed, it was identified that three out of the four participants with scores below 80 percent were between the ages of 9 and 12. Age may have been a factor explaining why these participants did not pass the test.

Garden Production, Consumption, and Sale. At the time of the evaluation, the crops produced by the school garden had been primarily consumed by school children. However, a small portion of food items had been sold in the local market from the period of mid-April to the

first week of May 2010. The garden was successfully producing a variety of vegetables such as tomatoes, carrots, onions, and lettuce. Nearly 85 percent of those items produced were consumed as part of the school lunch program, providing nutritious foods for free to school children at the Ingui School. Approximately 10 percent of items produced prior to the project evaluation were sold at the weekly market located in Ingui town. Although there are other market days in neighboring villages, the school had yet to tap into these potential markets. One factor inhibiting them from this activity was the lack of a reliable means of transport. The garden management committee expressed that once more revenue was generated from the sale of goods, they hope to purchase a donkey cart to use to transport produce to these neighboring villages' market days. The remaining 5 percent of items produced were either inconsumable or deemed unfit to sell in markets. This information was retrieved during the garden management committee survey.

For the period of mid-June through mid-September 2010, it will be expected that the sale of garden produce in at least the local Ingui village weekly market will increase. This will be due to the fact that the school year ends in mid-June. As students will no longer be consuming the vast majority of garden produce, all of the crops produced during the summer months can be directly sold. The gardener and garden management committee will continue to manage garden production during this period. Although for the purposes of this project an initial evaluation was conducted at the end of program implementation, RAIN will continue to monitor and evaluate the Ingui School garden into the 2010-2011 school years. The host organization will also continue providing technical support to the garden management committee and Ingui community during the summer period and beginning of the school year.

Knowledge of Business Management. In addition to evaluating the knowledge acquired on agricultural techniques, the project evaluation also assessed acquired knowledge from the business management training. The scores of pre and post training tests for the garden management committee were compared during the evaluation. A passing grade on the post-training test was considered 80% or higher. The target set at the start of the program was that all committee members pass the training-post test. Results of the evaluation revealed that all nine of the committee members successfully passed the training post-test with a grade of 80% or higher, with the average post-test score at 92 percent. This score was compared to the average pre-test score of 7 percent.

The scores of the students, parents, and school faculty pre and post business management training tests were also compared during project evaluation. Of the 30 participants, 25 passed the training post-test with a score of 80 percent or higher. The remaining 5 had scores of 75 percent and were given feedback upon receiving their scores on how areas to work on. The overall average post-test score was 88 percent, compared to the pre-test average of 8 percent. As was the case for the low scorers of the agricultural training, the majority (three out of five) of the low scores were from young children, yielding the conclusion that age may have played a role in the low-scores. Although the training was adapted to meet the needs of different age-levels and education-levels, it may have been too difficult for some of the younger children to master all of the themes and concepts covered. Future trainings similar to this one should take that into consideration when choosing training beneficiaries.

Garden Management Committee Performance. The results of the survey that was given to the garden management committee provided useful information that was used to assess the overall performance of the committee on their key responsibilities. First, an assessment was

conducted on the committee's ability to manage and oversee garden development. Overall, the committee met the expectations of this responsibility. They reported holding weekly committee meetings to monitor garden production and identify any issues the garden may have been facing. Moreover, they reported that the provided regular feedback and support to the gardener. The garden had successfully yielded produce since the start of the program, another success that can be partly attributed to the management committee.

One of the few areas that needed improvement was the tracking of crops produced. Although the committee presented detailed records of the crops produced in the garden, the quantities of these crops were not always recorded. This activity is essential towards ensuring success and managing any profit earned from the sale of crops and also tracking the amount of produce consumed by students. When asked why the committee had not been closely measuring the exact quantities produced of each crop, the committee indicated that they did not have an adequate means of measuring these quantities (for instance a scale to measure the weight). However, feedback from the evaluation team was provided to the committee on identifying a standard measuring device, such as a bucket or bowl, and continually using that tool to measure a given crop in the future. This will ensure that measurements are regularly taken and quantities produced can be compared over time.

The garden management committee was also evaluated on their ability to develop a budget and financial plan. At the time of evaluation, the committee had successfully outlined a financial plan that included a budget of garden expenses. The plan highlighted marketing strategies for the sale of garden produce, in addition to a detailed plan for the use of revenue earned from the sale of produce such as purchase of donkey cart for transport to local markets, purchase of school supplies for the upcoming school year, repairs to school buildings and

facilities, and finally maintenance of the school garden. Although RAIN staff provided feedback on a few ways to improve the plan such as changing around budget items, in general the outputs produced by the committee were of high quality.

Change in School Revenue. The final indicator that was measured during the project evaluation was the change in school revenue from the sale of garden produce. As previously mentioned, produce was not sold until mid-April 2010, so at the time of the evaluation, the committee had only sold produce at four market days. The committee indicated that the total revenue earned from the sale of produce at these market days was approximately \$65. It is important to keep in mind that the quantity of crops sold was rather small, as children were still in school during this period and much of the produce consumed directly by children in school lunches. As the school did not have any revenue from the sale of garden goods prior to the start of the project, the net revenue earned was \$65. Unfortunately, the amount of information available at the time of the evaluation regarding change in revenue was insufficient to determine any long-term impacts that the sale of garden produce had on the school. RAIN will continue working closely with the garden management committee to further evaluate changes in school revenue from the sale of produce and conduct future assessments that are better able to capture these long-term project impacts.

5.2.8. Sustainability Plan

Although the project was implemented over a relative short duration of 4 months, the project strategy incorporated strategies aimed towards long-term project sustainability. Implicating the Ingui community was a key component to the sustainability of the project. From start to finish, the community was invited to participate in major decisions and be as involved as possible in project implementation. For instance, community volunteers received training and

helped with well-construction and construction of the drip irrigation system, in the hopes that in the future they will be able to construct their own systems and share their knowledge with other members of the community. In addition, many members of the community received training in gardening techniques and business management techniques, allowing the Ingui school and community members to continue managing the garden on their own after the end of the project. The knowledge learned at these trainings may also be shared with other members of the community by training participants.

Furthermore, as the Ingui community is also a partner community of RAIN, the organization will continue to monitor garden development in the future and will remain available to provide any needed technical support for the school garden, should the community encounter any difficulties. This will allow the community to self-manage the garden, while also providing them any assistance when requested.

By constructing the cistern and well, access to water for the school garden was greatly increased. This was an activity aimed towards long-term sustainability, as it targeted directly one of the main issues facing the Ingui community. With a reliable water source, the Ingui community and in particular the Ingui school will be able to initiate other gardening projects in the future. Wells and water sources, which can be very costly to construct, can be easily maintained and will remain a responsibility of the garden management committee that was also created under this project, in hopes of sustaining the school garden.

Finally, youth involvement in the project was also a strategy used to ensure project sustainability. As children and adolescents serve as the future leaders of their societies and communities, RAIN wanted to include them in this intervention. Through practical and theoretical trainings, education sessions, and involving students in project activities, the project

provided a learning foundation for students about sustainable agriculture. In addition, their inclusion in the project also aimed towards establishing ownership in project activities by students, which will continue in the future. These are the main components of the project sustainability plan.

6. Lessons Learnt

The “Sustainable Agriculture Project” encountered a number of obstacles and learnt a number of key lessons. The challenges and lessons learnt related to project success, which are detailed in the sections below, will serve as vital information to RAIN and will help the organization in any future programming in the Ingui community or in communities similar to Ingui.

6.1. Project Success

6.1.1. Flexibility Was Essential

One of the major lessons learned from this project was the importance of being flexible. Changes in planning can occur at any moment and to be successful and ensure that the project continued in a steady manner, it required flexibility and adaptability. Unplanned events, such as electricity shortages for hours or days, political uprising, car breakdowns on the way to the Ingui community on a desert sand road, were only a few of the many things encountered during the project implementation. These situations, although often frustrating and time-consuming, were approached by RAIN and project staff with a flexible and patient attitude. New solutions or strategies were constantly being developed to overcome unplanned events and this was due largely in part towards being flexible and adaptable.

6.1.2. Revisions Were Worth It

When reflecting on the project development process, a lot of progress was made from the initial start of project development and project implementation. It took a long time to develop a project that was focused enough and realistic to fit into the amount of time allotted for the actual project implementation. The project proposal underwent changes and a lot of revisions, with the help of numerous professors, colleagues at RAIN, and other colleagues who assisted with the editing process. Although the revision process was a difficult one, it was much needed and definitely worth all of the frustrations that came along with revising and again revising a document.

6.1.3. Community Participation Created Ownership

The collaborative approach used in the project between the host organization RAIN and various members of the Ingui community was very well accepted and highly appreciated by the community. Many community members expressed that the project approach allowed them to take ownership in the project, unlike with other work that NGO's had done in or around their community in the past. The overall feedback from the community was generally positive and the project was accepted as a priority for the community, which was likely because they were able to directly participate in the implementation process of many of the project activities. The community demonstrated a sense of ownership in creating the school garden and it is the hope of the host organization that they continue to feel this sense of ownership for the garden in the future.

6.2. Constraints

The project experienced a number of constraints since the beginning of project implementation. The main constraints that were faced include security issues, political instability, and the overall low-literacy levels of the target population. These constraints were highlighted below.

6.2.1. Insecurity

Since the launch of this project, security has been a major concern related to project implementation. From early 2007 to mid-2009, a rebellion was underway in Northern Niger, the area where the target community of Ingui is located. Rebel soldiers placed hundreds of land mines throughout the region, many of which have not yet been located. This had a great impact on how activities were implemented for the project, including staff travel, transport of equipment. Although a peace treaty was signed in late 2009, security remained a concern throughout program implementation. This issue was overcome by taking extra caution during all field visits by RAIN staff and regularly informing local governmental officials of any activity of movement by employees of the NGO. In addition, RAIN worked closely with Ingui community and kept constant communication with them in order to receive frequent updates on security surrounding the village.

6.2.2. Political Instability

Related to security concerns, Niger recently (in February 2010) experienced a political coup. The coup happened in Niamey, the capital of Niger, where the host organization RAIN has its country headquarters. Since the initial coup, the general atmosphere in Niger has remained calm. Military officials reassumed office during the transitional period. However,

RAIN was forced to remain cautious with the implementation of all NGO-related activities, as things were and are still somewhat politically unstable. In the days and first week following the coup, the staff located in Niamey, including the Program Director, was on edge and was occupied reviewing security procedures for the organization, so time devoted towards project implementation was limited. Over the remaining months of the project, RAIN staff continued to follow news and major events occurring in the capital. In addition, to overcome this obstacle, RAIN made every effort to work in collaboration with the newly appointed officials and to bring the military leaders up-to-speed on the work being conducted by RAIN.

6.2.3. Low-Literacy

Another concern for the project was the literacy of the Ingui population, and in particular, the program beneficiaries chosen to be trained in sustainable agriculture and business management. A large percentage of the Ingui community is illiterate and has never received formal educational instruction, including learning to read and write. For students and school faculty, this did not apply as the majority of them at least had some level of French and could read and write. However, for the school gardener, many school parents, and volunteers from the community, illiteracy was common. Some of the training guides and modules were adapted for the non-literate context. For instance, for the pre and post training quizzes, some quizzes had to be given orally and responses recorded by RAIN staff, as some were unable to write and read the quizzes. That being said, during the implementation of the agricultural trainings, illiteracy was not as large of a problem as initially anticipated, because so much of the training was practical learning enhanced through demonstrations and practice in the actual garden. But this was not the case for the business management training. Another strategy used to mitigate this constraint was to simplify some of the business management concepts that were deemed to difficult to convey

during the trainings. The trainer adapted his trainings accordingly to maximize understanding by trainees, while still conveying the major themes and points of the formation.

6.2.4. Limited Time for Evaluation

A final constraint of this project was the limited amount of time available to conduct project evaluation. Although a final project evaluation was conducted, the evaluation did not start until May 2010. The evaluation occurred over the period of 1 week. RAIN staff reported that the evaluation felt rushed and also that they would have liked to conduct key informant interviews and focus groups as part of the final project evaluation. However, as the Program Director's time was limited during the month of May and program activities were not completed until the end of April, this was the only time available for project evaluation. In the future, more time should be allotted to ensure proper evaluation time.

In addition, because project evaluation occurred directly after project implementation was completed, it was not possible to measure the long term impacts that the project had in the Ingui community. RAIN plans to conduct a second evaluation in late 2010 to assess the functionality of the school garden and school garden management committee. Unfortunately, these results are not yet available to include in this report, serving as a limiting factor to the evaluation component of the project as is reported in this document.

7. Recommendations

Upon reflection of this project, there are a number of recommendations that can be made that may increase project sustainability and ensure project success in future and/or similar interventions. These recommendations were highlighted in the section below.

7.1. Increase Number of Program Beneficiaries

One recommendation emanating from this project is that future interventions should expand the number of program beneficiaries. Although this project was limited by budget and time constraints, future projects introducing drip irrigation technology to a community should consider increasing the number of direct project beneficiaries in order to increase community awareness and involvement. By expanding the number of beneficiaries, more community members will know how to use the technology and be better equipped to tackle the issues facing agricultural communities. This may also have an effect on project sustainability, as more community involvement has the possibility to increase project ownership by the community and interest in sustaining garden activities.

7.2. Ensure Proper Time is allotted for Project Evaluation

Another recommendation resulting from this project is to ensure that a proper amount of time is allotted for project evaluation. The evaluation for the project was somewhat hurried and results incomplete at the time of evaluation. Too often the time period allotted for project evaluation is short and rushed. Future interventions should allow sufficient time to conduct project evaluation. Furthermore, projects should also budget for a follow-up evaluation to be conducted six months to a year after the completion of the project to allow for an assessment of long-term project impacts.

7.3. Conduct Refresher Trainings

Another action that may help increase project sustainability is to conduct refresher trainings for those trained on sustainable agriculture techniques and business management. As information is often forgotten after a period of not using it, this activity will ensure that the

information learned during the trainings remains fresh in project beneficiaries' minds. This activity may also be another way to increase ownership of project activities, as the refresher trainings will also serve as a way to re-implicate those involved in the project.

7.4. Continue Investing in Drip Irrigation Technology

One recommendation for the Ingui community and also the Nigerien government is to continue making investments in projects that introduce drip irrigation technology. As this project was targeted at a specific population within the Ingui community, in the future the community may want to build other drip irrigated gardens, for example a public garden where community members who would like to participate are asked to pay in to the shared garden plot to cover the costs of well construction, installment of the drip irrigation system, and training. This way, all community members could have the opportunity to benefit from the activity. In addition, as many other rural communities in Niger face the same problems of access to water and drought, the government of Niger may want to invest in projects that create drip-irrigated gardens in beneficiary communities. A nation-wide initiative would likely be a good strategy towards overall increasing access to water and reducing poverty.

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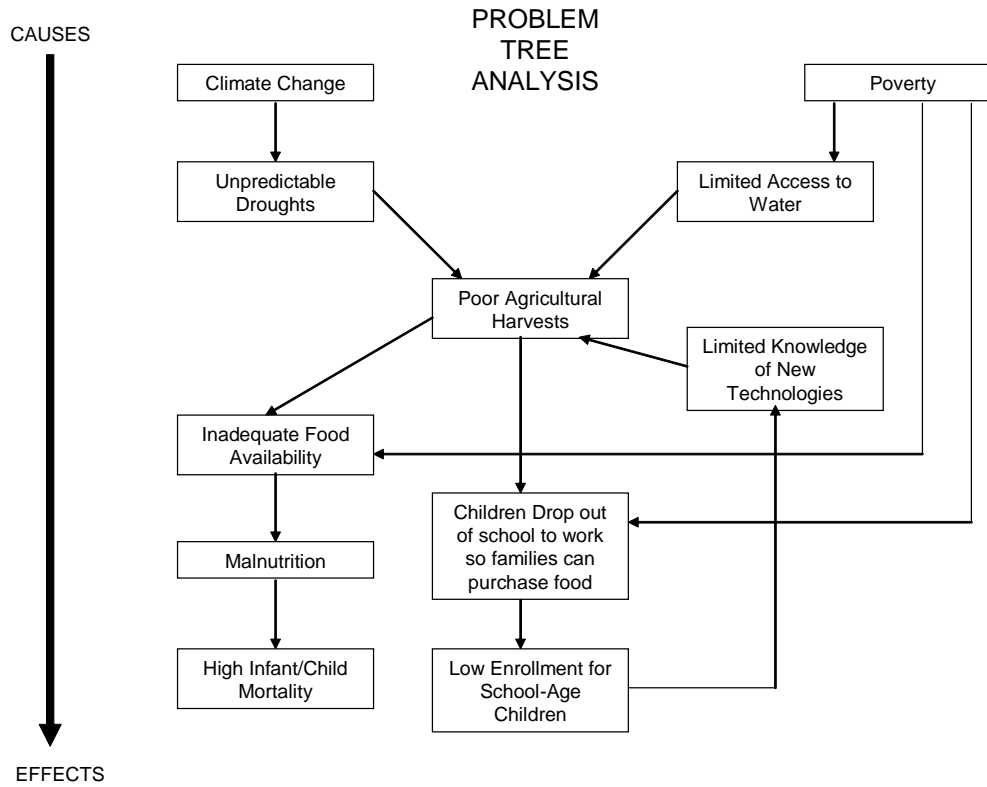
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9. Appendices

Appendix A

A. Problem Tree Analysis

Figure 2: Problem Tree Analysis



Appendix B

B. Stakeholders Analysis

Table 6: Stakeholder Analysis

STAKEHOLDERS	ATT		INF		ACTION
	E	C	E	C	
1. The organization (RAIN for the Sahel and Sahara)	++	/	H	/	
2. Tuareg Communities	++	?	M	?	Series of focus group discussions. Information dissemination campaign to inform communities on the benefits and their participation in the project.
3. Local Government	+	?	L	?	Draft proposal to give them idea on the needs and participation needed for the project; attempt to include them at all stages of project
4. Other Civic Organizations / Project Partners	+	/	H	/	Try to establish partnerships; inform NGO community of project
5. Donors	++	/	H	/	

ATT: attitude

E: estimate

++ Strongly in favor
+ Weakly in favor

C: confidence

/ fully confident
? Reasonably confident

INF: influence

E: estimate

H high
M medium
L low

C: confidence

/ fully confident
? Reasonably confident

Appendix C

C. SWOT Analysis

SWOT ANALYSIS: EDUCATING TUAREG SUSTAINABLE AGGRICULTURAL IRRIGATION TECHNIQUES

STRENGTH

- Well established organization (Rain for Sahel and Sahara) already implementing projects with Tuareg communities
- Passion to help or assist the community
- Organization is committed and confident in creating change and helping the village
- Adequate resources to implement project
- Participation of NGOs in social mobilization
- Strong linkages with other projects
- Participatory planning and management

WEAKNESS

- Need more volunteers to help out with the project
- Limited budget
- Project proposal still in development phase
- Management cover insufficient
- Donor funds not yet secured
- Resources and capabilities
- Insecurity in the Zone of intervention

OPPORTUNITIES

- Highly needed training
- Lifetime benefits offered by the project
- Positive impact of the project
- Government participation in program related to education
- Other civic organization's commitment to helping Tuareg communities
- Establishing and creating new relationship with community and partners

THREATS

- Strong cultural foundation
- Limited sources of income of community
- Limited time of the community
- Possible negative publicity
- Lack of support by community leaders
- Too much constraint by government run program
- Negative attitude of community towards project

Appendix D

D. Interview Guide for Community Surveys

Introduction: Hello, my name is _____. Thank you for participating in this interview. Rain for the Sahel and Sahara (RAIN) is conducting a community needs assessment to assess the specific needs of the Tuareg community of Ingui, related towards improving agricultural production and mitigating poverty. The information that we gather will be shared with RAIN staff and partners and used to develop a project that will benefit the community in Ingui. This interview will last approximately 45 minutes. If you choose to remain anonymous you may. You may decide how much information you want to share with me. I will be asking you a serious of questions, so please speak freely. The goal is to share information and gain insight on the specific needs of the Ingui community. You will receive no direct benefits from participating in this interview. Does this sound okay and may I have permission to begin the interview?

Document the following in your notes:

Length of interview: _____

Time initiated: _____

Time terminated: _____

Interviewer Name and Signature: _____

Section 1: Background Information

Name: _____

Sex: _____

Education: _____

Number of years lived in Ingui Community: _____

Current Occupation (Specify: Full-time, part-time or none): _____

Family Members: _____

Household headed by: _____

Section 2: Economic Information

1. What is the source of income for your family?
2. What is the average monthly income of your family?
3. Who makes financial decisions in your family?

Section 3: Agricultural Production in Ingui

4. Please explain the current methods of agricultural production in Ingui. How are crops grown?
5. What is the average size of your field plots?
6. Who does the work on the plots? How much does each person do?
7. What crops do you grow and in what periods each year?
8. Do you use fertilizer or pesticides on your crops?
9. Are you satisfied with their current crop yields?

Section 4: Water Supply

10. Which season do you irrigate your crops?
11. How do you irrigate your crops?
12. Where does the water come from?
13. Who brings the water to the land and how long does it take?
14. How often do you irrigate your fields? How long does it take?
15. Are you satisfied with their current irrigation method? If not, why?

Section 5: Awareness of other Technologies for Agricultural Production

16. Do you know of any other agricultural practices? If so, what?

17. In order to improve your current agriculture methods, what would you suggest farmers do?

Section 6: Introducing a New Technology in Ingui

18. Are you willing to learn a new technology to improve their agricultural practices?

19. If new agricultural technology/skills were introduced, who in the community should learn these new skills?

End of interview.

Appendix E

E. Interview Guide for Key Informant Interviews

Introduction: Hello, my name is _____. Thank you for participating in this interview. Rain for the Sahel and Sahara (RAIN) is conducting a community needs assessment to assess the specific needs of the Tuareg community of Ingui, related towards improving agricultural production and mitigating poverty. The information that we gather will be shared with RAIN staff and partners and used to develop a project that will benefit the community in Ingui. This interview will last approximately 45 minutes. If you choose to remain anonymous you may. You may decide how much information you want to share with me. I will be asking you a serious of questions, so please speak freely. The goal is to share information and gain insight on the specific needs of the Ingui community. You will receive no direct benefits from participating in this interview. Does this sound okay and may I have permission to begin the interview?

Document the following in your notes:

Length of interview: _____

Time initiated: _____

Time terminated: _____

Interviewer Name and Signature: _____

Section 1: Background Information

Name: _____

Sex: _____

Education: _____

Number of years lived in Ingui Community: _____

Current Occupation (Specify: Full-time, part-time or none): _____

Family Members: _____

Household headed by: _____

Section 2: Economic Information

1. What is the source of income for most families in Ingui?
2. What is the average monthly income for a family in Ingui?

Section 3: Agricultural Production in Ingui

3. Please explain the current methods of agricultural production in Ingui. How are crops grown?
4. What is the average size of field plots in Ingui?
5. Who does the work on the plots? How much does each person do?
6. What crops are grown and in what periods each year?
7. Is fertilizer or pesticides used by farmers in Ingui?
8. Are people satisfied with their current crop yields?

Section 4: Water Supply

9. Which season are crops irrigated in?
10. How are crops irrigated?
11. Where does the water come from?
12. Who brings the water to the land and how long does it take?
13. How often do people irrigate? How long does it take?
14. Are people satisfied with their current irrigation method? If not, why?

Section 5: Awareness of other Technologies for Agricultural Production

15. Do you know of any other agricultural practices? If so, what?

16. In order to improve your current agriculture methods, what would you suggest farmers do?

Section 6: Introducing a New Technology in Ingui

17. Do you think the Ingui community would be willing to learn a new technology to improve their agricultural practices?

18. If new agricultural technology/skills were introduced, who in the community should learn these new skills?

End of interview.

Appendix F

F. Community Forum Questions Guide

Introduction: Hello, my name is _____. Thank you for participating in this interview. Rain for the Sahel and Sahara (RAIN) is conducting a community needs assessment to assess the specific needs of the Tuareg community of Ingui, related towards improving agricultural production and mitigating poverty. The information that we gather will be shared with RAIN staff and partners and used to develop a project that will benefit the community in Ingui. You may decide how much information you want to share with me. I will be asking you a series of questions, so please speak freely. The goal is to share information and gain insight on the specific needs of the Ingui community. You will receive no direct benefits from participating in this community forum. Does this sound okay and may I have permission to begin the interview?

Document the following in your notes:

Length of community forum: _____

Time initiated: _____

Time terminated: _____

Forum Facilitator Name and Signature: _____

Section 1: Agricultural Production in Ingui

1. Please explain the current methods of agricultural production in Ingui. How are crops grown?
2. What is the average size of field plots in Ingui?
3. Who does the work on the plots? How much does each person do?
4. What crops are grown and in what periods each year?

5. Is fertilizer or pesticides used by farmers in Ingui?
6. Are people satisfied with their current crop yields?

Section 2: Economic Information

7. What is the source of income for most families in Ingui?

Section 3: Water Supply

8. Which season are crops irrigated in?
9. How are crops irrigated?
10. Where does the water come from?
11. Who brings the water to the land and how long does it take?
12. How often do people irrigate? How long does it take?
13. Are people satisfied with their current irrigation method? If not, why?

Section 4: Awareness of Other Technologies for Agricultural Production

14. Do you know of any other agricultural practices? If so, what?
15. In order to improve your current agriculture methods, what would you suggest farmers do?

Section 5: Introducing a New Technology in Ingui

16. Do you think the Ingui community would be willing to learn a new technology to improve their agricultural practices?
17. If new agricultural technology/skills were introduced, who in the community should learn these new skills?

End of Forum.

Appendix G

G. Household Survey for Final Evaluation

Introduction: Hello, my name is _____. Thank you for participating in this interview. Rain for the Sahel and Sahara (RAIN) is conducting a final project evaluation, related the “Sustainable Agriculture Project” that developed a school garden at the Ingui School and introduced a new irrigation technique. The information that we gather will be shared with RAIN staff and partners and used to develop a project that will benefit the community in Ingui. This interview will last approximately 45 minutes. If you choose to remain anonymous you may. You may decide how much information you want to share with me. I will be asking you a serious of questions, so please speak freely. The goal is to share information, gain insight, and evaluate the project. You will receive no direct benefits from participating in this interview. Does this sound okay and may I have permission to begin the interview?

Document the following in your notes:

Length of interview: _____

Time initiated: _____

Time terminated: _____

Interviewer Name and Signature: _____

Section 1: Background Information

Name: _____

Sex: _____

Education: _____

Number of years lived in Ingui Community: _____

Current Occupation (Specify: Full-time, part-time or none): _____

Family Members: _____

Household headed by: _____

Do you have children at the Ingui School? Yes No

If yes, how many? _____

Section 2: Familiarity with the project

19. Are you familiar with the “Sustainable Agriculture Project” that created a garden at the Ingui School?
20. If so, do you know the name of the organization that funded the project?
21. Can you briefly explain the project? What was done at the Ingui School to create the school garden?
22. Do you know any of the activities that were conducted under this project? If so, please list them.
23. What type of gardening techniques did the project use?
24. What was the water source created for the school garden?

Section 3: Information Learned from the Project

25. Were you directly involved in the project (project beneficiary)?
26. Please describe what you know about drip irrigation technology. Where did you learn this information?
27. Please describe what you know about business management. Where did you learn this information?
28. Did anyone who was directly involved in this project (such as student, parent, faculty) teach you anything about the school garden? If so, what did you learn?
29. If yes, what will you use this information for in the future?

Section 4: Project Success and Public Opinion about Project

30. Do you believe this project was successful?
31. What were the major accomplishments of the project?
32. What were the major challenges of this project?
33. What is your opinion about this intervention? For instance, was it well-accepted by the community? Do you hope to see a similar project like this in the future?
34. What didn't you like about this project and why?

End of Survey.

Appendix H

H. Sustainable Agriculture Training Pre and Post test for Gardener, Students, Parents and Faculty⁵

Trainee Name: _____

Section 1: Drip Irrigation

1. Do you know anything about the agricultural method of drip irrigation? Yes No

(If yes, answer questions 2-6)

2. What is drip irrigation?
- a. When rain falls and waters plants
 - b. Technique used to conserve water and provide equal amounts of water to plants
 - c. Technique used by watering plants with a can from a well
 - d. Do not know.
3. What are the primary materials needed to construct a drip irrigation system?
- a. This is a natural process, so there is no need for materials.
 - b. Water source
 - c. Water pump
 - d. Pipelines
 - e. Control Valve (nozzle)
 - f. None of the above
4. What are the potential benefits of using drip irrigation?
- a. Conserve water
 - b. Prevent Soil Erosion
 - c. Provides equal amounts of water to all plants

⁵ Some questions may have more than one correct response. Note all that apply.

- d. Easy to use
 - e. All of the Above
 - f. None of the above
5. How does the water reach the plant when using drip irrigation?
- a. Water is absorbed through the leaves
 - b. Water is absorbed from ground water source
 - c. Water is confined to the root zones of the plants
 - d. None of the above
6. How does drip irrigation affect soil erosion?
- a. It prevents soil erosion from occurring
 - b. It causes soil erosion
 - c. It has no affect on soil erosion

Section 2: Gardening and Planting Techniques

7. Can water be conserved by using drip irrigation? Yes No
8. How do you correctly water plants using drip irrigation?
- a. Make sure plants have equal access to water source
 - b. Make sure water control is properly monitored and managed
 - c. Maintain system regularly
 - d. All of the above
9. What is crop rotation?
- a. Only planting on crops on certain areas of land
 - b. Planting a variety of the same crops each year
 - c. Planting a new crops from one year to the next on same piece of land

- d. Harvesting plants early
 - e. None of the above
10. What are some examples of organic pest control?
- a. Weeding by hand
 - b. Using some crops to shade or smother weeds
 - c. Create habitat that is beneficial for insects
 - d. Combine methods
 - e. All of the above
 - f. None of the above
11. What are some types of organic composting methods?
- a. Manure
 - b. Leguminous materials
 - c. All waste materials
 - d. None of the Above
 - e. All of the above

Section 3: Maintenance and Repair of Drip Irrigation System

12. Which are the following are important when maintaining drip irrigation system?
- a. Check water source
 - b. Monitor water pressure
 - c. Check pipelines and tubing for blockages
 - d. Ensure all plants receive equal amount of water
 - e. All of the above
 - f. None of the

Appendix I

I. Business Management Pre and Post Test for Garden Committee, Students, Parents and Faculty⁶

Trainee Name: _____

Section 1: Teamwork

1. Why is teamwork important?
 - a. It helps achieve goals
 - b. Collective input helps reduce conflicts or issues more effectively
 - c. More ideas can be generated with more people involved
 - d. Work can be done more effectively with more people than individually
 - e. Team work isn't Important
2. What are some team building techniques?
 - a. Create clear goals and objectives
 - b. Build trust among members
 - c. Communicate
 - d. Make decisions as a group
 - e. Provide positive and negative feedback
 - f. All of the above

Section 2: Budgeting and Money Management

3. Why is it important to create a budget?
 - a. Budgeting isn't really that important

⁶ Some questions may have more than one correct response. Note all that apply. Each question is worth 2 points 20 total points

- b. Helps a person live within their financial means
 - c. Serves as a type of plan
 - d. Helps track monetary inputs and outputs
 - e. Helps reduce debt
4. How do you make a budget?
- a. Must buy expensive tools to make a budget
 - b. Use simple resources to make a list of everything you spend money on
 - c. Continually track inputs and outputs on a regular basis
 - d. None of the above
5. What are some money management techniques?
- a. Regulate finances
 - b. Budget
 - c. Save a portion of income in a safe place
 - d. Set financial goals
 - e. Spend income as quickly as possible

Section 3: Marketing

6. Give examples of how you could market or advertise something that you are selling in your local community. What resources or tools would you use? Who would your audience be?

Section 4: Business Management

7. Describe some of the important aspects of business management. What about goal setting, marketing, budgeting, management of funds, etc?
8. What are some important questions to ask when evaluating your business?

- a. What are the problems that face my business?
 - b. What is good about the product?
 - c. What is not good about the product?
 - d. Is the business profitable?
 - e. What does the competition look like?
 - f. How to improve the sale of the product?
 - g. All of the above
 - h. None of the above
9. Describe how to create a business plan and why it is important to create a business plan.
10. What roles do goal setting, marketing, budgeting, and funding management play in business management?

Appendix J

J. Sustainable Agriculture Training Pre and Post Test Results Scores

Table 7: Sustainable Agriculture Training Pre and Post Test Results Scores

Sustainable Agriculture Training Pre and Post Test Results Scores							
Respondent #	Age	Title	Gender	Pre-Test Score (out of 12)	Pre-Test Score (%)	Post-Test Score (out of 12)	Post-Test Score (%)
1	9	Student	Male	0	0%	9	75%
2	33	Faculty	Male	2	17%	11	92%
3	27	Faculty	Female	1	8%	12	100%
4	35	Parent	Female	3	25%	12	100%
5	12	Student	Male	0	0%	10	83%
6	14	Student	Female	2	17%	12	100%
7	45	Parent	Male	1	8%	11	92%
8	38	Faculty	Male	0	0%	11	92%
9	10	Student	Female	0	0%	10	83%
10	43	Gardener	Male	4	33%	12	100%
11	29	Faculty	Female	1	8%	11	92%
12	36	Parent	Female	3	25%	12	100%
13	13	Student	Female	1	8%	10	83%
14	37	Faculty	Male	0	0%	10	83%
15	15	Student	Male	2	17%	12	100%
16	9	Student	Female	0	0%	9	75%
17	29	Faculty	Female	3	25%	12	100%
18	45	Parent	Female	0	0%	10	83%
19	10	Student	Male	0	0%	11	92%
20	11	Student	Female	1	8%	12	100%
21	51	Parent	Male	1	8%	11	92%
22	46	Faculty	Female	2	17%	12	100%
23	12	Student	Female	0	0%	10	83%
24	12	Student	Male	0	0%	12	100%
25	16	Student	Male	2	17%	12	100%
26	11	Student	Female	0	0%	11	92%
27	39	Parent	Female	3	25%	12	100%
28	34	Faculty	Male	0	0%	9	75%
29	14	Student	Male	0	0%	10	83%
30	53	Parent	Female	0	0%	9	75%
31	15	Student	Female	2	17%	12	100%
		AVERAGE SCORE:			9%		91%

Appendix K

K. Business Management Training Pre and Post Test Results Scores

Table 8: Business Management Training Pre and Post Test Result Scores

Business Management Training Pre and Post Test Results Scores							
STUDENTS/STAFF/FACULTY DATA							
Respondents #	Age	Title	Gender	Pre-Test Score (out of 20)	Pre-Test Score (%)	Post-Test Score (out of 20)	Post-Test Score (%)
1	9	Student	Male	1	5%	16	80%
2	33	Faculty	Male	3	15%	19	95%
3	27	Faculty	Female	4	20%	20	100%
4	35	Parent	Female	3	15%	20	100%
5	12	Student	Male	1	5%	18	90%
6	14	Student	Female	0	0%	17	85%
7	45	Parent	Male	0	0%	17	85%
8	38	Faculty	Male	2	10%	17	85%
9	10	Student	Female	1	5%	19	95%
11	29	Faculty	Female	2	10%	18	90%
12	36	Parent	Female	5	25%	17	85%
13	13	Student	Female	0	0%	15	75%
14	37	Faculty	Male	1	5%	16	80%
15	15	Student	Male	3	15%	20	100%
16	9	Student	Female	0	0%	15	75%
17	29	Faculty	Female	3	15%	20	100%
18	45	Parent	Female	2	10%	20	100%
19	10	Student	Male	1	5%	19	95%
20	11	Student	Female	0	0%	19	95%
21	51	Parent	Male	0	0%	17	85%
22	46	Faculty	Female	2	10%	16	80%
23	12	Student	Female	2	10%	17	85%
24	12	Student	Male	1	5%	20	100%
25	16	Student	Male	0	0%	17	85%
26	11	Student	Female	1	5%	15	75%
27	39	Parent	Female	2	10%	15	75%
28	34	Faculty	Male	3	15%	19	95%
29	14	Student	Male	2	10%	17	85%
30	15	Student	Female	0	0%	15	75%
		AVERAGE SCORE:			8%		88%

GARDEN MANAGEMENT COMMITTEE DATA							
Respondent #	Age	Title	Gender	Pre-Test Score (out of 20)	Pre-Test Score (%)	Post-Test Score (out of 20)	Post-Test Score (%)
1	38	Committee Member	Male	2	10%	20	100%
2	45	Committee Member	Female	1	5%	19	95%
3	43	Committee Member	Female	1	5%	18	90%
4	37	Committee Member	Male	2	10%	20	100%
5	29	Committee Member	Female	0	0%	19	95%
6	31	Committee Member	Male	3	15%	17	85%
7	35	Committee Member	Male	2	10%	18	90%
8	50	Committee Member	Female	0	0%	18	90%
9	52	Committee Member	Male	1	5%	17	85%
		AVERAGE SCORE:			7%		92%

Appendix L

L. Questionnaire for garden management committee

Section 1: Familiarity with the project

1. Can you briefly explain the project? What was done at the Ingui School to create the school garden?
2. Describe your involvement with the project.
3. Do you know any of the activities that were conducted under this project? If so, please list them.
4. What type of gardening techniques did the project use?
5. What was the water source created for the school garden?

Section 2: Information learned from the project

6. Please describe what you know about drip irrigation technology. Where did you learn this information?
7. Please describe what you know about business management. Where did you learn this information?

Section 3: Project Success and Public Opinion about Project

8. Do you believe this project was successful?
9. What were the major accomplishments of the project?
10. What were the major challenges of this project?
11. What is your opinion about this intervention? For instance, was it well-accepted by the community? Do you hope to see a similar project like this in the future?
12. What didn't you like about this project and why?

Section 4: Business Plan Development

13. Please show us a detailed version of the school garden business plan.

14. What is the progress of this plan to-date?

15. What changes will be made for the future

Section 5: Management of Garden Produce

16. What has been done with the produce that was produced in the school garden?

17. How has this directly benefited the school children?

18. Have any of the crops from the garden been sold? If so, which ones, in what markets, and when?

19. Describe how the sale of garden produce is organized and managed.

Section 6: Garden Budget

20. Please present a detailed version of the garden budget and report inputs and outputs (refer to table below for example):

Table 9: Garden Budget and Report Inputs and Outputs

Item (crop)	Quantity Produced	Quantity Used by School	Quantity Sold	Losses	Remaining stock	Observations

21. What was the revenue brut from the sale of garden produce?

22. What was the net revenue from the sale of garden produce?

23. What has any revenue gained from the sale of garden produce been used for?

End of Survey.

construction, and sustainable gardening		curriculum											
Train students, parents, and faculty in drip irrigation, cistern construction, and sustainable gardening	Gardener, Agricultural Coordinator	Training guides/training curriculum											
Well digging and cistern construction	Volunteer Parents, technical service assistants (TSA)	Construction materials, cistern											
Installation of drip irrigation system	TSA	Drip irrigation system materials											
Garden Enclosure Constructed	Volunteer Parents, TSA	Enclosure materials											
Plant Seeds in Garden	Gardner, Volunteer Parents	Seeds and gardening materials											
Monitoring and Water Garden	Gardner, garden management committee, Agricultural Coordinator, Program Director	Gardening materials, garden monitoring reports											
Train Garden Management Committee in business management	Economic Coordinator	Training guides/training curriculum											
Train students, parents, faculty in business management	Economic Coordinator	Training guides/training curriculum											
Manage garden-related expenses	Garden Management Committee, Economic Coordinator	Expense/revenue logs and reports											
Evaluation of project	Program Director	Focus groups, survey											

Appendix N

N. Monitoring Plan

Expected Result 1: Access to nutritious locally grown foods for students at Ingui school is improved through the development of a school garden.									
Activities	Indicators	Research Tools/Techniques	Person Responsible	Month (2010)					
				Jan.	Feb.	Mar.	Apr.	May	
1.1 Hold community assembly	1.1 # of community assemblies held	Meeting reports	RAIN Agricultural Coordinator (Ag. Co)	X					
1.2 Recruit and hire gardener	1.2 Gardener hired	Contract	Ingui Community	X					
1.3 Recruit and select garden committee	1.3 Garden committee selected	Contract	Ingui Community	X					
1.4 Sign protocol agreement between RAIN and Committee	1.4 Protocol signed between RAIN and committee	Protocol agreement	RAIN and community		X				
1.5 Open savings account for Ingui school garden	1.5 Savings account opened for Ingui school garden	Bank agreement	RAIN and garden committee	X					
1.6 Recruit volunteers to assist with garden construction	1.6 Volunteers recruited for garden construction		Garden Committee	X					
1.7 Dig well and construct cistern	1.7 Well dug and cistern constructed		Volunteers and technical services		X				
1.8 Install drip irrigation system	1.8 Drip irrigation system installed		Technical services		X				
1.9 Construct garden enclosure	1.9 Garden enclosure constructed		Volunteers and technical services		X				
1.10 Plant seeds	1.10 Seeds planted	Report of items planted	Volunteers and gardener			X			
1.11 Monitor and water garden	1.11 Garden monitored and watered		Gardener			X	X	X	
1.12 Monitor and evaluate progress of garden construction	1.12 Monitoring and Evaluation	M&E progress reports	Committee and Rain Staff	X	X	X	X	X	
Expected Result 2: Agricultural production is reinforced through the promotion and use of sustainable agricultural techniques.									
2.1 Train gardener in drip irrigation, cistern construction, and sustainable gardening	2.1 Gardener is trained in drip irrigation, cistern construction, and sustainable gardening	Training materials	ICRISAT Tech. Expert			X			
	2.2 Gardener passes post practical and technical test on drip irrigation, cistern construction and gardening	Training Post-test	ICRISAT Tech. Expert			X			
2.2 Train students, parents and school faculty in drip	2.3 Students, parents, and school faculty trained in drip	Training materials	Gardener and RAIN Ag. Co.			X			

irrigation and sustainable gardening	irrigation and sustainable gardening							
	2.4 Students, parents and school faculty who participated in training pass post practical test in drip irrigation and sustainable gardening	Training Post-test	RAIN Ag. Co			X		
Expected Result 3: Economic capacity of the Ingui school is improved.								
3.1 Train garden committee in business management	3.1 Committee trained in business management	Training Materials	RAIN Economic coordinator				X	
	3.2 Garden committee members pass training post test on themes covered during training	Training Post-test	RAIN Economic Coordinator				X	
	3.3 Garden committee establishes a budget and financial plan for the school garden	Budget and Plan	Garden Committee				X	
3.2 Train students, parents and school faculty on business management	3.4 Students, parents, and school faculty trained in business mng.	Training Materials	RAIN Economic coordinator				X	
	3.5 Students, parents, and school faculty pass training post test on themes covered during training	Training Post-test	RAIN Economic Coordinator				X	

