Training Water Committees in Bocas del Toro, Panama:

A Case Study of

Peace Corps Volunteers' Initiative to Improve

Rural Water System Management

By

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A REPORT

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This report, "Training Water Committees in Bocas del Toro, Panama: A Case Study of Peace Corps Volunteers' Initiative to Improve Rural Water System Management" is hereby approved in partial fulfillment of the requirements for the degree of MASTER OF SCIENCE IN CIVIL ENGINEERING.

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Preface

This report is based on my primary work and experiences during the 27 months I spent as a U.S. Peace Corps Volunteer in Panama from August 2005 to October 2008. For my service I was placed in the community of Quebrada Cacao in the province of Bocas del Toro in the far northwest corner of the country. My role as a water and sanitation extension agent was to assess health problems in the community related to water and sanitation and promote alternatives to improve the community's overall health. I focused on the design, construction, and management of gravity-fed water supply systems and encouraged the use of pit and composting latrines. My role as a health promoter also included HIV/AIDS awareness, hygiene, and STI education as well as environmental advocacy through conservation and restoration. Along with two semesters of coursework and research in the field, this report is submitted to complete a Masters of Sciences Degree in Civil Engineering from Michigan Technological University through the Master's International Program with the Peace Corps. This report is meant to serve as an aid to governments, NGOs, or development workers interested in improving rural water system management in indigenous areas like Bocas del Toro, Panama.

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List of Acronyms

ANAM	National Authority for the Environment *Authoridad National de Ambiente*
CM	Community Management
CWC	Community Water Committee
IDAAN	National Institute of Acueducts and Sanitary Sewers *Instituto de Acueductos y Alcantarillados Nacionales*
IPACOOP	Panamanian Autonomous Institute of Cooperatives *Instituto Panameño Autónomo Cooperativa*
JAAR	Rural Water System Administrative Council *Juntas Aministradoras de Acueductos Rurals*
MINSA	Ministry of Health *Ministerio de Salud*
PCV	Peace Corps Volunteer
RWS	Rural Water System

Acknowledgements

I would like to thank my advisor, Dr. David Watkins, for his advice, friendship and support throughout my two years in the Peace Corps and for personally visiting me and seeing firsthand the work I was performing.

I would also like to thank Dr. Neil Hutzler, Dr. Blair Orr, and Dr. Kris Mattila for serving on my defense committee and for their time, flexibility, and feedback.

Thanks to my parents and the rest of my family for their patience with my worldly adventures, and especially to my Mom who decided to participate in one of them.

A huge thanks to Julie Majkrzak whose idea it was in the first place to organize the seminar series; she made it happen. Thanks to the rest of the PCV Bocas Crew that organized workshops and seminars: Ryu Suzuki, Lane Olson, Joe Goessling, Mo Hart, Kevin Harrison, Colin Daly, Nico Armstrong, Jim Fraser, Sara Hunt, Melissa Salgado, Matt Rogge, Rebecca Miller and all the rest of my PCV friends.

Abstract

The Seventh Millennium Development Goal of the World Health Organization aims to reduce by half the proportion of people without sustainable access to safe drinking water and basic sanitation by 2015 (WHO, 2008). Currently in Panama, nearly one-fifth of the rural population lacks access to safe drinking water, and this number is even higher in indigenous areas like Bocas del Toro where the author lived and worked as a U.S. Peace Corps Volunteer (WHO Core Indicators by Country, 2008).

In Panama, building rural water systems is under the direction of the Ministry of Health (MINSA) but after completion the management is left up to the citizens, usually in the form of a community water committee. Often times, rural water systems are built well initially but fail within a few years because these committees lack adequate skills, education, capital, understanding, or interest to keep their systems functioning properly.

It was obvious to PCVs working in Bocas del Toro that there was a divide between the implementation of water projects and the actual management, so they organized a series of seminars to train citizens the skills they needed to manage their water systems and provide reliable, potable water. Along with knowledge transfer, organizers especially sought behavioral change during and after the seminars. Basic indicators were devised to evaluate participants' educational progress and well as continually monitoring leadership, confidence, and empowerment changes. Between August 2007 and July 2008, 58 indigenous Ngäbe villagers attended these seminars and 20 completed the whole series.

This report first identifies the current obstacles rural water committees face and then outlines how each session was tailored to overcome those hurdles. Four main themes provided the backbone of the series: Accounting, Watershed Management, Infrastructure, and Community Management and Leadership. This report tracks each particular session and analyzes its effectiveness using the pre-established indicators. Some indicators were found to be unsuitable for measuring knowledge transfer and had to be abandoned. Likewise, improvements were made between the two rounds which specialized to the differing cultural learning styles.

The seminar series outcomes were positive based on the indicators, feedback from the attendees, and a follow-up surveys with Peace Corps Volunteers, but direct behavioral change was not obvious. Results were also more prevalent amongst immediate, quick-solution activities rather than long-lasting changes of policy. Perhaps the most influential outcomes concerned the personal development of the participants – an area where organizers witnessed significant gains.

Water education and instruction is a pressing need in rural, indigenous areas like Bocas del Toro and the water committee trainings examined in this report may have been the first step towards a future certification program. Therefore the effectiveness, short-falls, and lessons learned during these rounds may prove to be very valuable for future trainings.

Chapter 1 - Study Motivation and Objectives

This report is a case study examining the effectiveness of a seminar series to train water committee members organized by U.S. Peace Corps Volunteers living and working in Bocas del Toro, Panama with the Ngäbe Peoples. It is meant to serve as an aid to governments, NGO's, or development workers interested in improving rural water system operation and management.

The seminar series arose from dozens of conversations among Peace Corps Volunteers (PCVs) and ultimately was a catalyst to the refocusing of Peace Corps's Environmental Health Sector from rural water system construction to training. The seminar series was originally the brainchild of PCV Julie Mjakrzak who wrote the grant and was the main organizer.

Chapter two of this report thoroughly introduces the reader to Panama, Bocas del Toro, to the Ngäbe Culture, and especially to the current problems facing rural water system operation and management. This context is critical to understanding the decisions behind presenting each seminar topic, and the second chapter describes specific issues and problems facing this region that led to each topic.

Chapter three outlines the instructional methods for each session, as well as the themes, goals, and activities of each seminar. The instructors developed novel teaching techniques to reach their students in consideration of local teaching norms, the level of education of the participants, and language barriers. Other activities were specially designed to develop participants' confidence, leadership, and motivation. Chapter three also details why changes were made from the first round to the second.

Chapter four examines the conference's effectiveness of achieving its original goals as well as analyzes individual outcomes of knowledge transfer, capacity building, and behavioral change. It also scrutinizes the seven indicators developed to measure participant advancement and evaluates their effectiveness.

Chapter five presents continuing work in the training of community water committees, lessons learned from the seminars, and the author's recommendations for future work.

Chapter 2 – Overview of Problem and the Need for Training

2.1 – Overview of Panama

The Republic of Panama is the isthmus country that connects North and South America most commonly known for its transcontinental canal. Panama is a relatively small country with a total land area of 78,200 sq km, roughly the size of Ireland (World Factbook Online, 2008). Over half of the population of the entire country lives within a 100 km radius of Panama City (MINSA, 2008).

Lying between 7 to 9.5 degrees north of the equator Panama endures a hot and humid tropical climate with a prolonged rainy season extending from May to January. Climatic regions are determined mostly by rainfall which considerably contributes to lack of access to the most tropical rural regions.

Panama is demographically diverse. The majority (70%) of the population is "mestizo" meaning European ancestry mixed with indigenous American. The rest is 14% Amerindian and mixed West Indian, 10% white and 6% Amerindian. The Amerindian population includes seven indigenous peoples, the Emberá, Wounaan, Buglé, Kuna, Naso (also called the Teribe), Bribri, and the Guaymí, most commonly known as Ngäbe (World Factbook Online, 2008). In indigenous areas the level of poverty is 95% (UNICEF, Equality with Dignity, 2004).

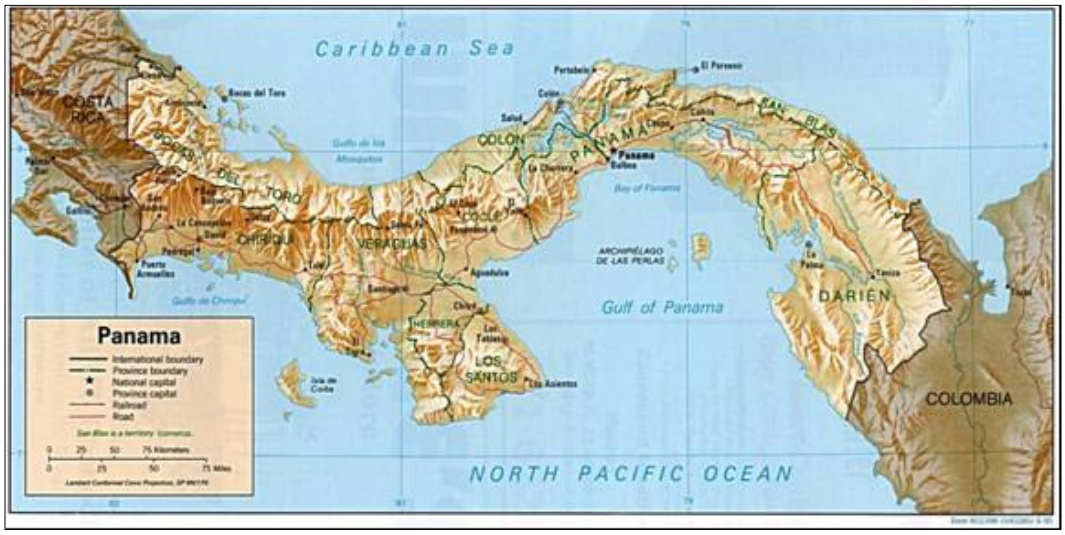

Figure 2.1 *– Country Map of Panama*
Source: http://www.intute.ac.uk/sciences/worldguide/maps2/988_a.jpg
Printed with permission (Appendix I)

Wealth is not evenly distributed throughout Panama. It is among the countries with the highest levels of economic inequality in the world, ranked 13th of 177 reported (UN, Human Development Report, 2006). In other terms, the wealthiest 20 percent of the population has an annual family income 32 times that of the poorest 20 percent (UNICEF, 2008). Around one-third of the country lives below

the national poverty line and 6% live below $1 per day (UN Human Development Report, 2006).

2.2 – Bocas del Toro

Bocas del Toro is the northwestern most provinces in the Repubic of Panama with a land area of 8,745 sq km (St. Louis, 2004). It borders Costa Rica to the west, the Caribbean Sea to its north, the mountains of Chiriqui Province to the south, and the Ngäbe and Bugle indigenous reservation to its east (see Figure 2.2). Like other regions along the Caribbean coast, rainy seasons and dry seasons are not as distinct as other parts of Panama. Bocas del Toro (or simply called Bocas) receives an incredible amount of rain, sometimes three meters per year (Hanratty and Meditz, 1987).

Figure 2.2 *– Bocas del Toro Province*
Source: http://en.wikipedia.org/wiki/File:Countries-Panama-provinces-2005-10-18-en.png
Licensed under the Creative Commons

The Province of Bocas del Toro, population 113,180 (MINSA, 2008), has been dominated by the banana industry dating back to 1880 when the Snyder Brothers from the USA established the first formal business there. Nine years later they joined The United Fruit Company and the banana industry boomed (St. Louis, 2004).

In the 1930s at the height of the region's prosperity, a fungus commonly known as Panama Disease destroyed the banana industry. In the 1950s disease resistant plants were developed and the industry once again began to grow (Hanratty and Meditz, 1987). Around this time large numbers of Ngäbe families migrated from the mountains seeking work with the banana companies. The labor usually settled in the already established towns but many others followed the wave and the overflow settled rural lowland valleys along rivers and streams. They continued subsistence farming, fought for available land, and eventually formed loose-knit communities.

2.3 – Ngäbere Culture

Guaymí is the traditional term for the Ngäbe Peoples and is derived from the Buglere term for them – guaymiri (Online Encyclopedia, 2008). Ngäbe is the more common term usually misspelled as Ngöbe or Ngobe. Ngäbes today can be divided roughly into two camps: those living in highlands or the mountainous areas of the Ngäbe-Bugle Reserve, or lowland dwellers inhabiting the coast of the reserve and Bocas del Toro. Their language is essentially the same but with a heavy influence of regional word usage. Highland Ngäbe inhabitants tend to be more traditional. The women assume their traditional form of dress and local customs, roles, and beliefs are practiced more in these parts. In general, Ngäbes who have migrated to Bocas del Toro have lost their traditional customs and subsequent generations are trying to adopt to a more modern society. This report is only relevant for lowland Ngäbes living in rural Bocas del Toro.

In rural areas they live on a starchy diet consisting of green bananas, manioc (cassava), and a wide selection of root tubers. Their farming techniques place more emphasis on the gradual selective clearing and weeding of plots rather than slash and burn techniques or monoculture plots. Those living along coasts supplement their diet with fish and seafood and wealthier families buy rice as their staple. Besides raising crops, their subsistence living is complimented with small-scale livestock production and occasional hunting.
Goods such as lumber, plantains, oranges, or limes may be hauled to local markets and sold if they are not consumed by the immediate family. Their largest cash crop is cacao beans which support the majority of the families even if payment is sporadic and dependent on volatile market fluctuations.

Figure 2.3 *– A typical Ngäbe village (Cayo Paloma)*
Source: Babcock, 2006
Printed with permission (Appendix I)

Housing in rural areas commonly takes the form of wooden, stilted houses taking advantage of the abundance of lumber (see Figure 2.4). Walls are planked with wooden siding and the roof either consists of palm thatching or tin sheeting. Very few rural communities in Bocas del Toro have electricity, but some wealthier families may have a generator or solar panel to produce a few hours of electricity each day. Basic necessities are purchased for the home such as clothing, cooking utensils, tools, blankets, sewing machines, and radios, for example. Most cook over an open fire inside their homes; others save for months or years to buy a gas stove burner. The large majority of rural communities and villages in Bocas del Toro have a population under 500 inhabitants; many are extended families, or are a grouping of a few families. Besides a primary school and some form of public meeting hall, there is usually very little public infrastructure.

Figure 2.4 *– Common Ngäbe house in Bocas del Toro where the author lived for two months*
Source: Photo by author

Most young men have some experience as wage laborers either working with the banana industry, as construction day laborers in larger cities, or working on nearby farms. Others leave for extending times to harvest coffee, cacao, or rice in other parts of the country.

The women may contribute to the household income by selling crafts, tending cash crops and produce, but child rearing is usually the women's main role. Ngäbes tend to be very religious, a by-product of mostly Protestant Evangelism and a continual cause of friction in and amongst villages.

Compared to other developing countries, Panama's level of education is quite high, with a 92 percent adult literacy rate (UNICEF, 2008) and high primary school attendance. However, in rural Bocas del Toro few Ngäbes complete high school and of those who do, few are women. Nevertheless, the majority graduate from primary education, and all but a few elders can read and write Spanish.

Of the 50% of children who live in conditions of poverty in Panama, (nearly 30% in extreme poverty), most come from indigenous areas like Bocas del Toro. Furthermore, more than half of all indigenous children are underweight (UNICEF, 2008). The majority of reported illnesses are due to water borne diseases (MINSA, Indicators of Health Report, 2008). In fact, poor water supply is the primary cause of illness in every age category in Bocas (see Box 1).

Age Category	*# of Cases Reported*
0-4 years	*8,706*
20-59	*2,844*
60+	*229*

***Box 1** – Diarrhea cases reported by age group in Bocas del Toro*
(No data given for ages 5-19)
Source: MINSA Indicators of Health Report, 2008

2.4 – Water Supply in Panama and Rural Bocas del Toro

Roughly 1 out of 5 individuals (19%) in rural Panama lack access to improved drinking water sources which ranks them in the middle of Central American countries (WHO, 2008). To add to the rural/urban division in Panama, two separate agencies are accountable for their respective urban or rural clientele. All city public water facilities in Panama are administered by The National Institute of Aqueducts and Sanitation (IDAAN) and rural systems are overseen by the Ministry of Health (MINSA). Rural water systems (RWS) in Panama are synonymous with gravity-fed water distribution systems (or simply "aqueducts") utilizing natural springs and springboxes, elevation differences, concrete tanks, and PVC tubing to bring water to individual homes. Public tap stands are not common, nor are household meters. Chlorination in rural areas is promoted but seldom practiced.

Each province in Panama has a local MINSA office dealing with rural water and yearly funding for water projects and training gets divided between each province. MINSA continually protests about a lack of adequate funding for their rural water programs, a shortage of available labor, a shortage of construction materials, and of political favoritism between the provinces. They argue that one provincial office (sometimes with only a few staff members) is not capable of administering several dozen if not a hundred villages and their systems. In turn, MINSA has been forced to adopt a regionally diverse and reactive system of management.

Political maneuvering is also a concern for rural water management in Panama. It is not uncommon for a provincial agency's staff to be replaced given the results of the latest local, regional, or national election. Many regional engineers have little or no official training. All of these factors compound to place the majority of the responsibility of rural water systems unto the users themselves, a model commonly mislabeled as Community Management (CM).

2.5 – The Community Management Model

Even though the community management model is not new (rising from development theories in the 1960s and 1970s), it is still weakly defined (Lockwood, 2004). It often involves other catch-phrase concepts such as "self-help," "self-reliance," "user-choice," "community involvement," "participatory planning and development," and "sustainability" (Feachem, 1980).

The CM paradigm also has different definitions in every locale where it is applied. Definitions range from a means of using cheap or free local labor or materials with no local authority to a model where users are involved in every step of their water project from design, implementation, and operation and management (O&M), completely and indefinitely. Characteristics include participation, decision-making independence, O&M, ownership, and cost contributions (see Box 2). Simply put, community management is about users having control over their systems (World Bank, 2008; IRC, 2003).

Participation: *A cross-sectional representation of the community must be presented for effective CM as well has intensive, continual community support.*

Control: *The community must have the ability to make strategic decisions throughout the entire water system process - from the design phase to long-term O&M.*

Ownership: *Although formal legal ownership of physical infrastructure is highly desirable, it may not be possible in existing legal frameworks. Of equal importance is the "sense of ownership" by the user community.*

Cost sharing: *CM models require some initial element of community contribution (not necessarily financial) and the financial independence to administer O&M procedures.*

Box 2 – *Four main characteristics of community management*
Source: (McCommon et al. 1990; IRC, 2003)

During the International Drinking Water Supply and Sanitation Decade of the 1980s, the CM model reached popular consensus as the leading paradigm for rural water development and management with the purpose to improve community empowerment, efficiency, and sustainability (Brikke, 2000). The paradigm was sponsored by different actors with differing agendas, summarized below (Lockwood, 2004):

- **Governments** saw community involvement as a way of reducing demands on overstretched resources and making up for lack of capacity.
- **Donors** saw an opportunity to stretch development budgets and expand implementation of water supply and sanitation facilities, and to bypass the problems posed by inefficient and often corrupt governments
- **Non-governmental organizations** became the voice of the community and happily seized an opportunity to increase their role, becoming in many countries a parallel provider of services and, in that respect, a kind of parallel government
- **Multilateral lending institutions** saw CM as an ideal vehicle for their messages about reduced government involvement, and increased private sector and civil society roles.

A growing body of evidence suggests that better quality participatory planning and management leads to better performing community water supplies (Narayan, 1995; FANCA, 2007). Supporters believe that properly executed CM models can improve designs, reduce costs of construction, reduce costs of O&M, and empower community members. This report however will not review the well-published proposed and reported benefits of CM but rather briefly examine difficulties of CM models that the author specifically noticed in Panama and Bocas del Toro.

Broadly speaking, there are two sets of factors that can lead to problems for CM systems (Lockwood, 2004):

- **Limitations Within the Community:** community dynamics, political or social conflict, failure to generate sufficient tariff revenue, lack of preventative maintenance, lack of cohesion and lack of capacity (technical, managerial, financial, etc.)
- **External Constraints to the Community:** poor designs, poor implementation, political interference in planning and resource allocation, lack of spare parts supply, lack of supportive policies and legislation and, very importantly, the lack of long term support to help communities through major repairs, conflicts and other problems with extension and upgrading.

If there is not a well-defined national CM model (as in Panama), water authorities are forced to adopt a village-by-village approach, and not all villages are created equal. Differences according to country context, geography, demographics, culture, history, politics, and population impede the implementation of well-intended water projects. Of course some communities excel when compared to others. The task of scaling-up the CM model from these "islands of successes" currently touted to regional or national levels, however, faces many challenges (see Box 3) (Feachem, 1980; White, 1981).

Practicability: *"Current CM recommendations require a cadre of staff that do not exist; working for government bureaucracies that are already stretched to the limit; paid by funds that are not available; and engaged in community level activities that would be immensely difficult, in any country, to incorporate into the regular, routine functions of a large bureaucracy or amongst a network of NGOs or other organizations." Nor is it safe to assume that planners will find community members who are willing, able, and competent to dedicate the time and services needed for successful voluntary participation.*

Relevance: *Most supporters of CM are nationals of industrialized countries where CM is not, and never has been, a major component of water supply development. Perhaps village-based models such as CM would seem less necessary in developing countries if they enjoyed a stronger governmental hierarchy better serving the village level.*

Cost: *CM requires increased costs by outside institutions for the employment, training, supervision, and transportation of community level workers that are necessary for successful community involvement. These costs are seldom computed nor added to the individual cost per household or per village to truly achieve a balanced view.*

Standardization: *Developing countries usually strive for a high level of standardization as a partial answer to their managerial, administrative, and financial woes. The very nature of CM forces a high level of flexibility which strains organizations and considerably adds costs and time.*

Political context: *Many communities do not enjoy a healthy relationship with their government or water agency. Furthermore, unscrupulous local politics is a taboo subject that is muted during communication with banks, donors, and governmental officials nationally and internationally.*

Box 3 *– Five obstacles impeding CM scale-up*
Source: (Feachem, 1980; White, 1981)

2.6 – Community Water Committees in Remote Bocas del Toro

The standard practice in Panama of utilizing community involvement is through the operation of a community water committee (CWC). CWCs are designed to administer RWS and their promotion and general acceptance is strong in rural areas of Bocas del Toro. They involve five to seven members including a President, Vice-President, Secretary, Treasurer, *Fiscal* (to oversee checks and balances), and *Vocal*(s) (to announce meetings and communicate with public). Panamanian CWSs have four major functions including: communicating with users (meetings, elections, training, etc.); managing community resources (financial, environmental, human, etc.); RWS operation and maintenance; and serving as representatives from the community for agencies, organizations, and governments.

Figure 2.5 *– An informal CWC planning meeting the president, secretary, and laborer in author's home. Source: Photo by author*

Panama refocused efforts to shore up RWS in 1994 with National Resolution No. 28 which established a national policy of the roles and responsibilities of the CWCs along with roles and responsibilities for users. That same year Executive Decree No. 40 gave legal authority to CWCs officially recognized by the government (JAAR).

In rural areas in Bocas del Toro however, few national policy ramifications have trickled to their level. Villagers know what a committee is and the names of the different positions, but few are familiar with the roles or have any prior experience serving on a committee. Few CWCs in Bocas are officially recognized JAARs. Additionally, the JAAR regulations state that committee positions are not to receive financial rewards for their service. Therefore, there is little or no financial incentive for villagers to volunteer, let alone be the focal point of angry community members when the faucet runs dry. The reality is that water committees many times only exist as a few names scribbled on paper. In the author's experience living in a rural village in Bocas del Toro (population 120), his community elected four different water committees in less than a year. Many of these elected officials were unaware they held positions. In his community and others, the author witnessed first-hand all of the possible limitations within the community outlined above, which solidified his opinion that specific training was needed for these CWCs.

2.7 – The Need for Training

The discrepancy between MINSA's expectations of CWCs and their capabilities appeared to be the root cause of difficulties within the CM model. This author suspected the discrepancy he saw was widespread, and surveyed all active PCVs serving in Panama (roughly 175 at the time) and received 105 responses. He

asked PCVs to rank, in order of priority, how MINSA should focus their resources regarding RWS in their respective provinces. Six options included:

- Building brand new systems
- Repairing current systems
- Training local water committees or technicians
- Partnering with NGOs or outside assistance
- Training in-house to better train MINSA staff
- Developing a Master Water Plan for next 5-10 years.

The opinions of the PCVs clearly indicated that "training local water committees" was the suggested priority (See Appendix A). Additionally, the results showed that "Repairing current systems" was a main concern, a responsibility that generally falls on CWCs as well. The results for only PCVs working in Bocas del Toro (14 responses) was the same with "training local water committees" as the top priority. In second place though was "build brand new systems," a reflection of the many current communities who have no public water supply in Bocas. In a close third was "repair current systems."

To address training needs, PCV and Bocas Regional Leader Julie Majkrzak proposed a series of seminars "to teach community leaders techniques for maintaining and managing a community aqueduct while building their leadership skills." She anticipated the following short-term objectives to be met by the end of the seminar (Majkrzak, 2007):

- Three community leaders from 15 communities (45 participants total) will receive training in a seven session water committee seminar.
- Each participating community will teach two selected alternates about the seminar topics, thereby training 30 community members second-hand.
- 80% of participants will understand how a well-managed community aqueduct can improve the health of a community.
- 80% of participants will learn and be able to apply the Panamanian Health Ministry JAAR system of accounting.
- 90% of participating communities will plant trees in their community's aqueduct watershed and will develop a plan to maintain the watershed.
- 80% of participating communities will repair holes in their aqueduct line, clean the storage tank and springbox and add air-release valves if needed.
- 80% of participating communities will make a plan to teach the incoming water board how to manage and maintain the community aqueduct.

Majkrzak recruited a team of PCVs living in rural Bocas del Toro to help organize and facilitate the planned workshops. Most were from Peace Corps' Environmental Health Program specializing in rural water and sanitation promotion. Though not experts on non-formal adult education, they relied on their knowledge of the Ngäbe Culture and the needs they experienced to help them organize the seminars.

Chapter 3 – Seminar Planning and Execution

3.1 – Structuring the Workshops

The conferences were divided into two rounds and were held on Saturdays from 8am – 4pm. The first round, which was held during August-October, 2007, had 27 invitees representing 9 villages. The second round, held May-July, 2008, had seven villages participate with 21 invitees. Each community was invited to elect their three representatives. Communities that currently hosted PCVs were invited to partake to ensure participation and to utilize the PCV for homework assignments and village-level support (see Box 4).

Participating Communities

Round One	***Population[a]***	***Round Two***	***Population***
Quebrada Cacao	*120*	*Tibite (no PCV)*	*200*
Nueva Estrella	*170*	*Quebrada Banano*	*220*
Santa Marta	*250*	*Rio Oeste Arriba (no PCV)*	*300*
Silico Creek	*300*	*Loma Muleto*	*350*
Nudobiti	*450*	*Junquito*	*400*
Valle de Agua Arriba	*500*	*San Cristobal*	*700*
Valle Zaron	*500*	*Bella Vista*	*700*
Valle de Risco I[b]	*1000*		
Valle de Risco II			

Box 4 *– Population of participating communities by round*
[a]Estimated population, 2007
[b]Valle de Risco is one village with two RWS managed by separate CWCs. Both participated in the seminars and will be labeled I and II.

The location of the workshops was based on a model used by a previous workshop in Bocas del Toro planned by PCVs related to cacao production. Rather than bring all the participants from their villages to one centralized location, the conferences were planned to occur in the respective villages on a rotation basis. PCVs had found past success with this model because:

- Participants preferred learning new information in a place they felt physically and emotionally comfortable
- Attendees were able to visit and network in villages with similar conditions
- Host communities felt a sense of pride to host a conference in their village which sometimes led to other community-initiated projects such as trash clean-up, construction projects, income generation, etc.
- By visiting other villages, participants could observe alternative CM implementations, and share views on CM, RWS, and rural development.

3.2 – Covering Costs

After investigating possible in-country means of support, Majkrzak applied and was granted a Peace Corps Partnership Program Grant to cover the costs of the conferences with 49.8% community contribution. Total costs amounted to $4,590.05 and the grant covered $2,306.45 (see Box 5 and Appendix B for original grant proposal). All participants who incurred travel costs were reimbursed, but attendance was voluntary.

Total Project Costs	***% of Total Cost***	***Total Cost (USD)***
Grant Contribution	*50.2*	*2,306.45*
Community Contribution	*49.8*	*2,283.60*
Total Project Cost	*100*	*4,590.05*

Box 5 *– Project Costs*
Source: (Majkrzak, 2007)

Each hosting community was given $30 in advance for the purchase of food items to supply breakfast and lunch to the participants. Each was encouraged to hold a community meeting, along with their PCV, to plan a budget, organize cooks, and acquire supplies. These extra tasks were intentionally planned to facilitate another form of community planning. During the conferences, a good-humoured competition formed over who could cook the best lunches. Although comical, this showed organizers a sense of pride developing in the hosting villages.

3.3 – Background of Participants

The first session of round one enrolled 23 of 27 total participants, lacking a third representative from Quebrada Cacao, Valle Zaron, Valle de Risco I, and Nueva Estrella. All attendees were male with ages ranging from 21 to 58 and an average age of 33 (see background on participants collected from voluntary questionnaires in Appendix C). Of the 23, all but one completed primary school, nine attended a year or two of middle school, and two had high school diplomas. Two had lived outside Bocas del Toro or the Ngäbe-Bugle Reserve at some point in their lives. Seven participants have held a temporary job outside of their communities, but 17 currently earned their income from their farms, most from cacao (4 blank responses, 2 have formal jobs). Eight have attended some other seminar (agroforestal, health, etc.) in the past. All participants either served directly on their CWC or another leadership committee in their community.

Villages invited for round two were geographically located nearer the main regional city of Changuinola and four of the seven had direct road access. Therefore, attendees from these villages had completed a considerably higher average level of education (four high school graduates and six others with post primary school education) and nearly half had held jobs outside of their

community and had attended other seminars. Ages among all the participants ranged from 18-51 with two females. The majority represented their village's CWC. San Cristobal however, a village located on San Cristobal Island, was invited but could not attend the first seminar due to transportation issues, and no data was collected from them.

3.4 – Method of Investigation

Besides knowledge transfer and capacity building, the organizers hoped to inspire behavioural change. The key objective was to help the participants put the knowledge, skills, and abilities they learned in the seminars into practice in their villages. Majkrzak and the author proposed a few basic indicators to measure achievements including:

- **Identical pre- and post-questionnaires:** Participants would complete before-and-after surveys and differences could be deduced (See Appendix D).
- **Accounting testing:** Along with individual accounting homework, participants would complete an individual accounting exam (See Attached Files on Data CD).
- **RWS calendars:** Participants would keep daily calendars recording water system problems. Organizers would evaluate trends.
- **Direct feedback:** Participants would provide verbal feedback to organizers to aid in planning of round two.
- **Non-formal evaluations:** Since most communities had a host PCV, they could witness changes in character such as self-confidence, leadership, personal organizational skills, etc.
- **Follow-up surveys:** The author would survey contributing PCVs three months after conference closing to evaluate their village's progress (See Appendix E)

3.5 – Seminar Summary

Section 3.5 provides a brief summary of the goals, themes, and activities for each seminar and Chapter 4 will examine outcomes of these activities. Detailed, weekly agendas can be found in Appendix F.

3.5.1 – Session One

Session one introduced the structure of the conference, presented a few classes of knowledge transfer, and sparked enthusiasm for the participants. Attendees also filled out the personal background and the pre-test questionnaires. Committees divided into three groups for the afternoon. The topics covered were: writing basic solicitudes, a review of the roles of CWC members, and a demonstration of ways to collect and disinfect water at a household level (such as rainwater harvesting, solar, and chlorine disinfection). For round two the planners decided to eliminate the solicitude writing based on feedback from the participants and

instead added a roundtable discussion on how water affects health – presented by a MINSA rural health promoter.

Figure 3.1 *– Session one focused on introductions and motivation*
Source: Photos by author

The homework assignment was to fill out the Community Diagnostic Form (see Appendix G) which was designed to encourage the participants to have a comprehensive dialog about their water systems outside of the sessions. Round two attendees were also asked to bring whatever method of accounting they currently used to demonstrate to the others at the next meeting. This effort highlighted various accounting models.

3.5.2 – Session Two

Session two aimed to provide a hands-on workshop for attendees focusing on skills. Three rotating groups covered: how to remove air and debris using tees and valves, how to make simple field repairs, and a hands-on demonstration of a model aqueduct or "mockquaduct." The mockquaduct has been a tool PCVs have used in the past to demonstrate common problems gravity-fed systems experience. This activity relates well to their visual and hands-on learning styles.

Figure 3.2 *– Session two focused on skills such as gluing PVC joints and learning ways to remove air and debris from tubes.*
Source: Photos by author

Round two added a discussion on the life-cycles of RWSs. Instructors used cacao farming as an analogy to explain the concepts of initial capital investment, production, maturity, diminishing returns, and retirement or replacement. Round two also recruited graduates from round one to help teach repair methods for tubes, explaining concepts in Ngäbere rather than Spanish. Organizers also intended to build a rainwater collection system for the school but the activity cancelled due to inclement weather.

Two homework assignments were given to the attending CWCs for session two. The first was for each community to organize a workday for their water systems. They were encouraged to plan a community-wide project such as cleaning the springboxes, making repairs to leaky or exposed tubing, cleaning the tanks, or identify and fix leaky faucets. Participants were notified there would be prizes for the villages that organized the largest workdays involving the entire community. The second homework assignment was meant to familiarize the CWCs with their systems. They were asked for specifics about their system such as tank size, tube sizes and lengths, flow rate, etc (See Appendix H).

3.5.3 – Session Three

The goal of week three was to disseminate the use of standard accounting practices recommended by MINSA. Attendees first presented a recap of their workdays and prizes were awarded to all communities that held a workday. The first breakout sessions included an introduction of accounting and transparency using role playing by PCVs. They acted out accounting problems noticed in their communities such as no standard collection amount or time, lack of transparency, users who do not pay, and inaccurate bookkeeping, etc. MINSA representatives presented information about bank accounts. They outlined the advantages and disadvantages of accounts and tips how to manage them within a committee.

Figure 3.3 *– Session three focused on accounting and bookkeeping*
Source: Photos by author

Before lunch, IPACOOP, the Panamanian agency in charge of legalizing cooperatives, explained the advantages of co-op legalization. Feedback showed that participants enjoyed the presentation and were especially interested in CWC management styles in other areas of Panama. However, confusion arose betweens IPACOOP's method of legalization and benefits compared to JAAR.

In the afternoon materials were provided to build money boxes for each committee. Organizers thought that since bank account access was difficult due to geography and intimidation, committees could safely guard their funds in a lockbox. Instead of simply providing a lockbox, organizers wanted the members to make their own to encourage their use and to foster a sense of ownership. There were three locks on each box designed for three committee members to administer the funds and to reduce pilfering. Participants appeared to enjoy the hands-on construction, and began to compete over which committee could

construct their box the fastest. Unfortunately, the structural integrity of the boxes suffered accordingly.

For the homework this week participants were given their individual accounting workbook to be completed by session five (see Attached Files on Data CD). The workbook had example forms for practicing how to make receipts, how to make of list of payments, and how to track if users have not paid. The goal was for each village to work together, perhaps with their PCV, and to start early to address questions and clarifications during session four. For round two, session two and three were switched in order to give attendees more time to complete their accounting workbooks.

3.5.4 – Session Four

Session four aspired to improve leadership, self-confidence, and a sense of empowerment. Round one was purposely held in Silico Creek, a community situated with road access and the recipient of many past and current agency developmental projects. This community is also known for its well-established women's handicraft cooperative. This week organizers sought assistance from the cooperative's leaders to explain their procedures for holding meetings, electing officers, bookkeeping, and other procedural matters. Another relatively well-functioning CWC from a nearby Ngäbere town of Bella Vista was invited as well to explain their methods of accounting and their working relationship with MINSA. This form of peer-to-peer training proved useful in the previous cacao seminars not only for knowledge transfer but also to model other Ngäbere committees under more advanced forms of administration.

Figure 3.4 *– Session four aimed to improve confidence and empowerment. Source: Photos by author*

Round two used more role-playing amongst PCVs to demonstrate examples of efficient and inefficient community meetings. Another activity focused on confidence building. In this activity, a bucket of water was used as an analogy to demonstrate self-esteem. Participants gave examples that hinder self-esteem (water removed from the bucket) as well as ways to improve self-esteem (water added to buckets).

The whole afternoon was spent on individual and team exercises focused on leadership, team-building, and confidence empowerment. Activities included

blindfolded or muted communication games, relay races, and group competitions. Feedback showed that the attendees really enjoyed these activities, and it was clear that by week five friendships were forming.

The homework this week was for the participants to hold a community meeting about their RWS. They were also encouraged to keep working on their accounting workbook and to ask their PCV if they had questions. They were informed the next session included an accounting exam.

3.5.5 – Session Five

The theme of session five was watershed management. At the time, deforestation was not as extreme of a problem in Bocas as it was in other areas of Panama, but organizers felt it was a vital aspect to water supply and management. Lumber production was also an increasing source of income for the rural population that was loosely enforced. Organizers hoped that after week five participants would know the importance of watershed management and how their current sources of water – springs – may be subject to depletion.

Figure 3.5 *– Week five focused on watershed management and themes such as the water cycle, conservation, and reforestation.*
Source: Photos by author

Again the attendees were divided into groups, some learning about seedbeds while the others gained knowledge of the water cycle. Hands-on activities were included in the lessons. Promoters from ANAM (National Authority for the Environment) were also invited to lead sessions on conservation and how to properly plant trees. In the afternoon, after the accounting exam, all participants planted donated trees around the host community's water source.

3.5.6 – Session Six

The final week of the seminars was the graduation. Attendees filled out their post conference questionnaires, turned in their RWS calendars, received their accounting packets and exams with corrections. Awards were given to high scorers. Again, organizers planned activities focusing on empowerment. Participants played games demonstrating possible pitfalls to the well-functioning of their RWS and potential ways to remedy them.

Figure 3.6 *– The graduates of round one and two received their diplomas*
Source: Photos by author

MINSA representatives and the directors of Peace Corps Panama were invited to the graduation ceremony. All graduates received certificates and special diplomas were awarded to those who attended all the sessions.

Overall, 32 different individuals attended at least one session during the first round of training (many sent replacements if they could not personally attend). Of these, 17 completed the accounting workbook and seven satisfactorily passed the accounting exam. In total, round one graduated 12 participants who attended all six sessions. Round two had 26 different participants and 13 completed the accounting workbook. Of the 13, seven successfully passed the accounting exam. In total, round two graduated eight participants who attended all six sessions. Including both rounds, 20 CWC members graduated from the training workshops by attending all six sessions.

Chapter 4 – Analysis of Outcomes

Chapter four examines the effectiveness of the seminar. Section 4.1 explores the results and compares them to the original goals. Subsequent sections examine each of the six original achievement indicators which include: identical pre- and post-questionnaires; accounting testing; RWS calendars; direct feedback and non-formal evaluations; and PCV follow-up surveys.

4.1 – Measuring Goals and Objectives

The original goals and objectives for the seminars were presented in Section 2.7 and are repeated here with their respective results. Achieving these goals was difficult, as became apparent during conference planning, and some subsequent planning sought different intentions. Nevertheless, all the original goals from the original grant application are presented (see Box 6) (Majkrzak, 2008).

- **Goal 1** - Three community leaders from 15 communities (45 participants in total) will receive training in a seven session water committee seminar.

The conferences were changed to six rather than the original seven sessions. While not all communities enrolled three participants every week, some enrolled various individuals week-by-week. In total, 15 different CWCs participated in the conferences representing at least 17 different RWS. Between the two rounds, 44 people attended at least one session and some sessions included host community bystanders. Twenty participants attended all six sessions. Perhaps there was some benefit in having various attendees each week, but the original goal was to have the same participants attend each session. Conference organizers, however, did not want to deny attendance to unregistered participants.

- **Goal 2** - Each participating community will teach two selected alternates about the seminar topics, thereby training 30 community members second-hand.

This was not directly measured but can be assumed based on the CWCs that completed their homework assignments including community meetings.

- **Goal 3** - 80% of participants will understand how a well-managed community aqueduct can improve the health of a community.

When asked, participants indicated that they understood a strong correlation. However, sometimes their O&M practices demonstrate otherwise. This was not directly measured either, and in retrospect, was probably not an appropriate goal because of monitoring difficulties.

- **Goal 4** - 80% of participants will learn and be able to apply the Panamanian Health Ministry JAAR system of accounting.

There is not currently a standardized JAAR system of accounting and there are no standardized MINSA accounting forms. Therefore, organizers for this conference proposed a basic accounting system consisting of a current balance register, receipts for payments, and receipts for exoneration. Participants were encouraged to modify the systems organizers presented, until they found a system that would fit their needs.

Each round had seven participants pass the basic accounting exam for a total of 14 from the original 45 (31%). Between the two rounds, 30 completed the accounting workbook (67%). So while many learned an improved system of accounting, few could apply their knowledge. Perhaps the conference should have involved another accounting indicator because the use of exams and homework is a foreign teaching method for most attendees.

- **Goal 5** - 90% of participating communities will plant trees in their community's aqueduct watershed and will develop a plan to maintain the watershed.

This goal was not achieved based on the 3 month follow-up survey by PCVs (see section 4.6.5) nor was it specifically pursued during the seminars. To achieve this goal, donated seedlings could have been provided to each community but were not due to lack of supply. The only donated seedlings that were planted during the actual seminar were located in the hosting village.

- **Goal 6** - 80% of participating communities will repair holes in their aqueduct line, clean the storage tank and springbox and add air-release valves if needed.

Based on the PCV survey, 5 of 9 communities who participated in round one used repair techniques learned in the seminar (56%). One community, Quebrada Cacao, was currently constructing their aqueduct and had not yet faced maintenance issues. In round two, at least two communities, Bella Vista and Junquito, made repairs using the new methods (Tibite, Rio Oeste Arriba, and Quebrada Banano were not surveyed). Five participating CWCs in round one completed the homework assignment to organize a community workday, as did at least three during round two.

- **Goal 7** - 80% of participating communities will make a plan to teach the incoming water board how to manage and maintain the community aqueduct.

This goal was not directly pursued. The conferences did not specifically focus on training from one CWC to the next. Organizers focused on training the current CWCs, rather than on training them how to train. In cultural context however, very few village members volunteer for CWC positions in the first place, and many serve extended "terms." Elections are often random and crisis-based.

Written by-laws for each CWC are a goal for promoters but very few communities currently employ them.

Goal #	*Degree of Goal Realization*	*Directly Measured*
1	*Definite*	*Yes*
2	*Definite*	*No*
3	*Somewhat*	*No*
4	*Somewhat*	*Yes*
5	*Not at all*	*Yes*
6	*Somewhat*	*Yes*
7	*Not at all*	*No*

***Box 6** – Summary table of original goal realization*

4.2 – Identical Pre- and Post-Questionnaires

Organizers struggled to develop indicators to measure knowledge gained during the seminars. They wanted to avoid written questionnaires because many participants feel uncomfortable reading and writing. But based on prior PCV experiences with the Ngäbe Culture, rural villagers often times respond to verbal surveys in ways they believe the assessor wants to hear. Villagers often invent "appropriate" responses rather than give their honest answers. This makes verbal feedback very difficult. The conference planners eventually installed written questionnaires because they thought the anonymity of written responses could provoke more honest answers (see Appendix D). They decided to give this identical questionnaire during the first and last days of the seminar to identify trends.

Organizers observed some unexpected results. First, the participants that attended the first seminar were not necessarily the same who attended the last one. In total, 20 pre- and post- questionnaires were collected for round one but only 9 for round two. Second, many participants left blank results, possibly because they did not understand the questions. Last, the trainers noticed many hastily completed post-questionnaires. This may have been an indication of participants learning they were no repercussions for not completing the voluntary forms. In retrospect, an award could have been used to encourage better participation. Another theory suggests that participants were excited for the upcoming graduation or perhaps simply tired of filling out forms.

Because these written responses were, taken together, so difficult to interpret accurately, interpreting individual responses was likely to yield a more relevant analysis. One question on these questionnaires was likely to have the most accurate results, due to its highly specific and experience-based nature. The final question on the form asked participants to categorize their personal understanding of managing RWS. They were asked to choose between either no knowledge, a little knowledge, a lot of knowledge, or expert. All but three initially labeled themselves with little or no knowledge (humility is a trait of the Ngäbere Culture).

Seven attendees ranked themselves higher in the post-evaluation than the pre-evaluation, suggesting at least a boost in confidence. Two questionnaires were not legible, and one graduate decreased in the auto-ranking scale. Overall though, the pre- and post-questionnaires were an inaccurate means of measuring knowledge transfer.

4.3 – Accounting Testing

As noted above, seven participants each from round one and two passed the basic accounting exam. Upon further examination though, a correlation was found between those who passed the exam and those participants in each round who had a higher than primary school education or experience with paid employment (see Box 7). In fact, all but two of the 14 had held paid employment and/or studied past primary school.

Community Represented	***Paid Employment Experience***	***Grade Completed***
Nudobiti	*Lived and worked outside of Bocas*	*5*
Quebrada Cacao	*Worked in city of Almirante*	*6*
Santa Marta	*Employed with local government reps*	*High School Grad*
Silico Creek	*Current health promoter*	*High School Grad*
Valle de Agua Arriba	*No experience provided*	*6*
Valle de Agua Arriba	*Cacobo Seminar in Costa Rica*	*6*
Valle de Risco I	*Worked outside of village*	*8*
Bella Vista	*Works in Changuinola in office*	*High School Grad*
Junquito	*Worked in supermarket in Changuinola*	*11*
Loma Muleto	*Lived in Chiriqui Province*	*High School Grad*
Loma Muleto	*Works in Costa Rica harvesting coffee*	*Some High School*
Rio Oeste Arriba	*None, but sells homemade baked goods*	*5*
Rio Oeste Arriba	*Worked at a cocoa cooperative*	*11*
San Cristobal	*Works maintenance for municipality*	*6*

***Box 7** – Correlation between those who passed accounting exam, education level, and work experience*

The relationship presented in Box 6 suggests that new accounting knowledge was not gained, but rather some participants had prior capacity in reading, writing, basic arithmetic, and handling money. Conference facilitators also noticed a difference in verbal and written accounting ability throughout the seminars. It seemed to the coordinators that attendees understood accounting concepts theoretically, but they had a hard time transferring the themes to paper. As previously noted, perhaps the conference could have developed another accounting indicator such as a verbal exam which could have assessed participants' theoretical understanding of the material. But while theoretical understanding of the material is vital, participants will still need to put this knowledge into practice.

4.4 – RWS Calendars

The use of RWS calendars as an indicator proved to be a complete failure, and organizers discontinued their use for round two. Organizers originally hoped each participant would note the daily functioning of their water systems and afterward facilitators could examine them for trends. Each attendee was given a calendar to cover the three months of the conference, and they were reminded to use the calendars at each session. Most of the calendars were not completed, were filled-in illegibly, or were never returned. In retrospect, even if all the calendars were filled out correctly, trends would still have been difficult, if not impossible, to deduce given the inconsistent nature of many RWS.

4.5 – Direct Feedback and Informal Evaluations

After each seminar participants were asked informally for feedback. Facilitators had to distinguish if positive feedback meant attendees thought particular sessions were relevant and beneficial or if they simply enjoyed them. They imagined that often times suggestions were withheld because of shyness, out of kindness or respect, or because Ngäbes in general are not often confrontational. Regardless of the reason, the participants often withheld direct feedback, forcing the PCVs to rely on more informal evaluations.

Informal conversations were most directly responsible for changes made for round two, such as removing the session on solicitudes, giving more time to complete the accounting workbook, removing the session on co-ops by IPACOOP, adding the session on aqueduct life-cycles, and adding more role playing, skits, and physical activities. Most of the volunteer facilitators participated in both rounds 1 and 2, and their increased experience may have had an influence.

A lot of PCVs expressed disappointment that their communities were not participating in the voluntary homework assignments and often times sending replacement attendees to the seminars. Volunteers did not want to force participation; rather, they preferred to only encourage participation. PCVs also noticed a general lack of enthusiasm as the seminars progressed, especially in round two. One PCV commented that it seemed some participants were only attending each week to visit other villages. By the end, organizers had to use awards to entice participants to complete the assignments. The follow-up PCV surveys also reflected a sentiment of disappointment regarding their community's lack of commitment.

4.6 – Three Month Follow-up Survey

All communities that participated in round one had a host PCV living in the village, as did five of the seven from round two. Three months after the seminar graduation, each PCV was asked to fill out a questionnaire evaluating their community in terms of each week's goals, homework participation, and behavioral change. The original survey questions and responses in table form can be found in Appendix G, but the following sections summarize the results.

4.6.1 – Session One

After the round one session on solicitude writing, two communities witnessed an increase in letter writing ability. One community, Valle de Agua Arriba, noticed two families disinfecting their household water using solar disinfection. One of these families attended the session and the other learned at a community meeting held by the CWC. One third of the villages noticed an increase in the assumed roles of CWC members.

The homework, a community diagnostic form that asked about their CWC procedures, was completed by all communities, usually via a CWC meeting. However, based on PCVs that attended the community meeting, it seemed to about half that answers were invented simply to complete the form. Other communities got confused if their answer did not match one of those provided on the form. Most PCVs responded though, that the homework created a good dialogue amongst the CWC members.

Of the three communities in round two that directly responded to the survey (Junquito, Loma Muleto, and San Cristobal), all three PCVs thought the diagnostic form created a good dialogue amongst the CWC members. All three held specific CWC meetings to fulfill this homework assignment. No behavior change regarding disinfection of water has been noticed but Junquito reported an increase in the assumed roles of CWC members.

4.6.2 – Session Two

Over half of communities from round one have used repair methods they learned in the workshop but none have added air-release or clean-out valves. Six of the nine villages completed the homework assignment which called for a community workday, and the infrastructure questionnaire seemed to have led to an increased understanding of their systems.

Junquito made tube repairs during the seminar, and Bella Vista organized a group workday and added six clean-out valves to their system. San Cristobal and Lomo Muleto each organized a work day, and put up fencing and cleaned their tank, respectively. Two PVCs in round two expressed their CWCs gained knowledge

of their systems during these activities. However, from both rounds only one community reported gaining knowledge from this week's activities.

4.6.3 – Session Three

Two communities from round one, Nueva Estrella and Quebrada Cacao, have been using improved accounting methods they learned from the seminars, and Silico Creek has significantly improved transparency. Only two communities currently use their lockboxes to guard funds, but eight of the nine villages left the session with an increased ambition to focus more on their accounting.

During round two, Junquito admitted past corruption after this week's seminar and pledged to be more transparent in the future. San Cristobal voted in a new treasurer to better focus on accounting, but he was unable to attend the conferences. None of the communities in round two have opened a bank account and only Junquito is currently using a money box.

4.6.4 – Session Four

Five of the nine PCVs from round one reported an increase in leadership skills from their participants. Five also thought it was beneficial to use Bella Vista's CWC as an example but only two communities this week completed their homework assignment calling for a community meeting about their RWS. The community of Silico Creek held new CWC elections at their meeting.

Improvements in leadership skills were not obviously noted from round two. Leadership and meeting efficiency gains were only reported by Junquito. No communities from round two completed their homework assignment to hold a community meeting.

4.6.5 – Session Five

Eight of nine PCVs felt their community left session five with a better understanding of why reforestation is important. However, no community has carried out a reforestation project since the conference – possibly due to currently well-forested watersheds (2 responses), or perhaps forestation projects were taking longer than three months to initiate.

All three PCVs that responded for round two thought their community gained knowledge of reforestation during session five. One community has since implemented a reforestation project, and two of the three were motivated to use their existing seedbeds.

4.6.6 – Session Six

The remaining questions on the PCV survey concerned the conferences in general. Eight of nine thought it was "worthwhile" for their communities to participate in the seminars. The other PCV, however, thought that it was not valuable to the village because of their poor attendance. All PCVs thought rotating the sites was beneficial, and all but one reported an increase in personal skills from their participants. They also mentioned that the conferences assisted them in highlighting skills and determining village leaders. Seven PCVs expressed they would like to see more conferences focused on training in the future, but the other two were not sure if the CM model should be pursued. And even though they thought the seminars were worthwhile, only four could say their RWS were being managed better since the seminar.

Again, all three PCVs from round two believed it was worthwhile for their communities to participate in the conferences, and all three thought rotating the sites was beneficial as well. All three noted personal development and increased confidence in the participants and would like to see a conference such as this continue in the future. Of the three, one reported a definite improvement in the aqueduct management, one saw possible improvement, and the third was unsure.

Chapter 5 – Conclusions, Future Work, and Recommendations

This chapter reflects on the entire seminar series and briefly highlights post-seminar work training CWCs in rural Panama. It also concludes the report with recommendations for future work.

5.1 – Seminar Conclusions

As noted in Chapter 4, most of the original goals planned for the conferences were not met. The majority of the original objectives either lost relevance as the conferences continued to develop or where not defined enough to be measurable. More specific, measurable objectives should be developed for future trainings. Example objectives could incorporate seminar participation, homework completion, an oral accounting exam, community work days, MINSA office visits, and community meeting requirements, to name a few. More specific objectives would allow organizers to better judge the value of the trainings and to tailor the seminars as needed.

Overall, all but one PCV thought it was beneficial for their CWC to participate in this conference, and five of nine PCVs thought their RWS were being better managed since the seminars. The conference organizers did witness behavioral change in some instances. Results, however, seem to indicate that tangible activities (i.e. solar disinfection of water, repairing tubes, using lockboxes, etc.) were better understood than intangible ideas such as improved accounting procedures, reforestation, or the correlation between potable water and health. Some observed that participants considered the recommendations presented to be merely theoretical suggestions, not practical directives.

Even though round two was adjusted based on feedback, round one was deemed more of an overall success for a few reasons. First, communities in round one seemed more personally motivated to participate in the seminars. Perhaps due to lack of access, they have attended fewer seminars than villages in round two and chose to capitalize on the opportunity. Second, round one mostly trained the same individuals week-by-week, compared to the participant mixing encountered in round two. Third, participants in round one were less likely to know each other for geographical reasons which impeded socializing. Last, round two experienced worse overall weather conditions, which may have discouraged participation as well.

The conference focused on four main themes: Accounting, Watershed Management, Infrastructure, and Community Management and Leadership. In retrospect, Community Management and Leadership should probably have been given a larger focus. The other three categories aimed to transfer specific knowledge or skills but the CM and Leadership activities focused more on personal development and confidence building. Regardless of the technical skills of CWCs, without personal confidence and initiative, little developmental

progress can be made. They must also posses a certain level of ambition, which is frequently a missing factor for CM success. But, based on his experience, the author believes ambition and personal confidence are directly related. Participants first need the confidence to be able to execute their ambition. Therefore, more confidence-building activities could improve ambition levels which would foster more community participation.

This is not to say that knowledge and skill transfer is not needed, but organizers believed the majority of participants knew the general concepts of each lesson. For example, all attendees grasped the theory and need for accounting. The problem arises in applying these ideas in practice – the main area where organizers witnessed possible growth hindered by a lack of personal confidence. If CWC members were given more structure and better defined roles and responsibilities from their overseeing authority, their level of apprehension could significantly diminish.

5.2 – Future Work

Community water committee training will continue be a great need in Bocas del Toro (and rural Panama in general) if the CM paradigm is continued. Since the first two rounds, Majkrzak has used extra funds to hold an abbreviated third round, held in two three-day sessions in the Ngäbe-Bugle Reserve along the Manati River. The villages of Kwite, Calante, Gualaca, Notente, Drigari, Cerro Neque, and Odobate all sent representatives. Thirty-eight different people attended at least one seminar, and 12 attended all six days. This conference was not directly included in this study, but organizers again expressed an increase in self-confidence from the participants. It is too early to tell if measurable behavioral changes have been implemented, especially since three of the communities are currently without a water system.

Graduates from round one were invited to a one-day workshop on public speaking and giving presentations and were then asked to help facilitate lessons for round two. Seven graduates attended this workshop. Two other graduates were asked as well to help Majkrzak present about the conferences at a national seminar hosted by Peace Corps held in September, 2008. This 4-day workshop titled "Reinforcing Water Committees" invited representatives from MINSA, ANAM, and Peace Corps. CWC members from across Panama were also invited to plan ways to improve rural CWC administration. This conference, facilitated by the author and others, was hampered by unfocused planning and poor participation from the agencies and ultimately fell short of its objectives. It was also an obvious reminder of how much is needed to improve the CM model in rural Panama.

5.3 – Author's Recommendations

As noted above, organizers noticed that enticing involvement by using awards seemed not only to increase participation but also enthusiasm. The reverse may also be true, that penalties could have been given for poor performance. For example, each CWC could have received a certain amount of money before the conferences began. For each session they attended, they could keep a specific amount. If they did not attend however, an amount would have to be paid back as a penalty.

Current development agencies pushing the CM model in Panama seem to believe that health benefits alone should be the leading motivator driving voluntary community participation. But if that belief is true then why then does the CM model fail? Their policies should reflect their answer. If CM is the only applicable model, agencies should examine success stories in other communities or countries, especially more developed ones where CM has seldom been relevant. Regardless, if the CM model is to be pursued in rural Bocas del Toro, the author recommends a few modifications:

- **Develop CWC Master Training Plan:** A Master Training Plan should be implemented to match the standard regional and national CWC policies (JAAR and Resolution No. 28). Once a Master Training Plan is in place, MINSA and other agencies could work with NGOs or agencies (domestic and/or international) to promote their training procedures.

- **Certifying CWC Members:** The author envisions a future certification program for CWC members. MINSA or IDAAN could partner with third-party training organizations and administer an oversight protocol. A certification procedure would standardize CWC roles and responsibilities nationwide and automatically train CWC members.

- **Awards for Strong Performance:** Currently there are no incentives encouraging participation in the management of RWS, financial or otherwise. If incentives were standardized such as a monthly salary for technicians, decreased quotas for CWC members, paid training, or legal recognition for members, participation could increase.

- **Penalties for Weak Performance:** Likewise, poor performing technicians should be removed by MINSA or the enforcement agency, and CWCs that do not adhere to the standardized procedures should be held accountable. For example, there should be standardized penalties established by MINSA for users who do not pay their quotas as well as CWCs who do not collect them.

- **Stricter Enforcement**: Standardized penalties are meaningless if they are not enforced. MINSA and ANAM (or other water authorities) should boost enforcement of policies and environmental protocols and standardize community oversight visits.

- **Standardized Accounting Procedures:** MINSA should standardize national or regional accounting procedures, publish forms, and make them available to all CWCs, as well as demand their completion and inspection monthly or quarterly. This would eliminate the current "reinvent-the-wheel" mode of operation and would also facilitate training.

Benefits were gained in the Bocas CWC trainings, especially regarding the confidence, empowerment, and the personal skills of the participants, even if they were not dramatic or immediate. With more standardization and a more focused collaboration between governmental agencies and NGOs, rural areas in Panama such as Bocas del Toro will be better able to meet their RWS needs. These gains will ultimately increase rural health, decrease wasted spending, and improve the likelihood of success for future rural developmental projects

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Appendix A – Author's Survey of all PCVs in Panama

Question: Regarding MINSA and water systems in your province, where should their resources be focused immediately? Please rank in order of importance (1 = most important, 6 = least important)

_____Building brand new water systems
_____Repairing current systems
_____Training local water committees or technicians
_____Partnering with NGOs or outside assistance
_____Training in-house within MINSA to better train staff
_____Partnering with NGSs or outside assistance

All PCVs (105 Responses)

Priorities	1	2	3	4	5	6	Total	Ranking
Training local water committees or technicians	29	23	12	13	9	3	226	1
Repairing current systems	22	29	11	13	9	5	240	2
Developing Master Water Plan for next 5-10 years	18	13	18	9	16	13	292	3
Building brand new water systems	11	8	19	16	17	16	329	4
Training in-house within MINSA to better train staff	4	13	12	19	22	17	354	5
Partnering with NGOs or outside assistance	5	3	16	17	14	33	395	6

PCVs living in Bocas del Toro (12 Responses)

Priorities	1	2	3	4	5	6	Total	Ranking
Training local water committees or technicians	5	3	2	1	1	0	26	1
Building brand new water systems	3	2	3	1	2	1	36	2
Repairing current systems	0	5	2	3	1	1	39	3
Partnering with NGOs or outside assistance	2	0	3	2	3	2	46	4
Training in-house within MINSA to better train staff	0	2	0	2	4	4	56	5
Developing Master Water Plan for next 5-10 years	2	0	2	3	1	4	49	6

Appendix B – Original Peace Corps Partnership Program Proposal

Proposal Summary and Synopsis

Bocas del Toro Water Committee Training

Site: Bocas del Toro, Panama
Total Request: US$2306.45
Peace Corps Volunteer: Julia Majkrzak
US hometown: Oak Park, IL
Community Leader: Felix Holder

The proposed project is a rural water committee training with the goal of improving rural health in the Bocas del Toro province of Panama by training community leaders to manage and maintain community aqueducts. Fifteen communities from the province will be invited to participate in a seven-session water committee training. The sessions will cover the topics of the importance of potable water, community participation and leadership, watershed management, money management, and repair and maintenance of an aqueduct. In order to ensure sustainability and effectiveness, the participating community members will have tasks to complete between sessions. The seven session schedule will be completed over a 3-4 month time frame. The 15°1 invited communities have a total population of approximately 5840.

Detailed Proposal and Verification of Peace Corps Partnership Program Guidelines

Background and Motivation

The province of Bocas del Toro is located on the Caribbean Coast of Panama[1]. Thousands of indigenous people from the Ngabe group traveled to the area to work in the banana industry during its rise. The following decline of the industry left many people without jobs, and the government encouraged them to relocate throughout the province by selling land cheaply. Currently, families produce the majority of their food in the farm, and generate income from the major cash crop of the area, cacao.

The Ngabe people did not traditionally live in communities, but in family units on farms. Currently, they build their communities around the arrival of a school and in succession, seek other benefits of community living such as aqueducts. The large majority of aqueducts constructed in Bocas Del Toro are spring-fed and gravity flow. Various communities have previously received aqueducts through the Peace Corps Partnership Program, World Bank projects, Non-governmental organizations, and the Panamanian government.

[1] Community background information

The Bocas Del Toro province is highly underdeveloped, receiving its only paved road 11 years ago and with the majority of the population living without electricity, access to higher education and advanced medicine. One benefit of being underdeveloped is that the province has many of its natural resources intact. The soil is healthy, hardwood trees are in abundant supply and clean water is available.

Unfortunately, in the Bocas Del Toro Province there are very few water committees that capably ensure a reliable and potable water supply for their communities[2]. Few water committees hold meetings regularly or are able to manage funds, pay a plumber or buy new PVC tubing as needed. Many community aqueducts do not produce potable water or supply water on a reliable basis. During time periods when the aqueduct is not delivering water, community members must resort to other sources of water such as open wells, puddles or creeks. These alternate sources lead to high occurrences of diarrhea, intestinal worms, amoebas, giardia and a generally lower quality of life. An aqueduct delivering non-potable water may cause the same health problems but is still consumed untreated in the home because community members perceive aqueduct water as potable. Unreliable or non-potable water supply slows the growth and development of children, as well as increases the infant mortality rate. Further, it is the children of the family that are sent to look for water elsewhere when the aqueduct is not functioning. This is a clear indication that the proposed water committee training will meet a pressing community need.

If the project is not implemented[3], the majority of communities in the province will continue mis-managing their community aqueducts and looking to the Health Ministry for aid when the water supply is insufficient, unreliable or non-potable, or the aqueduct requires new materials. Community members will continue to become sick by drinking water perceived as potable and children will continue to spend their afternoons after school carrying water from other sources to the house.

The 15 invited communities have a total population of approximately 5840[4]. 42 adults will be trained in community aqueduct management. Assuming a typical family break-up, the proposed seminar will affect 584 families, 1168 men, 1168 women and 3504 children.

Goals and Objectives

The proposed project is a rural water committee training with the goal[5] of improving rural health in the Bocas del Toro province of Panama by training community leaders to manage and maintain community aqueducts such that they may provide reliable, potable water for community members. Fifteen communities from the province will be invited to participate in seven, day

[2] This section discusses how the Project meets a pressing community need.
[3] This section addresses what will happen if the Project is not implemented.
[4] Community demographics.
[5] This is the overall, long term aim of the Project.

long, sessions where they will receive training over management and maintenance of a rural aqueduct.

The proposed seminar has the following objectives[6]:

1. By the end of the seminar, 3 community leaders from 15 communities (45 participants total) will receive training in a seven session water committee seminar.
2. By the end of the seminar each participating community will teach two selected alternates about the seminar topics, thereby training 30 community members second-hand.
3. By the end of the seminar, 80% of participants will understand how a well-managed community aqueduct can improve the health of a community.
4. By the end of the seminar, 80% of participants will learn and be able to apply the Panamanian Health Ministry JARR system of accounting.
5. By the end of the seminar, 90% of participating communities will plant trees in their community's aqueduct watershed and will develop a plan to maintain the watershed.
6. By the end of the seminar, 80% of participating communities will repair holes in their aqueduct line, clean the storage tank and springbox and add air-release valves if needed.
7. By the end of the seminar, 80% of participating communities will make a plan to teach the following water board how to manage and maintain the community aqueduct.

Sustainability

The Health Ministry held water board trainings in the past through World Bank funding which has since been discontinued. The Peace Corps Volunteer proposed to the Health Ministry that a water committee training be held through the Peace Corps Partnership Program when it was conveyed that there were no current plans for one due to lack of funding. The Health Ministry is involved in all levels of planning and will supply the majority of presenters for technical topics throughout the seminar[7]. In order to fulfill the 25% community contribution requirement, a different format is being used than in previous Health Ministry Water committee trainings. The format could be replicated by the Health Ministry in the future if desired and a new funding source became available.

All in-country means of support have been explored, to the best of the coordinators knowledge[8]. There is appropriate technical support from the Health, Environment and Agricultural Ministries to implement and continue the project[9].

[6] These are the intermediate, shorter term results.
[7] This satisfies that the Project is community initiated and directed.
[8] This satisfies the requirement for in-country jeans of support.
[9] This satisfies the requirement for resources and time.

Individual participating communities are not expected to, nor will have the resources to repeat the project. For participating communities, the sustainable aspect lies in the techniques acquired throughout the seminar. The beneficiaries of the project – the community leaders that will participate in the seminar are not involved in the seminar's planning or controls but will be continuously evaluated for input.

The techniques and skills taught during the seminar should be sustainable on a community to community basis. The proposed seminar will help participating communities become more self-reliant by training them to control and manage their own water supply. Community members participating in the seminar will be encouraged throughout to consider how the taught material can be sustained in their community and will be responsible for teaching the techniques and ideas to 2 alternates in the community as well as create a plan to pass the information to the following water committee. In this manner, once a committee has successful control of its water supply, it will be self-sufficient.

Besides the number of community leaders trained, there are several secondary benefits. Participants will receive the opportunity to meet other water committees and see other communities, thereby broadening their views on community organization and development. Further, community leaders will have the opportunity to interact and form bonds, which may lead to future networking among water communities in the province.

Project Implementation, Monitoring and Evaluation

The proposed seminar will be implemented as a series of six, one-day sessions over a 3-4 month time frame[10]. A 2 -3 week break will occur between each session allowing participants sufficient time to complete assigned tasks necessary for successful implementation. The timeline for the project is as follows.

Timeline

Week 1	Session 1 - Introduction
Week 2	Homework assignment to be completed in the community
Week 3	
Week 4	Session 2 - Infrastructure
Week 5	Homework assignment to be completed in the community
Week 6	Session 3 - Accounting
Week 7	Homework assignment to be completed in the community
Week 8	
Week 9	Session 4 - Community Participation and Leadership
Week 10	Homework assignment to be completed in the community
Week 11	Session 5 - Watershed Management
Week 12	Homework assignment to be completed in the community
Week 13	
Week 14	Session 6 - Putting it all together, putting it all together
Week 15	Homework assignment to be completed in the community
Week 16	Session 7 - Closing Ceremony

[10] This addresses the timeline for successful completion of the Project and satisfies the requirement that it be completed within one year.

The seminar should not have any special circumstances that will affect implementation other than problems encountered. These may include failure of presenters to arrive at scheduled sessions, buses not running or arriving on time during a planned session, or unpredictable weather preventing a significant number of participants from attending. If necessary, the coordinator will be prepared to reschedule a session. The coordinator will regularly visit the Health, Environmental and Agricultural Ministries to ensure their continued participation and verify attendance at future sessions. To ensure proper presentation of session topics, Peace Corps Volunteers will be prepared to give back-up presentations.

Each session will include an evaluation in order to gauge the level of understanding among participants. Further, each session will assign a task to each community which must be completed prior to the next session. Completion will be monitored by the community's respective Peace Corps Volunteer.

Seminar coordinators do not foresee the project conflicting with local politics. The project can be expected to reach completion and be maintained. Some flexibility is built into the schedule for exactly this reason. The participating members from each of the communities will be chosen by the communities themselves and therefore should successfully integrate all key players[11].

Improved potable water supply to a community by better management of an aqueduct will benefit all members of a community who use the aqueduct, regardless of age, race or religion[12]. In fact, improved potable water access will improve the quality of life of women more than men because traditionally the women in the family manage the cooking and cleaning. The successes of the proposed seminar will benefit all aqueduct users even if the water committee members are all men. Women will be encouraged to be selected to participate in the seminar but the final decision will be made by current community leaders and water committee members.

Project implementation should not have any negative impacts on the environment[13]. The project includes a section on watershed management, water conservation and the importance of reforestation, including a scheduled activity to plant trees.

Indicators of Success

The following indicators of success will be used to measure the successes of the project. Each objective will be evaluated as follows:

1. Seminar attendance will indicate how many community leaders received training.
2. Peace Corps Volunteer reports will indicate the number of community members taught second-hand.

[11] This satisfies the requirement of considering the local situation.
[12] This satisfies the requirement that the Project has gender, racial and religious equitability.
[13] This section considers the impact Project implementation will have on the environment.

3. Paper evaluations will indicate the number of participants that understand how a well managed community aqueduct can improve the health of a community.
4. A paper quiz will indicate the number of participants that learned and are able to apply the JARR system of accounting.
5. Peace Corps Volunteer reports will indicate how many communities planted trees and developed plans to maintain the watershed.
6. Peace Corps Volunteer reports will indicate how many communities repaired holes in their aqueduct line.
7. Peace Corps Volunteer reports will indicate the number of communities that create plans to teach the following water committee how to manage and maintain the community aqueduct.

If all objectives are met, the seminar will have successes at the following levels.

1. 45 participants will acquire new skills in aqueduct maintenance and management.
2. 30 community members will acquire skills in aqueduct maintenance and management second-hand, while 45 participants will acquire presentation skills.
3. 36 community leaders will understand how a community aqueduct can improve the health of a community.
4. 36 community leaders will learn and be able to apply the JARR system of accounting.
5. 13 communities will plant trees in their community aqueduct watershed (estimated at 650 trees planted) and will develop a plan to maintain the watershed.
6. 13 communities will repair holes in their aqueduct line and clean the storage tank and springbox.
7. 12 communities will develop a plan to teach the following water committee how to manage and maintain the community aqueduct.

Budget

In order to guarantee "community buy-in", the participating communities, Panamanian Health, Environmental and Agricultural Ministries are providing 50% of the project cost[14]. The Health Ministry understands that once the budget is approved, it cannot be changed[15], funding can only be used for project costs, that circulation to potential sponsors does not guarantee funding and that donors cannot be solicited for further requests outside of the Partnership program.

All amounts are measured in US dollars ($) with a one to one ratio with the Balboa (B./). The total project cost is $4590.05. $2306.45 or 50% is requested to finance the project. The requested funds are used for transportation, some food items, copies, markers, rotafolio paper, and materials to use during presentations.

[14] This satisfies the community contribution requirement of partnership programs.
[15] This satisfies the requirement that the community understands the restrictions of project money.

The amount provided by the community is US$2283.60 or 50%. This percentage is in the form of technical presentations, communal house use, chair use, cooks, firewood, manual labor, food items, plastic tree bags and seedlings.

Detailed Budget
(Currency Exchange Rate: 1 Balboa (/B) = 1 US Dollar)

Partnership Contribution

Material	Unit	Quantity Needed	Unit Cost (/B = USD)	Total Cost (/B)	Total Cost (USD)
certificates	per certificate	55	1.25	68.75	68.75
tape	per roll	2	0.95	1.90	1.9
markers	per marker	10	1.00	10.00	10
rotafolio paper	per sheet	70	0.15	10.50	10.5
photocopies	per copy	2275	0.03	68.25	68.25
1 inch PVC tube	20ft tube	5	3.30	16.50	16.5
PVC glue small	can	2	2.00	4.00	4
chicken	pound	210	1.00	210.00	210
rice	pound	175	0.40	70.00	70
onion	pound	70	0.35	24.50	24.5
bullion	packet	140	0.10	14.00	14
garlic	head	35	0.10	3.50	3.5
carrot	pound	70	0.40	28.00	28
celery	pound	70	0.60	42.00	42
Flour	pound	105	0.30	31.50	31.5
Yeast	bag	7	1.25	8.75	8.75
Salt	bag	7	0.15	1.05	1.05
Sugar	pound	21	0.35	7.35	7.35
Oil	bottle	7	0.50	3.50	3.5
Participant Transportation	See below	1	1655.40	1655.40	1655.4
Technician transport, Bella Vista	See below	1	27.00	27.00	27
Total Partnership Contribution				**2306.45**	**2306.45**

Community Contribution

Material	Unit	Quantity Needed	Unit Cost (/B = USD)	Total Cost (/B)	Total Cost (USD)
Bamboo	foot	2800	0.05	140.00	140.00
Laurel wood	foot	90	0.50	45.00	45.00
Firewood	bag	49	2.5	122.50	122.50
Tree bags	bag	700	0.03	21.00	21.00
chair rental	chair	455	0.15	68.25	68.25
chalkboard/whiteboard rental	day	7	2.00	14.00	14.00
Tree Seedlings	seedling	350	1.00	350.00	350.00
communal house rental	day	7	20.00	140.00	140.00
bananas	bag	21	3.00	63.00	63.00
squash	pound	210	0.25	52.50	52.50
root vegetables	pound	280	0.35	98.00	98.00
cilantro	bunch	35	0.25	8.75	8.75
pepper	pound	28	0.70	19.60	19.60
chocolate	pound	7	1.00	7.00	7.00
Coffee	pound	3.5	2.00	7.00	7.00
coconut	per coconut	28	0.25	7.00	7.00
Technicians from Changuinola	workday	28	15.00	420.00	420.00
Technicians from Bella Vista	workday	10	7.00	70.00	70.00
Seed collection	workday	10	5.00	50.00	50.00
Session preparation	workday	7	29.00	203.00	203.00
Aqueduct reparation	workday	30	5.00	150.00	150.00
Tree maintenance	workday	20	5.00	100.00	100.00
Seedbed construction	workday	5	5.00	25.00	25.00
Technicians transport, Changuinola	See below	1	102.00	102.00	102.00
Total Community Contribution				**2283.60**	**2283.60**

Total Project Costs

	% Contribution	Total Cost (/B)	Total Cost (USD)
Partnership Contribution	**50.2%**	**2,306.45**	**2,306.45**
Community Contribution	**49.8%**	**2,283.60**	**2,283.60**
Total Project Cost	**100%**	**4,590.05**	**4,590.05**

Appendix C – Background on Participants

Managing Rural Aqueducts, 2007

Personal Information

Name: _____ Community: _____

Age: _____ Sex: Male Female

Where were you born?_____

Where did you go to school and what was your last grade completed?

Where did you go to high school and was your last grade completed? Did you graduate?

Have you lived in any other province besides Bocas del Toro or the Ngäbe-Bugle Reserve?

Yes, in _____ No

Where have you had paid employment outside of your community?

What are you doing right now to earn money?

Have attended any other seminar, conference, or technical class? If yes, please put the name, date, theme, place, and overseeing agency.

Name	Date	Theme	Place	Agency
1.				
2.				
3.				
4.				
5.				

Please list all community positions you have held in your community.

Position	Committee Name	Years

In what other communities have you helped with aqueduct construction?

Results of Background on Participants Survey — Round One

Community	Age	Sex	Born	Complete Primary School	Years of Futher Ed.	Lived In other area	Worked Outside Community	Income Generation	Attended other seminars	Community Posistions	Aqueduct Work
Quebrada Cacao	33	M	Quebrada Cacao	Yes	0	No	Yes	Farmer	No	CWC Pres	Yes
Quebrada Cacao	39	M	Quebrada Cacao	Yes	1	No	No	Farmer	No	CWC VP	Yes
Nudobiti	36	M	Almirante	Yes	0	No	Yes	Farmer	No	CWC Vocal	Yes
Nudobiti	28	M	Valle de Risco	Grade 5	0	Yes	Yes	Farmer	Yes	CWC Sect	Yes
Nudobiti	44	M	Cricamola	Yes	0	No	Yes		No	CWC Fiscal	Yes
Valle Zaron	31	M	Changuinola		0		Yes	Farmer	Yes	CWC Sect	Yes
Valle Zaron	30	M	Valle Zaron	Yes	0		No	Farmer	Yes	CWC Fiscal	Yes
Santa Marta	24	M	Kankintu	Yes	Graduation	No	No	Farmer		CWC Sect	
Santa Marta	21	M	Santa Marta	Yes	1	No	No	Farmer		CWC Vocal	
Santa Marta	30	M	Santa Marta	Yes	2	No	No		Yes	CWC Vocal	
Nueva Estrella	40	M		Yes	0	No	No		No	CWC Pres	
Nueva Estrella	29	M	Piedra Roja	Yes	0	Yes	Yes	Farmer	No	CWC Sect	
Valle de Risco I	40	M	Almirante	Yes	2	No	Yes	Farmer	Yes	CWC Pres	Yes
Valle de Risco I	53	M	Piedra Roja	Yes	3	No	No	Farmer		CWC Fiscal	Yes
Silico Creek	58	M	Cricamola	No school	0	No	No	Farmer	No	CWC Pres	Yes
Silico Creek	24	M	Silico Creek	Yes	Graduation	No	No	Health	No	CWC Vocal	No
Silico Creek	22	M	Chiriqui Grande	Yes	5	No	Yes	Farmer	Yes	Panama Verde	Yes
Valle de Agua	42	M		Yes	0	No	No	Farmer	Yes	Pres other	
Valle de Agua		M		Yes	0	No	No		No	CWC Pres	
Valle de Agua	33	M	Rio Cano	Yes	0	No	No	Farmer	No	CWC Pres	
Valle de Risco II	43	M	Chiriqui Grande	Yes	2	No	Yes	Const	Yes	CWC Pres	Yes
Valle de Risco II	35	M	Valle de Risco	Grade 3	0	No	No	Farmer	No	CWC Tes	Yes
Valle de Risco II	32	M	Valle de Risco	Yes	2	No	No	Farmer	No	CWC Fiscal	Yes

Results of Background on Participants Survey — Round Two

Community	Age	Sex	Born	Complete Primary School	Years of Further Ed.	Lived in other area	Worked outside of Community	Income Generation	Attended other conferences	Community Positions	Aqueduct Work
Bella Vista	42	M	Chiriqui Grande	Yes	4	Yes	Yes	Construction	Yes	No	Yes
Bella Vista	37	M	Cricamola	Yes	Graduation	No	Yes	Professional	Yes	CWC Pres	Yes
Junquito	44	M	Changuinola	Yes	0	No	Yes	Maintenance	No	CWC Pres	Yes
Junquito	17	M	Junquito	Yes	Graduation	No	No	Student	Yes	CWC Voca	Yes
Junquito	25	M	Changuinola	Yes	5	No	Yes	Farmer	Yes	CWC Sect	Yes
Rio Oeste Arriba	27	M	Rio Oeste Arriba	Yes	Graduation	No	Yes	ANAM	Yes	CWC Pres	Yes
Rio Oeste Arriba	27	M	Rio Oeste Arriba	Yes	5	No	Yes	Farmer	Yes	CWC VP	Yes
Rio Oeste Arriba	40	F	Almirante	Grade 5	0	No	No	Household	Yes	No	Yes
Loma Mulato	30	M	Finca 02	Yes		No	No	Farmer	Yes	CWC Fiscal	Yes
Loma Mulato	33	M	Junquito	Yes	4	No	Yes	Farmer			Yes
Loma Mulato	25	M	Chiriqui Grande	Yes	Graduation	Yes	No	Farmer	No	No	Yes
Tibire	43	M	Chiriqui Grande	Yes	1	No	No	Farmer	No	No	No
Tibire	37	M	Almirante	Grade 7	0	No	No	Farmer	No	No	
Quebraca Banano	61	M	Cricamola			No	No	Farmer	Yes	CWC Pres	
Quebraca Banano	40	F	Chiriqui Grande	Grade 4	0	No	No	Household	No	CWC Tes	
Quebraca Banano	18	M	Punta Nespero	Yes	2	No	Yes	Farmer	No	No	No
Quebraca Banano	19	M	Villa 3	Yes		No	No		No	Yes	

No information available for participants from San Cristobal

Appendix D – Personal Evaluation

Managing Rural Aqueducts, 2007

Preliminary Individual Evaluation

Name: _____ Community: _____

Do you currently hold any community positions?

THE WATER COMMITTEE IN YOUR COMMUNITY (fill in the names of members)

President: _____ Vocal 1: _____

Vice president: _____ Vocal 2: _____

Treasurer: _____ Fiscal 1: _____

Secretary: _____ Fiscal 2: _____

How man tap stands are there in the community? Are they public or private?

GENERAL INFORMATION ABOUT THE WATER COMMITTEE

How do you inform the community of a meeting?

Who is responsible to make repairs to the system? (Please select)

President Vice president Treasurer Secretary Vocal Fiscal
Other:_____

Who is responsible for cleaning the springbox and tank (Please select)

President Vice president Treasurer Secretary Vocal Fiscal
Other:_____

How often to you clean the system? (Please select)

Monthly Bi-monthly Tri-Monthly Don't Know Other: _____

Who is responsible to call meetings? (Please select)

President Vice president Treasurer Secretary Vocal Fiscal
Other:_____

How often does the water committee meet? (Please select)

Monthly Yearly When it's necessary When there are repairs
Other:_____

Does the water committee currently have funds? (Please select)

If Yes, how much?:_____ No

Where is the money kept? (Mark all that apply)

In the house of:_____ In a lockbox In the bank

Have you visited the MINSA office within the last six months? If yes, where?

Does the water committee charge a monthly quota? (Please select)

If yes, how much?:_____ per month No

GENERAL INFORMATION ABOUT THE WATERSHED

The area around the spring is: (Please select)

Pasture Jungle Farmland Maintained public land

Does the water committee have a legal contract with the landowner of the spring?

Yes No

If yes, who has the documents?

President Vice president Treasurer Secretary Vocal Fiscal
Other:_____

Does the water committee have a seedbed?

Yes No

Is the area around the spring protected? How many meters?

Can cows or horses enter the spring area? (Please select)

Yes No

Have you planted trees by the spring? What kind?

GENERAL INFORMATION

What is the purpose of a community meeting?

Why is it important that one water committee train the next water committee?

What does JAAR mean and is its role?

Regarding rural water systems, how would you classify yourself? (Please select)

_____No knowledge
_____A little knowledge
_____A lot of knowledge
_____Expert

Appendix E – Three Month PCV Follow-up Survey

Questions from Round One:
Seminar 1

1. Since learning about the solicitude writing, have you witnessed an increase in letter writing ability from your committee members?
2. Have you witnessed any participants that now treat their water based on what they learned at the conference?
3. Did you witness an improvement in the assumed roles of committee members after the presentation by MINSA?
4. How did your community complete the homework?
5. In your opinion, did it seem they knew the answers to most of the questions or were making up the answers based on what was provided on the form?
6. Do you think this community diagnostic form was a helpful means to create a dialogue among the committee members?

Seminar 2

7. Has your community made any repairs to tubing that can be attributed to what they learned in this session? How many?
8. Has your community made other tube improvements such as cleanout valves or air-release valves that can be attributed to this session? How many?
9. Overall, did you sense a willingness amongst your participants to learn more about potable water and how it affects health after the MINSA presentation
10. How did your community complete this homework?
11. How did your community organize its work day? If it didn't, why not?
12. Do you think the *committee members* gained knowledge of their system based on this homework?
13. Do you think the *community in general* gained knowledge of their system?

Seminar 3

14. Have you witnessed an increase in transparency since the session?
15. Has your community opened a bank account since learning more about accounts at this session?
16. Do you think the participants left this session with an ambition to focus more on their accounting?
17. How did your community complete this homework?
18. Are they now using an improved form of accounting that can be attributed to skills learned from the homework?
19. Is your community using its money box from the conference?
20. Has transparency improved since the conference?

Seminar 4

21. Since this session, have you seen an increase in leadership skills displayed by your participants?
22. Do you think it was beneficial to use Bella Vista's water committee as an example?
23. Did your community hold a community meeting to fulfill their homework assignment? If so, what was discussed? If not, why not?

Seminar 5

24. Do you think your participants gained a better understanding of why reforestation is important?
25. Has your community organized any reforestation projects since the conference?
26. Has your community built a seed bed since attending the conference?

Seminar 6

27. Do you think it was worthwhile for your community to participant in this conference?
28. Overall, do you think your aqueducts are being managed better because of this conference?
29. Do you think that rotating the sites of the conference was beneficial?
30. Please comment if you think the conference added personal skills not specifically covered in the conference (such as confidence, personal organization, etc)
31. Would you like to see a conference such as this continued in the future?
32. Please add any complaints about the conference in general as well.

Questions from Round Two:

Seminar 1

1. Have you witnessed any participants that now treat their water (using cloro, SODIS, or rain water) based on what they learned at the conference? If yes, how many people (including family members.)
2. Did you witness an improvement in the assumed roles of committee members after the presentation?
3. How did your community complete this homework? (ex. town meeting, committee meeting, individual)
4. In your opinion, did it seem they knew the answers to most of the questions or were making up the answers based on what was provided on the form?
5. Do you think this community diagnostic form was a helpful means to create a dialogue about their water systems among the committee members/community at large?

Seminar 2

6. Have you witnessed an increase in transparency since this session?
7. Has your community opened a bank account since learning more about accounts at this session?
8. Do you think the participants left this session with an ambition to focus more on their accounting?
9. How did your community complete this homework?
10. Are they now using an improved form of accounting that can attributed to skills learned from the homework?
11. Is your community using its money box from the conference?

Seminar 3

12. Has your community made any repairs to tubing that can be attributed to what they learned in this session? How many?
13. Has your community made other tube improvements such as clean-out valves or air-release valves that can be attributed to this session? How many?
14. How did your community complete this homework?

15. How did your community organize its work day? What did they work on? If they didn't, why not?
16. Do you think the committee members gained knowledge of their system based on this homework?
17. Do you think the community in general gained knowledge of their system?

Seminar 4

18. Since this session, have you seen an increase in leadership skills displayed by your participants?
19. Have you witnessed improved meetings in terms of efficiency and better communication?
20. Did your community hold a community meeting to fulfill their homework assignment? If so, what was discussed? If not, why not?

Seminar 5

21. Do you think your participants gained a better understanding of why reforestation is important?
22. Has your community organized any reforestation projects since the conference?
23. Has your community built a seed bed since attending the conference?

Seminar 6

24. Do you think it was worthwhile for your community to participate in this conference?
25. Overall, do you think your aqueducts are being managed better because of this conference?
26. Do you think that rotating the sites of the conference was beneficial?
27. Please comment if you think the conference added to personal skills not specifically covered in the conference (such as confidence, personal organization, etc).
28. Would you like to see a conference such as this continued in the future?
29. Please add any future suggestions about the conference in general as well.

Appendix E - Three Month PCV

Questions for Round One	Community of: Santa Maria	Valle Zaron	Silico Creek	Nueva Estrella	Community of: Valle de Agua
1	no	no	yes, had good writers before	no	yes
2	no	no	no	no	yes
3	no	no	yes	no	no
4	one individual	among participants	one individual	CWC meeting	CWC meeting
5	Answers were known	made up a lot of answers	answers were known	not sure	answers were known
6	no	yes, reminds roles	yes, reminds duties	yes	yes
7	yes, 5	more than one	no, trained technician beforehand	yes, more than 5	yes, 3
8	no	no	no	no	no
9	no	no	yes	no	no
10	small group	PCV and individual	community work day	cleaned tank and springbox	cleaned springboxes
11	no work day	5 guys to clean springbox	work day, cleaned spring box, tapstands	Vocal organized people	CWC
12	Yes, ex. Size of tanks	yes	yes	yes, younger members	yes
13	no	no	no	yes	no
14	no	no	yes, drastic change	maybe a little	no, not charging
15	no	already had bank account	no	no	already had an unused account
16	no	yes, no final results though	yes	yes	yes, at first
17	only one person, individually	only one person, individually	individually	not sure	CWC meeting
18	no	no	not sure	yes	no
19	yes	no	yes	no	no
20	no	no	not sure	maybe a little	no
21	no	no	yes, held new elections	no	yes
22	yes	yes	yes	not sure	yes
23	no, one person participating	no	yes	not sure	no
24	yes	yes	yes	not sure	yes
25	no	no, but thinking about it	made plans, unsure if carried out	no	no, already forested
26	no, already had a seedbed	no, had an unused seedbed	made plans, unsure if carried out	no	had an unused seedbed
27	no, lack of participation	yes	yes	yes	yes
28	no	yes	yes	yes	not yet
29	yes	yes	yes	yes	yes
30	Learned life skills, accounting	motivation, good to find leaders	yes	not sure	yes
31	Yes, needs inspiration	yes	yes	yes	yes
32	no comments	no comments	well organized	no comments	a few small errors in workbook

Questions for Round One	Valle de Risco I	Valle de Risco II	Nudobidi	Quebrada Cacao
1	no	no	no	no
2	no	no	no	no
3	no	no	yes	yes
4	not sure	not sure	CWC meeting	town meeting
5	not sure	not sure	projected goals	making up
6	yes	yes	no	yes
7	no	no	yes	NA, under constuction
8	no	no	no	NA, under constuction
9	no	no	no	no
10	measured	had documented	as CWC	CWC
11	no	no	under construction	hauling materials
12	no	no	no	yes
13	no	no	no	yes
14	no	no	not sure	no
15	no	no	not sure	no
16	yes	yes	yes	yes
17	small groups	small groups	no	individually
18	no	no	not sure	yes
19	no, threw away to not carry	no	not sure	no
20				
21	yes	yes	not sure	yes
22	no	no	not sure	yes
23	no	no	not sure	yes
24	at least reinforced	at least reinforced	yes	yes
25	no	no	no	no, well forested
26	no	no	no	no
27	yes	yes	yes	yes
28	no	no	not sure	yes
29	yes	yes, reason to continue	yes	yes
30	yes	yes	Not sure	yes
31	yes	yes	not sure	not sure if CWC is the answer
32	no comment	no comment	no comment	not comment

Questions for Round Two	Community of: Junquito	San Cristobal	Loma Muleto	Bella Vista
1	no	no	no	
2	yes	not really	N/A, no CWC	
3	CWC meeting w/o PCV	CWC meeting	participants	
4	not sure	answered to ability	not sure	
5	yes	somewhat	somewhat	
6	yes, admitted corruption	not yet	N/A, no CWC	
7	no	no	no	
8	yes	new treasurer, but not there	no	
9	not sure	CWC meeting	participants	
10	yes	not yet	not sure	
11	already had one in use	not sure	no	
12	yes, 1	not sure	no	
13	no	no	no	yes, 6
14	individual	CWC meeting	community work day	
15	nobody showed up	yes, fencing and cleaning	yes, cleaned tank	
16	no, only guessed	yes	yes	
17	no	no	not sure	
18	yes, esp Secretary	no	no	
19	yes	no	no	
20	no	no	no	
21	yes	yes	yes	
22	yes	no	no	
23	already had one in use	no	already had one in use	
24	yes	yes	yes	
25	yes	maybe	not sure	
26	yes	yes	yes	
27	increased confidence	personal development	somewhat	
28	yes, small positive change	yes	yes	
29	none	none	none	

Appendix F – Weekly Agendas

Managing Rural Aqueducts

August 11, 2007
Quebrada Cacao

8:30 Breakfast

9:00 **"Opening Welcome by Peace Corps"** by Lane Olson and Julia Majkrzak
-Introduce the Agenda
-What will happen in the seminars?
-Present this week's homework

9:30 **"Opening Welcome by MINSA"** by Felix Holder
-What this seminar means to MINSA

10:00 **"What is Peace Corps"** by Sara Hunt and Nico Armstrong

10:30 **Background on Participants Form**

11:15 Three rotating rooms:
"**Writing Solicitudes**" by Melissa Salgado y Kevin Harrison, school classroom one
"**Roles of JAAR**" by Felix Holder, school classroom two
"**Ways to have household potable water**" by Sr. Cubilla, Brandon Braithwaite and Lane Olson, community shelter

12:30 Lunch

1:30 Change rooms for the second round

2:30 Change rooms for the third round

3:30 Conclusion and explanation of the homework

4:00 Closure

HOMEWORK: Complete the form "Community Diagnostic" and water calendars.

Managing Rural Aqueducts

August 25, 2007
Santa Marta

8:30 Breakfast

9:00 **"Welcome, revisit the homework, and present the Agenda"** by Lane Olson

9:30 Three room rotation:
"**Mock-a-duct 1: Air release and clean-out valves**" by Brandon Braithwaite and Ryu Suzuki, classroom one
"**Mock-a-duct 2: Aqueduct Configurations**" by Colin Daly, classroom two
"**How to make basic repairs**" by Lane Olson and Kevin Harrison, school kitchen

10:20 Change rooms for the second round

11:10 Change rooms for the third round

12:00 Lunch

1:00 Walking the aqueduct line with Sr. Cubilla

3:00 **"What is potable water and why is it important"** by Nuria Machado, community shelter

3:45 Closure, explain the homework and expectations

***HOMEWORK**: Organize a community workday to repair the water line, clean the tank, and clean the springbox.*

Next meeting: September 6 in Valle de Agua Arriba

Managing Rural Aqueducts

September 8, 2007
Valle de Agua Arriba

8:30 Breakfast

9:00 **"Welcome, revisit the homework, and present the Agenda"** in the church

9:30 Two room rotation:
"**What is accounting and transparency**" by Merrow Hart y Ryu Suzuki
"Saving money in a bank" by Félix Holder from MINSA

10:30 Change rooms for the second round

11:30 "**Options for a water committee to become a cooperative**" by Lic. Góndola y Ing. Pedro Santos from IPACOOP

1:00 Lunch

2:00 Construction of a money box

3:30 Closure, explain the homework and expectations

4:00 Closure

HOMEWORK: Begin to fill out accounting workbook

Next meeting: September 15th in Silico Creek

Managing Rural Aqueducts

September 15, 2007
Silico Creek

8:30 Breakfast

9:00 **"Welcome, revisit the homework, and present the Agenda"**

10:00 **"Preparation and Presentation of a Community Meeting"** by Silico Creek's Artisan Group

"Presentation of their System of Accounting" by Bella Vista

12:00 Lunch

1:00 Group Activities

3:30 Closure, explain the homework and expectations

4:00 Closure

HOMEWORK: Finish the accounting workbook

Managing Rural Aqueducts

September 29, 2007
Valle de Risco

8:30 Breakfast

9:00 **Opening** by Lane Olson

9:15 **"Soil Conservation"** by Sr. Bonilla

10:15 Two room rotation:
"The Hydrologic Cycle" by Melissa Salgado
Seedbed Tour by Joe Goessling

11:00 Change rooms for the second round

11:45 Lunch

12:45 Accounting Exam

1:30 Plant trees in the watershed

3:30 Conclusions

4:00 Closure

Next Meeting: October 6th in Valle Zaron

Managing Rural Aqueducts

October 6, 2007
Valle Zaron

8:30 Breakfast

9:00 **Opening and Evaluations** by Lane Olson and Brandon Braithwaite

9:45 **Reflection Activities** by Julia Majkrzak

10:30 **Closing Words from Participants**

12:30 Lunch

1:30 **Closing Words from Agencies**

2:00 **Presentation of the Certificates**

3:00 **Pictures**

4:00 Closure

Managing Rural Aqueducts

May 10, 2008
Quebrada Banano
Introduction

8:30 Breakfast

9:00 **Opening** Welcome by Peace Corps Volunteers Ryu Suzuki and Julia Majkrzak

Welcome by MINSA by Lic. Félix Holder and Lic. Nuria Machado
Words from the Participants
Self-Introductions of the Participants
Format of the Seminar

10:00 **"What is Peace Corps"** by Jaime Fraser and Nico Armstrong

10:30 **Background on Participants Form**

11:15 Two Room Rotation
"**How water effects health**" by Lic. Nuria Machado and Kevin Harrison
"**Roles of JAAR**" by Lic. Félix Holder and Ryu Suzuki

12:30 Lunch

1:30 Change rooms for the second round

2:30 **Water Fair: Making Household Potable Water**

3:30 Closing and explanation of the homework

4:00 Closing

Homework: Fill out the Community Diagnostic Form. All communities should bring their current accounting papers to the next session as well.

During the next session, participants will construct a money lockbox. Please bring hand tools such as planer, saw, and hammer.

Next Meeting: May 24 in Bella Vista

Managing Rural Aqueducts

May 24, 2008 Bella Vista

Accounting

8:30 Breakfast

9:00 **"Welcome, revisit the homework, and present the Agenda"** by Julia Majkrzak

9:30 Two Room Rotation
Room1: "**What is accounting and transparency**" By Mo Hart and Ryu Suzuki
Room 2: **"Saving money in the bank**" By Lic. Félix Holder of MINSA

10:30 Change rooms for round two

11:30 **Participating Community Interchange.** Each community that brought examples of their accounting system can present to the group

1:00 Lunch

2:00 Building a money lockbox

3:30 Closing and explanation of the homework

4:00 Closure

Homework: *Fill out the form "Aqueduct Diagnostic" and start to fill out the accounting workbook. Try to finish exercises 1, 2 and 3.*

Next Meeting: June 7th in Lomo Muleto

Managing Rural Aqueducts

June 7, 2008 Loma Muleto

Infrastructure

8:30 Breakfast

9:00 **"Welcome, revisit the homework, and present the Agenda"**

9:15 Presentation by the Director of the Environmental Health Program with Peace Corps Lic. Tim Wellman

9:30 Two Room Rotation

Room 1

"**Aqueduct Configurations"** By Colín Daly and Matías Rogge

Room 2

"**Freeing the tubes from air and mud"** By Ryu Suzuki and Brandon Braithwaite

"**How to make field repairs**" By Kevin Harrison and Patricio Holm

"Aqueduct life-cycle" By Julia Majkrzak

11:15 Change rooms for the second round

1:15 Lunch

2:00 Build a rainwater collection system for the public elementary school of Loma Muleto.

3:30 Closing and explanation of the homework

4:00 Closure

Homework*: Organize a community workday to repair the water line, clean the tank, and/or clean the springbox. Continue completing the accounting workbook with finishing exercises 4, 5, 6 and 7.*

Next Meeting: June 21 in Tibite

Managing Rural Aqueducts

June 21, 2008 Tibite

Community Participation and Leadership

8:30 Breakfast

9:00 **Welcome**

9:15 **Presentations from participating communities**. Presentation about your passed community workday. What did you do and how many people participated? Prizes for the winners.

10:00 **Community Participation and Holding Meetings** by MINSA

11:00 **"Empowering the Community"** By Ryu Suzuki and Jaime Fraser

11:45 **Facilitating a Community Meeting**

12:30 Lunch

1:30 **Activities in Groups**

3:30 Closing and explanation of the homework

4:00 Closure

Homework: *Finish the accounting workbook.*
(Optional: Take the practice accounting exam)

Next Meeting: July 12 in Junquito

Managing Rural Aqueducts

July 12, 2008 Junquito

Watershed Management

8:30 Breakfast

9:00 **Welcome** and handing in the accounting workbook

9:15 **"The Water Cycle"** By Colin Daly

10:15 **"Conserving the Soil and Forests"** By Julio Sanjur

11:30 **Accounting Exam**

1:00 Lunch

2:00 **Plant trees in the watershed**

3:30 Closure

4:00 Exit

Next Meeting: July 26 in Rio Oeste Arriba

Managing Rural Aqueducts

July 26, 2008 Rio Oeste Arriba

Graduation

8:30 Breakfast

9:00 **Welcome and Review of Past Themes**

9:30 **Activity to Connect the Themes**

10:30 **Reflexion Activity**

11:30 **Exit surveys and evaluations of the seminars**

12:30 Lunch

1:30 **Words from the Participants**

2:30 **Words from the Agencies and Peace Corps**

3:00 **Presentation of the Certificates**

3:30 **Pictures**

4:00 Exit

Appendix G – Community Diagnostic

Managing Rural Aqueducts, 2007

Community Diagnostic – Homework #1

Name of the Community: _____

Names of the three principal participants:

1.

2.

3.

WATER COMMITEE (fill in the names of the members)

President: _____ Vocal 1: _____

Vice President: _____ Vocal 2: _____

Treasurer: _____ Fiscal 1: _____

Secretary: _____ Fiscal 2: _____

GENERAL INFORMATION ABOUT THE COMMUNITY

How many people (roughly) live in the community?

When was the community founded?

Where is the closest high school?

Are the missionaries or NGOs currently working in the community?

How many churches are there in the community?

GENERAL INFORMATION ABOUT THE WATER COMMITTEE

How many years has the water committee been established?

Does the committee have Personería Jurídica? (Select one)

Yes No I don't know

How do you inform the community about general meeting?

How often does the water committee meet? (Select one)

Monthly Yearly When it's necessary When the system breaks down

Other:_____

How often do you elect a new water committee? (Select one)

Every 6 months Yearly Every two years I don't know

Other: _____

Does the water committee have saved funds? (Select one)

Yes, and the amount is:_____ No

Where do you guard the funds? (Select one)

In the house of a member In the bank

Does the water committee visit MINSA? How often, and where?

Does the water committee collect a monthly quota? (Select one)

Yes, B/._____ monthly No

Who is responsible to make repairs to the aqueduct?

President Vice President Treasurer Secretary Vocal 1

Vocal 2 Fiscal

Other:_____

Who is responsible to clean the springbox and the tank?

President Vice President Treasurer Secretary Vocal 1
Vocal 2 Fiscal

Other:_____

How often do you clean the springbox and the tank?

Monthly Every two months Every three months Never I don't know

Does the water committee organize other activities? Such as?

GENERAL INFORMATION ABOUT THE STATE OF THE WATERSHED

The area around the spring is: (Select one)

Pasture Jungle Farmland Public maintained land

Does the water committee have a signed contract with the owner of the spring?

If so, who has the documents?

President Vice President Treasurer Secretary Vocal 1

Vocal 2 Fiscal

Other:_____

Does the water committee have a seed bed?

Yes No

Is the area around the springbox protected? How many meters?

Can horses or cows go near the spring? (Select one)

Yes No

Have you planted trees near the spring? What kind?

Appendix H - Aqueduct Diagnostic

Managing Rural Aqueducts, 2007

Aqueduct Diagnostic – Homework #2

Community:_____ Date:_____

Who built the aqueduct and when was it built? Please list the contributing agencies and principal technicians who oversaw the springbox and tank construction.

What agreements were made with the users when the aqueduct was completed?

From where were the funds or materials received to build the aqueduct?

What sources of water does the aqueduct use? (Only the aqueduct, not the entire community)

Spring Creek Well Rain Other:_____

How many sources does the aqueduct have?

How long are the aqueduct and what size are the tubes?

How much of the tubes are buried and how much is unburied?

How many gallons per minute does the spring produce in the wet and dry season?
If you don't know, make the measurements now and write the quantity and date.

Use the provided formula:

$$\frac{\text{Size of the container}}{\text{Time to fill}} \quad \frac{\square \text{ gallons}}{\square \text{ seconds}} \quad X \quad \frac{60 \text{ seconds}}{\text{minute}} \quad = \quad \frac{\square \text{ Gallons}}{\text{minute}}$$

$$\frac{\square \text{ Gallons}}{\text{minute}} \quad X \quad \frac{1440 \text{ minutes}}{\text{day}} \quad = \quad \frac{\square \text{ Gallons}}{\text{day}}$$

Please note any particular details of your aqueduct here:

How many users does the aqueduct serve presently? What is the daily demand?

Population:_____persons

MINSA suggests that every user be entitled to 30 gallons per day.

$$\square \textbf{ Persons} \quad X \quad \frac{30 \text{ Gallons}}{\text{Person per day}} \quad = \quad \frac{\square \text{ Gallons}}{\text{day}}$$

Is the quantity of water provided from your sources sufficient to meet the daily demand?

How many gallons does your community's tank hold? If you don't know, make the measurements.

Height:_____feet
Remember not to include the width of the blocks!

Width:_____feet

Length _____feet

Use the provided formula:

	Height	X		Width	X		Length	=	

Cubic feet of volume

	Cubic feet of volume	X	$\frac{7.48 \text{ gallons}}{\text{feet cubed}}$	=	

Volume, gallons

Volume of the tank:_____gallons

Sketch of the Aqueduct
Please make a sketch of your aqueduct including: springboxes, tanks, distribution system, air release valves, clean-out valves, and other specific information. Use another sheet of paper if necessary.

Appendix I – Permissions

Figure 2.1 – Country Map of Panama

June 5, 2009
University of Manchester
From the IT Service Desk regarding submission reference: 452197
Submission has been marked as *Resolved*.

Solution:
Dear Brandon
As long as you reference it, it would be fine [to use our picture].
Regards
Linda

Figure 2.3 – A Typical Ngabe Village (Cayo Paloma)

I, **Matthew Babcock**, grant **Brandon Braithwaite** permission to use photos taken by me and pertaining to the town of Cayo Paloma, Panama for use in defense of his M.S. in Civil Engineering at Michigan Technological University.

Signed: Matthew Babcock

Date: June 17, 2009

Appendices B, C, D, F, G

I, **Julie Majkrzak**, grant **Brandon Braithwaite** permission to use pictures or documents created by me and pertaining to the Bocas del Toro, Panama Water Committee Seminars for use in defense of his M.S. Civil Engineering at Michigan Technological University.

Signed: Julie Majkrzak

Date: June 10, 2009