COMMUNITY CULTURE AND RURAL WATER MANAGEMENT

By

Mirey Lopez, M.A.

B.Sc., University of Alberta, 2005

A thesis submitted in partial fulfillment of the requirements for the degree of

MASTER OF ARTS

In

ENVIRONMENT AND MANAGEMENT

We accept this thesis as conforming to the required standard

__________________________
Loraine Swift, Project Coordinator
Change for Children Association

__________________________
Dr. Chris Ling, Professor
School of Environment and Sustainability

__________________________
Dr. Lenore Newman, MEM Program Head
School of Environment and Sustainability

__________________________
Dr. Anthony Boydell, Director
School of Environment and Sustainability

ROYAL ROADS UNIVERSITY
April 30, 2010
© Mirey Lopez, 2010
# Table of Contents

Table of Contents ii  
List of Tables and Figures iv  
Tables iv  
Figures iv  
Abstract 1  
Chapter 1: Introduction 2  
  Research Purpose and Objectives 3  
  Organization of the Thesis 4  
Chapter 2: Literature Review 5  
  Water Availability in Nicaragua 5  
  Water Administration in Nicaragua 6  
    National management. 6  
    Role of nongovernmental organizations. 8  
    Community Management. 9  
  Community Culture in Rural Development 11  
Chapter 3: Case Study Background and Methodology 13  
  Case Study Background 13  
    The Rural Community Water Project. 13  
  Research Methodology 14  
    Methodology. 14  
    Case study selection. 15  
    Research design. 16
Community Culture and Rural Water Management

Sources of evidence. 17
Data collection. 19
Data analysis. 22

Chapter 4: Research Study Results 24
Key Findings 24

Chapter 5: Discussion 40
Interpretation of the Rural Community Water Project 40

Chapter 6: Recommendations 48

Chapter 7: Conclusion 53

References 56

Appendix A: Interview Guides 59
Female Focus Group 59
Male Focus Group 61
Interview – Potable Water and Sanitation Committees 63
Interview – Centro Humboldt, Rural Community Water Project Coordinator 65

Appendix B: Research Consent Form 67
List of Tables and Figures

Tables

Table 1. Typical Locally Operated Water Systems. 10
Table 2. Breakdown of Case Study Interview and Focus Groups. 19
Table 3. Sequence of Data Collection Events. 20
Table 4. Key Water Challenges in Santa Tereza and Las Marias Prior to Participating in the RCWP as Ranked by Research Participants. 25
Table 5. Major and Minor Challenges Associated with the RCWP as Identified by the Respondents. 32
Table 6. Rural Community Water Project Characteristics and Administration in Santa Tereza and Las Marias. 33

Figures

Figure 1. A Map for the Study Area in Nicaragua. 69
Figure 2. A Location Map for Santa Tereza and Las Marias, Nicaragua. 70
Figure 3. Santa Tereza Potable Water Distribution Tank. 71
Figure 4. An Example of a Public Water Access Point in Las Marias. 72
Abstract

Access to potable water has been on the forefront of the international agenda for almost three decades. The international community has been working together in developing potable water management programs and improving potable water access. This thesis examines how the nature of rural communities influences water usage and rural potable water projects in Nicaragua. Factors such as proximity to urban environments and exposure to nongovernmental organizations are demonstrated to play a role in shaping community expectations and satisfaction with potable water projects. The author proposes approaches for addressing urban influence focused on improving flexibility of project consultation processes, strengthening project monitoring, and enhancing the level of community knowledge with respect to available potable water systems. The author briefly explores how this case study is transferrable to other communities in developing countries.
Chapter 1: Introduction

In recent years, procurement of potable water has been an international concern and has been regarded as one of the most serious natural resource issues facing global communities. The World Health Organization (WHO) and the United Nations Children’s Fund (UNICEF) (2000) estimate that water shortages affect more than 2 billion people with 1.1 billion people lacking adequate drinking water. Efforts to address the issue by providing “water and sanitation for all” (Black, 1998) as part of the International Drinking Water and Sanitation Decade (1981-1990) proved to be unsuccessful.

Since then, notable progress has been made in increasing urban access to potable water; however the same cannot be said about rural development, where the plight of rural communities with respect to waterborne diseases and the practicality of accessing water sources is undeniable. One of the factors responsible for the difference relates to the relative ease of implementing urban water systems in centrally located areas, mimicking existing technologies and operations of more developed countries. On the other hand, rural water development presents an additional set of challenges ranging from geographic location to the number of sparsely distributed but numerous settlements (Black, 1998).

Furthermore, according to the United Nations Environment Programme (UNEP) (1999), the global water cycle is unable to adapt to meet the growing demand, which is attributed primarily to economic development, especially with respect to the agriculture sector. However, additional problems exist, including poor water quality due to pollution, population growth, unregulated distribution and climate change (United Nations Environment Programme, 1999).

In response to the crisis, the international community continues to develop water policies and new programs to improve potable water access. The principal points emphasized are
participatory approaches in water development and management involving users, planners and policy makers, as well as ensuring that women play a key role in the provision and management of the resource (Dublin Statement, 1992). Non-governmental organizations (NGOs) are also invested, providing support in the development and administration of on-the-ground water management projects (Farrington and Lobo, 1997).

**Research Purpose and Objectives**

Cultural factors can play a role in rural community development (Brennan, Flint and Luloff, 2009) and water provision projects are typically implemented across several communities. Applying the same model for all beneficiary communities of a given project, it is necessary to consider how community-specific differences with respect to culture and the degree of development influence the success of these programs. Therefore, the objectives of this study are to investigate the effects of the nature of communities on rural potable water development and how factors such as urban proximity influence local culture and subsequently water management. Finally, this thesis intends to recommend approaches for incorporating these factors into management practices.

The research will focus on Centro Humboldt’s Rural Community Water Project in Nicaragua. This Nicaraguan nongovernmental organization provides potable water access to rural communities across the country and receives wide support from international donors. To facilitate this investigation, the study’s specific objectives are to:

1. Summarize the opinions of the rural communities participating in the Rural Community Water Project in order to understand why they believe the project succeeds and to understand some of the challenges they face with respect to potable water and the project.

2. Determine the role of urban influence in community culture and success of the project.
3. To document the Rural Community Water Project framework, including the recommendations resulting from this study, with the intention that these can be used as a foundation for future rural potable water provision projects.

The Rural Community Water Project Coordinator and two communities participating in the project were selected for the study. Community members were interviewed to understand potable water governance, key roles, and opinions within and between communities, while an interview with the coordinator provided the perspective of the nongovernmental organization leading the project.

**Organization of the Thesis**

This thesis is organized into 7 chapters and a series of supporting appendices. Following this introduction, Chapter 2 provides a context for key elements of the case study through a literature review of the potable water situation in Nicaragua, the role of nongovernmental organizations in water provision and the governance structure within Nicaraguan communities with respect to potable water administration. Chapter 3 presents the case study, includes background information on the research communities and provides a discussion of research method and design. Key findings are found in Chapter 4 with results interpretation presented in Chapter 5. Recommendations based on the research are outlined in Chapter 6 with concluding remarks presented in Chapter 7. Appendices A and B provide supporting information to the report.
Chapter 2: Literature Review

Water Availability in Nicaragua

The current state of affairs regarding water availability in Nicaragua is deceptive. At first glance, Nicaragua appears to be a large aquifer where 8% of its total area is water (Central Intelligence Agency, 2009), including over 75 rivers, approximately 32 lagoons (Guevara Jerez, 2007) and two lakes that combine to cover 9,000 km² (Empresa Portuaria Nacional, 2009; International Lake Environment Committee Foundation, 2005). However, it was reported in 1995 that a third of the population did not have access to a sustainable source of potable water (Pan American Health Organization [PAHO], 1995; UNICEF, 2007). The reality of the country’s water situation is that only 48% of rural areas have access to a water supply (Inter-American Development Bank, [IDB] 2006). Factors contributing to Nicaragua’s current potable water situation include, among others, continuing deterioration of rural water systems, lack of consistent water administration and regulation at the national level, private appropriation of public water, contamination, deforestation and climate change (Guevara Jerez, 2007).

In rural areas, many households rely on shallow artisan wells, natural springs and surface water bodies. However, many of these are contaminated with pesticides from agricultural runoff, residential sewage and industrial waste. Some peri-urban communities, those adjoining consolidated urban centres and located between the urban metropolis and rural areas (Torres, 2008), have informal or unauthorized piped water which provide an inconsistent supply of water. For some urban areas such as Somotillo, located in the north-western region of Nicaragua, the municipality’s water service is shut off for the majority of the day requiring residents to collect a limited supply of water during short periods of time in the evenings. Others resort to purchasing bottled water at a high cost or occasionally having to rely on water brought in by tanker trucks.
In other cities such as Jinotega, in the north-central region, only 50% of the residents have potable water and the supply is inconsistently available across the city. While some neighbourhoods have access to potable water for only an hour each day, others may be supplied for up to 20 hours, daily (Guevara Jerez, 2007).

Environmental degradation is a major concern with respect to water quality, specifically due to deforestation, use of agrochemicals, industrial effluents and disposal of raw sewage. The principal water sources servicing agricultural processes (e.g. coffee, tobacco and banana production) and industrial operations (e.g. mining) become polluted with organo-chlorides and other toxic substances are also used for domestic purposes (Guevara Jerez, 2007).

Water Administration in Nicaragua

National management.

Water provision in Nicaragua has a history of relying heavily on external support including funding from the Inter-American Development Bank (IDB), International Monetary Fund (IMF) and the World Bank, with funding and structural reform programs dating back to 1992 (Inter-American Development Bank, 1992). With the help of the three funders in the 1990s, the water management model of the Nicaraguan government began to deviate from state run water administration to that of privatized management. The Inter-American Development Bank (1999) committed to providing a loan of $14 billion if the government established a contract with an international water firm to modernise management of the water services of the Nicaraguan National Aqueduct and Sewerage Enterprise (Empresa Nicaragüense de Acueductos y Alcantarillados, [ENACAL]) in the capital city. Furthermore, the program developed a strategy.
to promote participation of the private sector that would begin with a water management contract
given to a qualified international operator.

After implementation of the plan, the price of water rapidly increased in response to the
structural adjustment conditions imposed by the International Monetary Fund and the World
Bank. As part of these conditions, “strengthening of the financial position of the state enterprises
through revenue increases and cost containment” (International Monetary Fund, 1999) were
considered to be an “important component of the fiscal program” (International Monetary Fund,
1999), meaning that ENACAL had to continue increasing its tariffs by 1.5% a month “until
reaching marginal cost” (International Monetary Fund, 1999) as identified by the IMF and IDB.
Furthermore, 37-43% of the national water system was expected to be offered for private
management by the year 2000 (International Monetary Fund, 1999), while rural water provision
was delegated to the Nicaraguan Social Investment Fund (Fondo de Inversión Social de
Emergencia, [FISE]), whose responsibility was to accelerate the expansion of water services in
rural communities and strengthen local capacity to operate and maintain government-installed
water systems (International Monetary Fund, 1999).

Since 1999, decentralization and privatization was challenged by Nicaraguans, resulting
in the passing of law 440 in 2003, which suspended all private sector development and returned
some of the privatized management back to ENACAL. In 2008, the World Bank supported FISE
in a project to increase access to potable water in rural areas through participation of
municipalities and communities in managing their systems following a demand approach (Inter-
American Development Bank, 2006; World Bank, 2008) where promotion of a particular service
results in a higher demand for that service (Black, 1998). Today, national water administration
still faces several challenges including insufficient revenue in comparison to its administration
expenses, high tariffs, and lack of consistent water supply to urban and rural populations due to
deteriorating infrastructure, insufficient funds for maintenance and poor business management
(Inter-American Development Bank, 2006).

**Role of nongovernmental organizations.**

Nongovernmental organizations have been active players in the transformation process of
Nicaragua since at least the 1960s, and through international cooperation, NGOs have executed a
large number of development projects in the country (International Center for Non-for-Profit
Law, 2009). With respect to potable water, NGOs play an important role in the water sector by
bridging the gap between water supply and demand. They focus on empowering local
communities by providing them with the tools required to use and manage their water resources
sustainably, rather than establishing large-scale water projects such as those of ENACAL.
According to the International Development Research Centre (IDRC) (n.d.), NGOs integrate
water provision and community participation by:

- Integrating economic, environmental, health and social factors into potable water
  projects.
- Involving beneficiaries through their voluntary community committees in project
  implementation.
- Ensuring participation of beneficiaries in local water management (e.g. design,
  implementation, monitoring, etc.).
- Building capacity.
- Liaising and intervening between local, national and international spheres.
- Providing support and encouragement for local initiatives.
Community Management.

In Nicaragua, under the general potable water and sewerage services law, 297, (Ley No. 297, ley general de servicios de agua potable y alcantarillado sanitario), rural water systems with less than 500 connections can be operated by cooperatives known as Potable Water and Sanitation Committees (Comités de Agua Potable y Saneamiento [CAPS]) (Instituto Nicaragüense de Acueductos y Alcantarillado, 1998). Potable Water and Sanitation Committees are volunteer-run, non-profit organizations whose members are democratically elected by the community. The mandate of these organizations is to locally conserve water supply and provide sanitation through administering, operating and maintaining water systems. Out of more than 8,000 rural communities in Nicaragua, there are approximately 5,200 communities whose water systems are administered by CAPSs. Some of the committees have informally existed for more than 30 years (Pan American Health Organization, 2007).

The types of water systems operated by the committees vary in complexity depending on the resources available to the community and the hydrogeology of the area. Table 1 presents common water systems operated by CAPSs in Nicaragua and their approximate numbers.
Table 1.

Typical Locally Operated Water Systems.

<table>
<thead>
<tr>
<th>Water System</th>
<th>Quantity</th>
<th>Description</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manually excavated well</td>
<td>1780</td>
<td>Built in shallow water table areas. The system has a low construction cost and is a relatively simple system. Has a small capacity to act as a reservoir.</td>
<td>Pan American Health Organization (2004a)</td>
</tr>
<tr>
<td>Perforated well</td>
<td>1772</td>
<td>Greater depth to water table requires mechanical perforation using drilling equipment. A costlier installation method typically relying on external financial aid (e.g. from an NGO) and a drilling contractor. The aboveground system is simple and relatively inexpensive to operate once installed.</td>
<td>Pan American Health Organization (2004b)</td>
</tr>
<tr>
<td>Mini-aqueduct, gravity</td>
<td>874</td>
<td>Usually constructed around the exit point of groundwater (e.g. surface spring) in mountainous areas and relies on gravity for water distribution. Low installation and operation costs.</td>
<td>Pan American Health Organization (2004a)</td>
</tr>
<tr>
<td>Mini-aqueduct, electric or</td>
<td>413</td>
<td>Due to greater depth of the water table, an electric pump draws water to the surface. Involves potentially high operational costs depending on the source of power (e.g. electricity, gasoline fuel, etc.).</td>
<td>Pan American Health Organization (2004a)</td>
</tr>
<tr>
<td>mechanical pump</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface water collection</td>
<td>182</td>
<td>Water collection and containment technology depends on the source of water such as rain water, surface water body (e.g. lake or river) and topography of the terrain. Complexity and costs varies depending on the design of the system.</td>
<td>Pan American Health Organization (2004a)</td>
</tr>
</tbody>
</table>


Due to a limited knowledge about the registration process or inability to afford the cost of registration, only 1% of Potable Water and Sanitation Committees are officially recognized as
legal entities by the State. As a result, the government is unable to provide organizations the full support that legal entities are entitled through the National Development Plan. Consequently, CAPSs experience challenges such as lack of funding, mismanagement of potable water sources, deteriorating water system infrastructure, poor tariff collection, and inadequate application of sanctions to potable water system users without legal grounds or protection. Additionally, some CAPSs encounter the inability to open bank accounts in the name of the committee in order to deposit revenue from the levies, which results in funds being deposited into personal accounts of community members (Pan American Health Organization, 2007). However, efforts are underway to facilitate recognition of the Potable Water and Sanitation Committees through the development of a proposed Potable Water and Sanitation Committee law (Ley especial de Comités de Agua Potable y Sanaemiento ley numero_1) (Pan American Organization, 2007), as well as proposed initiatives to create an association uniting all CAPSs and facilitate in the registration process (Pan American Health Organization, 2007).

**Community Culture in Rural Development**

The developmental path of communities is commonly described in terms of economic indices, with discussions of development often referring to regional or national scales as exemplified in the *World Social Situation 2009* report (United Nations, 2009). Little attention is given to the significance of community culture in rural development (Brennan, Flint and Loluff, 2009), disclosing little about the local circumstances and local uniqueness. However, available research in the field has demonstrated the importance of this factor in rural development, including the acceptance or rejection of programs sponsored by external organizations. Even those projects that are less technically involved or economically demanding require

---

1 Currently, the official name of the law has an underscore in place of a number as the law is still in the proposal phase.
consideration of local cultural and social dynamics which may not be immediately obvious (Dube, 1956). Recognition of these factors provides a more complete understanding of community development (Brennan et al., 2009).

According to Dube (1956), secondary effects of innovations or programs play a significant role in determining their degree of acceptability or success. As such, the author contends that emphasis must be placed on adapting technology and programs to the culture of beneficiaries rather than the other way around. Values and cultural norms influence the initial response of the community to a project and although the benefits of a given program are recognized, acceptance may not be as easily attained if the program imposes a significant change in the daily activities or requires a financial investment which may be affordable but nevertheless viewed as an imposition.

With respect to water provision projects, Dube (1956) provides an example of a well repair project in a rural Indian village that was initially positively received by the participants but experienced declining enthusiasm. Adjusting to the new ways of drawing water proved to be more difficult than anticipated for a number of reasons. The first being that the limited number of individuals able to collect water simultaneously increased the amount of time required for water collection. The second reason was due to the physical construction of the new system requiring posture modifications for the women, which was found to be an inconvenience and more exhausting than the previous method, resulting in an overall feeling of dissatisfaction with the project (p. 21). Therefore, established social practices must be considered during project or program design and must not be expected to easily change based on scientific grounds.
Chapter 3: Case Study Background and Methodology

Case Study Background

The Rural Community Water Project.

The Rural Community Water Project (Proyecto Comunitario Rural de Agua en Zonas Secas de Nicaragua (Chinandega, León y Estelí), [RCWP]) provides access to potable water in over 70 communities in the municipalities of Chinandega, León and Estelí located in the northwestern part of Nicaragua (see Figure 1). This region of Nicaragua is susceptible to drought conditions, suffers from environmental degradation and experiences potable water shortages, especially in rural areas (Change for Children Association, 2009). The RCWP is operated by a local Nicaraguan environmental nongovernmental organization, Centro Humboldt and receives project funding the Canadian International Development Agency and from a Canadian partner organization the Change for Children Association (Change for Children Association, 2009). Although some of these communities have existing artisan wells, they did not adequately meet the needs of community members.

The Rural Community Water Project has been providing potable water in rural Nicaragua since 2003. In addition to potable water provision, other project objectives include capacity building to provide beneficiaries with the knowledge and tools necessary to maintain their potable water systems, as well as promoting sanitation and environmental preservation through education campaigns (Centro Humboldt, 2009).

The work of Centro Humboldt is widely known in the Chinandega-León-Estelí region. The project is typically initiated via two avenues; the first involves the organization proposing the project in a community known for experiencing water shortages or having limited access to potable water, while the second method involves the community soliciting the NGO’s help. Once
the decision is made for the project to commence, a series of studies is conducted to determine appropriate potable water systems based on the local hydrogeology, topography, and local economic situation. Through a consultation process, communities accept one of the potable water system options presented by the NGO. Factors such as the number of beneficiaries desiring to participate in the project and the cost of operating and maintaining the system play a role in the community decision making process. Construction of the water system engages all project participants, which ensures that users are familiar with the water system and instills a sense of ownership of the project. Furthermore, a monthly tariff is established by the Potable Water and Sanitation Committee in consultation with the beneficiaries to pay for operation and maintenance costs. Tariffs vary between communities depending on the type of water system and payment systems. For example, payment systems may consist of every household paying the same amount irrespective of household size, or may be based on a set amount per individual beneficiary.

Additionally, a series of workshops is held by Centro Humboldt providing the knowledge and skills necessary for operating the new water system and managing finances associated with the project. The organization also encourages communities to resolve issues on their own by providing them with the technical support required to implement the project and the framework for sustaining the project. Finally, regular monitoring is conducted directly by Centro Humboldt or in some cases through a locally partnered non-for profit organization that is active in the communities.

**Research Methodology**

**Methodology.**

For this research study, an exploratory case study approach was chosen as it is a comprehensive research method suitable for investigating questions or contemporary events that
cannot be effectively addressed through controlled experiments due to the limited ability to manipulate variables (Yin, 2003). Yin (2003) defines a case study as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (p.13).

Specifically, this research study is a multiple-case study to determine how community culture and the potential role of external factors, such as urban proximity, influence rural potable water projects. These types of study designs are ideal for analyzing commonalities and/or differences across cases with similar key criteria (Yin, 2003). Theoretical and technical literature was reviewed to set the context and help identify any external factors that may influence the Rural Community Water Project, such as urban influence and or exposure to other nongovernmental organizations active in the RCWP communities.

Case study selection.

For the purpose of this research, the communities of Santa Tereza and Las Marías were selected based on four main criteria. First, both communities have been participating in the Rural Community Water Project for a sufficient amount of time to allow the project to become fully operational, determine roles and responsibilities of community members and the CAPSs, and establish monthly tariffs. Second, the communities are similar in size and demographics. Third, they are located at different distances from urban centres, which allows for the analysis of the impacts of urban influence on community expectations of the RCWP (see Figure 2). Lastly, both communities experience similar environmental and economic conditions including drought induced water shortages, deforestation, water contamination and poverty.
Research design.

The study design was based on four components as described by Yin (2003). The first three indicate what was to be collected and include: (a) study questions; (b) study purpose units; and (c) analysis. The fourth component refers to the criteria used to interpret the success of the study.

Study questions: This research study examines how the nature of the community influences rural water management by examining the difference in attitude towards the water resource, the project and the difference in the use of the resource among communities. Factors such as proximity to urban economies may influence community character and may dictate community project expectations. Alternatively, existing water usage may affect the success of a water administration project if the project does not adequately meet individual community needs.

Study purpose: It is intended that this study be used to:

1. Benefit the Rural Water Administration Project by summarizing the overall opinion of the communities with respect to the project, and provide their perspectives on factors responsible for project success or challenges.

2. Determine how proximity to urban economies plays a role in determining the success of the RCWP and present ways in which this may be addressed in the project. Additional factors identified in the research will also be presented.

3. To document the RCWP framework with recommendations resulting from this study, with the intention that they may be used as a model for other nongovernmental organizations involved in water management projects in developing countries.

Units of analysis: The overall units of analyses are the communities of Santa Tereza and Las Marías within the context of rural water management. Sub-units correlate to stakeholders
involved in the community-level governance of the project, including the Potable Water and Sanitation Committees and the Nicaraguan nongovernmental organization steering the project, Centro Humboldt.

*Criteria used to interpret success of the study:* The following criteria have been identified to determine the level of success achieved by the study:

- Access to the appropriate sources of evidence, including documents and research participants required to fulfill study objectives;
- Accomplish research objectives; receiving positive feedback from the organizations involved in the Rural Community Water Project on the usefulness of the information collected and an indication of potential application of research results and recommendations into the future direction of the Rural Community Water Project; and
- Making this thesis available to the general public and institutions by publishing in the UMI/Proquest and the Theses Canada portal of the Library and Archives Canada (2009) to ensure the RCWP framework is accessible and usable as a reference or an educational tool.

*Sources of evidence.*

Multiple sources of evidence were used in the data collection process as suggested by Yin (2003) in order to establish “construct validity and reliability” (p.97) by developing “converging lines of inquiry” (p.98), also referred to as triangulation. The advantages of following this approach lie in the ability to reveal different aspects of the study subject or situation (Denzin, 1978), and in having versatility in the sources of evidence for the same scenario (Yin, 2003). There are several kinds of triangulation including data triangulation, investigator triangulation,
theory triangulation and methodological triangulation (Denzin, 1978) with data triangulation and methodological triangulation being used in this research design.

The sources of evidence consulted in conducting this case study research include (a) documentation (municipal and national reports); (b) historical records (rural potable water availability, and national and local water administration records); (c) interviews following an open-ended format; (d) focus groups; and (e) direct observation accomplished via field visits to the case study communities where the researcher was able to observe community water systems and distribution methods and to gain a better understanding of the reasons for implementing a particular water system. Other data collection methods that were initially considered during the design stage of this study included a survey methodology. However, because of range of literacy levels exhibited by community members, a survey would have been inefficient and less effective. Furthermore, as suggested by Yin (2003), a survey’s ability to examine context is highly limited as the number of variables to be analyzed and questions to be asked must be restricted and therefore provides an inaccurate depiction of the context.

The primary sources of evidence were the interviews and focus group discussions. Focus groups especially provided an efficient means of collecting information from project beneficiaries. As indicated by Krueger and Casey (2000), focus group interviews are appropriate to use when attempting to understand the differences in perspectives between groups or in this case, communities. Furthermore, because water management is typically gender specific with men, women and girls having different responsibilities (United Nations, 2003), participants were gender and age balanced to account for potential differences in water usage and perception of the RCWP. Details on interview and focus group compositions are presented in Table 2.
Table 2.

**Breakdown of Case Study Interview and Focus Groups.**

<table>
<thead>
<tr>
<th>Source of Evidence</th>
<th>Data Collection Method</th>
<th>Number of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Santa Teresa</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General community members</td>
<td>1 Focus group - females</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>1 Focus group - males</td>
<td>13</td>
</tr>
<tr>
<td>Potable Water and Sanitation Committee</td>
<td>Interview*</td>
<td>2</td>
</tr>
<tr>
<td><strong>Las Marias</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General community members</td>
<td>1 Focus group – females</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>1 Focus group – males</td>
<td>7</td>
</tr>
<tr>
<td>Potable Water and Sanitation Committee</td>
<td>Interview*</td>
<td>2</td>
</tr>
<tr>
<td>RCWP Coordinator, Centro Humboldt</td>
<td>Interview</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total (44)</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Interviews with Potable Water and Sanitation Committees were gender balanced by consisting of a female and male representative of the committee.

**Data collection.**

Documentation and historical records were obtained from Centro Humboldt’s library and from various Nicaraguan government websites. Project-specific documents were obtained from Centro Humboldt and the Change for Children Association prior to commencing fieldwork in order to become familiarized with the project and the case study communities. Historical records on water usage, community demographics, etc. were also obtained from Centro Humboldt as the organization maintains up-to-date records of community population numbers, number of project beneficiaries, etc. Other documents, including articles related to the establishment and role of the Potable Water and Sanitation Committees were obtained from Centro Humboldt during the
field visit. Some documents could not be obtained until completion of fieldwork including government reports on the status of rural water in Nicaragua and its management.

Focus groups and interviews were conducted in May, 2009. Participants were asked to volunteer for the research by a representative from Centro Humboldt via the Potable Water and Sanitation Committee. Confirmation was obtained during visits with the CAPS by Centro Humboldt. To avoid potential biases or pre-conditioning of participants, Centro Humboldt and the Potable Water and Sanitation Committees were not made aware of the objectives or purpose of this research. The NGO was provided with only the case-study selection criteria. All focus groups and interviews in Nicaragua were conducted by the researcher in Spanish, the official language of the country. The sequence of field data collection is presented in Table 3.

Table 3.

<table>
<thead>
<tr>
<th>Day</th>
<th>Community</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>Santa Tereza</td>
<td>Focus group - male</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interview – Potable Water and Sanitation Committee</td>
</tr>
<tr>
<td>Day 2</td>
<td>Las Marías</td>
<td>Focus group - female</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interview – Potable Water and Sanitation Committee</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Focus group – male</td>
</tr>
<tr>
<td>Day 3</td>
<td>Centro Humboldt</td>
<td>Interview – RCWP Project Coordinator</td>
</tr>
<tr>
<td>Day 4</td>
<td>Santa Tereza</td>
<td>Focus group - female</td>
</tr>
</tbody>
</table>

The format of focus groups followed the multiple-category design as described by Krueger and Casey (2000) allowing the comparison between the two communities and between
the male and female members within the communities. Focus group questions were structured according to the authors’ suggestions and among others attempted to have the following two qualities: (a) used words the respondents would normally use when speaking about the topic; and (b) ensure questions were open-ended to encourage discussion.

Because this research study involved international groups (e.g. Centro Humboldt), great care and attention was given to being culturally sensitive and considerate. In particular, the researcher adhered to the best of her ability to five principles recommended by Krueger and Casey (2000) when performing data collection in an international setting: (a) avoid power differentials by ensuring that only those participating in the session were present; (b) consider cultural differences; (c) use the local language; (d) recognize the difference in the pace of life and therefore be less concerned with time; and (e) provide adequate confidentiality. Confidentiality was respected by storing recordings on the researcher’s computer with password protection. Reporting of the data did not use names of the respondents or divulge any details that may identify any of the participants (see Appendix B).

In order to effectively lead the interviews and discussions, interview guides were developed in Spanish in advance of each focus group and interview. English versions of the interview guides are presented in Appendix A. The question route followed the sequence suggested by Krueger and Casey (2000) starting with warm-up questions, transition questions leading into primary discussion questions and closing with a summary. Every attempt was made to maintain consistency between focus group sessions and interviews to facilitate comparison of responses during the analysis phase. All interview and discussions addressed the following themes:

- Theme 1: Community expectations of the RCWP before its implementation.
• Theme 2: Centro Humboldt-lead consultation process prior to well construction and the community relationship with the organization.

• Theme 3: Changes in water usage with the construction of the new water system.

• Theme 4: Community characteristics including values, infrastructure priorities and exposure to urban amenities.

• Theme 5: What is necessary to improve the project?

Participants signed a letter of consent prior to each interview (See Appendix B).

**Data analysis.**

The approach of Krueger and Casey (2000) and Patton (2002) were used for qualitative data analysis. During the interview or discussion groups, the researcher’s primary task was to listen and make field notes. At the end of a session, the researcher summarized the key points captured from the participant(s) and asked for final comments. This ensured that the researcher had a sound understanding of the points raised during the session, and served as a confirmation to the participants that their points and opinions were accurately captured.

All discussions were recorded using a digital sound recorder to complement field notes and facilitate data analysis. Following each session, the digital recording was reviewed for sound quality as well as the quality of the questions. Additionally, brief summaries were prepared of individual sessions including any themes and surprising points that arose during the discussion. Recorded data was digitally transferred to a computer upon the researcher’s return to Canada. After the transfer of the field data, detailed summaries were prepared of each interview and focus group in English. Using these summaries, the author was able to develop a classification and coding scheme to identify primary patterns in the data. Finally, a series of matrices was developed for data interpretation, one for each community and for the Centro Humboldt Project.
Coordinator. Each matrix had a horizontal axis representing the participant(s) and a vertical axis representing each question and the major themes identified. This facilitates cross-classification as indicated by Patton (2002). Matrices were used for evaluating the number of individuals sharing a similar opinion, the frequency with which a particular point was made and overall themes.
Chapter 4: Research Study Results

Below are the key findings from the focus group discussions and interviews. The findings reflect how the results from the fieldwork evolved from identifying the state of the communities’ water supplies prior to participation in the Rural Community Water Project, the process of project implementation, and the communities’ perceptions of the project. The interview with the NGO representative provides additional background information on the conditions of the project in the communities, the representative’s perception of project success and challenges, and additional factors that may influence the project.

Key Findings

1. *Prior to participating in the Rural Community Water Project, the communities of Santa Tereza and Las Marias faced several short- and long-term challenges. Since the RCWP was introduced, the communities have experienced changes in their lifestyle with respect to day-to-day activities and the overall health of project beneficiaries.*

The Rural Community Water Project has brought notable changes to Santa Tereza and Las Marías. As summarized in Table 4, both communities experienced several challenges prior to participating in the RCWP, with poor water quality and associated poor health being of the highest concern. Ranking is based on the number of research participants that identified a particular challenge or issue.
### Table 4.

**Key Water Challenges in Santa Tereza and Las Marias Prior to Participating in the RCWP as Ranked by Research Participants.**

<table>
<thead>
<tr>
<th>Potable Water Challenge</th>
<th>Santa Tereza</th>
<th>Las Marias</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
</tr>
<tr>
<td>• Drinking water quality</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>• Prevalence of illness</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>• Meeting demand in summer</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>• Impact of groundwater contamination</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>• Impact of upstream industrial and commercial activity on surface water supply</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>• Decentralization of water supply</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>• Water collection frequency and travel time</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>• Water infrastructure</td>
<td>4</td>
<td>✓</td>
</tr>
<tr>
<td>• Need for adequate water storage</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

*Note:* Responses from male and female participants were ranked in descending order with the most commonly identified issue ranked as “1”. Responses from CAPS members were not ranked for confidentiality purposes due to the small number of participants.

Santa Tereza’s primary source of potable water was a “filthy and contaminated” (Female participant A, personal communication, May 19, 2009) river. The river was not only used by the community, but was also frequented by cattle and used by “different companies and government programs that washed equipment in the river” and “removed sand and rocks” (Male participant...
A, personal communication, May 13, 2009), which created more contamination upstream. Consequently, Santa Tereza experienced high incidents of disease, fever and diarrhoea, with children being the most susceptible age group (Santa Tereza female participant B, personal communication, May 19, 2009). The community attempted to develop an alternative solution by building artisan wells where the water table was sufficiently shallow for manual excavation, however the wells became contaminated by debris or in some cases the groundwater was already contaminated with petroleum products from nearby underground fuel storage tanks (Male participant C, personal communication, May 13, 2009). Due to the lack of filtration systems, accidental ingestion of contaminants and debris was common and is considered to be the principle cause of diarrhoea by both the male and female research participants.

Similarly, high rates of diarrheal illness were present in Las Marias before it acquired the new water system (Las Marias female participant E, personal communication, May 14, 2009). The community’s former source of potable water was an uncovered well containing debris that was deliberately thrown in or was chemically contaminated by hazardous substances present in the groundwater.

In addition to improved water quality, respondents from both communities expressed a change in the distance necessary to travel to collect water. In order to meet daily family water needs, the women had to make multiple water collection trips. This increased the amount of time required for water collection and consequently reduced the time available for other household responsibilities. The original sources of water were used for all of the families’ water needs including consumption, cooking, bathing, irrigation and washing.

Since construction of the new well, the frequency of visits to the river has been reduced as the river is no longer used for consumption. This has been identified as an especially
significant change for those women whose homes are located at a greater distance from the river. Water from the original sources continues to be used in Santa Tereza for laundry, bathing and irrigation while the RCWP well water is solely used for consumption. In contrast, in Las Marias, the original well is used for laundry, bathing and irrigation only during the summer months (March – April). In the winter months, the community’s water source supplying the RCWP water system is able to provide sufficient water to meet all community water uses.

2. *The RCWP successfully provides project beneficiaries with sufficient potable water to meet daily consumption requirements. However, according to project beneficiaries it does not address all their project expectations.*

One of the objectives of the RCWP is to provide 20 L of potable water per day per person for consumption, which also includes cooking and oral hygiene (RCWP Project Coordinator, personal communication, May 16, 2009). The quantity is based on the daily minimum standard for potable water consumption for rural communities as determined by the Nicaraguan body responsible for aqueducts and sewage systems (Instituto Nicaragüense de Acueductors y Alcantarillados, 2009).

In general, the Santa Tereza and Las Marias research participants agree that the RCWP has met their primary expectation of the project by providing access to potable water, a fundamental need identified by respondents. The significance of having access to potable water is accurately captured by the statement: *water is life*, which was repeatedly mentioned during the focus groups and interviews. However, project participants expected the NGO to solve other water related issues such as the lack of water storage capacity in both communities and meeting summer water demand in Las Marias (i.e. using potable water for bathing and laundry). Both of these water uses are outside of the scope of the RCWP of using potable water solely for consumption.
3. *The RCWP is perceived to pose new challenges for project communities, which influences community satisfaction with the project and its sustainability. However, some of the challenges are due to an increase in demand and use of the water system beyond the system’s capacity and original intended use.*

**Perceived unaffordable water provision.**

Although the RCWP has provided access to potable water, community members have identified a new set of challenges associated with the project. Both communities share a primary concern about rationing the water supply. For Las Marias, it is with respect to meeting demand in the summer, and keeping the cost of water provision affordable in the case of Santa Tereza.

According to the Santa Tereza research participants, the community must ration its water supply year round because of the operating cost of its new water system. The system relies on gasoline fuel to draw water to the aboveground distribution tank (see Figure 3). Due to the relatively high prices of gasoline experienced in 2007 (RCWP Project Coordinator, personal communication, May 16, 2009), the community agreed to ration its potable water supply by dividing the community into two sectors with each sector collecting water every second day. This results in each sector using half the amount of fuel and consequently half of the amount of water the project is designed to provide. According to the Project Coordinator from Centro Humboldt (personal communication, May 16, 2009), project beneficiaries were made aware of the costs associated with a gasoline powered pump before they selected the system over the manual pump, the alternative option presented by the NGO.

Since the RCWP is not designed to subsidize the cost of gasoline as it is outside the scope of the project and fosters reliance on external aid (RCWP Project Coordinator, personal communication, May 16, 2009), the responsibility falls on the beneficiaries. In order to purchase the fuel, a monthly tariff of 40 Cordobas was established by the Potable Water and Sanitation Committee of Santa Tereza at the initiation of the project in 2006, which has since remained the
same. Any remaining funds are used to cover large repairs and replacements (e.g. motor replacement). The fund does not cover costs associated with maintenance of the twelve public water access points. In the event of a malfunction, personal funds must be used for the repairs.

In contrast, because Las Marias is located in a mountainous region that has several natural springs of water found at higher elevations, the RCWP system relies on gravity to distribute water from the groundwater spring to the access points. The level of complexity of this type of system is significantly less than that of Santa Tereza and has a significantly lower cost of maintenance, which is limited to minor repairs or replacement of pipes. As a result, the monthly quota necessary to sustain the project in Las Marias is only 7 Cordobas, five times less than that of Santa Tereza.

**Unequal water distribution due to physical environmental properties.**

In Santa Tereza, the physical characteristics of the local environment result in longer collection times and unequal collection quantities for some of the users. Specifically, access points located further away from the distribution tank or those located at a higher elevation than the tank receive water at a much slower rate. Participants stated that in certain cases this prevents some households from obtaining an equal amount of water as other beneficiaries. Furthermore, this has been found as one of the causes of tension in the community with respect to the new system. In Las Marias this was not found as an issue due to the local topography.

**Centralization of potable water access points.**

In both communities, female research participants identified an additional source of conflict relating to sharing the system’s water access points with multiple families. The number of public water access points (see Figure 4) provided by the RCWP reflects the number of
families that agreed to participate in the project during the initial consultation process led by Centro Humboldt. However, after project implementation the number of users has increased.

In Santa Tereza, the challenges associated with sharing access points were identified to be (a) longer water collection times as there are 3-4 families accessing each collection centre, with each household collecting up to 8 containers of water; (b) the maximum number of containers is not proportional to the number of household members; and (c) 10% of beneficiaries have installed private water taps with the permission of the CAPS, which has created a demand in the community. The ability of the households to afford private water taps in Santa Tereza was attributed to having employment opportunities in Somotillo providing higher income than subsistence farming.

Similarly, in Las Marias only three public water access points were installed to serve the 14 participating households, resulting in unequal water collection among beneficiaries and long waiting times. The project beneficiaries overcame the sharing issue by installing private access points for each participating household using personal funds (Las Marias CAPS representative A, personal communication, May 14, 2009). Interestingly, none of the beneficiaries have employment in Somotillo.

**Potable water system limitations.**

The distribution tank of the RCWP system in Santa Tereza is not considered to be sufficiently large enough for the number of households using the system. This was indicated as being a second reason for dividing the community into two sectors and alternating water collection days. Although the source of water is capable of producing enough water to fill an additional tank per day, as previously mentioned the community cannot afford to incur the larger cost associated with running the pump for a greater amount of time, as it would use additional
fuel. According to the Centro Humboldt RCWP Project Coordinator (personal communication, May 16, 2009), the system’s capacity reflects the number of individuals that initially accepted the project. The increase to the number of users occurred post-project implementation.

**Inconsistent water provision.**

The most common complaint received by Centro Humboldt from Las Marias and Santa Tereza relates to inconsistent provision of water by the CAPS member responsible for water distribution. In Santa Tereza the issue was due to inconsistent operating times of the distribution tank. A similar problem existed in Las Marias; however the community replaced the CAPS member with another beneficiary.

**Summary.**

Overall, the community of Santa Tereza identified a greater number of issues or challenges considered to be significant\(^2\) than Las Marias with respect to the Rural Community Water Project. A summary of the challenges is presented in Table 5 while key differences in the water administration and the RCWP water system are presented in Table 6.

---

\(^2\) After summarizing the challenges identified during the discussions and interviews, participants were asked to designate each issue or challenge as being “major” or “minor”.
Table 5.

*Major and Minor Challenges Associated with the RCWP as Identified by the Respondents.*

<table>
<thead>
<tr>
<th>Potable Water Challenge</th>
<th>Santa Tereza</th>
<th>Las Marias</th>
<th>Centro Humboldt*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing challenges:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Meeting demand in summer</td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>• Need for adequate water storage</td>
<td>-</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td><strong>New challenges:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• System capacity</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase in the number of informal beneficiaries</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>• Unequal distribution of water due to:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Physical environment</td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>o Inconsistent administration</td>
<td>-</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>• System efficiency</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Keeping cost of water provision affordable</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Decentralization of water supply</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Conflict due to levels of authority</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

- Indicates a minor challenge or issue. + Indicates a major challenge or issue. * The response from Centro Humboldt was not designated as a major or minor issue for confidentiality purposes due to the small number of participants.
Table 6.  

*Rural Community Water Project Characteristics and Administration in Santa Tereza and Las Marias.*

<table>
<thead>
<tr>
<th>Rural Community Water Project Characteristics</th>
<th>Santa Tereza</th>
<th>Las Marias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project implementation</td>
<td>2006</td>
<td>2003</td>
</tr>
<tr>
<td>Initial number of beneficiaries a</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Total number of beneficiaries</td>
<td>40</td>
<td>14 c</td>
</tr>
<tr>
<td>Total number of access points</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Total number of families in the community</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>Water system</td>
<td>Gravity dependent</td>
<td>Gravity dependent</td>
</tr>
<tr>
<td>Distribution tank filled by mechanical pump</td>
<td>6-8 containers</td>
<td>5 minutes (equivalent to 5 containers)</td>
</tr>
<tr>
<td>Water distribution</td>
<td>Gravity dependent</td>
<td>Gravity dependent</td>
</tr>
<tr>
<td>Quantity of water collected – summer</td>
<td>6-8 containers</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Quantity of water collected – winter</td>
<td>6-8 containers</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Water rationing b</td>
<td>Year round</td>
<td>Summer</td>
</tr>
<tr>
<td>Monthly quota</td>
<td>40 Cordobas</td>
<td>7 Cordobas</td>
</tr>
</tbody>
</table>

*a Beneficiaries are considered as individual households which may consist of a single family or including extended family members.  
b Water rationing refers to limiting RCWP potable water use to consumption.  
c The 14 beneficiaries were chosen based on degree of need (i.e. availability potable water and non-potable water, distance to any existing sources, etc.)

4. **Perceptions about the cause of these issues and the ability to resolve them vary in relation to stakeholder.**
With the Santa Tereza research participants, cost is the major influence in sustaining the project and in resolving other challenges such as system efficiency and distribution. For Las Marias research participants, cost is the primary limitation with respect to repairs and acquiring a water storage system. One participant identified lack of motivation on behalf of the beneficiaries as a constraint (Las Marias CAPS member B, personal communication, May 14, 2009).

In contrast, the Centro Humboldt representative believes that not adhering to the intended use and design of the RCWP, poor community organization and administration of the resource, and conflict between the CAPS and politically affiliated community members are the principle causes of the difficulties. Specifically, four explanations were provided:

- Not adhering to the intended use (i.e. consumption) of the potable water supply creates a perceived shortage.
- Issues associated with sharing public access points are due to the increase in system users.
- Communities do not follow the advice provided by the NGO with respect to organizing water administration. Specifically in the case of Santa Tereza, Centro Humboldt recommended that only a few water access points should be functioning at a time allowing access centres that receive water at a slower rate to collect an equal amount of water. Furthermore, the NGO recommended a tariff per individual user thus accounting for differences in household sizes (Centro Humboldt Project Coordinator, personal communication, May 16, 2009).
- Community members having political affiliations are appointed as community representatives with perceived authoritative powers. Occasionally, when these individuals attempt to direct decisions related to water and/or the RCWP, conflict
arises with the Potable Water and Sanitation Committees, which have been elected by the community to be in charge of its water needs.

5. **Receiving aid from NGOs creates a culture of dependence while reducing the community’s ability to resolve its own issues and become self-sustainable.**

Santa Tereza has a history of participating in projects led by local and international NGOs. Many of these projects involved the NGO enduring all project costs and manual labour requiring little to no participation or investment on behalf of the communities. The influence of NGOs is observed in Santa Tereza where two-thirds of the participants expressed the desire and preference to have an external institution or group subsidize the cost of gasoline and facilitate access to electricity via solar panels for the entire community.

Furthermore, NGO projects are occasionally unsuccessful and influence a community’s ease of accepting new projects as is also the case with Santa Tereza. The community was a beneficiary of a water system powered by a wind turbine that proved to be unsuccessful due to the region lacking the environmental conditions to power a wind turbine. As a result, only 12 out of the 40 households in Santa Tereza initially agreed to participate in the RCWP, despite having identified a critical need for potable water.

Las Marias has not had direct exposure to NGO projects; however CAPS members indicated that the community was aware of NGO programs in the region. Furthermore, the CAPS representatives stated that this exposure has somewhat hindered the community’s motivation in the RCWP project. The following issues were identified:

- Community-led improvements to the project could be made, however no action has been taken due to lack of motivation and presence or encouragement of an external body.
• Some NGOs do not consistently follow a participatory approach, which reduces opportunities for communities to play an active role in project design and thereby reducing capacity and sense of ownership (i.e. projects or services are simply donated with no long-term community investment).

• Continuous donations by NGOs results in a lack of project appreciation. As a result, an attitude develops that since the community “now has water, [the water] will always be there” (Las Marias CAPS member A, personal communication, May 14, 2009).

• NGOs provide insufficient capacity building, which encourages communities to wait for a “rescue” (Las Marias CAPS member A, personal communication, May 14, 2009) from an NGO.

• Regular follow-up visits by NGOs to their respective projects are considered as the most significant motivating factor for improving the community’s circumstances and ensuring attendance at community project-related meetings.

The RCWP Project Coordinator confirmed that the region surrounding Somotillo has had a significant amount of exposure to various local and international NGO projects, including its own water projects (personal communication, May 16, 2009). However, Centro Humboldt’s model differs by building community capacity to ensure sustainability of the project with little to no external aid, and by attempting to adhere to a regular monitoring schedule. Capacity building is accomplished through workshops and by having the beneficiaries provide manual labour during the implementation phase of the project, which enables the community to learn the skills and knowledge necessary to address any future problems related to the water system (RCWP Project Coordinator, personal communication, May 16, 2009).

6. *The RCWP consultation process does not adequately take into consideration (a) the community level of knowledge and familiarity with different types of water management*
systems, (b) influence of emotions with respect to potable water on acceptance of the project.

In Santa Tereza, the male research participants consider the consultation process to be adequate. On the other hand, female focus group participants considered the consultation process to provide insufficient information on the advantages and disadvantages of the proposed water system, and on alternative water management systems. According to the Centro Humboldt representative (personal communication, May 16, 2009), the head of the household, which is typically the father of the household, attend the initial project implementation and consultation meetings. Interestingly, the female focus group stated that since the project began in their community they have become aware of other potable water systems such as those powered by solar panels, which are perceived as being less costly because they would be donated by an institution or an NGO and do not require gasoline. Furthermore, the participants believe that solar panels could also be used to bring electricity to the community, a second fundamental need identified by the community. Additionally, the Santa Tereza female respondents stated that because of the high emotions related to obtaining a potable water system there were no objections or questions for Centro Humboldt.

In contrast, all research participants in Las Marias deemed the consultation process to be adequate and they were not aware of any other systems that could be used in their community. According to the Centro Humboldt representative (personal communication, May 16, 2009), during the consultation process, different options are presented to beneficiaries with a discussion on the advantages and disadvantages of each option before obtaining approval from the community to proceed.
7. *Community priorities influence the success of water management projects.*

According to the RCWP Project Coordinator (personal communication, May 16, 2009), communities located on the urban periphery rank their priorities in the following order (a) electricity, (b) water, and (c) roads. On the other hand, for remote communities the order consists of (a) water, (b) roads, and (c) electricity. This order is consistent with those mentioned by research participants.

In Santa Tereza the topic of electricity and light was raised numerous times within different contexts. The first being that if the community had electricity, each household would have light and the ability to use electronics and appliances; the second need for electricity involves using it to power the water system in place of using gasoline, which is perceived to be more economical and would provide an unlimited potable water supply that could also be used to irrigate crops as observed by the respondents in Somotillo.

Interestingly, when asked if the participants consider the lifestyle of the nearby urban dwellers to be better than theirs, they unanimously agree that they are better off for the following reasons: (a) Somotillo experiences frequent and long power outages which affects water administration since the municipality relies on electricity to distribute potable water, (b) there is a severe shortage of water during the summer months due to mismanagement of the aquifer by the municipality, and (c) residents must purchase water at high prices from private suppliers during water shortages.

In Las Marias, access to potable water was seen as the most important need with the other priorities ranked as less significant and not considered as fundamental needs. The participants also agree to being in a better situation than those living in urban centres because Las Marias has an ongoing supply of potable water for consumption.
8. Although the RCWP attempts to gender balance the decision-making process and project administration by ensuring that Potable Water and Sanitation Committee composition has a minimum of 50% females, in some cases women are still not fully engaged in the complete lifecycle of the project.

The initial consultation sessions are intended to be attended by the head of the household, although female project beneficiaries are encouraged to attend. Subsequent project monitoring meetings are expected to be attended by all project participants (RCWP Project Coordinator, personal communication, May 16, 2009). However, in some communities such as Santa Tereza it appears that females have a smaller rate of participation than in Las Marias. According to one female focus group participant from Santa Tereza (personal communication, May 19, 2009), the women did not participate in the meetings because they do not “value their own opinions and because a lot of the time they rely on the excuse of having to tend to their responsibilities at home” (Santa Tereza female focus group participant B, personal communication, May 19, 2009). The consequence of their absence is inadequate water provision and an inconvenient location of public access points. A similar opinion was shared with respect to a manual pump installed in Santa Tereza by a different NGO several years prior to the RCWP, where the design of the pump was such that women encountered difficulties operating the pump due to its size.

In Las Marias, attendance by females is consistently higher than by males, but according to the female focus group the main reason for this is that in two-parent households the head of the household is typically away working in either a different part of the country or in one of the neighbouring countries. As a result, some women feel they are obligated to attend.
Chapter 5: Discussion

The purpose of this section is to interpret the findings from the information gathering phase and to use the interpretations as the basis for the recommendations presented in Chapter 4. This section is organized within the context of the study objectives for this thesis, supported by literature, and focuses on the researcher’s comprehension of the conditions that play a role in determining the success of the Rural Community Water Project.

Interpretation of the Rural Community Water Project

1. **Proximity to urban economies influences the nature of communities, including their priorities of needs, water governance and their expectations or perceptions of the Rural Community Water Project.**

   Proximity to urban centres has been shown as one factor influencing culture, population density, level of education and economic activities, with the degree of influence varying depending on proximity of rural communities (Ghelfi and Parker, 2001). Modernization in the form of improvement in health, education, standard of living, economic development and communication has been observed in rural communities with respect to community cultures in peri-urban settlements, while it has been less noticeable in more remote regions (Duncan, 1956; Ghelfi and Parker, 2001). Through the analysis of the water issues and management faced by communities participating in the RCWP, several key themes have emerged with respect to the role of proximity to urban centres:

- **Geographic context creates differences in income between communities.** According to Ghelfi and Parker (2001), urban centers play a role in regional economic activity. The authors suggest that access to larger economies provide opportunities for smaller economies to connect to national and international marketplaces. Furthermore, communities located in the urban periphery have an income advantage over remote communities. (Ghelfi and Parker,
This phenomenon was observed in Santa Tereza and Las Marias. Specifically, as mentioned by research participants, some of the Santa Tereza families obtain all or part of their income from Somotillo, whereas Las Marias, which is not considered to be part of Somotillo’s urban influence, does not rely on employment opportunities in Somotillo for income generation. Furthermore, the ability of certain Santa Tereza families to purchase and install private water access points was attributed to having employment opportunities in Somotillo.

- **Urban influence shapes community infrastructure priorities.** As indicated in the results section, water was identified as a second priority for Santa Tereza with light or electricity being the first. Meanwhile water was considered as the most important priority for Las Marias. In Santa Tereza, the topic of electricity and solar panels was raised numerous times during both focus group discussions and in the interview with the Potable Water and Sanitation Committee. One male focus group participant explained that the reason for wishing to have electricity is because “their costs would be the same [as with the gasoline-powered pump] but [they] would have permanent water and could do everything [in the vicinity of their homes] without having to go to the river” (male focus group participant A, personal communication, May 13, 2009).

  Electricity is considered to be the answer to all of the community’s current problems, including the perceived inability to afford the cost of gasoline, the need to ration the potable water supply, and the inability to have electronics and appliances available to residents of Somotillo. This poses a challenge to the RCWP because its primary objective is to solve the fundamental need of having access to potable water for consumption. However, electricity appears to be preferred over simply having access to potable water.
In Santa Tereza this issue is further magnified by the fact that one of the households purchased a solar panel to power its television and stereo equipment, the only amenities of their kind in the community, which appears to provide the family a higher status in the community. It is considered to be valuable in providing opportunities for socializing and a glimpse of life beyond the region and the country (Santa Tereza female research participant A, personal communication, May 19, 2009).

Furthermore, issues arising from the inability to use potable water for additional uses such as irrigation, livestock, bathing and laundry are perceived as an inadequacy of the RCWP when compared to the potable water uses in Somotillo. It is evident that Santa Tereza has the capacity to afford water provision using the system implemented by the RCWP, however due to its proximity to an urban economy, there are competing priorities. In contrast, in Las Marias, where priority lies in potable water and there is minimal urban influence, the project has achieved a greater level of success.

- **Proximity to urban centers affects rural water governance.** Residing within the urban influence can increase rural exposure to political parties, establish relationships with authorities, and has the potential to influence an individual’s position within a community based on his/her urban contacts (Duncan, 1956). As mentioned by the RCWP Project Coordinator (personal communication, May 16, 2009), there is a power struggle in Santa Tereza between individuals having political affiliations and the Potable Water and Sanitation Committee. According to Duncan (1956), in rural areas, community members having urban contacts, especially with those involved in administration or political parties, hold a strategic position.
In order to address the conflict, the Potable Water and Sanitation Committees must be provided with the necessary tools that would allow them to administer potable water. A consensus regarding the CAPS’s responsibility for water administration at the community and municipal levels is also necessary. “Every component of [a governance] system must be fully engaged and must function effectively for the whole to succeed” (Doppelt, 2003, p.233).

- **Urban influence facilitates exposure to NGO projects.** Since urban economies serve as centers of information, communication and trade (Ghelfi and Parker, 2001), being under the urban influence facilitates faster and more comprehensive information exchange than with those communities outside of the urban periphery. Somotillo is used as a base for many NGOs working in the region, and as a result varying degrees of knowledge of different projects and associated technologies is widespread in adjacent settlements such as Santa Tereza. The community is familiar with projects conducted in the region by different NGOs, specifically with respect to solar panels. Consequently, satisfaction with the RCWP has been negatively affected as it is considered by some participants to be simple and inadequate in comparison.

  Additionally, limited knowledge on the potential output of solar panels or other technologies present in the region combined with urban proximity can influence some community expectations with respect to the use of potable water beyond consumption, as observed in Somotillo. Furthermore, as stated in the results section, exposure to NGOs can discourage self-sufficiency.

- **Proximity to urban environments is not effectively accounted for in the RCWP.** Although the RCWP operates in rural communities sharing similar basic cultural values
while facing similar economic and natural resource issues, the affect of urban influence on local values is not adequately incorporated into capacity building, education and consultation process of the project. This is necessary in order to ensure realistic community expectations of the project, and to enrich any existing community knowledge of alternative water management plans and technologies, which can help facilitate project sustainability. Lack of attention to urban influence may be one of the root causes of a lower level of satisfaction with the project in Santa Tereza than in Las Marias. This stems from the number of identified challenges arising from participating in the project, preference for alternative systems, as well as the overall satisfaction with the consultation process. It is clear that urban influence plays a role in shaping the local culture as observed in Rural Community Water Project communities and therefore, it needs to be better incorporated into the project model.

2. *The Rural Community Water Project requires stronger communication with project communities, consistent monitoring and a strong governance system engaging all community members including women.*

Following regular and structured monitoring visits and ensuring ongoing communication with communities would improve the sustainability of the Rural Community Water Project. This would encourage full participation and consistent attendance by the RCWP water system users and would strengthen the NGO’s image and perceived commitment to the project. From the findings of this study, it appears that there is a lack of consistent participation by women in the full lifecycle of the project. Although the RCWP ensures the Potable Water and Sanitation Committees are gender balanced, this does not appear to be sufficient in engaging women consistently among all communities. According to Black (1998), women are more likely than men to be motivated in doing whatever is necessary to acquire and maintain a reliable water supply. Therefore, given that women manage the collection and household use of water (Black,
measures for increasing engagement of women may need to be further developed in the project. This is especially important for communities such as Santa Tereza where both parents, including the head of the household of most families are consistently present for the majority of the time.

3. To address the water challenges and influence of urban proximity on the nature of RCWP communities, the project framework should be flexible and reflect different community values.

The information captured from the focus group discussions and interviews with the CAPSs and the nongovernmental organization provides a foundation for establishing a framework that can accommodate the subtle, but nonetheless significant cultural differences. Community values should be reflected in the framework of the project by involving community members in the development of the community specific framework. Although the additional desired potable water uses of Santa Tereza are not generally considered as basic needs, community expectations and perceptions need to be addressed nevertheless.

4. Proximity to urban economies is not the only factor affecting the success of the RCWP; additional socio-political factors influence perceptions of rural water management systems.

In addition to urban proximity, other factors such as lack of consistent regional governance and coordination of, and among, various organizations appear to influence beneficiaries’ perceptions of a project.

- **Limited municipal regulation of NGO projects.** The lack of consistency and municipal capacity to oversee and coordinate rural efforts in Somotillo influences community perceptions of rural water management and the effectiveness of NGO led initiatives in the region. As indicated by the RCWP Project Coordinator (personal communication, May 16, 2009), presently there is no regulatory requirement for organizations to consult with municipal authorities on the characteristics of the proposed project area or the project
feasibility. This has resulted in some projects failing to achieve success or completion, like the wind turbine project mentioned in the results section, which has negatively affected trust in non-profit efforts and acceptance of future projects.

Although, communities are not solely responsible for being hesitant in accepting new projects, NGOs need to provide greater flexibility. In Centro Humboldt’s case, the organization does not expand the capacity of the RCWP water systems, even if beneficiaries request it based on an increase in users. Requests are denied as they are considered to be outside of the project’s scope and are believed to prevent communities from trying to help themselves. As a result, the size of the system capacity (i.e. distribution tanks) is only meant to accommodate for a 3.12% population growth over a 20 year period (RCWP Project Coordinator, personal communication, May 16, 2009). The figure is based on the urban population growth estimates for Nicaragua for the period 2000 – 2005, which is three times greater than the estimated rural population growth rate of 1.04%. Population growth estimates beyond 2005 follow a steady decline (United Nations Human Settlements Programme [UN-HABITAT], 1999). Although the growth figure applied in the RCWP model is an overestimation as it represents urban growth, it does not appear to account for the increase in system users due to natural population growth and informal users joining the project after the system has been designed and implemented. Therefore, applying the 3.12% growth increase in the RCWP model may be more appropriate for communities having 100% project acceptance from the onset of the project, as the RCWP water system capacity would then be reflective of the expected natural population growth with some additional room for growth due to other factors, such as immigration. As a result, the consultation processes should account for some degree of hesitation associated with project acceptance at the onset
of the project. The consultation process should also take special consideration for those communities for which a history of NGO involvement is known.

- **Lack of coordination among organizations.** In Nicaragua, NGO efforts have been commonly characterized as being undefined, following an uncoordinated work strategy. Although there is an existing legal framework governing nongovernmental organizations such as law 147, general law of non-profit legal entities (ley no. 147 ley general sobre personas jurídicas sin fines de lucro, 1992), which oversees their constitutions and functions, there are no accompanying regulations prescribing administrative procedures (International Center for Non-for-Profit Law, 2009).

  Absence of formal coordination among institutions can create an inconsistency in terms of which communities benefit from external aid. Furthermore, it can generate inefficient project implementation when multiple NGOs with similar objectives (e.g. potable water provision) attempt to work in the same communities.
Chapter 6: Recommendations

The previous chapter described and interpreted how the nature of communities influences the Rural Community Water Project, and which factors play a role in shaping community characteristics. From this, the question arises of how these factors can be incorporated into the RCWP to enable it to progress towards a more sustainable, encompassing project. This chapter recommends an increase in project flexibility to accommodate individual community properties, and the factors influencing those properties. Furthermore, it is recommended that a more comprehensive consultation process is conducted, which acknowledges existing community knowledge and one in which women play a consistent active role. Coordination among NGOs and municipal authorities is also strongly encouraged. The results will contribute to improving community satisfaction with the Rural Community Water Project and strengthen the project model.

In order to effectively account for the factors shaping the nature of a community, such as urban proximity, nongovernmental organizations can consider taking some of the following measures:

1. During the initial project investigation phase and consultation process, an inquiry of the community’s knowledge on alternative types of potable water systems and technologies should be conducted. Following this, a thorough discussion can take place to enhance existing community knowledge and provide a better context for the proposed water system. This would enable the organization to predict some of the concerns that may arise from the community with respect to proposed water systems, and would allow it to tailor future consultations to suit individual communities. Furthermore, communities would be in a position to make better informed decisions. As supported by Brennan et al. (2009), every
community is entitled to make informed choices about what it considers as “beneficial or threatening” (p. 99). The authors further emphasize that the “ability of communities to act is vital to the success of development goals” (p. 99).

2. Increased flexibility in the project framework could substantially help in accommodating community specific characteristics. This can be accomplished by undergoing a more comprehensive consultation process that provides prospective beneficiaries with an opportunity to voice concerns regarding their needs, including those not considered as basic needs or those beyond the scope of the project. Additionally, capacity building workshops could include an education component addressing the following themes (a) value of potable water, (b) the state of water resources, (c) appropriate uses of potable water versus non-potable water and reasons for the differences, (d) address health concerns related to continuing the use of non-potable water for purposes other than consumption, and (e) community water governance to address potential power struggles (e.g. power differentials experienced between the Potable Water and Sanitation Committees and individuals with political affiliations).

3. Overcoming the issue of unwillingness to pay for water by the community can be addressed by establishing demand (Black, 1998) before a community specific project is implemented. This can be accomplished by presenting specific advantages of having access to potable water and examples of project success stories. It is also equally important that some of the potential disadvantages or challenges arising from participating in the project are presented in combination with the ways in which these challenges can be avoided or mitigated. By creating a demand, organizations such as Centro Humboldt can avoid having to rely on the assumption that communities will eventually accept the project following persuasion.
Meanwhile, with an increase in the number of project beneficiaries during the initial phases of project implementation, the number of informal water system users would be expected to be reduced.

4. Because women govern the collection and use of water, potable water provision projects need to ensure that women are actively and consistently engaged in all stages of the project lifecycle from initial water source studies to administration and governance. This may require greater attention than anticipated. The opinion of women with respect to water administration is invaluable in ensuring water management projects meet their needs. For example, the structural design of the water system must consider changes it may impose on the way in which water is drawn similar to those described by Dube (1956) and presented in the Literature Review section of this thesis. Women also have the greatest knowledge of community water requirements and the value placed on water in comparison to other community preferences such as electricity, as observed in Santa Tereza.

In order to improve the role of women in the Rural Community Water Project, additional responsibilities can be assigned to female beneficiaries that are not already members of the CAPS. Responsibilities do not have to be limited to soft skills but can include technical skills taught to the men during the workshops. Black (1998) sites several examples of African and Asian rural potable water projects where community involvement in supply management was based on training “hand pump caretakers” (p. 30), typically women who were given some level of engineering-related status. In one project women were appointed as treasurers and collected water levies. In five years, 70% of the 125 communities participating in the project had opened bank accounts. Therefore, enhancing the role of
women in community management of the RCWP could improve their involvement in the project and could improve the sustainability of the project.

5. Monitoring and communication between existing project communities and the organization could be better facilitated by allocating an NGO employed individual or technician dedicated to liaise between the organization and project beneficiaries. This is especially important for projects such as the Rural Community Water Project, which as of 2009 already had 78 participating communities scattered across a large area of country. The individual would need to fit the following criteria:

   a. Have a sound understanding of the project, its scope and mandate.

   b. Be familiar with the project implementation process of each community, including the different water systems available to them and the rationale for implementing the selected systems.

   c. Understand community dynamics, including demographics and cultural values. A national of the project country is preferred.

   d. Be familiar with activities of other nongovernmental organizations and municipal programs related to potable water operating in the region of the project communities.

   Furthermore, the individual would actively participate in the project implementation process and be in charge of monitoring and follow-up meetings. These have been identified as key factors in keeping the community motivated in the project and in encouraging self-dependence, by having access to technical advice and expertise.

   However, continuous reliance on NGO presence as a source of motivation is not sustainable. Therefore, a monitoring schedule could consist of bi-monthly monitoring visits
for the first two years of the project, followed by a decrease in the number of visits to two per year in the third year with the final phase consisting of annual visits. Although visits would be reduced, communities would still have access to technical support as needed. The purpose of annual visits would be less focused on monitoring and more focused on evaluating the sustainability of the project and maintaining relationships with communities.

6. A clear need has been identified for improved coordination between nongovernmental organizations working within the same regions. Although it would require significant coordination and effort, the issue could be addressed by either greater regulation of regional NGO activities requiring organizations to report their activities to regional or municipal authorities, or by developing a network of NGOs, which would facilitate communication and information sharing.
Chapter 7: Conclusion

The purpose of this research was to explore how local culture influences rural community potable water development and the role of factors such as urban proximity in rural development. Specifically, the three primary objectives of this study were to (a) summarize the opinions of the Rural Community Water Project beneficiaries and which factors are responsible for the success and challenges of the project, (b) determine the role of urban influence in community culture and project success, and (c) to document the RCWP framework and include recommendations resulting from this study which can be applied to the future direction of the project or to other potable water provision projects. This chapter presents the main conclusions arising from the study, discusses its success using the predetermined criteria outlined in Chapter 3 and its wider application to rural water management projects in developing countries.

In the face of seasonal drought conditions, needed infrastructure, economic vulnerability, and climate change, the importance of comprehensive sustainable water management led by nongovernmental organizations such as Centro Humboldt is all the more critical. In spite of a lack of sound national direction, policies and support related to water administration in Nicaragua, the Rural Community Water Project has played an essential role in providing rural communities access to potable water. It is a strong example of the power of community water management, and the importance of the role of nongovernmental organizations in water provision in circumstances of weak government regulation and administration. Black (1998) argues that because community water management requires immense effort and time to develop successful water provision schemes, NGOs may be the most appropriate medium for accomplishing the task.
This thesis recommends incorporation of urban influence into the framework of potable water provision projects such as the Rural Community Water Project in order to better acknowledge differing community values influenced by their proximity to urban centers. A comprehensive consultation process, strong capacity building, flexibility in the implementation phase, greater engagement of women and consistent monitoring will provide a means of including values and perspectives of communities while ensuring project longevity. Strengthening these aspects will encourage the motivation required to sustain the project and the confidence required to become self-sufficient.

Several elements of this research are applicable to other rural water development projects in Nicaragua, and internationally, that are working towards not only potable water provision, but also towards more sustainable water management. First, the objectives and model of Centro Humboldt’s Rural Community Water Project is a strong framework to use as a foundation for similar projects. With the number of efforts underway to improve potable water accessibility in the developing world, projects with a history of experience such as the RCWP are essential to improving the state of global potable water availability. Second, understanding how additional factors such as urban proximity and exposure to non-for profit organizations affect community culture will encourage project development to have greater flexibility to cater to community needs based on their geographic location and expectations of external aid. Lastly, this research has identified possible options to address the water challenges faced by Santa Tereza and Las Marias.

In Chapter 3, three criteria were identified to help determine the success of this research study. In applying these criteria, the case study achieved access to all key sources of evidence, including pertinent documents and participants, and met the research objectives identified in
Chapter 3. As for the usefulness of the findings and recommendations presented in this thesis, it depends on the degree to which they are incorporated into the future direction of the Rural Community Water Project.
References


Appendix A: Interview Guides

Female Focus Group

INTRODUCTION (5 minutes)

- Introduce myself and explain that this research is for my thesis.
- Roundtable of first names
- Thank participants for their time and attendance
- Explain why you are here
  - To learn more about how the project is working in the communities, its strengths and weakness. To learn about your opinions and views about the project and how it can be improved.
- Review objective of the study: to determine how community-specific characteristics influence water management plans. As well as to gain an insight on the community’s experience with respect to the Rural Community Water Project.
- Review confidentiality and make sure everyone is comfortable
- Review letter of consent form and ask for signatures
- Set the atmosphere by explaining that there are no wrong answers, everyone should feel free to share their points of view regardless of what others have shared. Ask for any questions.

WARM-UP QUESTIONS (20 minutes)

1. Before construction of the RCWP well, what was your primary source of water?
2. How long did it take to reach the source?
3. What was the frequency of water collection?

TRANSITION QUESTION (5 minutes)

4. Before the RCWP well was built, what were the primary uses of the water you collected? (e.g. consumption, cooking, personal hygiene, livestock, irrigation, etc.)

KEY DISCUSSION QUESTIONS (30 minutes)

5. Before your community began participating in the water project, what were your expectations of the project? Were they met? If yes, how so? If no, why not?
6. What kind of consultation process was conducted by the NGO for determining an appropriate water system for your community? Did you all participate? Do you feel it was adequate?

7. How do you feel about the monthly quota required to maintain the well? How was it determined? Is it affordable? Is it collected regularly?

8. How has your water usage changed after the well was constructed?

9. Do you continue to collect water from the old source in addition to that collected from the RCWP well? If so why?

10. If you had the opportunity to use the well water for additional uses that you are not able to now, what would those be? Why is it not possible now?

COMMUNITY DEMOGRAPHICS (5 minutes)

11. Did you all go to school? If so, up to which grade?

12. Have you all visited Somotillo?

CONCLUDING QUESTION AND WRAP-UP (10 minutes)

13. In your opinion, what can be done to improve the project in meeting your water needs?

Thank you for your participation.
Male Focus Group

INTRODUCTION (5 minutes)

- Introduce myself and explain that this research is for my thesis.
- Roundtable of first names
- Thank participants for their time and attendance
- Explain why you are here
  - To learn more about how the project is working in the communities, its strengths and weakness. To learn about your opinions and views about the project and how it can be improved.
- Review objective of the study: to determine how community-specific characteristics influence water management plans. As well as to gain an insight on the community’s experience with respect to the Rural Community Water Project.
- Review confidentiality and make sure everyone is comfortable
- Review letter of consent form and ask for signatures
- Set the atmosphere by explaining that there are no wrong answers, everyone should feel free to share their points of view regardless of what others have shared. Ask for any questions.

WARM-UP QUESTIONS (20 minutes)

1. Before construction of the RCWP well, what was your primary source of water?
2. How long did it take to reach the source?

TRANSITION QUESTIONS (5 minutes)

3. Before the RCWP well was built, what were the primary uses of the water you collected? (e.g. consumption, cooking, personal hygiene, livestock, irrigation, etc.)

KEY DISCUSSION QUESTIONS (33 minutes)

4. Before your community began participating in the water project, what were your expectations of the project? Were they met? If yes, how so? If no, why not?
5. What kind of consultation process was conducted by the NGO for determining an appropriate water system for your community? Did you all participate? Do you feel it was adequate?
5. How do you feel about the monthly quota required to maintain the well? How was it determined? Is it affordable? Is it collected regularly?
6. After the well was constructed has your household been able to use the water for additional uses beyond those possible prior to having the well? If no, what additional uses would you require the water for?

7. Do you continue to be reliant on the old water source? If so, why?

8. If you had the opportunity to use the well water for additional uses that you are not able to now, what would those be? Why is it not possible now?

COMMUNITY DEMOGRAPHICS (5 minutes)

8. Did you all go to school? If so, up to which grade?

9. What kind of work do you do? Location? (Within the community e.g. farming, or in Somotillo).

10. Has your wife or family visited the city?

CONCLUDING QUESTION AND WRAP-UP (10 minutes)

13. In your opinion, what can be done to improve the project in meeting your water needs?

Thank you for your participation.
Interview – Potable Water and Sanitation Committees

INTRODUCTION (5 minutes)

- Introduce myself and explain that this research is for my thesis.
- Roundtable of first names
- Thank participants for their time and attendance
- Explain why you are here
  - To learn more about how the project is working in the communities, its strengths and weakness. To learn about your opinions and views about the project and how it can be improved.
- Review objective of the study: to determine how community-specific characteristics influence water management plans. As well as to gain an insight on the community’s experience with respect to the Rural Community Water Project.
- Review confidentiality and make sure everyone is comfortable
- Review letter of consent form and ask for signatures
- Set the atmosphere by explaining that there are no wrong answers, everyone should feel free to share their points of view regardless of what others have shared. Ask for any questions.

WARM-UP QUESTIONS (5 minutes)

1. Before construction of the RCWP well, what was your primary source of water?
2. What are the primary uses of the RCWP well (consumption, cooking, etc.)?

KEY QUESTIONS

3. Did the RCWP meet your expectations? How so? If not, can you elaborate?
4. Do you believe the rest of the community members are satisfied?
5. What kind of consultation process was conducted by the NGO for determining an appropriate water system for your community? Did everyone participate? Do you feel it was adequate?
6. Do you believe the water system implemented by the Centro Humboldt is appropriate?
7. What is the monthly quota? How was it determined? Overall, do you think the community agrees with the fee?
8. Do most members pay their monthly quota?
9. What are some of the most common complaints you receive regarding the RCWP well?

CONCLUDING QUESTION AND WRAP-UP

10. In your opinion, what can be done to improve the project in meeting your water needs?

Thank you for your participation.
Interview – Centro Humboldt, Rural Community Water Project Coordinator

INTRODUCTION (5 minutes)

- Thank participant for his time and attendance

- Explain why you are here
  - To learn more about how the project is working in the communities, its strengths and weakness. To learn about your opinions and views about the project and how it can be improved.

- Review objective of the study: to determine how community-specific characteristics influence water management plans. As well as to gain an insight on the community’s experience with respect to the Rural Community Water Project.

- Review confidentiality and make sure the respondent is comfortable

- Review letter of consent form and ask for signature

- Set the atmosphere by explaining that there are no wrong answers, he should feel free to share their points of view regardless of what others have shared. Ask for any questions.

QUESTIONS (60 minutes)

1. What factors (e.g. socioeconomic, environmental, and cultural) did Centro Humboldt take into consideration when deciding what type of water system was most appropriate for each community?

2. Were the communities consulted in the decision making process? What was the level of participation (e.g. most, half, few)?

3. What were the community’s major concerns prior to the project implementation? How were those concerns addressed?

4. What information have you received from the communities regarding their level of satisfaction with the wells? (Positive and negative). What are some of the primary complaints?

6. Are there follow up sessions and evaluations conducted by Centro Humboldt? If so, what are the results? (Successes, challenges, causes, etc.)

7. What other factors do you believe influence the success of the project between different communities? (E.g. distance to urban economies, level of education, etc.)

8. Do you think differences in community culture have an influence on their expectations and the outcome of the project? If yes, how so and how can these differences be integrated into project design?
9. In your opinion, what do you think could be done differently to improve the project?

Thank you for your participation.
Appendix B: Research Consent Form

(Note: due to Royal Roads University’s confidentiality policies, all contact information has been removed from the sample letter.)

My name is Mirey Lopez, and this research project is part of the requirement for a Master’s of Arts degree at Royal Roads University. My credentials with Royal Roads University can be established by contacting the program director.

This document constitutes an agreement to participate in my research project, the objective of which to investigate how the proximity to urban economies influences rural water management.

The research will consist of focus groups and interviews, and is foreseen to last approximately 1 hour on average. The foreseen questions will refer to water usage prior to participation in the Rural Community Water Project, expectations of the water project and overall satisfaction with the project. In addition to submitting my final report to Royal Roads University in partial fulfillment for a Master’s of Arts degree in Environment and Management, I will also be sharing my research findings with Dr. Chris Ling, Centro Humboldt and the Change for Children Association. The research data may be used to publish journal articles and other material accessible to the general public.

Information will be recorded in hand-written format or recorded using a digital audio recorder and, where appropriate, summarized, in anonymous format, in the body of the final report. At no time will any specific comments be attributed to any individual unless specific agreement has been obtained beforehand. All documentation will be kept strictly confidential.

A copy of the final report will be published. A copy will be housed at Royal Roads University, available online through UMI/Proquest and the Theses Canada portal and will be publicly accessible. Access and distribution will be unrestricted.

As the researcher is on the Board of Directors of the Change for Children Association, information gathered in this research process will not be used in influencing current initiatives or cooperation between research participants, Centro Humboldt or the Change for Children Association. However, depending on the analysis of the results obtained from this research, the researcher, Centro Humboldt and Change for Children Association reserve the right to take these results into consideration when developing future strategies for improving rural water management.

You are not compelled to participate in this research project. If you do choose to participate, you are free to withdraw at any time without prejudice. Similarly, if you choose not to participate in this research project, this information will also be maintained in confidence.
By signing this letter, you give free and informed consent to participate in this project.

Name: (Please Print): __________________________________________________

Signed: ______________________________________________________________

Date: _________________________________________________________________
Figure 1. A Map for the Study Area in Nicaragua.

(Adapted from CIA, 2009).
Figure 2. A Location Map for Santa Tereza and Las Marias, Nicaragua.

(Adapted from CIA, 2009).
Figure 3. Santa Tereza Potable Water Distribution Tank
Figure 4. An Example of a Public Water Access Point in Las Marias.