

# Empowering Development? Assessing the Impact of NGO-NGO-Community Partnerships on Capacity Development



Arielle Tozier de la Poterie  
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**Universiteit Utrecht**

Arielle Tozier de la Poterie (3427153)

*Email:* [tozierdelapoterie@gmail.com](mailto:tozierdelapoterie@gmail.com)

*Address:* 3245 Bryant St.  
Denver, CO 80211  
USA

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*Supervisor:* dr. Frank van Laerhoven, Utrecht University

*Second Reader:* dr. Hens Runhaar, Utrecht University

*NGO Contacts:* Jason Selwitz, Green Empowerment, and Jaime Muñoz,  
Asociación Fénix

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## Abstract

*Despite the proliferation of partnerships for sustainable development, relatively little is known about their effectiveness or about the impact they have on the communities they serve. This study focused on the impact of a partnership between two NGOs that partner to deliver water and electricity to poor, rural communities in Nicaragua: Green Empowerment, in the United States, and AsoFénix, in Nicaragua. Through their collaboration, these two organizations attempt to develop and increase capacities at each NGO and to build capacity in local communities so that they are able to independently manage the infrastructure provided by the Partnership. Criteria for determination of impact were identified in the Partnership's policy theory and in literature on capacity building, partnership, and community management of natural resources. The Partnership's impact on the individual, organizational, and network levels of capacity was evaluated separately for the two NGOs and for four case study communities. In accordance with important aspects of partnerships identified in the literature, this study also evaluated the impact of the Partnership resulting from exploitation of comparative advantage and the impact of the Partnership on independence at AsoFénix.*

*Results indicate that the Partnership has had a high degree of impact on capacity building at the individual and network levels of NGO capacity by increasing access to funds, promoting the exchange of technical knowledge, and increasing network ties. The Partnership has also provided gains in efficiency related to community organizing and communication with certain donors and manufacturers. The Partnership was not found to have had significant impact on organizational capacities or the enabling environment. By providing initial financing and technical support but allowing AsoFénix to expand and develop financial, technical, and network ties beyond the Partnership, the Partnership has avoided creating dependence, which was identified as a risk in the partnership literature.*

*Comparison of the four case study communities revealed that the Partnership's impact on community capacity to manage projects independently has been low. Despite the existence of new rules and committees dedicated to management of the systems, the communities have limited financial and technical resources, weak monitoring and accountability systems, and little ability to manage conflict. As a result, the communities remain dependent upon AsoFénix for on-going support. The implications of these findings, including suggestions for future research and preliminary policy recommendations, are discussed in the conclusion and appendices.*

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Arielle Tozier de la Poterie  
Denver, Colorado

## Table of Contents

<i>i. List of tables</i>	<i>11</i>
<i>ii. List of Figures</i>	<i>12</i>
<i>iii. List of Abbreviations</i>	<i>13</i>
<b>Chapter 1: Introduction</b>	<b>14</b>
1.1 Research Objective & Questions	14
1.2 Scientific Relevance	15
1.3 Social Relevance	15
1.4 Research Outline	16
<b>Chapter 2: Contextual Background</b>	<b>17</b>
2.1 The Region: Boaco Nicaragua	17
2.2 Health Impacts of Water & Electricity	18
2.3 Reconstructed Partnership Policy Theory: Knowledge Sharing & Capacity Development	19
<b>Chapter 3: Materials &amp; Methods</b>	<b>22</b>
3.1 Research Framework	22
3.2 Case Study Method	22
3.3 Research Design: Modified Pre-post Assessment	23
<i>3.3.1 Pre-intervention Stage</i>	<i>23</i>
<i>3.3.2 Intervention Stage</i>	<i>24</i>
<i>3.3.3 Post-intervention Stage</i>	<i>24</i>
3.4 Modifying the Pre-post Design: Isolating the Impact	25
3.5 Selection of Cases	25
3.6 Data Collection & Sources	26
<b>Chapter 4: Theoretical background</b>	<b>28</b>
4.1 Capacity Building	28

4.2 Partnership Literature and Capacities	30
<i>4.2.1 Defining Partnership</i>	30
<i>4.2.2 Green Empowerment and AsoFénix: the Partnership</i>	31
<i>4.2.3 Partnerships and Capacity</i>	31
4.3 Common Pool Resource Management, Institutions, & Design Principles	33
<i>4.3.1 Partnership Projects as CPR systems</i>	33
<i>4.3.2 Capacities and CPR Management</i>	34
<i>4.3.3 Design Principles &amp; Partnership Projects</i>	35
<i>4.3.4 CPR Literature Specific to Community-managed Water Provision</i>	36
<i>4.3.5 Exogenous Influences on the Success of Community-Management</i>	38
<i>4.3.6 Existing Literature on Community-managed Electricity Provision</i>	39
4.4 Synthesis of Capacities to be Examined in this Study	39
4.5 Defining Impact: Assigning Values to Indicators	41
<i>4.5.1 Measuring Impact on NGOs</i>	42
<i>4.5.2 Measuring Impact on Case Study Communities</i>	43
4.6 Final Impact Model: Variables & Exogenous Influences	45
<b>Chapter 5: NGO Capacity Building</b>	<b>46</b>
5.1 Individual Capacity Level	46
<i>5.1.1 Financial Resource Capacity</i>	46
<i>5.1.2 Technical Resource Capacity</i>	53
5.2 Organizational Capacity Level: Improved Organizational Procedures	58
5.3 Network Capacity Level: Increased Network Ties	60
5.4 Enabling Environment	61
5.5 Increasing Capacity Through Sustained Cooperation & Division of Labor	61
<i>5.5.1 Cultural Expertise &amp; Community Organizing</i>	62
<i>5.5.2 Cultural Expertise &amp; English-speaking Entities</i>	63

5.6 Isolating the Impact: Counterfactual & Exogenous Influences	63
<i>5.6.1 NGO Development Without the Partnership?</i>	63
<i>5.6.2 Exogenous Influences</i>	64
5.7 Discussion & Conclusions: the Partnership & NGO Capacity Building	66
<i>5.7.1 Partnership Impact on AsoFénix Capacity</i>	67
<i>5.7.2 Partnership Impact on AsoFénix Independence</i>	68
<i>5.7.3 Partnership Impact on GrnEmp Capacity</i>	68
<i>5.7.4 Partnership Impact on Efficiency Through Division of Labor</i>	69
<i>5.7.5 Final Conclusions on Overall Impact</i>	70
<b>Chapter 6: Developing a Baseline and Counterfactual for Communities</b>	<b>71</b>
6.1 Interview Data	71
6.2 El Jocote	72
6.3 Government Development Plans	73
6.4 Considerations for Electricity Projects	75
6.5 Conclusion: Would management structures have developed?	76
<b>Chapter 7: Candelaria Case Study</b>	<b>77</b>
7.1 Individual Capacity Level	77
<i>7.1.1 Financial Capacity</i>	77
<i>7.1.2 Technical Capacity: Training</i>	78
<i>7.1.3 Technical Capacity: Maintenance</i>	79
7.2 Organizational Capacity Level	80
<i>7.2.1 Community Organization Structures &amp; Rules</i>	80
<i>7.2.2 Monitoring &amp; Accountability</i>	82
<i>7.2.3 Enforcement &amp; Sanctions: Ability to Collect Payments</i>	84
<i>7.2.4 Conflict Resolution</i>	84
7.3 Exogenous Influences	85

7.4 Positive Spillovers: Network Capacity Level	86
7.5 Preliminary Conclusions	87
<b>Chapter 8: Potreritos Case Study</b>	<b>89</b>
<b>Chapter 8a: Management of the Three-Community System</b>	<b>89</b>
8a.1 Organizational Capacity Level	90
<i>8a.1.1 Community Organization Structures &amp; Rules</i>	90
<i>8a.1.2 Monitoring &amp; Accountability</i>	90
<i>8a.1.3 Enforcement &amp; Sanctions: Ability to Collect Payments</i>	91
<i>8a.1.4 Conflict Resolution</i>	92
8a.2 Exogenous Influences	92
8a.3 Preliminary Discussion & Conclusions About the Three-community System	93
<b>Chapter 8b: Management of the Potreritos-only System</b>	<b>95</b>
8b.1 Individual Capacity Level	95
<i>8b.1.1 Financial Capacity</i>	95
<i>8b.1.2 Technical Capacity: Training</i>	97
<i>8b.1.3 Technical Capacity: Maintenance</i>	97
8b.2 Organizational Capacity Level	98
<i>8b.2.1 Community Organization Structures &amp; Rules</i>	98
<i>8b.2.2 Monitoring &amp; Accountability</i>	100
<i>8b.2.3 Enforcement &amp; Sanctions: Ability to Collect Payments</i>	102
<i>8b.2.4 Conflict Resolution</i>	103
8b.3 Exogenous Influences	104
8b.4 Preliminary Discussion & Conclusions	104
8b.5 Additional Lessons from Potreritos: Sustainability of Benefits?	105
<b>Chapter 9: Bramadero Case Study</b>	<b>107</b>
9.1 Individual Capacity Level	107

<i>9.1.1 Financial Capacity</i>	107
<i>9.1.2 Technical Capacity: Training</i>	109
<i>9.1.3 Technical Capacity: Maintenance</i>	110
<b>9.2 Organizational Capacity Level</b>	110
<i>9.2.1 Community Organization Structures &amp; Rules</i>	110
<i>9.2.2 Monitoring &amp; Accountability</i>	112
<i>9.2.3 Enforcement &amp; Sanctions: Ability to Collect Payments</i>	114
<i>9.2.4 Conflict Resolution</i>	114
<b>9.3 Exogenous Influences</b>	116
<b>9.4 Preliminary Discussion &amp; Conclusions</b>	117
<b>Chapter 10: Cuajinicuil Case Study</b>	<b>119</b>
<b>10.1 Individual Capacity Level</b>	120
<i>10.1.1 Financial Capacity</i>	120
<i>10.1.2 Technical Capacity: Training</i>	121
<i>10.1.3 Technical Capacity: Maintenance</i>	122
<b>10.2 Organizational Capacity Level</b>	123
<i>10.2.1 Community Organization Structures &amp; Rules</i>	123
<i>10.2.2 Monitoring &amp; Accountability</i>	125
<i>10.2.3 Enforcement &amp; Sanctions: Ability to Collect Payments</i>	126
<i>10.2.4 Conflict Resolution</i>	127
<b>10.3 Exogenous Influences</b>	127
<b>Chapter 11: Cross-case Comparison &amp; Conclusions</b>	<b>131</b>
<b>11.1 Individual Capacity Level</b>	131
<i>11.1.1 Financial Capacity</i>	131
<i>11.1.2 Technical Capacity: Training</i>	133
<i>11.1.3 Technical Capacity: Maintenance</i>	133

<i>11.1.4 Overall Impact on Individual Capacity</i>	133
11.2 Organizational Capacity Level	133
<i>11.2.1 Community Organization Structures &amp; Rules</i>	133
<i>11.2.2 Monitoring &amp; Accountability</i>	134
<i>11.2.3 Enforcement &amp; Sanctions: Ability to Collect Payments</i>	134
<i>11.2.4 Conflict Resolution</i>	135
<i>11.2.5 Overall Impact on Organizational Capacity</i>	135
11.3 Final Conclusions	135
11.4 Future Research	135
<b>Works Cited</b>	<b>137</b>
<b>Appendix A: Lessons &amp; Recommendations</b>	<b>141</b>
A-1 Individual Capacity Level	141
<i>A-1.1 Financial Capacity</i>	141
<i>A-1.2 Technical Capacity: Training</i>	142
<i>A-1.3 Technical Capacity: Maintenance</i>	144
A-2 Organizational Capacity Level	145
<i>A-2.1 Community Organization Structures &amp; Rules</i>	145
<i>A-2.2 Monitoring &amp; Accountability</i>	145
<i>A-2.3 Enforcement &amp; Sanctions: Ability to Collect Payments</i>	146
<i>A-2.4 Conflict Resolution</i>	146
<b>Appendix B: Elaboration of &amp; Reflection on Data Collection Methods</b>	<b>147</b>
<b>Appendix C: Overview of Data Sources</b>	<b>148</b>
<b>Appendix D: Interview Questions</b>	<b>150</b>
<b>Appendix E: Preliminary Comparison to Other Development Models</b>	<b>154</b>

## i. List of tables

Table 3.1 Case Study Characteristics.....	26
Table 4.1 Ostrom's Design Principles for CPRs.....	35
Table 4.2 Capacities to Develop in Partner NGOs.....	40
Table 4.3 Capacities to Develop in Local Communities.....	41
Table 4.4 Using Indicators to Assess Impact on NGOs.....	42
Table 4.5 Using Indicators to Assess Impact on Case Study Communities.....	44
Table 5.1 AsoFénix Budget and Funding Sources 2007-2010.....	47
Table 5.2 Breakdown of Contributions for Candelaria and Potreritos.....	48
Table 5.3 Partnership Project Budgets.....	50
Table 5.4 Impact of Partnership on NGO Capacity Development.....	66
Table 7.1 Financial Status in Candelaria.....	78
Table 7.2 Water System Rules & Procedures in Candelaria.....	81
Table 7.3 Impact of Partnership on Capacity Development in Candelaria.....	88
Table 8.1 Water System Rules & Procedures in San Diego, Paso Honda, and Potreritos.....	91
Table 8.2 Impact of Partnership on Capacity Development for the Three-community System.....	94
Table 8.3 Financial Status in Potreritos.....	97
Table 8.4 Water System Rules & Procedures in Potreritos.....	99-100
Table 8.5 Impact of Partnership on Capacity Development in Potreritos.....	105
Table 9.1 Financial Status in Bramadero.....	108
Table 9.2 Water System Rules & Procedures in Bramadero.....	111-112
Table 9.3 Impact of Partnership on Capacity Development in Bramadero.....	118
Table 10.1 Costs of Replacement Parts for Turbine & Electricity System.....	121
Table 10.2 Water System Rules & Procedures in Cuajinicuil.....	124-125
Table 10.3 Impact of Partnership on Capacity Development in Cuajinicuil.....	129
Table 11.1 Cross-case Comparison of Impact.....	132
Table D1 Operationalization of Variables for NGO Impact.....	150-151
Table D2 Operationalization of Variables for Community Case Studies.....	152-153

**ii. List of Figures**

Figure 2.1 Labeled Map of Project Sites.....	17
Figure 2.2 The Partnership Policy Theory.....	21
Figure 3.1 Research Framework.....	22
Figure 3.2 Simple Impact Model.....	24
Figure 4.1 Levels of Capacity Development.....	28
Figure 4.2 Final Impact Model.....	45
Figure 5.1 Timeline of All AsoFénix Projects.....	51

### iii. List of Abbreviations

AC	Alternating Current (as in electricity that comes off the grid)
AEA	Alianza en Energia y Ambiente con Centroamérica (The Energy and Environment Partnership with Central America)
AsoFénix	Asociación Fénix
bE	blueEnergy
C\$	Nicaraguan Cordoba (Currency Unit)
DC	Direct current (electricity that comes from solar panels)
ED	Executive Director
ENACAL	Empresa Nicaragüense de Acueductos y Alcantarillados (Water utility)
FISE	Fondo de Inversión Social de Emergencia (Social Investment Emergency Fund)
GrnEmp	Green Empowerment
HIVOS	Humanist Institute for Development Cooperation (Dutch Foundation)
INETER	Instituto Nicaragüense de Estudios Territoriales
MCC	Mennonite Central Committee
MDG	Millennium Development Goals
MEM	Ministerio de Energía y Minas (Nicaraguan Ministry of Energy and Mines)
NA	Not applicable
NGO	Non-governmental Organization
PD	Program Director
PV	Photovoltaic
TD	Technical Director
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
WHO	Word Health Organization

## Chapter 1: Introduction

Access to clean water and electricity are widely recognized as important components of sustainable development. The Millennium Development Goals explicitly state the need to reduce the number of people without access to clean water (United Nations, 2010). Similarly, clean sources of electricity are widely cited as a means of reducing poverty and achieving a number of UN development goals (UNDP Energy and Environment, 2010). Partnerships are among the many new forms of governance arrangements that have emerged in recent years in order to address these and other complex social, economic, and environmental issues. Along with networks and other governance arrangements, they are often advocated as a means of relieving overburdened states and of enhancing the effectiveness of governance (Brinkerhoff, 2007). Despite the recent proliferation of such partnerships, relatively little is known about the actual impact partnerships have on their member organizations or the communities in which they work (Glasbergen, 2007). The partnership between Green Empowerment (GrnEmp), Asociación Fénix (AsoFénix), and poor rural communities in the department of Boaco, Nicaragua, is an excellent example of a partnership for sustainable development. The collaboration seeks to share information and expertise, thereby increasing and developing capacity for both the Non-governmental Organizations (NGOs) and the communities involved. In depth evaluation of the extent to which the partnership succeeds in developing capacities needed for development and management of water and electricity systems presents the opportunity to expose the strengths and weaknesses of such partnerships and their potential as mechanisms for sustainable development.

### 1.1 Research Objective & Questions

Given the research gaps identified, the purpose of this research is to do the following:

- 1) To contribute to existing literature on the role of partnerships in sustainable development through an assessment of the impact of NGO-NGO-community partnerships.
- 2) To provide GrnEmp with information regarding their policy theory and the impact of their programs on NGO and community capacity development and on the ability of communities to manage small-scale infrastructure projects on their own. These capacities include: financial resources; technical skills and knowledge; connections to other organizations and actors; organizational structures, procedures, and rules; the ability to monitor and enforce these rules; and conflict resolution mechanisms.

In order to meet the above objectives, this research sought evaluative knowledge answering the following central question:

What impact do GrnEmp-AsoFénix-Community partnerships have on capacity development for both NGOs and the local communities that participate in the partnerships (as measured by the capacities listed above)?

In answering this question, the following sub-questions were also addressed:

- What capacities does the Partnership<sup>1</sup> seek to develop in partner NGOs as evidenced by the Partnership's reconstructed policy theory?
- Do the Partnership's projects develop capacity within the partner NGOs as measured by a change in financial resources and technical skills?
- Do the Partnership's projects develop capacity within local communities as measured by changes in financial resources, technical skills and knowledge, community structures and rules, monitoring and sanctions, conflict resolution, and the community's abilities to maintain projects without continued Partnership assistance?
- What exogenous variables (i.e. other capacities and influences) not identified by the Partnership's policy theory can be identified in theory and in practice (through observation of the implementation process and impact assessment) that might explain results in local communities?
- What additional capacities, if any, might be necessary to allow communities to manage infrastructure on their own?
- On the basis of the above findings, what recommendations might be made in order to improve the Partnership's capacity development efforts?

## **1.2 Scientific Relevance**

While little is known about the effectiveness of partnerships in general, this study focused on a specific form of partnership: NGO-NGO-Community Partnership. In this case, a Western NGO, GrnEmp, and a developing country NGO, AsoFénix, work with poor, rural communities in Nicaragua to install small-scale potable water or renewable energy systems. Rather than focusing on a specific market sector, these partnerships aim to develop community capacities so that they can manage small-scale infrastructure. Comparatively little attention has been given to these NGO-NGO-Community partnerships, which work largely without the direct contribution of government or market actors, and which have a broader focus than those that work on sustainable supply chains or product certification. This study begins to fill the gap in the academic literature by evaluating the contribution of these unstudied partnerships to development and aid work in the developing world.

## **1.3 Social Relevance**

In the context of the Millennium Development Goals, and given recent emphasis given to local knowledge and community-based development, it is important to know what contribution, if any, this NGO-NGO-Community partnership makes to developing water and electricity projects and to empowering local communities to manage these resources for themselves.

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<sup>1</sup> As described in chapter 4, the Partnership will be used to refer to the GrnEmp-AsoFénix partnership in particular.

From a practical perspective, as fundraising organizations with a commitment to improving quality of life and reducing poverty, GrnEmp and AsoFénix have an interest in evaluating the impact their partnership has had on NGO capacities, as well as capacities within the communities in which they work. Since the partnership began in 2003, GrnEmp and AsoFénix have not conducted an extensive analysis of the effectiveness of their collaboration and projects. The purpose of this study was to determine, through an impact assessment, whether the partnership has helped to develop capacity within each organization and has produced the desired impact in the communities they serve. Such an assessment will help both NGOs identify strengths and weaknesses in their programs and identify potential improvements in both the theoretical underpinnings of its policy and in the implementation of its programs.

#### **1.4 Research Outline**

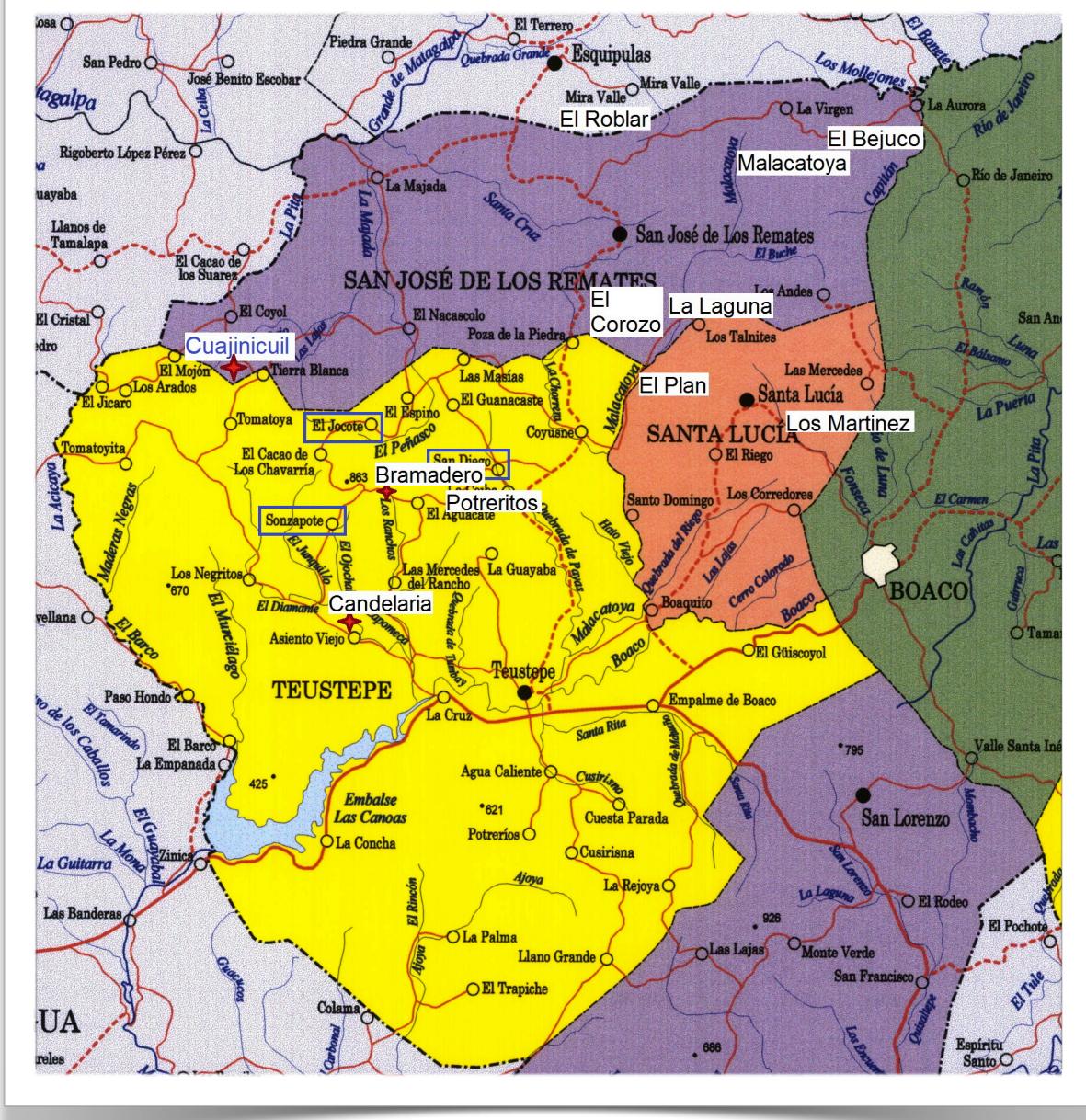
The study proceeds as follows: chapter 2 provides relevant background information on the Boaco region of Nicaragua, the NGOs involved in the partnership, and the partnership model to be evaluated. Chapter 3 describes the research framework as well as materials and methods used to conduct this impact assessment and the selection of cases to be examined. Chapter 4 presents an extensive review of literature on capacity building, partnerships, and community-based resource management and elaborates the capacities and indicators to be measured by this study. Chapter 5 begins to assess the impact of the partnership by isolating the exchange between the two NGO partners and examining capacity growth and development within these organizations. By combining information from the pre-intervention status of the communities, a control-group community, and government development plans, chapter 6 elaborates the counterfactual against which changes in the case study communities were measured. Chapters 7-10 evaluate the impacts of the partnership within four case study communities: Candelaria, Potreritos, Bramadero, and Cuajinicuil. Finally, chapter 11 compares the results from the four case studies in order to draw conclusions and set the stage for recommendations provided in appendix A. More detailed descriptions of data collection methods and preliminary comparisons of the Partnership to other development models are provided in appendices B-E.

## **Chapter 2: Contextual Background**

The following chapter provides context useful to understanding how the Partnership works and the model that the Partnership seeks to employ. The first section provides geographical background information regarding the region and the communities in Nicaragua in which the Partnership works. It is followed by a detailed reconstruction of the Partnership's policy theory, which is used as the building-block of the impact assessment.

## **2.1 The Region: Boaco Nicaragua**

## **Figure 2.1 Labeled Map of Project Sites**



**Source:** INETER Nicaragua Official Government Maps modified by GrnEmp and AsoFénix

The Department of Boaco, Nicaragua is located northeast of the capital city of Managua and comprises six municipalities. AsoFénix works in the three westernmost municipalities: Teustepe, San José de los Remates, and Santa Lucia. Despite its central location, rural communities, known as comarcas, remain extremely remote. Accessing even small population centers from these communities requires from 20 minutes to two hours of walking, as well as several hours of bus travel along unmaintained dirt roads. These buses generally run only once a day and represent a significant expense to poor populations in terms of time and money.

There are two dominant seasons in this area of the country. The winter rainy season generally begins in May, and heavy rains persist through November. During this season, rural households of Boaco plant and harvest corn, beans, and millet for consumption throughout the year. If there is surplus, it can be sold in the summer months as staples become scarce. Some families supplement this production with small fruit and vegetable harvests, and most raise chickens for eggs and cows for milk. Some families can also afford to purchase young pigs, which are raised and sold at a profit as a means of earning small quantities of cash. Until recently, most of the comarcas in this study also lacked access to electricity. This limits options for economic development and restricts communication options. As wage jobs are rare, most families earn no more than a few hundred dollars per year. In some families, adults will travel to Costa Rica during the summer months to look for work.

Water is a critical issue for families living in Boaco. During the winter months, regular downpours flood rivers, further degrading roads and rendering river crossings temporarily impassable. Travel to and from population centers therefore becomes more difficult and time consuming. Farmers are dependent upon annual rain patterns for the success of their crops. Both too little and too much rain can damage yields, meaning not enough food or less surplus for sale. The summer months from December to early May see little, if any, rain. As rivers and wells dry up, water becomes increasingly scarce, forcing women and children to cover great distances to meet their basic needs for drinking, cooking, cleaning, and washing. In some communities, women and children had to walk as far as one hour to wash and fetch water in five gallon buckets. These buckets, weighing approximately 40 pounds, are carried back on their heads. Families without access to wells or whose wells have run dry get water from rivers and streams where people bathe and livestock drink.

## 2.2 Health Impacts of Water & Electricity

Water scarcity is widely recognized to have a variety of negative effects on health and prosperity. When water is lacking, hygiene suffers as water must be used for cooking and cleaning rather than washing hands. Poor water quality and contamination from animals and lack of sanitation impairs health. Parasites and diarrhea can have devastating effects on nutrition and productivity, especially in children (Howard and Bartram, 2003; UNICEF, 2011). The World Health Organization estimates that between 7.5 and 20 liters of water per person per day should be sufficient to meet most demands for drinking, cooking, hygiene, and washing (WHO Water Sanitation and Health, 2011). Reducing the time spent fetching water each day frees up time for women and children to participate in other productive activities, such as attending school.

The benefits of electricity on health, and economic and social development are widely accepted. Electricity has been recognized by the UN as an essential prerequisite for meeting many of the MDGs, including those related to health, access to education, and economic development. Light in the evenings provides more time for children to study. It is also better for people's eyes, as it improves the quality of indoor light. Reducing fumes and indoor air pollution from kerosene lamps improves respiratory health (UN Energy Paper, 2005).

### **2.3 Reconstructed Partnership Policy Theory: Knowledge Sharing & Capacity Development**

GrnEmp is an NGO based in Portland, Oregon. Founded in 1997, the organization's mission is to alleviate poverty and improve chances for economic development through the installation of renewable energy and water delivery systems in rural communities in the developing world (GrnEmp, 2010). In attempting to achieve this goal, it partners with NGOs in developing nations whose "legal non-profit status within their countries and core values are compatible with those of Green Empowerment" (GrnEmp, 2010). In Nicaragua, GrnEmp's primary partner is Asociación Fénix, a locally founded and operated NGO with connections to communities in the Boaco region of Nicaragua. The Partnership's development model is described below.

The GrnEmp-AsoFénix partnership development model relies on two levels of exchange: exchange and sharing of financial, technical and other expertise between the NGO partners; and the transfer of equipment, technical knowledge, and other skills necessary to the communities so that they may eventually manage the systems on their own. This Partnership model recognizes that each NGO has specific expertise and capabilities. Through collaboration, each NGO can either further develop those skills or take advantage of the skills of the other NGO in order to better meet their shared goals. Cooperation between the two NGOs and the communities in which they work helps develop the capacity of rural communities so that they can ultimately manage their new facilities with minimal external assistance.

GrnEmp's role in the partnership model is to support NGOs in developing countries so as to develop their financial capacity, their technical capacity, and the viability of both the organizations and the projects. Its primary responsibilities are to help raise funds, provide technical expertise, facilitate knowledge transfer, and provide training to develop capacities at AsoFénix. Because of GrnEmp's location and cultural knowledge, it is in a better position than NGOs in the developing world to build relationships with and leverage funds from some Western foundations. It is also in a better position to interface with equipment manufacturers.

AsoFénix's expertise lies in identifying communities that might benefit from projects, conducting needs assessments, and working with the local community to develop structures and leadership to manage the project. Because it has a better understanding of local conditions and culture, AsoFénix interacts most directly with the local community throughout the project planning process. They are responsible for drafting project specifications, developing budgets, and identifying the equipment needed. AsoFénix collects local

measurements and works with communities to determine how much water or electricity is needed and what the rules for use of these new resources will be. They also provide training for the local community so that a local committee can assume long-term responsibility for the project. Once the project is complete, “the community will be in control of its renewable energy system and the NGO's role should be one of assistance and monitoring” (GrnEmp, 2010).

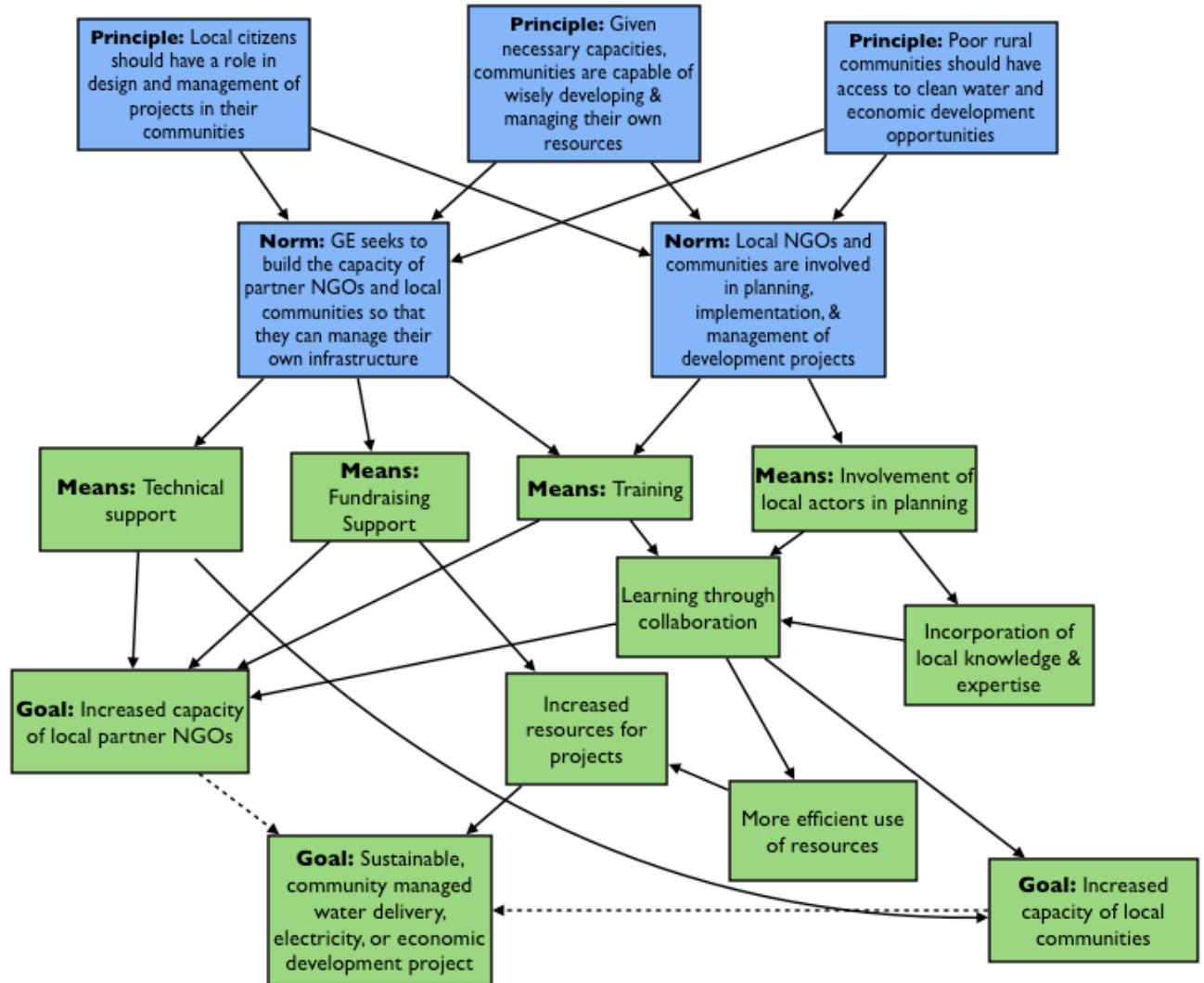
The role of the local community is to assist in designing a project that meets their needs and to develop a community organization responsible for community contributions to the project. This community organization, the comité de agua o electricidad, (water or electricity committee), is legally responsible for management of the equipment once the project is complete. Ideally, local community members “will determine their own needs, desires, and priorities in regards to the renewable energy or potable water project” (GrnEmp, 2010). At least three community members are elected to serve as coordinator, secretary, and treasurer. The community also decides who will be trained as technicians. Technicians are also considered members of the committee and are responsible for maintenance and repair of the equipment. The community as a whole provides non-technical labor during installation (digging trenches, carrying equipment, laying pipes) and is responsible for sourcing locally available materials. Once the project is complete, the committee is responsible for enforcing rules, collecting dues (if applicable), continuing maintenance, and holding regular meetings to keep the community informed of the financial and technical state of the system.

Figure 2.2 represents the Partnership’s reconstructed policy theory, developed in consultation with both NGO partners. This model forms the basis of the impact model and impact assessment elaborated in later chapters. For the sake of clarity, only the final and normative relations are depicted. The final relations include relationships between the desired objectives and the instruments or means proposed to achieve those ends. The normative relations refer to general principles and norms that underlie the Partnership’s approach (Hoogerwerf, 1990).

Based upon this reconstruction, the Partnership has identified the following capacities as essential to continuing management of infrastructure projects: financial resources, technical knowledge, and community-organizational structures. As the concept of community-organizational structures remains rather vague, existing literature on partnerships, capacity building, and community-management of local resources was used to further define this category and identify additional capacities that the partnership might need to develop to achieve its goals.

**Figure 2.2 The Partnership Policy Theory**

Blue - Normative Relations  
Green - Final Relations



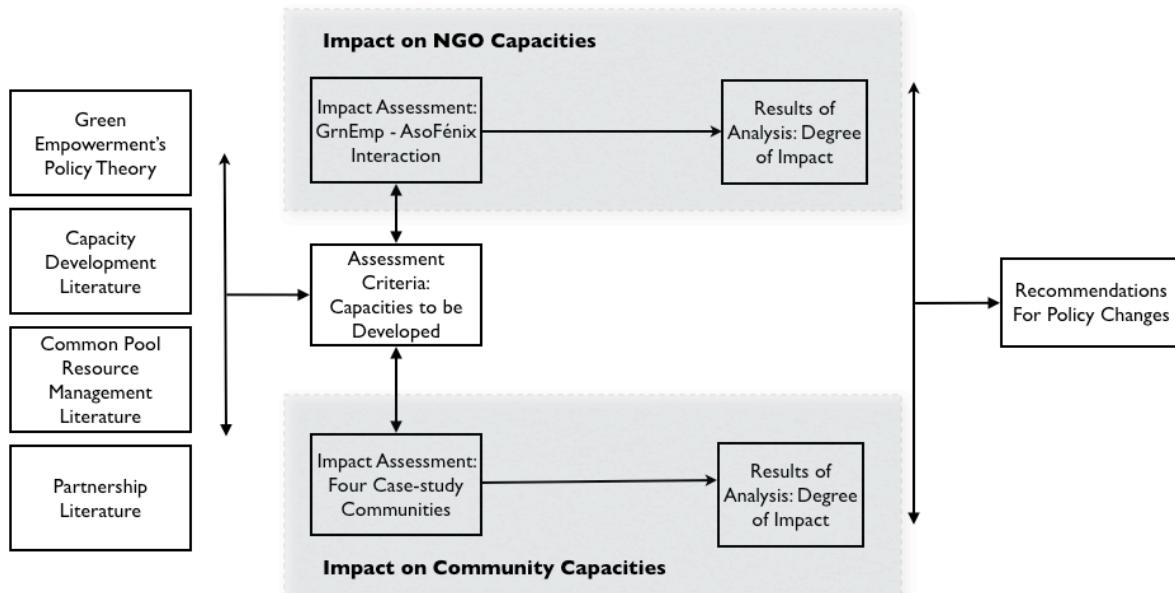
## Chapter 3: Materials & Methods

### 3.1 Research Framework

This evaluation used the method of impact assessment to provide empirical evidence of GrnEmp and AsoFénix's success or failure in achieving their capacity development goals. The method of impact assessment allows for evaluation of whether the policy is influencing targets as intended and for identification of aspects that can be improved (Rossi et al., 2004). Criteria for evaluation of impact were drawn from an extensive review of literature pertaining to partnerships, capacity building, and community management of common pool resources.

Using these criteria, the assessment itself was divided into two sections. The first examined the interaction of the NGO partners to determine the impact of the collaboration on NGO capacity building. The second evaluated the impact of the partnership on capacities in local communities by means of four in-depth case studies. These case studies were then compared in order to establish a more complete picture of overall success in developing local community capacity across cases. Results provide a picture of the strengths and weakness of the NGO collaboration, as well as recommendations for areas of improvement. Figure 3.1 outlines the overall research framework.

**Figure 3.1 Research Framework**



### 3.2 Case Study Method

Within the impact assessment framework, the case study method was used as a means of data collection and analysis. Case studies entail collecting as much detailed information as possible regarding the subject of inquiry (Flyvbjerg, 2006). In order to provide recommendations for policy improvement, it is necessary to understand not only whether or not the Partnership is producing results, but also to have an understanding of why goals are or are not being achieved and what circumstances influence these outcomes. One of the primary strengths of in-depth case analysis is that it allow researchers to establish patterns of

covariation within a single unit, thereby providing the “empirical clues ones needs to reach conclusions about causation” (Gerring, 2004, p. 343). Accordingly, the case study approach is well suited to this study.

Though the strengths of the case study method are appropriate for this study, the method also comes with certain limitations. The ability to extrapolate from single cases is limited to a small number of similar cases (Gerring, 2004). Careful selection of cases and comparison across multiple cases helps to ensure broader applicability of results (Flyvbjerg, 2006; Seawright and Gerring, 2008), but use of the case study method invariably limits the overall generalizability of conclusions. This is especially true when attempting to apply results to other areas, environments, groups, or NGOs, and should be taken into account when drawing conclusions and making recommendations.

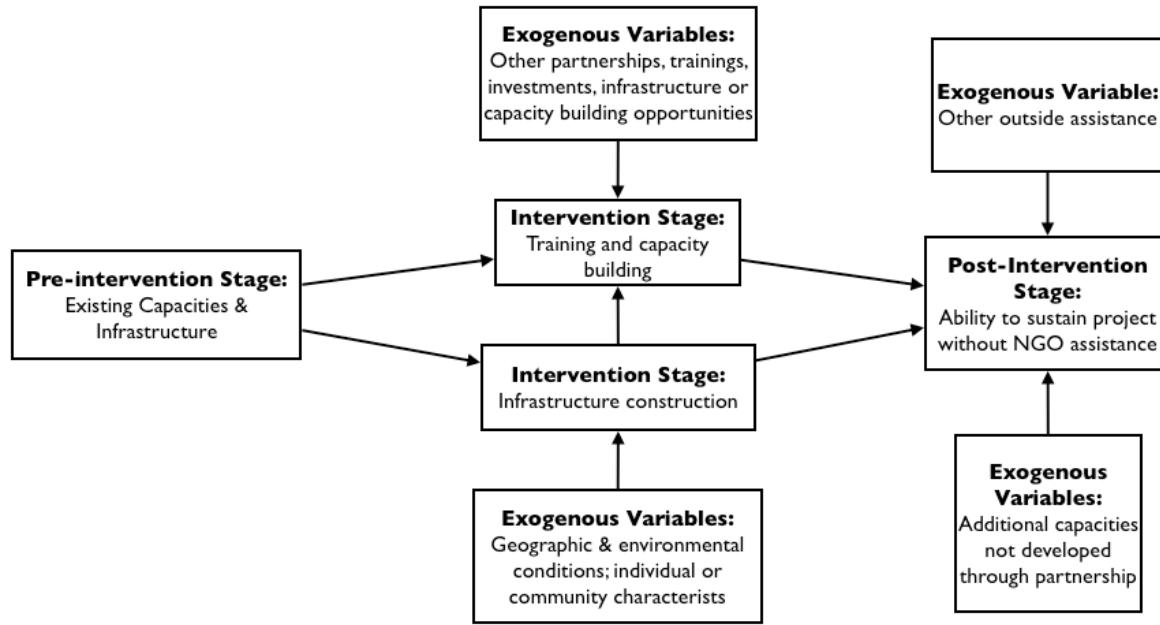
### **3.3 Research Design: Modified Pre-post Assessment**

Within each case, it was necessary to isolate the impact of the Partnership and assess change over time. Figure 3.2 depicts the impact model outlining the three key stages of the projects and potential for exogenous influences. Because of time and resource constraints, a modified pre-post reflexive design was applied to each case. In a pre-post design, any variation is assumed to relate to the intervention being studied (Rossi et al., 2004). However, in order to test the assumption that such communities would not change without involvement in the partnerships in question, the pre-post design was modified to include data from control group communities. This modification is discussed in more detail in the section 3.4.

Efforts were also made to isolate the impact of the Partnership model on project sustainability by conducting interviews and observing the impact of other development NGOs in Nicaragua. Because of time constraints, it was not possible to collect comprehensive data or draw definitive comparisons; however, preliminary impressions did suggest important strengths in the Partnership model not accounted for by assessment of capacity development. Because they are based on limited data, perceived differences in project outcomes and suggestions for future research that might conclusively isolate strengths and weaknesses of different development models are provided in appendix E.

#### ***3.3.1 Pre-intervention Stage***

The pre-intervention stage is used as a baseline against which to measure progress in capacity development and infrastructure. Evaluating pre-intervention circumstances required determining what capacities the NGOs had and what capacities and infrastructure existed in local communities before the Partnership. Three years prior to the partnership or the implementation was initially set as the pre-intervention stage, but this was modified during the actual assessment. As GrnEmp provided most of the early funding for AsoFénix, it did not exist as an organization before the partnership. The baseline was therefore modified to be only the executive director and his skills. In the case of the local community, asking people to remember only the three years before a specific project intervention seemed meaningless given a propensity to think back over a lifetime.

**Figure 3.2 Simple Impact Model**

### **3.3.2 Intervention Stage**

For the local community, the intervention stage was deemed to begin once organizational meeting and project planning began at the local level. GrnEmp and AsoFénix fundraising activities were not considered because they had little effect on the knowledge, skills, or lives of people in the community. The intervention stage for a particular project ends once the equipment is installed, trainings have been completed, and final funding reports have been submitted. It is during the interventions stage that, in theory, capacity should be developed. As the collaboration between AsoFénix and GrnEmp is on-going, it can still be considered in the intervention stage, and the post-intervention stage is not applicable.

### **3.3.3 Post-intervention Stage**

In theory, the post-intervention stage was to begin after the project was installed and was to begin three years after completion of the project to allow for continued training and adjustment. It was meant to refer to on-going maintenance by the community as well as the longevity of the project. In practice, the intervention and the post-intervention stages are more fluid and overlapping. Even three years after the projects are installed, the communities were found to rely heavily on on-going support from AsoFénix, some of which could be considered training geared at further capacity development. It could therefore be argued that the intervention stage appeared still to be under way. Capacity development can be an unending process, but given the goal of community management, these cases were evaluated based on the expectation that they should have moved on to post-intervention stage.

### **3.4 Modifying the Pre-post Design: Isolating the Impact**

While the ability to select an equivalent control community and observe it over the course of many years of development would have been ideal, given the number of variables involved and ethical concerns related to human subjects, such methods were not feasible. Nevertheless, it was necessary to develop a credible picture of how the case study communities would have developed in the absence of GrnEmp and AsoFénix involvement. In an effort to construct the most accurate counterfactual possible, this study went beyond immediately assuming that all changes were a result of interactions with the Partnership and that no change would have happened without the intervention. The assumptions of the pre-post design were tested by comparing actual results to results predicted using data from interviews, a control group, and government development plans. This reconstruction was designed to provide a more accurate description of the conditions that would have prevailed without GrnEmp and AsoFénix. The counterfactual for the case study communities is elaborated in chapter 6.

### **3.5 Selection of Cases**

“Purposive” selection of cases increases the knowledge that can be gained from studying relatively few examples (Flyvbjerg, 2006; Seawright and Gerring 2008). Careful selection ensures that cases are representative<sup>2</sup> and have “useful variation on the dimension of theoretical interest” (Seawright and Gerring, 2008, p. 296). In keeping with this reasoning, the original research proposal identified several criteria for case selection, including: different geographic location and different numbers of beneficiaries. All sites would ideally also be free of other partnerships. Variation among these variables was thought to be important to establishing the effectiveness of the Partnership’s policy theory and implementation across a variety of communities and contexts.

Upon closer examination of the available sites, it became evident that because the Partnership has only worked within a limited area, it would be impossible to evaluate effectiveness under widely differing conditions. At the time of research AsoFénix and GrnEmp had begun a total of nine projects, but only five of these had been completed. Of these projects, four were solar-powered water delivery systems. While this limits the ability of the study to generalize results to other regions or groups, the relative similarity of these sites does allow for more detailed exploration of other internal characteristics or exogenous influence that may influence results.

Using more detailed information from each of the sites, a total of four case study sites were subsequently selected based upon specific characteristics of interest. Table 3.1 depicts characteristics of the chosen sites. Yellow shading highlights differences that were used as a basis for selection.<sup>3</sup> It is also important to note the fourth site, Cuajinicuil, differs from the others in several respects. In addition to being the only energy project, it was developed with the technical assistance of another NGO, blueEnergy (bE), it is in another municipality (though the community borders Teustepe), and it did not meet the three-year completion criteria. It was selected as the only example of a different system available. Though in some

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<sup>2</sup> Flyvbjerg (2006) argues that exceptional cases are also particularly good at revealing important information.

<sup>3</sup> Bramadero was initially selected based on interest from the NGO partners. Subsequent data collection revealed important social differences between it, Candelaria, and phase two of Potreritos.

respects it was not ideal to have one site vary from the others so drastically on so many variables, its potential to expose strengths and weaknesses relevant to a different technology was deemed more important than concern for too many confounding differences.

**Table 3.1 Case Study Characteristics**

Community Name	Primary Characteristics					
	Geographic Area	Number of Beneficiaries	Social dynamic	Kind of Project	Project Partners	Date Completed
<b>Candelaria</b>	Boaco: Municipality of Teustepe	<ul style="list-style-type: none"> <li>• 40 families</li> <li>• 240 people</li> </ul>	<ul style="list-style-type: none"> <li>• No overt social differences</li> </ul>	<ul style="list-style-type: none"> <li>• Solar-powered water project</li> </ul>	<ul style="list-style-type: none"> <li>• GrnEmp</li> <li>• AsoFénix</li> </ul>	August 2004
<b>Potreritos</b>	Boaco: Municipality of Teustepe	<p>Phase one:</p> <ul style="list-style-type: none"> <li>• 3 comarcas</li> <li>• 500 people</li> </ul> <p>Phase two:</p> <ul style="list-style-type: none"> <li>• 30 families</li> <li>• 150 people</li> </ul>	<p>Phase one:</p> <ul style="list-style-type: none"> <li>• 3 distinct comarcas</li> </ul> <p>Phase two:</p> <ul style="list-style-type: none"> <li>• No overt social differences</li> </ul>	<ul style="list-style-type: none"> <li>• Solar-powered water project</li> </ul>	<ul style="list-style-type: none"> <li>• GrnEmp</li> <li>• AsoFénix</li> </ul>	March 2006
<b>Bramadero</b>	Boaco: Municipality of Teustepe	<ul style="list-style-type: none"> <li>• 40 families</li> <li>• 200 beneficiaries</li> </ul>	<ul style="list-style-type: none"> <li>• Internal social divisions</li> </ul>	<ul style="list-style-type: none"> <li>• Solar-powered water project</li> </ul>	<ul style="list-style-type: none"> <li>• GrnEmp</li> <li>• AsoFénix</li> </ul>	November 2007
<b>Cuajinicuil</b>	Boaco: Municipality of San José de los Remates	<ul style="list-style-type: none"> <li>• 14 families</li> <li>• 100 beneficiaries</li> </ul>	<ul style="list-style-type: none"> <li>• No overt social differences</li> </ul>	<ul style="list-style-type: none"> <li>• Combine wind and solar electricity project</li> </ul>	<ul style="list-style-type: none"> <li>• GrnEmp</li> <li>• AsoFénix</li> <li>• bE</li> </ul>	June 2010

### 3.6 Data Collection & Sources

In order to reconstruct the various project stages described, information was collected from as many sources as possible. Because the impact assessment required reconstructing past events and conditions, it was important to confirm personal opinions, memories, and perceptions by obtaining data from multiple sources. Consulting a variety of sources helped to confirm the validity of information through triangulation (Verschuren and Doorewaard, 1999). Sources of data included budgets, project reports and other NGO documents, interviews, site visits, and observation. Interviews were conducted using an open-interview format so as not to limit information provided to preconceived notions of impact and to allow for as much detail as possible. To minimize the probability for biased answers, interviews in the case study communities were conducted informally and a great deal of information was collected

through observation of community and committee processes.<sup>4</sup> Throughout the process, attention was given to the influence of outside support or geographical conditions on project outcomes. Appendix B provides a more detailed description of collection methods, and appendix C lists the dates of all visits and interviews.

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<sup>4</sup> The decision to conduct informal interviews and elicit information through observation and participation was made for cultural and practical reasons. It was apparent that the communities had become largely accustomed to having foreign visitors, often from donor organizations. Through these interactions, they had become conditioned to give positive responses. Most committee members, in particular, know the rules, and know what should be happening. Formal interviews yielded formulaic answers and proved not to reflect reality. When I assumed the role of a less-official, student visitor and curious observer, community members became more relaxed and willing to provide information.

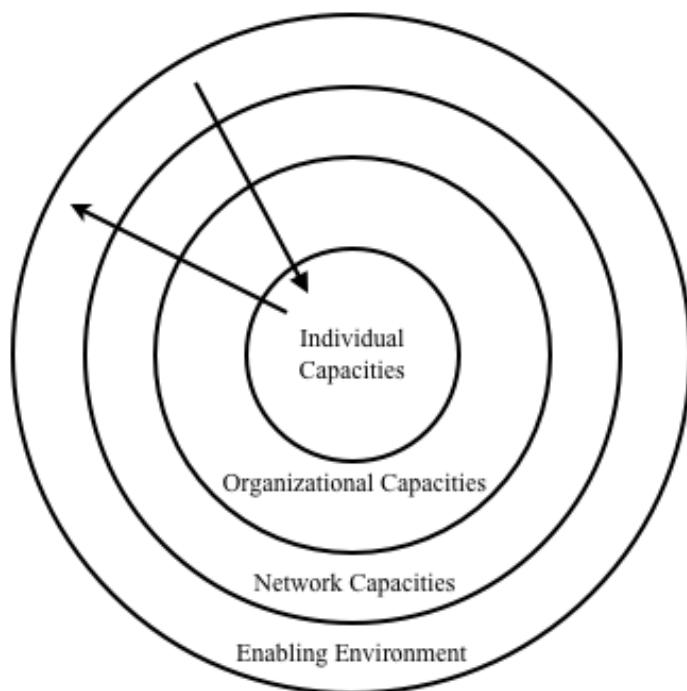
## Chapter 4: Theoretical background

The GrnEmp-AsoFénix Partnership model focuses on Partnerships for building capacity of both NGOs and local communities in order to ensure long-term sustainability of the infrastructure they install. The following chapter reviews literature on capacity building, partnerships, common pool resource management and water system management, thereby allowing for precision of capacities to be examined by this impact assessment. Features of partnerships and management systems from each of these areas of study are combined to specify the evaluation criteria applied to the NGO Partnership and the four community case study communities. These are synthesized in tables 4.2 and 4.3 at the end of the chapter, which also specifies indicators by which they were measured.

### 4.1 Capacity Building

Capacity, capacity building, and capacity development are commonly used terms in international development literature. According to the UNDP, capacity implies “the ability of individuals, institutions and societies to perform functions, solve problems, and set and achieve objectives in a sustainable manner” (UNDP, 2006). By this definition, capacity development could then refer to anything from providing training to institution-building. By extracting common themes from the existing literature on capacity building, this section seeks to specify the concept further, thereby providing a basis for identification of concrete and measurable indicators of capacity development.

**Figure 4.1 Levels of Capacity Development**



**Source:** adapted from Bolger (2000)

Most literature on capacity development identifies three or four levels of capacity that can be developed (Bolger, 2000; UNDP, 2008; van Loon, Driessen, Kolhoff and Runhaar, 2010).

These can be depicted as the nested circles in figure 4.1. Capacities at each level influence those at other levels and contribute to overall capacity for a given set of actors or situation. The innermost circle is identified by the UNDP (2008) as the individual level. This level comprises skills, experience, and knowledge, and is thus related to human and scientific capacity as identified by van Loon et al. (2010). Increases in technical knowledge, other skills, and personnel fall into this category. These are often attained through training, and given the Partnership’s objectives, are a key component of their capacity development. Van Loon et al. (2010) also identify a category of tools, including technical capacity and resource capacity, which are a valuable addition to the UNDP framework. These include technology, infrastructure, and financial resources that are part of the system. In the case of the Partnership, the infrastructure and the development of financial resources fall within this category.

The organizational level of capacity development comprises “internal policies, arrangements, procedures, and frameworks that allow an organization to operate and deliver on its mandate, and that enable the coming together of individual capacities to work together and achieve goals” (UNDP, 2008, p. 6). This level corresponds to the organizational level in van Loon et al. (2010) and requires structures and systems within which people can organize and interact. For the individual NGOs, this would entail development of tracking and reporting procedures, record keeping, and other management processes and skills. In the case of community capacity development, development and strengthening of community organizations—including drafting of rules and dispute resolution solution procedures—would apply.

The next level of capacities referenced in development literature is the sector or network level. This level refers to the development of ties and coordination within and across relevant sectors (Bolger, 2000). In the context of this study, the extent to which the Partnership facilitates development of network ties with other NGOs, government actors, donors or potential partners, professionals inside and outside Nicaragua, and product suppliers and manufacturers, determines its impact on this level of capacity building. Because the Partnership does not actively foster connection between communities and other organizations or actors, this level is more relevant for the NGOs than for the communities.

The final and broadest level of capacities is the enabling environment, which may include legislation, civic engagement, and the national policy context (Bolger, 2000; UNDP, 2008). This level is akin to the level of institutional capacities outlined in van Loon et al. (2010), which includes the broader legal environment. In the context of the Partnership, influence or participation in government planning might be seen as developing capacity at this level. Such connections might pave the way for future projects, increased government support, and the development of future goals—all of which could contribute to increased performance in the future. Although the Partnership does not explicitly seek to shape national policy, attention was paid to interaction with or influence on government entities facilitated by the partnership.

This four-tiered model provides the overall structure for the capacities that were measured by this study. The following sections review other fields of study in order to specify additional

capacities at each of these levels that are relevant to partnerships and community management of projects.

## **4.2 Partnership Literature and Capacities**

The following section briefly reviews partnership literature in order to define partnership more thoroughly and to identify any capacities relevant to partnerships that are not explicitly addressed in the capacity development literature. These are included in the final framework of capacities that were measured in section 4.4.

### ***4.2.1 Defining Partnership***

In response to the emergence of global problems, a growing recognition of the interconnectedness of actors from around the globe, and the limited ability of states to individually address complex social, economic and environmental issues, new forms of governance have emerged as (Jessop, 1998; Stoker, 1998; Lemos and Agrawal, 2006). In contrast to government, which exercises coercive power through state institutions (Stoker, 1998), governance describes processes by which actors from civil society, government, and the market sector are mobilized toward a common goal. Partnerships are among the many modes of governance that have become increasingly important in the realm of international and sustainable development. In developed and developing nations alike, partnerships are discussed as a means of providing public services in the context of privatization, structural-adjustment programs, or insufficient state resources (Fowler 1998; Wallis and Dollery, 2001; Brinkerhoff, 2002a). As a partnership that provides water and electricity—services often provided or coordinated by governments—the GrnEmp and AsoFénix collaboration is in keeping with this trend.

The term *partnership* can have a variety of meanings depending upon the particular context to which it is applied. In governance literature, partnerships are commonly defined as “collaborative arrangements in which actors from two or more spheres of society (state, market and civil society) are involved in a nonhierarchical process through which these actors strive for a sustainability goal” (Glasbergen, 2007). In the case of the GrnEmp and AsoFénix partnership, government and market actors do not play a principal role in decision-making; therefore, in this proposal, *partnerships* refers explicitly to NGO-NGO-community partnerships. This is in line with the broader definition of partnerships as an “arrangement existing between two or more organizations in working towards a commonly defined goal” (Darlow and Newby, 1997). This definition, however, says little about power relationships, how decisions are made, or the exchange of information and services between these organizations.

In the development field, *partnership* has been applied to a wide range of inter-organizational relationships—which can be placed on a continuum. Literature on partnerships from the realms of international and sustainable development often focuses on the nature of relationships between Northern and Southern NGOs or Northern donors and Southern recipients. At one end, the partnership label disguises a contractual relationship, in which Southern NGOs act as service-providers or implementors for Northern NGOs or governments

(Fowler, 1998; Bebbington, 1997; Brinkerhoff, 2002a). While the stated aim of such partnerships has often been “capacity-building” and mutual benefit, in reality Northern NGOs often exert greater power over decision-making, and benefit disproportionately from involvement in the partnership. Southern NGOs fail to develop the skills needed for independence, and therefore become dependent on their Northern partners rather than becoming empowered (Postma, 1994; Fowler, 1998). This is in direct contrast to the goals of the GrnEmp-AsoFénix partnership and points to potentially grave shortcomings in the international development partnerships.

In response to the proliferation of mischaracterized NGO-partnerships, scholars have proposed a more stringent definition of international development partnerships. This definition emphasizes that a true partnership consists of two or more entities whose individual identities and goals are aligned and a relationship that is characterized by shared values, mutual respect, trust, and shared benefits (Fowler 1998; Brinkerhoff, 2002a). The two key dimensions of such partnerships are mutuality and shared organizational identity (Brinkerhoff, 2002a). Mutuality refers to shared goals accomplished through individual responsibilities, nonhierarchical collaboration, and equal decision-making. Organizational identity refers both to an organization’s mission, and the skills and advantages it has over other partners by virtue of its position within a sector or society.

#### ***4.2.2 Green Empowerment and AsoFénix: the Partnership***

Throughout this paper *the Partnership* is used to refer specifically to the GrnEmp-AsoFénix partnership under evaluation: an NGO-NGO relationship characterized by a strong sense of mutual identity and interdependence, but also by the desire to develop or increase capacity for both organizations. As indicated in the policy theory, and confirmed in interviews (AsoFénix ED, February 24, 2011; GrnEmp ED, May 12, 2011), GrnEmp and AsoFénix share common goals and have similar organizational identities. Both seek to improve the lives of people living in poor rural communities. In theory, each also brings specific skills and abilities to the partnership that facilitate joint achievement of the goals. By measuring the impact on capacities at both NGOs produced by this partnership, this impact assessment indicates whether the Partnership is indeed mutually beneficial.

#### ***4.2.3 Partnerships and Capacity***

The discussion above brings to light an interesting tension between interdependence and independence in partnership relationships. On the one hand, partnerships are about mutual dependence and the individual task and responsibilities that each partner contributes to the partnership. On the other hand, too much dependence might mean that the less powerful organization is merely a contractor, an extension of the dominant organization, or becomes completely co-opted and subsumed (Brinkerhoff, 2002a). These two dimensions point to a distinction between building or developing capacity, and increasing capacity. Building capacity is about increasing independence; increasing capacity is about making the most of interdependence. From here forward, developing or building capacities refers to attempts to establish knowledge, resources, or skill within each organization. In contrast, increasing capacity refers to improved capacity made possible through exploitation of comparative

advantage and efficient collaboration that does not necessarily seek to transfer skills from one partner to another. Because of the complex nature of partnerships, attempts to measure the impact of any partnership need to measure both development and increases in capacity. Considering elements that allow individual organizations to be both independent and interdependent allows for elaboration of specific indicators for this study.

### ***a) Increasing Independence through Capacity Development***

Combining ideas from the capacity development and partnership literature, it is possible to identify indicators to measure whether the Partnership is helping to increase independence. It is important to note that at the outset of the Partnership, GrnEmp was already an independent and well established organization. It had a larger financial base, other partners, and a more established record of developing projects. Consequently, the literature suggests that it had the potential to become the more dominant partner and reap most of the benefit. As GrnEmp continues to work in many countries, and with many other partners, there is no reason to believe that partnership with AsoFénix has decreased GrnEmp's independence. Measuring the Partnership's impact on independence is therefore more relevant to AsoFénix.

Relating the concept of independence to each of the levels of capacity development yields specific variables for this study. At the individual level, increased financial independence can be measured by increases in independently secured funding and independent projects. Increased technical independence as a result of the partnership is indicated by increases in skill and technical responsibility. On an organizational level, no specific indicators measure growth in independence; however indications that AsoFénix's rules and processes are heavily dictated by GrnEmp might indicate power imbalance or decreased independence. At the network level, increases in direct ties to other organizations made possible by the Partnership were used to measure independence and capacity development. These indicators are included in table 4.2, and section 4.5 describes how they were used to determine impact.

### ***b) Increasing Capacity through Division of Labor***

An important theme from both international development and partnership literature is the notion that partnerships increase capacity not just through knowledge transfer and training but also through comparative advantage. Partnerships in general are often justified in terms of efficiency gained through division of labor and exploitation of each other's strengths (Bebbington, 1997; Brinkerhoff, 2002b). Partnerships "seek simultaneously to address the weakness of a particular social agent and to build upon the strength of the other partner" (Lemos and Agrawal, 2006, p. 310). Indeed the GrnEmp-AsoFénix partnership explicitly sees such division of labor as a strength of the partnership model. Any impact assessment must therefore assess increases in capacity derived from recognition that certain tasks are more efficiently performed by one partner than the other. The nature of such skills and advantages, however, is largely context specific.

Returning to the Partnership's policy theory, the Partnership specifies two areas in which division of responsibilities increases efficiency. As the U.S.-based NGO, GrnEmp is better able to interact with some donors and manufacturers. As a Nicaraguan NGO, AsoFénix is

closer both culturally and geographically to communities in which projects are installed. Whether or not these two advantages are exploited is used to determine if the Partnership increases efficiency through division of labor.

In theory, increased capacity through division of labor might occur at any of the four levels described above (individual, organizational, network, or enabling environment). In this case, interfacing with donors and manufacturers and the local communities could be seen as efficiency in network ties; however, in the interest of maintaining a clear boundary between the Partnership's impacts on capacity development and its impacts on efficiency, division of labor is be added to table 4.2 as a separate category.

### **4.3 Common Pool Resource Management, Institutions, & Design Principles**

There is an extensive body of literature detailing factors that lead to effective collective action and community-based management of common property and common pool resources (CPRs) (Agrawal, 2001). CPRs may be natural or man-made systems that share two important properties: they are rivalrous (or subtractive) and non-excludable (Gardener, Ostrom, and Walker, 1990). A resource is subtractive when one person's consumption reduces the availability of the resource for others. Non-excludability refers to difficulty in preventing unauthorized users from accessing the resources provided by a particular system. As the characteristics of CPRs and Partnership projects are similar, and as there is considerable precedent for treating water and irrigation systems as common pool resources (Ostrom, 1993; Madrigal et al., 2011), lessons from CPR literature are instructive. Three essential capacities identified from the CPR literature were added to the evaluation framework in table 4.3: monitoring, enforcement and sanctioning, and conflict resolution.

#### ***4.3.1 Partnership Projects as CPR systems***

In order to apply CPR and collective action theory to these projects, it is necessary to establish partnership projects as common pool resources. Both the water and electricity that are produced by Partnership systems are available in limited quantities; consumption by one household reduces what is available to others thereby satisfying the condition of rivalrous goods. On the other hand, potable water and electricity are generally delivered by private systems that allow outsiders to be excluded. In general, a different body of economic and social theory should be applied to private goods; however, under the conditions of collective management developed by the Partnership, the characteristic problems facing CPRs managers emerge and CPR theory can be applied.

Once the storage and pipe systems are in place (or generators and electric cables in the case of electricity generation), common ownership and management of Partnership systems makes it difficult for any one authority to prevent usage by another member of the community. The Partnership model installs a local committee, which is responsible for oversight; but unless that committee has the right structure and abilities, the problems of CPR management reemerge.

Among these common problems is free-riding. Because the marginal benefits of one person's investment are small and spread out over many users, a rational actor is likely to succumb to the temptation to provide as little contribution as possible. As long as others contribute, the impact of the free-rider is minimal and the system continues to function (Ostrom and Gardener, 1993). However, if many households withhold their contributions, eventually "the temptation to take a free ride on public infrastructure provisions would lead to the destruction of the resource base" (Anderies, Janssen, and Ostrom, 2004, p. 22). The same temptation to free-ride is present in Partnership projects. As found in studies of irrigation systems commonly studied by CPR researchers (Ostrom and Gardner, 1993), beneficiaries of Partnership projects are unlikely to contribute to general maintenance of the system unless institutional arrangements are put in place to monitor consumption and to encourage maintenance and investment. Such institutions have been identified as essential components of community-managed resource systems. By examining existing literature on institutions for CPR management, it is possible to identify capacities needed for local communities and committees to manage their water and electricity systems and to evaluate the Partnership's success in developing such capacities.

#### ***4.3.2 Capacities and CPR Management***

The success and failure of CPR management systems has been linked to as many as 36 variables (Agrawal, 2001), which have been arranged into four categories: resource system characteristics, group characteristics, institutional arrangements and the external environment. The focus of this study on capacity building suggests a focus on the institutional arrangements category. Unless the partnership chooses to put more emphasis on screening community partners, the characteristics of the group and internal dynamics are more or less beyond the Partnership's control. For the sites in question, characteristics of the resource system and the environment were largely similar, and areas where differences appeared to affect outcomes are discussed. The most widely cited characteristics of successful institutional design are Ostrom's design principles (Ostrom, 1990; 1993). These design principles, presented in table 4.1, have been widely applied to other CPRs and, more recently, to social-ecological systems more broadly (Anderies et al., 2004). They provide a valuable starting point for the determination of capacities necessary for CPR management.

**Table 4.1 Ostrom's Design Principles for CPRs**

Principle	Definition
1) Clearly Defined Boundaries	The system and those allowed to use it are clearly defined.
2) Proportional Equivalence between Benefits and Costs	Allocation rules are related to local conditions and user contributions (of money, labor, or materials).
3) Collective-choice Agreements	Users participate in crafting and changing of rules.
4) Monitoring	Monitors accountable to the community monitor resource status and user behavior.
5) Graduated Sanctions	Users that violate rules are subject to punishment commensurate with severity of the offense. Sanctions are imposed either by the community of users, or by outside authority that is accountable to the users.
6) Conflict Resolution Mechanisms	Affordable and straightforward dispute-resolution processes are available to resolve conflict between users or between users and officials.
7) Minimal Recognition of Rights to Organize	Outside authorities do not interfere with ability of community to manage the resource
8) Nested Enterprises	Structures allowing for provision, monitoring, enforcement and conflict resolution are nested in multiple relevant levels.

*Source:* Based on Ostrom (1993)

### **4.3.3 Design Principles & Partnership Projects**

While all of the design principles have been shown to be important to CPR management, only some of them are relevant in the context of building community capacity for Partnership projects. In the case of Partnership projects discussed here, principles 1, 2, 3, 7, and 8 are generally satisfied and therefore irrelevant to the study of capacity building in the Partnership context.<sup>5</sup> Because principles 4, 5, and 6 are not inherent to the communities, the projects, or the overarching governmental structure, they represent capacities relevant to evaluation of Partnership projects. Each one of these three capacities—monitoring, enforcement and sanctions, and conflict resolution—is elaborated briefly below, and specific indicators for measurement of these characteristics are discussed. Both the capacities and the final indicators to be measured are summarized in table 4.3.

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<sup>5</sup> **Principle 1)** The system itself includes the infrastructure installed by the partnership, and users are all those connected to the water or electricity system. **Principle 2)** In all three water system communities, users pay in direct proportion to use, or in approximate proportion to the number of people living under one roof. In the case of electricity, most houses are the same size and have the same number of electrical fixtures, therefore use does not vary much among households. A few houses do have televisions, and those houses serve as gathering spots for the entire community. **Principle 3)** As implemented by the Partnership, all households connected to the system are free to participate in crafting rules. **Principle 7)** The rights of communities to manage their own water systems is recognized under Nicaraguan law and is therefore universally true for all of the communities in question. **Principle 8)** Given the small scale of the system, multiple layers of organization are inapplicable to the current study. While the Partnerships may want to explore means of reorganizing rules, maintenance, and enforcement across multiple communities or jurisdictions, the present-day structures do not include cross-scale coordination.

**c) Monitoring**

Monitoring is identified by Ostrom (1993) and other scholars (Agrawal, 2001) as a key component of community-based CPR management. Applied to Partnership systems, this translates to the capacity of the entire community to monitor water or electricity usage and payment of dues. It is also important that the community has a means of monitoring that those elected to be in charge of the system are performing their duties. Indicators to measure capacity building efforts in this area include training on record keeping, the existence of tracking and monitoring rules and mechanisms, and a means of conveying monitoring information to the general community.

**d) Enforcement & Sanctions**

The second capacity established by literature on CPR management is the capacity to enforce the rules by means of sanctions. Without sanctions households are likely to give in to the impulse to free-ride, and the system and its revenues will eventually suffer. The existence of rules, as well as evidence of compliance and enforcement, can be used to measure this capacity within communities.

**e) Conflict Resolution**

Finally, principle 6 suggests that Partnership communities should have the capacity to resolve conflict. If communities are to succeed in managing their infrastructure, they need the capacity to adapt to new situations and resolve conflict. Development of the capacity to resolve conflict could be measured by evidence of conflict resolution training, the existence of conflict resolutions rules and procedures, the ease and accessibility of such procedures, and observation of how well the community is able to resolve problems that arise.

#### **4.3.4 CPR Literature Specific to Community-managed Water Provision**

While the literature on management of potable water systems is not as extensive as that existing for CPRs more generally, several studies have sought a better understanding of the factors underlying successful community-management of water systems. In keeping with Ostrom's design principles, all studies determined that the existence of clear operational rules, sanctions for noncompliance, and the ability or willingness to enforce those rules were strongly correlated with systems with high water quality, financial stability, customer satisfaction, and long-term sustainability (Sara and Katz, 1998; Isham and Kähkönen, 2002; Madrigal et al., 2011). In addition to these previously elaborated characteristics, they also found correlations between performance and downward accountability of the local committees to the general population and community investment in the project (Sara and Katz, 1998; Madrigal et al., 2011). These features are therefore combined with capacities identified in other bodies of literature and are incorporated into table 4.3, which outlines measures of impact used for this study.

*a) Accountability*

The concept of accountability is closely related to monitoring, sanctioning, and conflict resolution identified by Ostrom, but it highlights the importance of committee responsibility to the community. Several studies reinforced that detailed record keeping (the ability to track and monitor payments) and a means of making monitoring information available to the public (regular meetings) are essential to promoting effective management (Sara and Katz 1998; Isham and Kähkönen, 2002; Madrigal et al., 2011). Costa Rican water committees also established downward accountability by means of clearly delineated procedures for removing committee members from power. Communities with high-performing systems were more likely to hold regular elections and have procedures for removing errant officials from power (Madrigal et al., 2011). For the purposes of this study, accountability and monitoring were combined. Downward accountability of the committee is measured by examining record keeping means of rules and procedures.

*b) Ownership & Financial Responsibility*

A sense of ownership and a willingness to pay (WTP) for the system were identified as essential components of project sustainability (Sara and Katz, 1998; Madrigal et al., 2011). Communities that expressly solicited projects and took responsibility for development and implementation of the projects were more likely to continue to invest time and money into on-going maintenance (Sara and Katz, 1998; Madrigal et al., 2011). However, Isham and Kähkönen (2002) found no difference in project results as long as the community was heavily involved in project planning and implementation. The importance of financial stability is in keeping with the Partnership's policy theory and the capacity development literature. It also highlights common obstacles or hazards that plague community-managed development projects.

Financial vulnerability—a gap between income and expenses—and reliance on outside assistance were identified as a common problem for community-managed systems (Sara and Katz, 1998; Nyarko, 2007; Madrigal et al., 2011). Financial sustainability is also one of the variables identified by the Partnership's policy theory. The importance of financial sustainability also points to a potential hazard of donor funded projects. Studies of donor funded projects have found that external sources of assistance decouple benefits received from effort or funds contributed (Gibson, Andersson, Ostrom, and Shivakumar, 2005). De-linking benefits from community contributions tends to exacerbate tendencies toward free-riding, transferring continued success of the project from the local community to the donor organization. While WTP may not be a capacity that can be directly cultivated, it should be possible to create payment structures that ensure financial stability and outline a plan for collecting funds and managing future maintenance expenses. Given the limited timeframe, it was not possible to collect sufficient data to measure the sense of ownership over the project. However, the ability of the Partnership to develop financial capacity to manage the project is measured by examining community income and expenses and by determining who is responsible for financing maintenance and repairs.

#### ***4.3.5 Exogenous Influences on the Success of Community-Management***

In addition to the capacities outlined above, literature on CPR management in general and water projects in particular also pointed to a variety of community characteristics or exogenous variables that have the potential to influence community-base management outcomes. These elements can be considered exogenous because they are not capacities that are or could be targeted by the Partnership, but are rather characteristics inherent to the individuals, social conditions, or environmental contexts of different communities. While some efforts were made to control for these during case selection, it was impossible to find the ideal sample of cases, especially given the small number of completed projects. Because these elements may still be present, and because they have the potential to explain successes and failures in capacity building and project outcomes, a brief summary of the most common and relevant factors is provided below. Throughout the analysis, the influence of these factors was given particular attention in sections on exogenous influences. A better understanding of external influences on capacity building can help NGO partners adapt and develop more effective strategies in the face of characteristics that are beyond their control.

##### ***a) Human Capital: Networks, Leadership, and Education Levels***

The existing literature identified several components of human capital including existing expertise, education, leadership, and participation in other organizations or collaborations. Overall the influence of different aspects of human capital was dependent upon local conditions and was correlated to both improved and reduced performance. Leadership, for example, had a positive effect when it was used to leverage community resources and motivate participation, and a negative effect when it crowded out participation of other members and encouraged dependence and free-riding.

Participation by community members in other community organizations or collaboration with outside organizations leads to better monitoring and sustainability (Madrigal et al., 2011). Increased interaction between community-members was found to deter free-riders and facilitate monitoring (Isham and Kähkönen, 2002). Committee members who were also active in other community organizations were also correlated with better functioning systems (Madrigal et al., 2011). This points to potential sources of exogenous capacity building, but more importantly it suggests that learning and experience and skills gained from other forms of collaboration and management translate into improved ability to manage water systems (*Ibid.*). The opportunity to learn and develop organizational skills is therefore likely to be an important component of capacity building.

Perhaps the most relevant finding was that general education and skill levels as well as the availability of training related to the systems correlated with higher performance (Sara and Katz, 1998; Madrigal et al., 2011). In communities where skills and training were concentrated or lacking, the community had little flexibility and was highly dependent on a few individuals for management. This led Madrigal et al., (2011) to advocate for “permanent and accessible training programs that include young people and women” in order to ensure continued “capacity to manage water systems over time” (Madrigal et al., 2011, p 11). Ensuring that the technical and managerial skills necessary for project sustainability exist

outside of a few select committee members reduces dependence on specific actors. In turn, this allows for change in leadership, greater accountability, and the ability of the community to respond to change. Finally, extensive training was also thought to increase the sense of community ownership for the project both by reinforcing responsibility for the project and by providing the necessary tools and skills for maintenance (Sara and Katz, 1998). Efforts at this kind of capacity building could be measured by accessibility of on-going training available to the general population, or to incoming committee-members.

### **b) Group Characteristics & Social Capital**

Literature on CPR also recognizes that group characteristics—including interdependence, shared values and experiences, and homogeneity of identity—may also affect CPR management outcomes (Agrawal, 2001). Accordingly, differences in religious views, income, and political affiliation are examples of heterogeneity that might strain social relations and the success of collective action. In some cases, the impact of these variables may be mediated by other, more influential, characteristics or circumstance; therefore more research on the effects of group size and other social variables is still needed to determine the precise impact of these social characteristics under different circumstances (Agrawal, 2003; Agrawal 2007). Despite the complicated relationship between these variables and successful resource governance, many studies have identified user characteristics as important determinants of successful cooperation (Agrawal, 2001); therefore, attention was given to the potential influence of these variables on communities in this study.

#### **4.3.6 Existing Literature on Community-managed Electricity Provision**

In the case of electricity, there have been many studies of the benefits of decentralization and renewable energy production in the developing country context, but not on design of community-based management structures for on-going operations and maintenance. In light of the absence of such specific research on electricity systems the same capacities identified for water systems were used to measure capacity development for electricity systems. Ostrom's *design principles* have been applied and proven useful in a wide variety of collective action and resource management contexts; it therefore seems reasonable to assume that given the similarity in the organization structures developed to manage both the water and electricity projects examined by this study, similar capacities should also be developed. This approach does not account for possible difference in capacities needed to manage different systems, but it does create a common evaluation framework, thereby facilitating analysis and comparison.

#### **4.4 Synthesis of Capacities to be Examined in this Study**

Table 4.2 outlines the capacities and indicators to be reviewed in assessing the Partnership's impact on NGO capacities. These are based on the partnership's policy theory, capacity development literature, and the general literature on partnerships outlined above. The Partnership does not explicitly seek to influence government processes or the enabling environment, but the category has been retained in the evaluation framework so as to allow for assessment of any activity or influence in this area.

**Table 4.2 Capacities to Develop in Partner NGOs**

<b>Capacity/Level</b>	<b>Capacities Examined by this Impact Assessment</b>	<b>Indicators for Measurement of Increased Capacity</b>
<b>Individual Capacity</b> (Developing skills, experience, knowledge, technical capacity, financial capital)	Financial capacity at AsoFénix	<ul style="list-style-type: none"> <li>• Greater access to funds</li> <li>• Growth in independently secured income and independent projects</li> </ul>
	Financial capacity at GrnEmp	<ul style="list-style-type: none"> <li>• Greater access to funding attributable to the Partnership</li> </ul>
	Technical capacity at AsoFénix	<ul style="list-style-type: none"> <li>• Formal training provided by the Partnership</li> <li>• Mentoring, skills development, and technical support provided by the Partnership</li> <li>• Increased technical responsibility on Partnership projects</li> <li>• Increased capacity through volunteers attributable to the Partnership</li> <li>• Increases in other skills attributable to the partnership</li> </ul>
	Technical capacity at GrnEmp	<ul style="list-style-type: none"> <li>• Increased technical knowledge attributable to the Partnership</li> </ul>
<b>Organizational Capacity</b> (Developing organizational rules, policies, and procedures)	Organizational rules and procedures at either NGO	<ul style="list-style-type: none"> <li>• Improvements in reporting procedures and management practices attributable to the Partnership</li> </ul>
<b>Network Capacities</b> (Developing inter-sector and cross-sector ties to other organizations)	Network ties at AsoFénix	<ul style="list-style-type: none"> <li>• Increase in ties with other NGOs, government actors, development professionals, suppliers etc. attributable to the Partnership</li> </ul>
	Network ties at GrnEmp	
<b>Enabling Environment</b> (Institutional capacities, policies, and programs)	Legal environment and national policy context	<ul style="list-style-type: none"> <li>• Increased influence over the government policies or programs</li> </ul>
<b>Division of Labor</b> (Increasing capacity through exploitation of comparative advantage and resulting efficiency)	Increased efficiency due to division of labor	<ul style="list-style-type: none"> <li>• Efficiency resulting from AsoFénix performing community-organizing work</li> <li>• Efficiency resulting from GrnEmp interfacing with foreign manufacturers and donors</li> </ul>

Table 4.3 outlines the capacities to be assessed in the case study communities. They were derived by integrating information from the Partnership's policy theory with information from literature on capacity development, common pool resource management, and water-system management. Operationalization of the variables in each of these tables, including questions asked and sources consulted, can be found in Appendix D.

**Table 4.3 Capacities to Develop in Local Communities**

Category / Level	Capacities Examined by this Impact Assessment	Indicators for Measurement of Increased Capacity
<b>Individual Capacity</b> (Developing skills, experience, knowledge, technical capacity, financial capital)	Financial capacity	<ul style="list-style-type: none"> <li>• Sufficient income to cover system expenses</li> <li>• Demonstrated ability/willingness to pay for system repairs</li> </ul>
	Technical capacity: training	<ul style="list-style-type: none"> <li>• Evidence of formal technical training</li> <li>• Evidence of informal technical training/mentoring</li> </ul>
	Technical capacity: maintenance	<ul style="list-style-type: none"> <li>• Ability to troubleshoot and maintain system independent of Partnership support</li> </ul>
<b>Organizational Capacity</b> (Developing organizational rules, policies, and procedures)	Community organization structures & rules	<ul style="list-style-type: none"> <li>• Changes in or development of community organizations</li> <li>• Changes in and development of rules</li> </ul>
	Monitoring & accountability: monitoring community compliance	<ul style="list-style-type: none"> <li>• Clear records of community payments</li> </ul>
	Monitoring & accountability: committee accountability	<ul style="list-style-type: none"> <li>• Regular committee meetings</li> <li>• Regular meetings with the community</li> <li>• Community knowledge of committee positions and responsibilities</li> <li>• Public records of committee tasks and duties</li> </ul>
	Enforcement & sanctions: ability to collect payments	<ul style="list-style-type: none"> <li>• Ability/willingness to enforce rules</li> </ul>
	Conflict resolution	<ul style="list-style-type: none"> <li>• Conflict resolution rules and procedures</li> <li>• Evidence of conflict resolution training</li> <li>• Ability to resolve conflict</li> </ul>

#### 4.5 Defining Impact: Assigning Values to Indicators

Because this paper deals with both governance structures and impact assessments, it is important to define the use of *impact* in this proposal. The term impact is often used in governance literature to refer only to observable changes in the physical environment that result from the rules or behavior changes set in motion by a governance regime (Underdal, 2002). By this definition, impact does not refer to the creation of new rules or norms. For the purposes of this study, impact is characterized more broadly, to include any changes in the capacity indicators described above.

#### 4.5.1 Measuring Impact on NGOs

The 16 indicators in table 4.2 were used to evaluate the Partnership's overall impact on four levels of capacity development. They were also used to isolate impact on each of the NGOs independently, on AsoFénix's independence, and on efficiency gains through division of labor. Table 4.4 details each of these indicators and the categories of impact to which they apply. Because there was no need for cross-case comparison and each of the indicators indicates growth in capacity, no weighting system was used in this part of the analysis. As GrnEmp capacity was more established before the collaboration, more indicators are used to measure capacity development at AsoFénix.

**Table 4.4 Using Indicators to Assess Impact on NGOs**

Capacity	Indicator	Indicators Specific to Capacity at AsoFénix	Indicators Specific to AsoFénix's Independence	Indicators Specific to Capacity at GrnEmp	Indicators Specific to Efficiency
Financial capacity at AsoFénix	Increased access to funding	X	-	-	-
	Growth in independently secured income and independent projects	X	X	-	-
Financial capacity at GrnEmp	Increased access to funding	-	-	X	-
Technical capacity at AsoFénix	Formal training	X	-	-	-
	Mentoring, skills development, and technical support	X	-	-	-
	Increased in technical responsibility on Partnership projects	X	X	-	-
	Increased capacity through volunteers	X	-	-	-
	Increases in other skills	X	-	-	-
Technical capacity at GrnEmp	Increased technical knowledge	-	-	X	-
Organizational Capacity	Improvements in reporting procedures and management practices at AsoFénix	X	-	-	-
	Improvements in reporting procedures and management practices at GrnEmp	-	-	X	-
Network Capacity	Increase in network ties at AsoFénix	X	X	-	-
	Increase in network ties at GrnEmp	-	-	X	-
Enabling Environment	Increased influence over the regional planning process	X	-	X	-
Increased capacity due to division of labor	Efficiency resulting from AsoFénix performing community-organizing work	-	-	X	X
	Efficiency resulting from GrnEmp interfacing with foreign manufacturers and donors	X	-	-	X
Total Number of Indicators	16	11	3	5	2

Increases in independently secured funding, increased responsibility on Partnership projects, and increases in network ties were taken as indicators of increases in AsoFénix's independence because growth in these areas suggests autonomy and the ability to provide funding and technical expertise without GrnEmp support. As financial and technical capacity were explicitly identified by the Partnership, Partnership impact on at least these two variables was necessary in order to establish positive impact on independence.

Only two indicators measure efficiency, as those are the only two areas of increased efficiency identified by the policy theory. Because these efficiencies are an explicit part of the development model, anything less than positive impact on both indicators is considered poor impact in this area.

Because there was no need for cross-case comparison, explanation of how the degree of overall impact was determined for each NGO is elaborated at the time of analysis.

#### **4.5.2 Measuring Impact on Case Study Communities**

In order to establish overall impact of the Partnership across case studies, the evaluation scheme in table 4.5 was established. Because some indicators measured efforts to build capacity, regardless of the level achieved, while others measured development of actual capacity, different weights were given to these two classes of variables. A weight of one was given to every indicator that revealed concerted effort on the part of the Partnership to develop capacity. These include creation of rules and evidence of training. A total of 9 points are possible with these capacities alone. Twice the weight was assigned to indicators that confirmed some degree of independent management, including the abilities to pay for the system, perform maintenance, hold meetings, enforce rules, and resolve conflict. An additional 14 points are available for proven management capacity. Table 4.5 summarizes the weights assigned to each indicator.

From the indicators and their respective weights, the following classifications of impact were developed. **Very low impact** is indicated by a range of 0-4. Four points can be earned by simply providing training and mentoring on technical capacity, developing new structures, and establishing a committee—regardless of effectiveness. Therefore, scores less than 4 likely indicate not only insufficient impact, but weak efforts at capacity development. The range of **low impact** is from 5-8 points. Communities in this range have not demonstrated much, if any, ability to apply this training to independently managing the system. A score in this range indicates minimal impact on capacity building because in addition to the criteria for very low impact, it only requires ensuring the committee knows how to keep records, understands their duties, and meets regularly with each other or the community. These were all capacities identified by the Partnership, not academic literature. It is therefore reasonable to assume the Partnership has directed some effort at developing them. Scores from 9-15 require demonstrating some degree of independence and are classified as **moderate impact**. Scoring 16-20 points indicates increased ability of the community to manage the project, earning the Partnership a rating of **high impact**. The range from 21-23 indicates communities that have developed nearly all capacities necessary for independent management and who have demonstrated significant ability to do so. For communities with these scores, the Partnership's impact is considered **very high**.

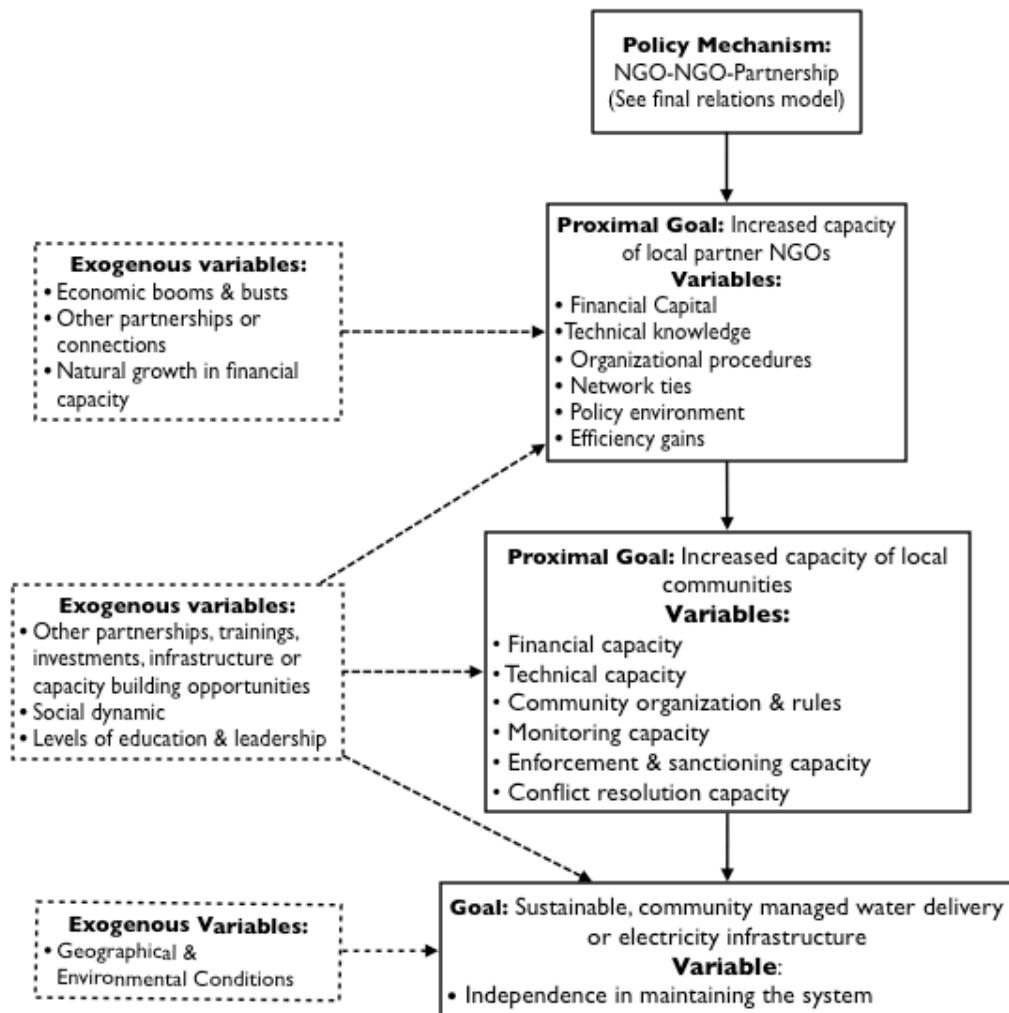
**Table 4.5 Using Indicators to Assess Impact on Case Study Communities**

<b>Capacity</b>	<b>Indicator</b>	<b>Weight</b>	<b>Rationale for Weight</b>
<b>Financial capacity</b>	Sufficient income to cover system expenses	1	Indicates possibility of independent management
	Demonstrated ability to pay for system repairs	2	Demonstrates a degree of independent management
<b>Technical capacity: training</b>	Evidence of formal technical training	1	Indicates attempts at capacity development
	Evidence of informal technical training/mentoring	1	Indicates attempts at capacity development
<b>Technical capacity: maintenance</b>	Ability to troubleshoot and maintain system independent of Partnership support	2	Demonstrates a degree of independent management
<b>Community organization structures &amp; rules</b>	Changes in or development of community organizations	1	Indicates attempts at capacity development
	Changes in and development of rules	1	Indicates attempts at capacity development
<b>Monitoring &amp; accountability: monitoring community compliance</b>	Clear records of community payments	1	Indicates possibility of independent management
<b>Monitoring &amp; accountability: committee accountability</b>	Regular committee meetings	2	Demonstrates a degree of independent management
	Regular meetings with the community	2	Demonstrates a degree of independent management
	Community knowledge of committee positions and responsibilities	1	Indicates possibility of independent management
	Public tracking of committee tasks and duties	2	Demonstrates a degree of independent management
<b>Enforcement &amp; sanctions: ability to collect payments</b>	Ability/willingness to enforce rules	2	Demonstrates a degree of independent management
<b>Conflict resolution</b>	Conflict resolution rules and procedures	1	Indicates attempts at capacity development
	Evidence of conflict resolution training	1	Indicates attempts at capacity development
	Ability to resolve conflict	2	Demonstrates a degree of independent management
<b>Total Points Possible</b>	-	<b>23</b>	-

## 4.6 Final Impact Model: Variables & Exogenous Influences

The final impact model for this project, depicted in figure 4.2, was developed by combining the simple impact model with the capacities identified in this chapter. This impact model delineates the expected outcomes of the Partnership's development model, including variables that were measured for the impact assessment and exogenous variables that were taken into account. It also calls attention to potential exogenous variable that my impact indicators at each level. Appendix D outlines the questions asked and sources consulted in order to operationalize these indicators.

**Figure 4.2 Final Impact Model**



## Chapter 5: NGO Capacity Building

In the process of working jointly on individual projects, both NGOs increased their technical and financial capacities. In between projects, the NGOs remained in close contact, planning for new projects and supporting each other as necessary. The skills and resources exchanged between NGOs while working on individual projects has had cumulative effects on the capacities of each NGO partner. For this reason, in order to fully assess the impact of the Partnership it is important to examine the exchange between the NGOs independently of the individual projects.

As elaborated in the theoretical background, there are four levels at which capacity building for the two NGOs may have taken place: the individual, organizational, network, and institutional levels. The partnership literature and the Partnership's policy theory also suggested that there would be areas in which the partnership increased capacity at both NGOs but did not seek to transfer the knowledge or skills to the other partner. In these areas, each NGO should assume responsibility for activities in which it has comparative advantage, thereby creating a division of labor and increasing overall efficiency. While not capacity development in the sense of knowledge transfer, it does increase overall capacity in achieving joint and individual goals. This chapter examines the impact of the Partnership on each of these levels of capacity development as well as capacity increases through division of labor.

### 5.1 Individual Capacity Level

#### 5.1.1 Financial Resource Capacity

One of the primary capacities that GrnEmp and AsoFénix sought to develop through their partnership is an increase in financial capacity. Without funds, it is nearly impossible to accomplish any development goal. Greater access to financial resources builds capacity by creating stability and by allowing the NGO to grow, expand technological expertise, and provide support to a greater number of local communities. For AsoFénix, increased financial capacity was measured by an overall increase in access to funds. Increased financial independence, indicating that the Northern partner was not benefiting disproportionately, was indicated by growth in independently secured funds and independently funded projects. For GrnEmp, increased financial capacity was measured by any increase in funding made possible by the Partnership.

##### a) Financial Capacity AsoFénix

###### *Increased Access to Funding*

When the Partnership between GrnEmp and AsoFénix began, AsoFénix had only one employee: the Executive Director (ED). He was introduced to the Executive Director of GrnEmp by means of a mutual acquaintance because of their shared interest in rural development. The ED of AsoFénix had previously worked with Grupo Fénix, another local NGO focusing on development in Nicaragua, but he had begun to feel that too much emphasis was placed on training and “not enough was being done to provide beneficial

technology to the communities” (AsoFénix ED, January 28, 2011). In 2001, he began to organize communities on his own, supported almost entirely by funding and technical expertise from GrnEmp. In the beginning “all of [his] funding came from Green” (AsoFénix ED, March 22, 2011). In the opinion of AsoFénix’s ED, the Partnership developed and has been successful because the organizations have “matching goals” (AsoFénix ED, February 24 and March 22, 2011).

By all accounts, in the early years AsoFénix resembled more of a “one-man-show” than an organization (AsoFénix ED, GrnEmp ED, GrnEmp Technical Director [TD], GrnEmp Program Director [PD], 2011). GrnEmp staff members report that as late as 2006 the AsoFénix ED was “sleeping on his sister’s couch. There was no office. E-mail was done in Internet cafes. We went everywhere by bus” (GrnEmp TD, April 19, 2011). GrnEmp and AsoFénix were “like sister organizations”; and, with funding secured by GrnEmp, the Partnership installed their first potable water system in Candelaria in 2004 (AsoFénix ED, February 24, 2011). Given AsoFénix’s size and inexperience, it was unlikely to be able to raise sufficient funds from aid agencies or foundations looking to fund development projects. At the same time, GrnEmp had already provided technical and financial support for projects in Nicaragua, Malaysia, and the Philippines, and had a full-time engineer on staff (GrnEmp, 2011). It was not until late 2008 and 2009 that AsoFénix was able to hire full-time social and technical staff to relieve some of the burden from the Executive Director, but over time AsoFénix slowly developed its own resources.

As annual budgets reflect the amount of resources being funneled between organizations, as well as a pattern over time, they were analyzed to see what percentage of funding came from GrnEmp and other organizations. Table 5.1 depicts complete budget information for the years available. AsoFénix did not have comprehensive accounting procedures until 2007, several years into the partnership; as the number of funders increased, so did the need for thorough accounting practices. Because organizational budget information is only available for AsoFénix from 2007-2010, statements from AsoFénix and GrnEmp staff, payment records, and individual project budgets are the only records of AsoFénix’s financial status in the early years of the Partnership.

**Table 5.1 AsoFénix Budget and Funding Sources 2007-2010**

	2007	2007%	2008	2008%	2009	2009%	2010	2010%
<b>GrnEmp Funds</b>	24,914	22	48,710	30	50,397	28	86,725	39
<b>Other Private Donors</b>	70,080	63	103,500	63	70430	39	37,018	17
<b>Government Agency Funds</b>	16,186	15	11,311	7	60,850	33	100,437	45
<b>Total AsoFénix Budget</b>	111,180	100	163,521	100	181,677	100	224,181	100

In the absence of overall budget numbers for AsoFénix, project budgets from Candelaria in 2005 and Potreritos in 2006 were used to reconstruct the flow of money to AsoFénix for those years. AsoFénix’s Executive Director and accountant confirm that those were the only

projects AsoFénix was involved in until 2007, and therefore the organization's only source of funds (AsoFénix ED, February 24, 2011; AsoFénix Accountant, April 18, 2011). Table 5.2 shows that GrnEmp provided nearly all of the funding for both of these projects. In both cases AsoFénix was able to secure in-kind contributions from ENACAL, the government agency in charge of water provision. In Candelaria, ENACAL helped conduct health workshops, build the water tank, and drill the well. In Potreritos, AsoFénix again obtained pipes for the delivery system and materials and expertise in constructing the water storage tanks from ENACAL. The value of these contributions represented 29 percent of the budget in Candelaria and 34 percent in Potreritos, but in-kind donations cannot be used to pay rent, phone bills, Internet connections, or salaries. Consequently AsoFénix was largely dependent on GrnEmp to fund everyday operations and pay salaries. Not until 2007 did AsoFénix independently procure its first donation from a private international donor. This represented a significant step toward financial independence.

Statements from staff members at both organizations and financial information suggest that GrnEmp was essential to providing initial financial support and stability at AsoFénix. Without the Partnership, AsoFénix, an inexperienced organization with one employee, was unlikely to have secured funding for early projects. Funding coming through the Partnership gave AsoFénix the opportunity to establish a reputation and a foundation for soliciting funds independently. Based upon these findings, it is clear that the Partnership has had a positive impact on financial capacity at AsoFénix.

**Table 5.2 Breakdown of Contributions for Candelaria and Potreritos**

Donor	Candelaria 2004	% Funding	Donor	Potreros 2005	% Funding
GrnEmp - EnerGreen Foundation	\$4,070	10%	GrnEmp - EnerGreen Foundation	\$8,650	19%
GrnEmp - New Earth Foundation	\$19,500	48%	GrnEmp - Doug Swanson Memorial Fund	\$13,000	28%
GrnEmp - International Foundation	\$4995	12%	GrnEmp - International Foundation	\$9,057	19%
<b>Subtotal of GrnEmp Funds</b>	<b>\$28,565</b>	<b>71%</b>	<b>Subtotal of GrnEmp Funds</b>	<b>\$30,707</b>	<b>66%</b>
AsoFénix - Other Private Donors	\$0	\$0	AsoFénix - Other Private Donors	\$0	0%
AsoFénix - Government Agency (in-kind) - ENACAL	\$11,830.00	29%	AsoFénix - Government Agency (in-kind) - ENACAL	\$14,800	32%
AsoFénix - Community	\$0	0%	AsoFénix - Community	\$1,140	2%
<b>Subtotal of AsoFénix Funds</b>	<b>\$11,830</b>	<b>29%</b>	<b>Subtotal of AsoFénix Funds</b>	<b>\$15,940</b>	<b>34%</b>
<b>Total Project Budget</b>	<b>\$40,395</b>	<b>100%</b>	<b>Total Project Budget</b>	<b>\$46,647</b>	<b>100%</b>

### ***Increased Financial Independence***

Having established that the Partnership increased AsoFénix's access to funds, the literature suggests the importance of also determining whether AsoFénix has remained dependent on GrnEmp for financial stability. NGO Partnerships have often been found to

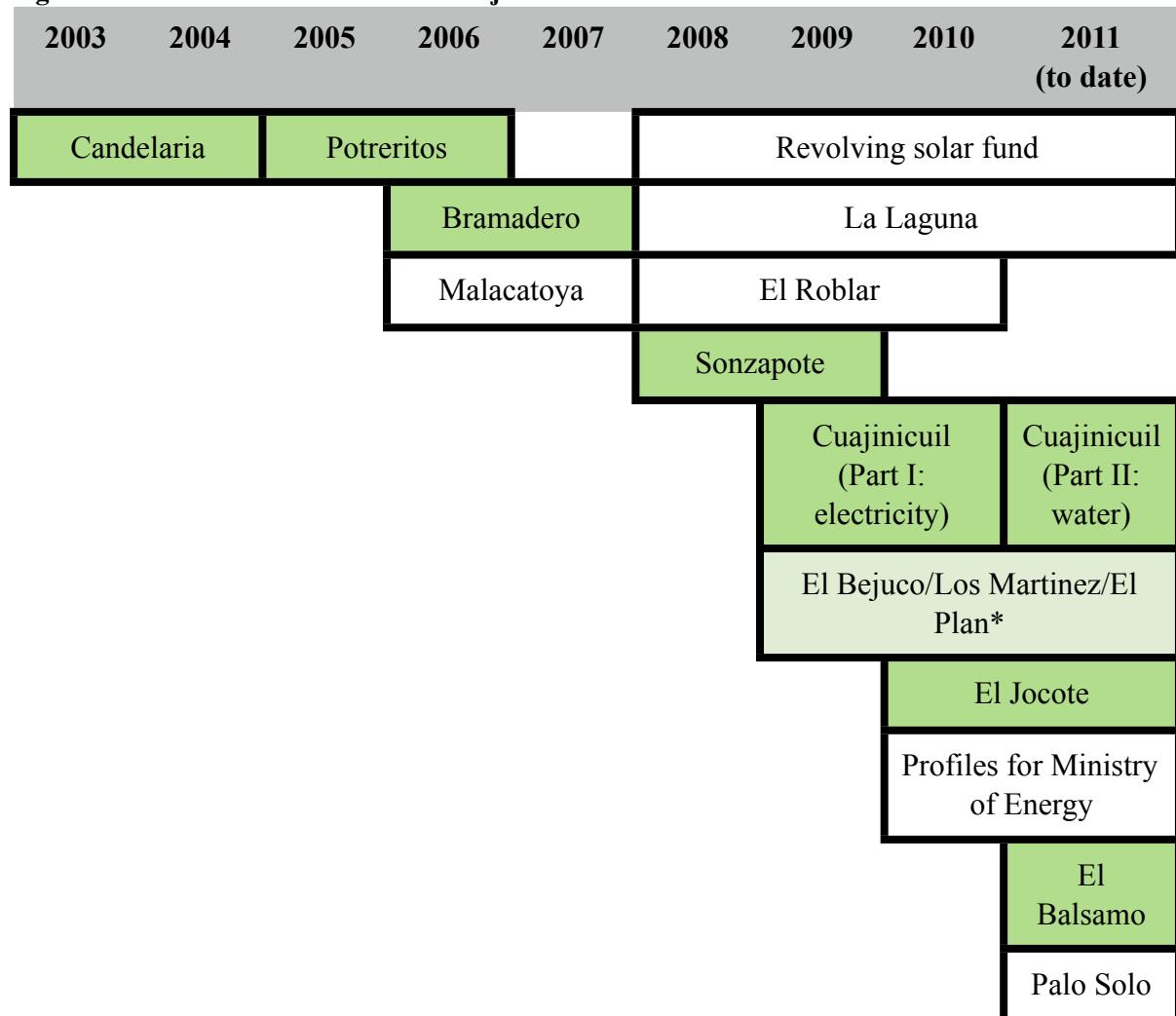
disproportionately benefit Northern NGOs, creating few avenues for Southern NGOs to develop autonomy (Postma, 1994; Fowler, 1998). Evidence of AsoFénix's increasing financial independence would negate the possibility the Partnership is increasing capacity without actually developing independent capacity at AsoFénix. Together, tables 5.1 and 5.2 show that GrnEmp provided the majority of initial funding for AsoFénix, but that over time, AsoFénix has been able to develop other ties and develop independent sources of funding. This indicates that the Partnership has not merely created stability through dependence, and that AsoFénix has been able to gradually grow beyond the Partnership.

Examining the trend in funding for Partnership projects (table 5.3) and in the number of projects undertaken by AsoFénix (figure 5.1) provides further evidence that the Partnership has helped AsoFénix develop its own financial capacity and projects. Until Bramadero in 2007, the percentage of GrnEmp funding for Partnership projects was declining; but, beginning with Sonzapote, GrnEmp once again began contributing the majority of funding for Partnership projects. This could seem to contradict the position that AsoFénix was gaining independence; however, when viewed within the larger context it suggests that partnership with GrnEmp was allowing AsoFénix to dedicate its private resources to developing non-partnership projects. In 2007, AsoFénix received a major donation directly from an international funder: Humanist Institute for Development Cooperation (HIVOS). At the time, AsoFénix was only working on two projects: Bramadero with GrnEmp, and an independently planned micro-hydro turbine in Malacatoya. As it only had two projects, AsoFénix dedicated 58 percent of the HIVOS funds to Bramadero. By the time Sonzapote (2009), Cuajinicuil (2009-2010), and El Jocote (2011) were developed, the number of independent AsoFénix projects had increased, creating greater need to funnel separately raised funds to independent projects. Figure 5.1 presents a timeline of AsoFénix projects, highlighting GrnEmp Partnership projects in Green. It clearly shows that the number of non-partnership projects at AsoFénix has substantially increased over time. It is also important to note that these funds come directly from donor agencies or governments, not partnerships with other NGOs. AsoFénix's ED confirmed that GrnEmp support for joint projects allows AsoFénix to use independently secured funds for overhead and other projects (AsoFénix ED, March 22, 2011). The Partnership therefore does not preclude independent activities. It increases capacity by providing funds and helps it to develop capacity at AsoFénix by helping it build relationships and a reputation, and by allowing AsoFénix to forge other relationships necessary for achieving financial independence.

The number of non-Partnership donors giving directly to AsoFénix has also increased over time. In 2007, HIVOS provided AsoFénix's first independently secured donation. Since then, AsoFénix also received funds from the Alianza en Energia y Ambiente con Centroamérica (AEA -The Energy and Environment Partnership with Central America), municipal governments, the Nicaraguan Ministry of Energy and Mines, and UNICEF. Recently, a former Partnership donor, Renewable World, also expressed interest in providing direct funding to AsoFénix (GrnEmp PD, July 22, 2011). This diversification is demonstrative of increasing independence and stability, as over-reliance on a single funding source, inside or outside the Partnership, increases the risk of financial fluctuations or collapse.

Table 5.3 Partnership Project Budgets

	Candelaria 2004-2005	% Funding	Potreritos 2005-2006	% Funding	Branadero 2007	% Funding	Sonzapote June 2009	% Funding	Cuajinicuil 2009-2010	% Funding	El Jocote 2011	% Funding
<b>Green Empowerment Funds</b>	\$28,566	71	\$30,707	66	\$33,450	43	\$53,000	83	38,182	76	71,900	95
<b>AsoFénix - Other Private Donors</b>	\$0	0	\$0	0	\$43,856	56	\$0	0	0	0	0	0
<b>AsoFénix - Government Agency Funds</b>	\$11,830	29	\$14,800	32	\$0	0	\$10,000	16	12,000	24	0	0
<b>Community</b>	\$0	0	\$1,140	2	\$1,140	1	\$1,140	2	0	0	4,000	5
<b>Total Project Budget</b>	\$40,396	100	\$46,647	100	\$78,446	100	\$64,140	100	50,182	100	75,900	100

**Figure 5.1 Timeline of All AsoFénix Projects**

\* AsoFénix and other funders initiated the project in el Bejuco, and support from GrnEmp was sought later.

A final sign that the Partnership has not fostered dependence is found in increased initiative on the part of AsoFénix in channeling financial support from GrnEmp. In 2009, AsoFénix applied independently for a contract to provide hydroelectricity to three communities in the municipalities of San José de los Remates and Santa Lucía: El Bejuco, Los Martinez, and El Plan. Funding for infrastructural work and equipment had been approved by AEA, and local governments raised additional funds to support the project. Because these funds could only be applied to equipment, GrnEmp helped AsoFénix secure funding from donors to support community development work, personnel costs, installation management, and technical oversight of the project (SG Foundation Project Update, 2011). Having developed a positive reputation and relationships in the Boaco region, AsoFénix is increasingly involved in broader development plans. It is also well positioned to take advantage of recent increases in funding for renewable energy (GrnEmp ED, July 26, 2011). Through GrnEmp, it is able to seek additional sources of private funding that can be used to supplement local resources and expand coverage to more communities. Whereas before GrnEmp was involved in project planning, for this project it played more of a supporting, fundraising role. One instance does not make a trend, but GrnEmp staff has noticed a shift to a more ancillary, funding-focused

role as AsoFénix forges new connections and generates its own projects (GrnEmp Intern Coordinator, July 26, 2011). This flexibility in who initiates projects suggests that GrnEmp respects AsoFénix's independence and is willing to redefine the terms of the Partnership as needs change.

Demonstrated growth in AsoFénix's budget indicates that AsoFénix's financial capacity and independence have grown as a result of the Partnership. Early GrnEmp support allowed AsoFénix to develop expertise necessary to solicit funds independently and gradually develop their own projects. The increase in direct donations, non-GrnEmp funding sources, and independent projects shows that AsoFénix's has developed its own financial capacity rather than remaining dependent on increased financial capacity provided through the Partnership. The fact that AsoFénix can initiate projects and request GrnEmp financial support also indicates that AsoFénix is not a subservient partner. The conclusion is therefore that the Partnership has positively affected both indicators of financial capacity at AsoFénix.

### ***b) Financial Capacity at Green Empowerment***

The Partnership has also been successful in helping GrnEmp to increase financial capacity. For GrnEmp, partnership with AsoFénix meant the opportunity to develop a service-learning program that could be expanded to their partnerships with NGOs in other countries. Service-learning programs and associated trainings bring in a source of undedicated funds and increase connections to potential donors. GrnEmp's PD credits AsoFénix's ED for "entrusting [him] with developing the service-learning projects" that would provide labor, ideas, and funding for both partners while increasing their connections with universities, potential donors, and volunteers" (GrnEmp PD, May 11, 2011). From May 2007 to January 2011, fourteen community and university groups visited AsoFénix sites. These trips helped build GrnEmp's donor and volunteer base, and provided a source of funds. Funding for El Jocote is a key example of the relationships and funding opportunities that service-learning help to build. Over 50 percent of the funds for the solar water pumping project in El Jocote in 2011, about \$40,000, was raised by a Portland-based synagogue, whose representatives visited the community on a GrnEmp-AsoFénix service-learning trip in 2008. AsoFénix's openness to hosting foreign groups and its positive, on-going relationships with communities in Boaco has allowed GrnEmp to publicize its work and develop non-donor avenues of funding.

Because many international donors look specifically for in-country partners, for GrnEmp, Partnership with AsoFénix has opened doors to additional sources of funding. NGOs with local partners are often perceived as more legitimate and productive (Fowler, 1998). Staff at GrnEmp agreed that having local connections made more funding sources available to GrnEmp, thereby increasing their financial capacity. In general, "this type of work is simply not possible without local partners or paid in-country staff that are fluent and savvy in the local language, politics, and culture" (GrnEmp TD, July 22, 2011). However, GrnEmp staff members also noted that "many donors prefer to fund directly the in-country organization once it is stable, thereby reducing the flow of funds through GrnEmp" and that "lots of grants resulted from GrnEmp work without benefitting GrnEmp's bottom line" (GrnEmp TD, July 13, 2011; GrnEmp PD, July 22, 2011). In these cases, all the financial benefits of the partnership flow to local NGO partners. This indicates that benefits to GrnEmp's financial

capacity as a result of the Partnership may decline over time, or may fluctuate as new donors are found and others choose to fund only the local NGO.

Overall, through internships and service-learning programs (which provided undedicated funds and helped develop relationships with potential donors) and through improved access to foundations looking for in-country partners, the Partnership did increase capacity at GrnEmp; however, changes in funding preferences over time may mean that the financial benefits to GrnEmp will be reduced over time.

### ***5.1.2 Technical Resource Capacity***

In addition to building financial capacity, the Partnership has also explicitly sought to transfer and develop technical knowledge and expertise between the two NGOs. Knowledge transfer from GrnEmp to AsoFénix took place by way of formal trainings, mentoring and general support, increases in volunteerism, and fund-raising training and support.<sup>6</sup> Technical capacity building at GrnEmp was evident in opportunities to explore new technologies and learn from observing other AsoFénix projects.

#### ***a) Technical Capacity at AsoFénix***

##### ***Increases in Capacity through Formal Technical Training***

There was considerable evidence that GrnEmp invested in technical training for AsoFénix's ED so that he could contribute more effectively to planning and implementation of Partnership projects. Records indicate that GrnEmp raised funds to send AsoFénix's ED to two separate trainings with Soluciones Practicas, another renewable energy NGO in Peru. The one in 2005 covered both micro-hydro and solar technologies. The second one, in 2009, was a symposium on biodigesters, affording both training and networking opportunities. Funding provided by GrnEmp, also enabled the AsoFénix ED to attend workshops on biodigesters in Mexico and Costa Rica. Even as the number of experienced technical staff at AsoFénix has grown, GrnEmp has continued to support professional development and training opportunities. GrnEmp recently secured funds to send AsoFénix's Lead Engineer to a wind-power symposium in Peru that will be held in November of 2011. Participation in these international technical forums provides valuable opportunities to increase technical knowledge and also to network with and learn from other engineers and development professionals. Because they required international travel, and considerable expense, these training opportunities would not likely have been accessible to AsoFénix without GrnEmp support (GrnEmp ED, July 26, 2011).

There was also record of a four-day "tech transfer" workshop in 2009 that provided valuable training to AsoFénix staff members and interns. The workshop was also attended by university students from around the world and representatives from four other NGOs (GrnEmp TD, July 15, 2011). Content was related to the solar water pumping and renewable

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<sup>6</sup> Increases in personnel, and hence technical capacity, at AsoFénix were also evident. Although some of these increases were likely made possible by funding from the Partnership, in the interest of not double counting benefits, those are not included here.

energy installation at Cuajinicuil, and it was designed by GrnEmp to educate staff at bE, AsoFénix, and other NGOs. This workshop not only documents training but demonstrates how much the AsoFénix ED had learned through the Partnership, as he was responsible for co-leading a visit and explanation of the system in Candelaria (GrnEmp TD, July 13, 2011).

Efforts to formally develop AsoFénix's technical expertise through training show commitment to technical capacity development and skills-transfer. Combined with ample evidence (provided below) that AsoFénix staff members were able to employ these skills in project planning and implementation, they indicate that the Partnership has been directly responsible for increasing technical capacity at AsoFénix.

### ***Increases in Skill through Mentoring***

In addition to the evidence of formal technical knowledge transfer, there was ample evidence of informal mentoring, coaching, and support. GrnEmp engineers have visited AsoFénix at least once a year since 2005 and have been present at all system installations. Statements from staff members at both NGOs, email records, and reports indicate that GrnEmp staff was largely responsible for the technical planning related to Partnership projects. Despite relatively little formal schooling, AsoFénix's Executive Director is known as "el ingeniero" in the communities. As AsoFénix's only permanent "technical" employee until 2009, he was responsible for interpreting guidance from GrnEmp engineers and using it to coordinate administrative and technical duties in Nicaragua until GrnEmp staff arrived for the installation. He attributes much of what he knows to the technical courses he has attended and to his collaboration with and observation of GrnEmp over the years (AsoFénix ED, March 22, 2011).

The opportunity to observe troubleshooting of the pump in Bramadero in 2011 shed light on the many ways in which information is transferred through the Partnership. In April of 2011, GrnEmp's TD visited Nicaragua to assist with installation of the water system in El Jocote, and AsoFénix also requested his assistance on troubleshooting the broken DC pump at Bramadero. During the visit to Bramadero, the GrnEmp TD often took the lead, but the AsoFénix ED and Engineer and several engineering interns also provided input. None of the five engineers present was able to identify the problem, but together they tested different theories, ruled out problems, and compiled information and questions to provide the manufacturer. In the process, all those involved learned from the thoughts and expertise of the others. It was also an opportunity to see that although the AsoFénix ED is not an engineer, he has learned a great deal from participating in installation and maintenance of the projects over the years. He and the GrnEmp TD agreed that GrnEmp visits to Nicaragua had always provided excellent opportunities for visiting existing sites, performing troubleshooting and maintenance, evaluating future project sites, and sharing skills and information.

Statements from NGO representatives and observations of the mentoring process indicate that Partnership with GrnEmp has had a positive impact on technical capacity development at AsoFénix. This conclusion is further supported by evidence that AsoFénix's independence and responsibility for various aspects of each project has grown over time as discussed below.

### ***Increasing Responsibility for Partnership Projects***

Over time, AsoFénix has been able to take on more of a technical role in designing projects. For the first water installation in Candelaria, correspondence confirms that technical expertise was largely provided by staff at GrnEmp. Assistance included preparing detailed lists of materials that needed to be purchased for the installation and specific instructions about how and why these items were important (Instalacion Technica de Candelaria, 2004). Given AsoFénix's lack of technical expertise at the time, these documents were essential to moving the project forward, served as a means of educating AsoFénix personnel, and provided a record for future projects.

During the second installation, GrnEmp again provided the majority of technical planning; however, money in the budget was also provided to hire two local engineers as consultants. They helped with organizing materials before the arrival of the GrnEmp TD, and were also present at the installation to provide assistance and learn from the process. By providing financial resources for local staff, the partnership began to build a network of local engineers and experts that AsoFénix continues to draw upon. This indicates both technical capacity building and network capacity building, discussed in greater detail below. After the project a step-by-step review of the installation was created in both English and Spanish. By including pictures and detailed explanations of the installation process and setbacks, the report provided a valuable record for future training and planning purposes, as well as a chronicle for donors.

According to project reports, AsoFénix was given more responsibility in Bramadero for collecting design parameters and supervising the installation of the well. The Partnership was also able to source the solar panels through a Nicaraguan solar company, permitting AsoFénix to do much of the communication and advancing toward the goal of “build[ing] the entire renewable energy supply chain in Nicaragua” (Bramadero Final Project Report, 2007). The AsoFénix ED was also able to draw on all of his experience to provide an overview of the system and its major functions for Bramadero’s committee. GrnEmp’s TD led the installation and was responsible for most of the design, but AsoFénix’s technical contributions had steadily increased by this point.

As AsoFénix’s financial capacity has grown, it has been possible to hire permanent technical staff. Because increased financial capacity has already been attributed to the Partnership, counting increased staff might result in double-counting of Partnership benefits. Nevertheless, increases in staff combined with evidence of mentoring are important indicators of increasing independence and transfer of responsibility. In 2009, AsoFénix hired their first permanent engineer, an engineering student from the National Engineering University in Managua. Since being hired he has worked primarily for non-Partnership projects, leaving the technical planning for GrnEmp-AsoFénix projects to GrnEmp engineers and Partnership interns (AsoFénix Engineer, April 14, 2011). The presence of GrnEmp technical support frees his labor for other projects, increasing but necessarily developing capacity. While the Engineer’s time has thus far been directed at non-Partnership projects, both GrnEmp and AsoFénix hope that AsoFénix engineers will manage future installations. The solar water pumping installation at El Jocote in 2011 set the stage for this transfer of duties. Engineers from both organizations were present. The full-time AsoFénix Engineer

might have been able to manage the installation on his own, but AsoFénix requested that GrnEmp's TD, who had installed systems in three other Nicaraguan communities, be present to provide him with support (GrnEmp ED, May 12, 2011). The engineers collaborated successfully on the installation, working through challenges together. Having now participated in an installation, the AsoFénix Engineer should be able to manage future installs on his own, bringing GrnEmp closer to the goal: "that [AsoFénix] depends on GrnEmp technical assistance less and less" (GrnEmp ED, May 12, 2011).

By mentoring AsoFénix staff and gradually increasing AsoFénix's technical responsibilities for individual projects, GrnEmp has helped to develop technical knowledge, expertise, and overall capacity at AsoFénix. In continuing to provide technical support for Partnership projects despite increases in local personnel, the Partnership also allows AsoFénix to devote its technical staff to independent projects, thereby increasing the total number of projects on which AsoFénix can work.

### ***Increased Capacity Through Volunteerism***

Another way in which the Partnership has increased and built capacity at AsoFénix is through its burgeoning internship program. Interns from the United States, connected to AsoFénix via GrnEmp, provide a valuable source of free labor and bring expertise in engineering, communications, and website-development. The benefits of such labor are made evident through the example of the Engineering Intern present at the time of this study who had committed one year of his time to working for AsoFénix. In addition to helping AsoFénix staff with projects not related to GrnEmp, he was responsible for nearly all of the planning for the water system in El Jocote. This freed GrnEmp engineers and AsoFénix engineers for other projects. Not only do these interns provide valuable technical support, they increase intercultural exchange and communication between the two organizations. By interacting with and managing foreign interns on a daily basis, AsoFénix staff members gain valuable insight into work-styles and customs in the United States (GrnEmp TD, July 13, 2011).<sup>7</sup>

One difficulty with this kind of support is that as interns leave, capacity is again diminished. It could therefore be argued that interns do not actually build capacity; they only provide a temporary boost. Recognition that short-term volunteers can also drain resources has led to conscious efforts to maximize the capacity building nature of this exchange (Engineering Intern, June 15, 2011) and to ensure that Interns serve for longer periods of time (GrnEmp PD, July 22, 2011). Development of manuals and resource materials (in Spanish) that can be left behind are a key component of this local capacity development. As permanent staff at AsoFénix grows, there could also be more effort to have employees and interns work together directly, sharing knowledge and skills. In the absence of permanent funding for local engineering staff, the contributions of interns, which allow more projects to be developed and installed, is deemed more important to increasing and developing capacity than any potential losses in knowledge. In addition to greatly increasing the technical capacity on-the-ground, interns also provide a source of unrestricted funding that can be used to cover overhead costs

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<sup>7</sup> Intercultural exchange and exposure to different backgrounds and customs is not unique to GrnEmp interns. Similar benefits come out of the collaboration with MCC and interns that come from other countries, not through GrnEmp.

—funds that are particularly difficult to get from foundations.<sup>8</sup> Overall, AsoFénix greatly values this source of assistance and expressed an interest in hosting future interns with grant-writing expertise and varied engineering field experience (AsoFénix ED, February 24, 2011; GrnEmp Intern Coordinator, March 10, 2011).

By increasing access to volunteers with critical skills, the Partnership has provided a valuable source of free labor and has increased technical capacity at AsoFénix. Interns not only supplemented local technical expertise but they increased exposure to different work-styles, skills, and problem-solving approaches. While volunteers provide only a temporary boost to local capacity, they do increase the number of projects that can be developed and efforts have been made to mitigate information loss. In the context of international development, where securing funds for permanent staff is always a challenge, the benefits of temporarily increased capacity were deemed more important than the shortcomings. By providing volunteers who bring additional technical expertise, Partnership with GrnEmp has had a positive impact on technical capacity at AsoFénix.

### ***Increased Capacity through Development of Fundraising Skills***

GrnEmp has also helped AsoFénix develop skills essential to successful financial development. While not a technical skill in the same way as engineering skills previously discussed, the ability to successfully solicit funds depends on a variety of specific skills, including an understanding of the language, format, and procedures of potential donors. By initially providing the majority of grant writing and reporting services for AsoFénix and allowing AsoFénix to use templates from GrnEmp grant applications, GrnEmp exposed AsoFénix staff to funding and reporting procedures. This support allowed AsoFénix time to internalize knowledge and adapt to external requirements. GrnEmp also provided guidance on how to develop a multiyear plan and budget, and organize visits from potential donors (GrnEmp TD, July 13, 2011). Over the years, AsoFénix has become more adept at submitting proposals, keeping track of reporting requirements, and interfacing directly with donors (AsoFénix ED, February 24, 2011; GrnEmp Intern Coordinator, March 10, 2011). Nevertheless, GrnEmp staff members continue to revise AsoFénix proposals, provide suggestions, and prompt AsoFénix to deliver updates and reports (GrnEmp Intern Coordinator, March 10, 2011). Through this process, AsoFénix staff learns how to construct more concise, professional proposals for potential donors, and increase their understanding of donor expectations. Though AsoFénix has made progress in these areas, grant-writing and reporting are areas where AsoFénix “still needs more help” and will be looking for long-term volunteers through GrnEmp to provide additional training and support (AsoFénix ED, February 24, 2011).

Overall, by mentoring AsoFénix staff on fundraising procedures and skills, GrnEmp helped to increase AsoFénix’s technical capacity related to fundraising.

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<sup>8</sup> GrnEmp Interns, and some other foreign interns, must pay a monthly internship fee. For those that come through GrnEmp, the fee is split between the two organizations. Most interns also live in rooms above the AsoFénix office and pay room and board to the organization. Depending on the number of interns, these fees can completely off-set the expense of rent and utilities at the office. At the time of this study there were between two and five interns living above the office at all times, though not all of them came through GrnEmp.

### **b) Technical Capacity at Green Empowerment**

Interviews with GrnEmp staff indicated that there were several areas in which partnership with AsoFénix on projects in Nicaragua helped GrnEmp to develop their own technical capacity. In Candelaria, Bramadero, and Potreritos, GrnEmp and AsoFénix jointly secured funds for smaller supplemental projects like rain-gardens and biogas digesters. Each of these projects afforded GrnEmp staff time and money to conduct research and further develop their expertise in these areas. Expansions into new areas also allowed GrnEmp to attract new partners and interns (GrnEmp PD, May 11, 2011). In particular, initial research on biogas led to the development of an international network of NGOs and businesses dedicated to “research, development, implementation, and diffusion of biogas digesters for the purpose of better managing natural resources and to promote socioeconomic wellbeing in Latin America and the Caribbean”: RedBioLAC (RedBioLAC website). This contributed to both technical and network capacity at GrnEmp. Partnership with AsoFénix and blueEnergy for the energy installation at Cuajinicuil “allowed [GrnEmp] to develop and demonstrate experience with wind turbine technology and provided leverage to secure funds for future wind projects” (GrnEmp PD, May 11, 2011). The opportunity to investigate new technologies and develop new contacts has been an important source of technical capacity at GrnEmp.

The partnership also exposed GrnEmp to methods for communities organizing and new ideas and models of development. Through years of working with and observing AsoFénix, GrnEmp staff has learned much about how to motivate and empower communities (GrnEmp ED, July 26, 2011). In 2009, AsoFénix independently developed a revolving microcredit scheme, allowing households in several poor communities to finance solar panels for their homes with no-interest loans. The model allowed farmers to create their own repayment schedules based upon personal cash flows. When families repay the loan, money is put back into the revolving fund to support purchase of solar systems by other members of the community, or to support households in neighboring communities who are also unconnected to the national grid. According to GrnEmp’s ED, knowledge gained from watching AsoFénix interact with communities has been applied in other areas where GrnEmp works, and the revolving fund model is under consideration for projects with partners in other countries (May 12, 2011).

Based on evidence from interviews with GrnEmp staff, the Partnership increased capacity at GrnEmp by affording opportunities to work with new technologies and by exposing GrnEmp staff to new project ideas.

### **5.2 Organizational Capacity Level: Improved Organizational Procedures**

Organizational capacity refers to processes, procedures, and related skills that allow entities to harness individual capacities and function in an organized manner. In the case of NGOs, these might include tracking and reporting procedures, record keeping, and other management processes and skills.

In general, it appears that the Partnership has had minimal direct impact on the development of formal processes or procedures at either organization. GrnEmp staff reported providing

assistance and coaching in developing work-plans and budgets, but there were no formalized procedures put in place (GrnEmp, July 13, 2011). As grant-writing and budgeting support were included under skills development at the individual level of capacity building, they are not counted as organizational capacity building.<sup>9</sup> GrnEmp recognized the need for better processes at AsoFénix, but it appears to have limited its involvement to prompting AsoFénix to develop better procedures on its own (GrnEmp PD, July 22, 2011). Because of time constraints, the reasons for not providing further assistance were not fully explored; but data from interviews suggest that GrnEmp was generally sensitive to the need to empower AsoFénix rather than “bypass [the ED] and take over” (GrnEmp TD, July 25, 2011). Direct interference might have been seen as an encroachment upon AsoFénix’s independence.

AsoFénix has made great strides in accounting procedures, internal record keeping, and personnel management, but these have largely resulted from the ability to hire professionally trained staff. At the time of data collection, a hired consultant was in the process of revising and formalizing personnel policies and accounting procedures and of generally organizing office operations. Pressure to institute these changes came from GrnEmp (GrnEmp PD, July 22), but it was also the result of growth and requirements from other funders (AsoFénix Accountant, April 18, 2011). The funds for these employees have been independently acquired. Because formalization of daily operations appears to have been funded and executed by actors outside the Partnership, these changes are not attributed to the Partnership. Similarly, AsoFénix does not appear to have provided any training or exerted any influence over GrnEmp’s organizational procedures, which were well established when the Partnership was initiated.

With the exception of GrnEmp providing AsoFénix with reporting assistance related to joint projects, internal procedures at each of the NGOs have remained largely independent. This leads to the conclusion that the Partnership did not substantially influence organizational capacity development for either partner. While the lack of impact on organizational capacity could be seen as a failure of the Partnership in this area, it could also be interpreted positively. Independent internal operations means that there was no imbalance of power and that one organization was not dictating procedures and policies for another. As indicated in the Partnership literature, excessive dominance of one partner has the potential to reduce mutual benefit or to shift a partnership relationship into the realm of extension or co-optation (Fowler, 1998; Brinkerhoff 2002a). Because minimal impact on organizational capacity could be interpreted both positively and negatively depending on the specific circumstances, the Partnership’s lack of impact at the organizational level did not influence evaluation of overall performance.

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<sup>9</sup> The decision to include budget support at the level of skills building (individual capacity) was based on the fact that the assistance took the form of informal coaching and occasional assistance, rather than support in developing formalized procedures pertaining to all aspect of operation.

### **5.3 Network Capacity Level: Increased Network Ties**

Fostering ties with other NGOs, development and engineering professionals, donors, and government actors is an important part of capacity development. In particular, increasing network ties increases the possibility of developing new projects and securing new funds.

#### ***Network Ties at AsoFénix***

According to sources at both NGOs, GrnEmp has been important in connecting AsoFénix to potential funders and partners within Nicaragua and abroad. Some donors originally solicited by GrnEmp for Partnership projects now prefer to fund AsoFénix directly (GrnEmp PD, July 22, 2011). GrnEmp facilitated meetings in which AsoFénix could meet representatives from Heifer International or the UNDP (GrnEmp ED, July 26, 2011). As mentioned above, the Partnership has also allowed both NGOs to expand their connections to universities and interns. GrnEmp introduced AsoFénix to contacts at the Nicaraguan Ministerio de Energía y Minas, from whom they have been able to raise over \$31,000 in 2009 and 2010 for non-GrnEmp projects (GrnEmp PD, May 11, 2011). This connection has also led to consulting contracts for AsoFénix in which they were asked to complete feasibility studies on ten potential micro-hydropower sites. This has the potential to significantly expand their involvement with larger-scale regional planning for renewable energy projects throughout Nicaragua (AsoFénix ED, February 24, 2011).

While some initial contacts with national government agencies, international aid organizations, and renewable-energy-focused organizations were made with the help of GrnEmp, contacts with municipal governments and were made independently of the Partnership. AsoFénix may eventually have made similar contacts without the Partnership; however, GrnEmp allowed it to happen more quickly. As AsoFénix only had Partnership projects in its repertoire at the time of introduction, it is reasonable to assume that it was Partnership successes that allowed AsoFénix to be viewed as a potential partner in regional energy development. It is difficult to say that AsoFénix would not have developed similar funding connections and contacts on its own, but evidence suggests that, “initial GrnEmp support was critical to AsoFénix building rapport and to coming through with funding and tech expertise to make the programs happen. Since [the early years], AsoFénix has been able to develop their own links” (GrnEmp PD, May 11, 2011). Although AsoFénix has been able to develop independent connections, Partnership with GrnEmp has likely led to more connections than would otherwise have been possible.

#### ***Network Ties at GrnEmp***

As mentioned in the section on technical capacity at GrnEmp, partnership with AsoFénix has helped GrnEmp develop connections to other NGOs. Work on biogas and wind energy projects leads to connections with eventual members of the RedBioLAC and with blueEnergy. Perhaps more importantly, Partnership projects gave GrnEmp the opportunity to reach out to students, universities, professionals, and community groups and to connect them to specific projects. By hosting interns and helping to organize group visits to project sites,

AsoFénix helped GrnEmp build a solid base of volunteers and potential funders in the United States.

Overall, interview data indicate the Partnership has allowed each organization to increase network ties to individuals, other NGOs and organizations, and government entities.

#### **5.4 Enabling Environment**

While the Partnership did not explicitly seek to influence government policies, which are part of the *enabling environment*, there is some evidence that Partnership projects have helped AsoFénix develop ties to government agencies and build capacity and support for renewable energy at a regional level. According to project reports for Cuajinicuil, partnering with AsoFénix and GrnEmp allows the municipality to fulfill long-term utility provision goals. In Cuajinicuil, support from the Partnership helped spur development that would not otherwise have been possible because limited funds and lack of roads prevent access by heavy equipment needed to install the national grid (Informe Final Cuajinicuil, 2010). Interaction with AsoFénix may also have prompted the regional government to use renewable energy as a means of meeting the region's energy needs. At a renewable energy fair held by AsoFénix in January of 2011, the Mayor of San José announced a plan to train local technicians and develop renewable energy throughout the region (Mayor, Speech, January 28, 2011). In her speech, the Mayor cited Cuajinicuil and other AsoFénix contributions and projects in the region as proof that such development was possible. She also explicitly thanked AsoFénix for propelling projects forward and for bringing renewable energy to the fore. Interviews with local government officials would be necessary to determine the degree to which the Partnership's activities in San Jose influenced the development and adoption of this plan. Nevertheless, the Mayor's statements suggest that AsoFénix's work with GrnEmp and outside the Partnership have furthered the cause of renewable energy in the area, helping to create policies and programs that contribute to a more enabling environment for renewable energy.

Because AsoFénix has worked on Partnership and non-partnership projects in the area, it is difficult to determine whether any of this influence on the enabling environment can be attributed to the Partnership. Some of AsoFénix's original contacts were made in order to facilitate Partnership projects but, as mentioned in the section on network capacity, many ties to local governments were developed without direct facilitation by GrnEmp (GrnEmp PD, July 22, 2011). AsoFénix's relationship with authorities in San José de los Remates and involvement in the local development plan represent an important area of growth and influence for AsoFénix; however, because the relationship between AsoFénix and local governments cannot be immediately traced to the Partnership, it is not considered an impact of the Partnership.

#### **5.5 Increasing Capacity Through Sustained Cooperation & Division of Labor**

While developing the individual capacity of each organization makes sense for financial and technical stability and independence, there are also areas in which the Partnership appeared to increase capacity for both partners without attempting to "develop" those capacities in each other. While this might not be considered traditional capacity development, it is an important

component of the Partnership's impact. It is also consistent with academic literature on Partnerships, which justifies partnerships in part based upon the ability for each partner to contribute according to its own skills and expertise (Bebbington, 1997; Brinkerhoff, 2002b; Lemos and Agrawal, 2006). In the case of the Partnership, each NGO contributes cultural knowledge and skills that increase efficiency for the partnership as a whole. AsoFénix contributes cultural expertise related to community organizing, and GrnEmp maintains communication with English-speaking donors and interfaces with manufacturers.

### **5.5.1 Cultural Expertise & Community Organizing**

While GrnEmp has learned from observing AsoFénix's approach to community organizing (GrnEmp ED, May 12, 2011), it continues to leave the role of interfacing with the community to AsoFénix. This is consistent with the policy theory, and it also seems to make economic sense in terms of efficiency gains from specialization. Culturally, AsoFénix staff members have a better understanding of local customs and they are therefore able to relate more easily. Geographically, it also makes more sense to send someone from Managua to speak with communities than from the United States. Through the partnership, GrnEmp can maintain a local connection to the projects without spending extensive resources on travel and without having to train someone in the intricacies of Nicaraguan culture. Given the work involved in community organizing, this represents a significant source of efficiency and increased effectiveness for GrnEmp.

During each partnership project, AsoFénix has been responsible for mobilizing the community, organizing the work crews, and making sure the community understood the importance of their contribution. In Candelaria, the transition from an *alcaldito* (little mayor), who was solely responsible for making decisions, to a democratically elected committee was a challenge requiring "a close relationship with all of the people involved and... many months of groundwork and follow-up" (Potreritos Final Report, 2006). Interpersonal skills, cultural understanding, and patience are involved in community organizing. Accustomed to being disappointed by government and NGO promises, and unfamiliar with solar technology, some communities were understandably skeptical that AsoFénix could provide them with water using the sun. Consequently, it was especially time-consuming to build trust and motivate the community to work (Candelaria Technician, February 7, 2011; Potreritos Technician, March 3, 2011). Both AsoFénix and GrnEmp believe "that a local organization (such as AsoFénix) is best suited for the community organizing work" as it requires "time, dedication, and attention to the intricacies of the existing community leadership structure" (Potreritos Final Report, 2006). AsoFénix, and its ED in particular, were essential to providing this close connection to the community and to having someone readily available to answer questions and address concerns (Long-term Volunteer, April 18, 2011). Because of geographical and cultural barriers, building such expertise within GrnEmp would likely have been much more expensive and time consuming, and likely less effective.

AsoFénix's location and inherent cultural knowledge of Nicaragua give it comparative advantage when working with communities. By consistently taking responsibility for organizing and mobilizing project communities, AsoFénix has allowed GrnEmp to focus on

areas in which it has more knowledge and expertise. This collaboration is mutually-beneficial and increases the overall efficiency of the partnership.

### ***5.5.2 Cultural Expertise & English-speaking Entities***

Conversely, GrnEmp provides cultural and technical expertise for AsoFénix when it comes to working with U.S. and other English-speaking manufacturers and donors. GrnEmp staff members continue to write proposals and grants that are required in English. GrnEmp also maintains relations with product manufacturers. Interns and technical staff noted important differences between Nicaraguan and Western approaches to warranties and customer relations (GrnEmp TD, April 18, 2011; Engineering Intern, June 15, 2011). Just as AsoFénix has the cultural knowledge to more effectively connect with local communities, GrnEmp has a better understanding of how to make demands of U.S. and international companies. Also, because GrnEmp has a network of partners and projects around the globe, it purchases solar panels, pumps, and other technical equipment on a regular basis. It therefore has more leverage when dealing with companies. Businesses looking to maintain positive standing with a regular customer are more accommodating when equipment malfunctions or technical questions arise (GrnEmp TD, April 18, 2011). Finally, purchasing in the U.S. can offer the advantage of providing warranties which would not be available to Nicaraguan buyers. By facilitating interactions in English, GrnEmp secures better products and product support than would otherwise be available to Nicaraguan partners.

Just as AsoFénix's location and cultural expertise prepare it to interface with Nicaraguan communities, GrnEmp's location and experience provide advantages in dealing with foreign companies. By retaining responsibilities related to English-speaking donors and manufacturers, GrnEmp provides valuable services to AsoFénix. By maintaining the division of labor within these areas of relative expertise, the overall capacity and efficiency of the Partnership are increased. Because both partners have maintained responsibility for areas in which they have comparative advantage, the partnership was found to have a positive impact on efficiency.

### ***5.6 Isolating the Impact: Counterfactual & Exogenous Influences***

In the case of organizational development, it is particularly difficult to rule out external influences or establish a counterfactual. Any organization is likely to increase its budget, expertise, and connections over time. In order to establish the impact of the Partnership, it is necessary to address several questions. What would have happened to AsoFénix without GrnEmp's initial support? How would capacities at each organization have evolved without the Partnership? What other influences may explain observed changes in capacity development? In an effort to ensure that no changes in NGO capacities are misattributed to the partnership, the following section addresses these questions as best possible.

#### ***5.6.1 NGO Development Without the Partnership?***

In the absence of the Partnership, it is absolutely possible that either organization could have found other partners with whom to work and would eventually have developed the same

breadth of expertise. However, such a scenario would only have diverted the focus of this impact assessment to a different set of relationships. Regardless of whom or what provided the initial support, it remains unlikely that international foundations and government agencies would have begun to support AsoFénix had it not been able to demonstrate previous successes. During the early years of partnership, AsoFénix was a young organization without a formal office or staff and with minimal project implementation experience. GrnEmp had several years of experience, more connections, and greater technical expertise. Accounts from all involved suggest that early financial and technical assistance from GrnEmp made those projects possible and allowed AsoFénix to develop a reputation. From the perspective of GrnEmp's TD, "AsoFénix represents a true GrnEmp success story" (April 29, 2011). In the early years there was no evidence of other partnerships or sources of technical and financial support, but they did receive external support for community organizing and on-going training. Without GrnEmp support, AsoFénix would likely not have been able to demonstrate its competence in mobilizing local communities.

Likewise, without AsoFénix, GrnEmp would not have been able to organize communities in Boaco and install the systems currently in place. As discussed in subsequent chapters, it is also unlikely that the projects would still be functioning if not for AsoFénix involvement. The GrnEmp model depends upon cooperation with local partners. Without the local connections and expertise of these partners, GrnEmp's credibility and effectiveness in Nicaraguan communities would be greatly reduced. Cultural knowledge and trust-building provided by AsoFénix are essential to project success. Partnership with AsoFénix does not preclude partnership with other NGOs. GrnEmp has at least one other partner in Nicaragua, and many others around the globe. In determining the impact of AsoFénix on capacities at GrnEmp, employees were asked to identify contributions unique to the Partnership; therefore, the benefits they cited (access to funding requiring a local partner, increased network connections, and exposure to new project models) can fully be attributed to the dynamic of this particular partnership.

### ***5.6.2 Exogenous Influences***

The AsoFénix ED did receive some external education prior to the Partnership but attributed much of his technical knowledge to mentoring and experience gained while collaborating with GrnEmp (February 24, 2011). Obviously, the new AsoFénix Engineer received his training from an outside source. The Partnership cannot accept responsibility for his technical expertise, but it may claim limited responsibility for helping AsoFénix become stable enough to hire permanent personnel. As previously mentioned, growth in organizational capacities cannot be attributed to the Partnership, and some network connections were the result of AsoFénix initiative.

The most important source of exogenous capacity development not already elaborated was early volunteers not related to GrnEmp. The Mennonite Central Committee (MCC) began providing dedicated long-term volunteer couples as early as 2007. These couples lived in Nicaragua and worked with communities for up to three years, and they were instrumental in providing on-going support within individual communities (Committee Members, Candelaria, February 8, 2011); Residents, Bramadero, March 15-17, 2011). MCC's

contribution included salaries for volunteers and payment of their expenses. While the support was not directly financial or technical in nature, it provided a valuable source of free labor, allowing AsoFénix to develop stronger ties to communities and provide on-going mentoring and support for the committees. For an organization without the resources to hire paid staff, long-term volunteers was highly valuable. AsoFénix also developed independent ties to organizations in Sweden and benefitted from the help of young volunteers who lived in communities for several months. These volunteers had a range of expertise and provided many of the same skill-building benefits provided by GrnEmp interns. As AsoFénix grew, its visibility also increased. By 2010 volunteers could learn of AsoFénix through their website and could contact AsoFénix directly to offer their services. The impact of these additional human resources, particularly long-term volunteers, cannot be overlooked.

The existence of other sources of capacity building does not negate the importance of the Partnership to overall capacity building. Throughout this analysis, effort has been made to distinguish the impact of these exogenous capacity building influences from those of the Partnership, and the conclusions below are based upon those efforts that can be immediately traced to the Partnership.

## 5.7 Discussion & Conclusions: the Partnership & NGO Capacity Building

Drawing from the evidence above, table 5.4 summarizes the Partnership's impact on each of the indicators outlined in chapter 4. Based on these findings, the Partnership's impact on capacity development at each NGO, on independence at AsoFénix, and on overall efficiency was determined.

**Table 5.4 Impact of Partnership on NGO Capacity Development**

Capacity	Indicator	Indicators Specific to Capacity at AsoFénix	Indicators Specific to AsoFénix's Independence	Indicators Specific to Capacity at GrnEmp	Indicators Specific to Efficiency
Financial capacity at AsoFénix	Increased access to funding	Yes	-	-	-
	Growth in independently secured income and independent projects	Yes	Yes	-	-
Financial capacity at GrnEmp	Increased access to funding	-	-	Yes	-
Technical capacity at AsoFénix	Formal training	Yes	-	-	-
	Mentoring, skills development, and technical support	Yes	-	-	-
	Increased in technical responsibility on Partnership projects	Yes	Yes	-	-
	Increased capacity through volunteers	Yes	-	-	-
	Increases in other skills	Yes	-	-	-
Technical capacity at GrnEmp	Increased technical knowledge	-	-	Yes	-
Organizational Capacity	Improvements in reporting procedures and management practices at AsoFénix	No	-	-	-
	Improvements in reporting procedures and management practices at GrnEmp	-	-	No	-
Network Capacity	Increase in network ties at AsoFénix	Yes	Yes	-	-
	Increase in network ties at GrnEmp	-	-	Yes	-
Enabling Environment	Increased influence over the regional planning process	No	-	No	-
Increased capacity due to division of labor	Efficiency resulting from AsoFénix performing community-organizing work	-	-	Yes	Yes
	Efficiency resulting from GrnEmp interfacing with foreign manufacturers and donors	Yes	-	-	Yes
Total Number of Indicators	16	9 of 11	3 of 3	3 of 5	2 of 2

### **5.7.1 Partnership Impact on AsoFénix Capacity**

#### **a) Individual Capacity**

The Partnership was found to have had a strong, positive impact on both financial and technical capacity at AsoFénix. Capacity development efforts appear to have been particularly important in the early years of the organization. Nearly all early financial and technical assistance for Partnership projects was provided by GrnEmp, but concerted and successful efforts were made to transfer skills to AsoFénix. Budget numbers, project records, and interviews with members of both organizations support the conclusion that the relationship between GrnEmp and AsoFénix was essential in shifting the organization from a one-man-show to a full-fledged and independent organization. Therefore, the Partnership's impact in this area was found to be high.

#### **b) Organizational Capacity**

Despite other successes, the Partnership was found to have had low impact at the level of organizational capacity. GrnEmp prompted AsoFénix to develop better procedures but did not directly assist with development of internal procedures. Instead, AsoFénix has been able to develop these procedures independently. Given the delicate balance between fostering organizational capacity development and imposing policies and procedures on another organization, lack of direct impact in this area was not interpreted as a failure of the Partnership.

#### **c) Network Capacity**

At the network level, GrnEmp was responsible for connecting AsoFénix to key donors and government agencies, paving the way for future projects and funding sources. In addition to organizing these networking meetings, GrnEmp has connected AsoFénix to many universities and individual volunteers. Through its successes the Partnership has helped AsoFénix to build a reputation, which has been essential to its ability to forge new alliances with funders and organizations outside of the Partnership. Because of the important connections made possible by the Partnership, its impact on network capacity at AsoFénix was found to be high.

#### **d) Enabling Environment**

There was some evidence that AsoFénix has been able to develop connections and influence government programs and policies; however, further investigation would be needed to determine whether the Partnership, or AsoFénix alone, was responsible for these changes. Additional interviews with NGO staff members and government officials would help to determine how connections between AsoFénix and government agencies were made and the degree to which AsoFénix's activities have in fact influenced regional renewable-energy plans. Given the information and time available, it was not possible to attribute policy changes directly to the Partnership; therefore, the Partnership was not found to have an impact on the enabling environment.

Although the Partnership's impact on government actions was found to be low, it is important to note that influencing government policy is not, at this time, an explicit Partnership goal. As influence over regional policies and programs is likely to require concerted effort, failure to influence the enabling environment did not affect evaluation of the Partnership's overall impact.

### ***5.7.2 Partnership Impact on AsoFénix Independence***

The Partnership's impact on AsoFénix's independence was measured by means of three indicators: AsoFénix's ability to access independent sources of funding and develop independent projects; evidence that AsoFénix assumed greater responsibility on Partnership projects; and increases in independent network ties at AsoFénix. In assessing impact, only the Partnership's influence on these three measures was taken into account. The data indicate that the GrnEmp explicitly helped AsoFénix develop financial independence by introducing it to donors and helping AsoFénix staff develop their own fundraising skills. AsoFénix has also been able to increase its share of technical contribution, in large part because of training and mentoring provided by GrnEmp. Once dependent on GrnEmp for financial support and all technical advice, AsoFénix now has its own engineers and the technical resources to develop projects on its own projects. According to sources at both NGOs, this growth was largely made possible by early support from GrnEmp. Finally, by introducing AsoFénix to other NGOs, donors, and government agencies, GrnEmp helped AsoFénix develop ties to other relevant actors and establish its own alliances and projects. Because the Partnership was found to have positive impact on all variables measuring increased AsoFénix independence, the Partnership's impact in this area was found to be high.

### ***5.7.3 Partnership Impact on GrnEmp Capacity***

#### ***a) Individual Capacity***

Partnership with AsoFénix helped GrnEmp develop individual capacities by increasing its access to funds and providing opportunities to research new technologies for Partnership projects. The Partnership allowed GrnEmp to solicit funds from a wider range of donors and to connect to individual donors and volunteers in the U.S.. According to GrnEmp staff, knowledge gained from Partnership projects and research conducted with AsoFénix was transferred to other GrnEmp projects around the world.

Overall, the Partnership was likely less important to individual capacity development at GrnEmp than it was at AsoFénix. This is not surprising given that the two organizations were in significantly different phases of development at the time the Partnership was founded. Because financial and technical benefits were observed despite comparative inexperience at AsoFénix, the Partnership's impact on individual capacity development at GrnEmp was found to be high.

**b) Organizational Capacity**

The Partnership was found to have had no impact on organizational capacity at GrnEmp. When the Partnership was founded, GrnEmp already had firmly established organizational procedures. As there was no need for organizational capacity development at GrnEmp, lack of impact was not considered a failure of the Partnership.

**c) Network Capacity**

At a network level, the Partnership provided GrnEmp with the opportunity to meet and connect with other organizations in Latin America and to develop networks of volunteers and funders at home. In particular, connections for the RedBioLAC and to Nicaraguan wind-energy experts were made possible by the Partnership. The ability to develop service-learning networks with universities and civic groups has also lead to funding opportunities. These connections lead to the conclusion that the Partnership has had a positive impact on network capacities at GrnEmp.

**d) Enabling Environment**

As discussed above, the Partnership was found to have no impact on this level of capacity.

**5.7.4 Partnership Impact on Efficiency Through Division of Labor**

Evidence has shown that both organizations benefitted from the Partnership's division of labor. AsoFénix has obtained significant benefits from entrusting certain donor and manufacturer communications to GrnEmp. These benefits include better warranties and access to English-language donors. This has also allowed AsoFénix to concentrate effort in areas where it has greater expertise and on increasing overall efficiency between the two partners. As AsoFénix continues to establish more financial and technical independence, the value of the partnership is likely to shift increasingly to comparative advantages, increasing overall networking capacity and efficient use of pooled resources.

Perhaps the most important impact of the Partnership on GrnEmp stems from AsoFénix's role in organizing and supporting local communities. GrnEmp staff members openly acknowledge that such work would be much more difficult, if not impossible, without the involvement of Nicaraguan community organizers. Nicaraguan staff understand the local culture and customs, and they are available to work closely with the communities and to address their problems and concerns. This division of labor represents a source of efficiency, as GrnEmp does not have to hire or train permanent staff in Nicaragua. However, in addition to efficiency, it reflects a more culturally sensitive, and likely more effective, method of reaching out to foreign communities in need. Through AsoFénix's connections to communities in Boaco and its ability to mobilize and motivate local people, GrnEmp was able to locate and work with communities that may not have otherwise been receptive to GrnEmp projects. Without buy-in from communities, these projects would not be possible. AsoFénix is essential to securing community support; therefore, partnership with AsoFénix

has had a significant impact on GrnEmp's ability to develop more projects and reach more people.

Because capacity is increased for both organizations through division of labor, the Partnership's impact on efficiency was found to be high.

### ***5.7.5 Final Conclusions on Overall Impact***

Because it has had a positive impact on all of the indicators in the individual and network categories, the overall impact of the Partnership was found to be high. It has also had a positive impact on independence at AsoFénix and on efficiency at both organizations. Of the 16 variables identified, 13 showed improvement as a result of the Partnership. Overall, mutual financial, technical, and networking benefits, as well as increased efficiency and increased independence at AsoFénix were deemed more important than organizational capacity or the enabling environment.

Importantly, the data suggest that capacity building does not only flow one-way. While AsoFénix may have benefited more in terms of capacity building, GrnEmp benefited greatly from AsoFénix's engagement with Nicaraguan communities—a fact widely recognized among GrnEmp staff members. Initial funding, technical expertise, and credibility in the eyes of funders were provided by GrnEmp. AsoFénix contributed legitimacy on the ground and was able to motivate the communities to do their part for the installations.

As the organizations mature and evolve, it is reasonable to assume that explicit need for financial and capacity development may become less pronounced. As AsoFénix continues to grow, its financial and technical expertise will eventually equal that of GrnEmp. While always an essential part of the Partnership, capitalizing on the other partner's strengths and pooling resources toward joint projects are likely to become more important. Future research might explore how organizations transition successfully from capacity development to mutual support and how to sustain healthy partnerships between two fully-developed, independent organizations.

Division of duties related to communication with foreign manufacturers and community organizing are two areas in which the Partnership's impact are likely to be sustained. By continuing to share information and expertise through the Partnership, both NGOs can continue to learn and draw strength from the other's culture and perspective. Similarly, they can continue to jointly explore new technologies and approaches to development. As long as the NGOs continue to work together, GrnEmp can apply for funds that require in-country partners, and AsoFénix can reserve its individual resources for independent projects—thus increasing financial capacity at both organizations. It may also be worthwhile to explore potential for redirecting Partnership efforts toward influencing renewable-energy policy and the enabling environment in Nicaragua. Overall, the Partnership appears to exhibit mutual respect, balance between interdependence and independence, and to have had a positive impact on capacity and performance at each organization. Together the NGOs are able to accomplish more than they would independently.

## Chapter 6: Developing a Baseline and Counterfactual for Communities

In order to properly set the stage for comparison throughout the case study chapters, it is necessary to first outline prevailing conditions in the case study communities before the projects were installed and to determine how the communities would likely have evolved had the Partnership interventions not taken place. As discussed in the methods section, the counterfactual below draws from questions asked in each of the communities, government documents outlining development plans, and comparisons with a similar community that only recently began to develop and install its own water system through the Partnership: El Jocote. These were used to test the premise of the pre-post model, which assumes any change within the communities is the result of the intervention being studied (i.e. it assumes the communities are otherwise static). This counterfactual is meant as an overall examination of tendencies in the region. Where an individual community may have diverged from this generalized counterfactual, it is noted in the individual case study chapter.

### 6.1 Interview Data

For all the case study communities, committee and community members, AsoFénix staff, and volunteers were asked what structures and procedures existed before the project, what living conditions prevailed, and how they felt these would have changed without the Partnership. From this, it was possible to develop a preliminary picture of what life was like before the projects and how it might have been different without them.

In general, resource rules and community organization structures appear to have had minimal influence prior to Partnership installations. According to Long-term Volunteers, each community had, to varying degrees, committees or leaders connected to municipal government to streamline government-community interaction (April 18, 2011). In particular, these committees organized the delivery and preparation of government food donations for school children. Previous forms of organization were most obvious in Candelaria and Cuajinicuil. In Candelaria, the *alcadito* (little mayor) was solely responsible for community decisions. Despite efforts to reconstruct the configuration of these social systems, their precise form and functions remain unclear. Participants appear to attend meetings and perform duties on an ad hoc basis, but the committees did not appear to have set roles or hold meetings independently of outside officials. In Bramadero and Potreritos, community members themselves did not remember any previous leaders or committees. In all cases, there was no evidence to suggest that any committees were related to resource governance.

Although government water and sanitation plans highlight the importance of Comités de Agua Potable y Saneamiento (CAPS), no one in any of the case study communities remembered any community- or government-directed efforts at resource governance. Some community members did mention tree-harvesting regulations, but these were imposed and monitored by the government, not the community.<sup>10</sup> As water is generally abundant in the winter, people collected water at communal areas along rivers or at communal wells. In the

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<sup>10</sup> In an effort to prevent further deforestation, harvesting rules for larger trees are set by the government. In theory, permission for such harvesting must be sought of the land-owner and the government.

dry season, when rivers and public wells ran low, rules were set informally by private land or well owners who still had water.

In Candelaria and Bramadero, the owner of the well determined rules governing water use before the projects. When nearby rivers ran dry, people in Candelaria reported making clandestine trips in the middle of the night to a private well owned by a relatively wealthy community-member (Committee Members and household interviews, February 8, 2011). In Bramadero, some families were able to get water from a private well a few times a week. When that water was insufficient, people would walk to the river in El Jocote, several kilometers away (Bramadero Project Proposal, 2006; Committee Members, Residents, March 15-17, 2011). In 2003, UNICEF installed a sealed and capped well in Potreritos, creating a communal source of water with sufficient flow to supply everyone in the community, even during the dry season. They also provided a *bomba de mecate* (hand-powered rope-pump). Despite government involvement in providing infrastructure, no water committee or rules were established, and no payment system was put in place (Committee Members, March 3, 2011). Though Cuajinicuil does not yet have a water system installed through the Partnership, water is also available year-round from a centrally located, hand-dug well. For the sake of sanitation and privacy, families use separate wells for washing and bathing, and men and women go to different places.

Overall, there was also no awareness in any of the communities of government efforts to develop water committees, or craft local rules. Most communities had norms that determined locations for drinking water collection and for bathing and washing, but none had formal committees dedicated to water or sanitation. Those interviewed seemed to think that committees were unlikely to have developed, as it was the maintenance of infrastructure (pipes, tanks, and solar panels), as well as the collection of fees, that required organization. In the absence of those infrastructure elements, the previous system of informal collection sites and deference to private landowners would have prevailed.

## **6.2 El Jocote**

In order to test the validity of these memories and perceptions, a control community, El Jocote, was selected to illustrate conditions in a community that had not yet benefited from the Partnership. AsoFénix staff helped identify El Jocote as a community that had geographic, social, and environmental characteristics similar to those in the other case study sites. As with the three other water-project communities, it is located in the Teustepe Municipality of Boaco, is composed of poor, subsistence farmers, and faces severe water shortages during the summer dry season. As in the other communities, the water system was the first project that the Partnership or any other outside organization had initiated in the community. Because it had recently been selected as a Partnership projects site, there was reduced risk of selection bias. Those communities that have received AsoFénix assistance may have been chosen because they were perceived to be better equipped to sustain infrastructure, had well-connected or vocal leaders, or were otherwise perceived to be better candidates than other communities under consideration. Each of these factors has the potential to influence project effectiveness and can lead to selection bias. Its selection as a project site helps to rule out differences on any key variables that might lead the communities to develop differently over

time. There was no reason to believe that El Jocote differed substantially in environmental or social conditions at the time that AsoFénix began its partnerships with the case study communities. As a result, current conditions can be used as a proxy for how the case study communities might have evolved without Partnership projects.

The ability to observe and collect data for much of the community organization and installation process also provided valuable insights into how the Partnership model is implemented. Development of a solar water pumping system that will bring water to 45 households began in February, 2011. While communication with the community had begun, which may have led to some changes already, detailed records were kept, including a baseline survey of residents to record pre-project conditions. Any changes are fresh in the minds of both community members and NGO staff.

Despite attempts to select an unbiased and unaffected population, which can help to create an accurate picture of how Candelaria, Potreritos, Bramadero and Cuajinicuil would have evolved without involvement of AsoFénix and GrnEmp, El Jocote is necessarily connected to communities in which work has already been done. In some cases, families have intermarried with families from the case study sites. Nevertheless, because of differences in regional governments, landscape and climate, and sources of livelihood, it was deemed more important to select a community within the immediate vicinity rather than outside of the region. If anything, because of its proximity, information flow between communities might have led to better organization in the control group. These would reduce the gap between observed conditions and what would have been without outside influence, thereby lessening the perceived impact of the experimental project.

Like the other communities, El Jocote is located next to a seasonal river or stream. During the winter months, families go to the river to bathe and collect drinking water either from a nearby well or directly from the river. In the summer months the river runs low, and families have to walk farther to bathe and collect water. As water becomes scarcer, interpersonal conflicts develop, but there is no formal mechanism for resolving them. Despite the scarcity of water, there are no existing committees related to water use. This was apparent during the election of the committee for the Partnership project, as well as in interviews (Community Meeting, February 24, 2011; Residents, March 24, 2011). As in the other communities, some families had access to private, hand-dug wells on their property, for which they made the rules. According to AsoFénix and the community, the government had no plans to install water systems independently of the Partnership.

The lack of organization structures, resource rules, or water infrastructure in El Jocote supports the assumption that these elements would not have developed in the case study communities without the Partnership.

### **6.3 Government Development Plans**

A final important consideration in determining the likely trajectory of these communities is government plans to extend infrastructure to rural communities. La Empresa Nicaragüense de Acueductos y Alcantarillados (ENACAL) is the agency in charge of water provision in

Nicaragua. ENACAL's 2008-2012 plan focuses primarily on providing water to Nicaragua's urban populations with the goal of providing water to 85 percent of urban residents by 2012. For development in rural areas it depends largely on international donations (World Bank Water and Sanitation Program, 2008) and delegates to Fondo de Inversión Social de Emergencia (FISE), mayors offices, and local communities (ENACAL, 2008).

Although small-scale, community-owned projects appear to be the primary strategy for providing poor, rural communities with water, ENACAL's own statistics—as well as observations of existing infrastructure and organizations—suggest that this strategy stems primarily from a lack of resources to fund substantial infrastructure in rural areas. According to ENACAL's 2008-2012 strategic plan, local communities, “with support and supervision from ENACAL”, are responsible for the administration of their own water and sanitation plans (ENACAL, 2008, p. 75). In practice, evidence of support or supervision is generally lacking. According to the same 2008 report, “74 percent of rural communities maintain their water systems with minimal external support” (ENACAL, 2008). The World Bank reported that in 2008, 61 percent of rural communities surveyed in the central region of Nicaragua (where AsoFénix works) still depended on wells, streams, and springs for their water. Of the 34 percent of the population with access to wells, only half have access to wells that have been capped and sealed to prevent contamination. Only 39 percent of the population has water systems that deliver to their land (33 percent) or to a communal tap (6 percent). Until mid-2010, CAPS still did not have formal legal status giving them authority to collect fees and perform other duties necessary for constructing or maintaining a system (Kreimann, 2010). Despite over thirty years of having promoted community-managed, small-scale water systems as a means of providing essential services to rural populations, studies show that only 38 percent of rural communities have CAPS. Most of these were established with assistance from external organizations and developed in order to manage potable water infrastructure donated by development organizations (ENACAL, 2008; World Bank Water and Sanitation Program, 2008; Kreimann, 2010).

Lack of community management organizations (CAPS), payment structures, and tools for maintenance were identified as serious problems facing rural communities (ENACAL, 2008). Without funding structures, most communities lacked the ability to finance system repairs or buy the tools necessary to fix their systems. Given ENACAL's focus on urban areas, the fact that 26 percent of rural communities do not have wells (let alone water running to their homes), and the general scarcity of funds, it seems unlikely that any of the AsoFénix communities would have found the resources to develop their own infrastructure.

These statistics, combined with observations of conditions in other rural communities of Boaco—none of which had running water—, suggest that, if anything, Partnership support allowed these communities to advocate for and mobilize local resources for water projects. Together they were able to leverage outside funds to secure local resources for managing their own water. The existence of the CAPS framework likely made it easier for the NGOs to gain local government support, but testimony from community members and statistics on CAPS indicate they were unlikely to have developed without outside assistance or infrastructure around which to organize.

## 6.4 Considerations for Electricity Projects

Considerations for development of community organization structures and infrastructure are a bit different when it comes to electricity. The observation that no formal community structures existed in Cuajinicuil holds true; however, in the case of electricity, it seems even less likely that committees would have formed. The structure of electricity provision is also different, as both individual systems and grid connections are available. Nevertheless, evidence suggests that Cuajinicuil would not have developed other sources of energy without AsoFénix.

Given the nature of electricity production and consumption, communal organization structures are unlikely to develop without the influence of external actors. The two primary means of obtaining electricity in Nicaragua are connection to the national grid and purchase of individual solar panels. Only in communities where an NGO or other outside entity installed a communal system was community management observed. In all observed cases, people in communities connected to the grid paid individually for their own consumption. No committee was necessary to manage use. When people purchase their own solar panels they accept personal responsibility for their maintenance, again obviating the need for communal management structures.

Preference for individual management is supported by experience with four families in Cuajinicuil who had individual panels. These families were excluded from the group project because their homes were far from the power source, and transmission losses would therefore have been too great. So as not to deny them the benefits of electricity, the Partnership gave families two choices for obtaining renewable energy for their homes: purchasing individual panels for their home with a no-interest loan; or setting up a committee to collect dues, which could be used for maintenance and repairs. In the case of the latter, the panels would be donated. Initially, all four families preferred to purchase their systems individually, or return them to the organization, because they wanted personal ownership over the equipment and preferred not to engage with their neighbors (AsoFénix Community Organizer, February 15, 2011). Only after the benefits of community management were carefully explained by AsoFénix did families agree to consider communal management.

Whether or not Cuajinicuil would have obtained electricity without the partnership depends upon willingness to pay for individual panels and the likelihood that the utility, Union Fenosa, planned to extend the grid to their community. At the time of the installation, only one family in the community had bought an individual panel. Since then it had had several bad harvests and had been unable to repay its debt (Resident of Cuajinicuil, February 15, 2011). Given that family's experience, other members of the community were understandably reluctant to purchase individual panels. Several of those offered panels by AsoFénix considered returning them when they found out they would have to pay for them (AsoFénix Community Organizer, February 15, 2011).

The prospect that Cuajinicuil would have been connected to the grid is also slim. Cuajinicuil, is located in the municipality of San José de los Remates, whose local government collaborates regularly with AsoFénix. The Municipality of San José has developed a region-

wide renewable energy plan and works closely with AsoFénix to help develop its regional goals (Cuajinicuil Informe Final, 2010; Mayor of San José de los Remates, January 28, 2011; AsoFénix ED, February 24, 2011). Given this relationship and the financial support provided by the mayor's office to other AsoFénix projects, it is reasonable to assume that there were no plans to extend the national grid to Cuajinicuil.

Given the data provided above, it seems reasonable to assume that the grid would not have been extended to Cuajinicuil, few families would have bought individual panels, and no electricity management committee would have formed in the absence of the Partnership.

### **6.5 Conclusion: Would management structures have developed?**

Overall, testimony from interviews, examination of government plans, and comparison with other communities suggests that the assumption of the pre-post design—that little change or development would have occurred in the absence of Partnership interventions—is likely correct. Most interviewees were not aware of previous water-management committees or of efforts to develop CAPS. El Jocote, which faced water problems similar to those in other communities, did not develop a water committee or infrastructure on its own. Government funding for water projects and incentives for electric utilities to expand to poor communities are minimal. Finally, given patterns of development in the region, none of these communities were likely to procure the resources to develop infrastructure on their own. By all accounts, the communities are likely to have remained the same in terms of organizational structure and resource use.

## Chapter 7: Candelaria Case Study

In order to properly assess the impact of the Partnership, four case study communities were examined in closer detail. The first of these is Candelaria, a community that comprises approximately 240 people living in just over 40 households. Along with the communities of Potreritos and Bramadero (also case study sites), it is one of many communities located around the peak of San Jerónimo in the Municipality of Teustepe, Department of Boaco. Access requires taking a one-hour bus ride from Teustepe along a deteriorated dirt road, and then walking forty-five minutes. In the rainy season, access may be delayed by the need to cross several large rivers. Before installation of the potable water system in 2004, women and children had to walk between thirty minutes and a half hour to collect water during the dry season, depending on the location of their homes. There was no electricity in Candelaria at the time the project was installed, but the national grid was extended to Candelaria in 2008. However, the pump continues to run on solar electricity.

The first Partnership project, Candelaria is the longest-standing example of the Partnership's impact. As such, it has had the most time to mature, evolve, face problems, and test solutions. It also has the potential to expose long-term shortcomings of the Partnership model.

Just as the Partnership seeks to exchange knowledge between NGO partners, thereby increasing NGO capacity, it also seeks to develop capacities within the local community. As noted previously, the GrnEmp-AsoFénix partnership model emphasizes the importance of local community involvement in projects, from planning through implementation and maintenance, to creating lasting systems. Combining the Partnership's policy theory and literature the following capacities were examined: financial capacity, technical capacity, the existence of rules and organizational structures, monitoring and accountability pertaining to those structures, enforcement and sanctioning capability, and the ability to resolve conflict.

### 7.1 Individual Capacity Level

Financial and technical capacities were the primary variables used to measure the individual level of capacity development for the purposes of this impact assessment. The reliability of the system and the financial and technical ability to troubleshoot and repair the system indicate whether the most essential benefits to the community—the availability of clean water (or electricity)—have persisted beyond the installation phase and are likely to survive into the future. Financial capacity was evaluated by examining community cash flows, determining the extent to which past repairs have been financed by the local community, and assessing the likelihood that the community will be able to finance repairs in the future. Evidence of technical training and the ability of the local community to solve technical problems were taken as measures of technical capacity.

#### 7.1.1 *Financial Capacity*

Although in theory the community is raising enough money to occasionally pay for major expenses, in practice, they rely heavily on AsoFénix assistance. In Candelaria, the solar water-pump failed twice: once in 2007, and again in 2009. The replacement pumps cost

\$1295 and \$2100 respectively, and the more expensive pump included a five-year warranty, reducing concern over repeated failures. Table 7.1 depicts income and expenses in Candelaria. According to approximate calculations, the community fund nets \$47 per month after paying the technician. At this rate, it would take the community approximately 3.6 years to accumulate the funds to buy a DC pump with a five-year warranty. Based upon these numbers, the community could afford to replace the water pump and purchase another warranty every 5 years.<sup>11</sup> This would also leave them with a surplus of \$744 to pay for other maintenance. Despite the apparent availability of funds, the community received substantial assistance from AsoFénix. Replacement pumps were bought using a combination of community funds and donations procured with the help of the Partnership.

**Table 7.1 Financial Status in Candelaria<sup>12</sup>**

Item	Calculation/Source	Cordobas (C\$)	Dollars (\$)
Monthly Dues collected	Committee testimony and approximate calculation based on fees and usage: 35 families x C\$32/month + 15 families x C \$16 cords	1,360	61
Payment of Technician	Committee records	300	13
Monthly Balance	Income vs. Expenses	1,060	47
Total Reserves (As of May 30, 2011)	Candelaria records audited by AsoFénix	14,840	664
Annual reserve accumulation (no other expenses)	(1360 income - 300 technician fees) x 12	12,720	569
Expected Reserves after 5 Years (no other expenses)	(1360 income - 300 technician fees) x 12 months x 5 years	63,600	2,844

While it is difficult to predict maintenance costs over the long term, Candelaria's financial records provide some cause for optimism regarding their ability to finance a substantial portion of major maintenance. However, in reality they have not been required to take over financial responsibility for the project. Therefore, it is necessary to conclude that in Candelaria the Partnership has not been successful in developing financial capacity to manage the project.

### **7.1.2 Technical Capacity: Training**

The desired indicators of training were training records and materials, as well as less formal evidence of acquired skills. However, no clear records of trainings were available. There was

<sup>11</sup> The community would still need assistance from GrnEmp to secure the warranty in the United States, but this would likely be an acceptable level of assistance.

<sup>12</sup> The exchange rate from dollars to cordobas (C\$) used throughout this paper is C\$22.36 to the dollar, based upon to rate on June 15<sup>th</sup>, 2011.

also a notable lack of manuals or materials in the community that could be consulted in case of difficulties, though there were manuals in the AsoFénix office.<sup>13</sup> Nevertheless, the Coordinator and the Technician, both members of the original committee, confirmed that they had received training and interviews, and observations suggested that the Partnership had succeeded in developing some important capacities.

Despite lack of record keeping, Candelaria's Technician had substantial knowledge of the system. He was able to easily describe the system, how it worked, maintenance procedures, and potential problems in great detail. He attributed these skills to his work with AsoFénix staff members, observation, and the trainings AsoFénix had provided. According to the Long-term Volunteers, Candelaria's Technician is "the most highly skilled technician AsoFénix has [in any community] and can fix a variety of problems" (Long-term Volunteer, April 18, 2011). All community members, volunteers, and staff interviewed corroborated that the Technician was able to procure basic equipment from Managua and repair basic problems on his own. They also confirmed that the system had suffered only a few interruptions, and that the system provided sufficient water to meet the community's needs.

Although there was little evidence of formal technical training, there was evidence that the Technician had been mentored and was able to maintain the system; therefore, overall the Partnership has been successful in developing some capacities through training.

### ***7.1.3 Technical Capacity: Maintenance***

The local Technician is fully capable of performing daily and weekly maintenance on the tanks and panels, and of addressing pipe failures without AsoFénix assistance. Nevertheless, the Technician lacks sufficient technical capacity to diagnose pump failure, troubleshoot major problems, and disconnect and reconnect the pump without AsoFénix support. Fortunately, solar panels require only minimal maintenance, therefore advanced electrical knowledge has also not been needed in Candelaria. However, when the pump broke, the Technician called AsoFénix for help in resolving the issue (Technician, February 8, 2011; Long-term Volunteer, April 18, 2011). Among the key issues was how to continue to provide the community with water while the pump was being replaced. As the well is too narrow to allow for buckets, AsoFénix also helped secure a rope pump as a stopgap so that water could still be drawn at the well site. Families had to walk to get water from the well site, but for most the distance was still shorter than to the river.

Importantly, the system still provided clean water to meet people's basic needs; however, the community was dependent on AsoFénix to provide repairs. Because of this continued dependence upon AsoFénix for non-routine maintenance, it must be determined that the Partnership has not been successful in developing the technical capacity necessary for the community to assume full responsibility for the system.

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<sup>13</sup> This may be because the Technician is illiterate, but perhaps visual manuals could be provided.

## 7.2 Organizational Capacity Level

According to the literature, organizational capacity consists of organizational structures, rules, and procedures that enable the community to manage the system. Consequently, the existence of rules, monitoring and accountability practices, willingness to enforce rules and impose sanctions, and the ability to resolve conflict were evaluated to determine the community's capacity to maintain these key organizational functions. Because capacity building entails the development of skills to support each of these organizational functions, evidence of training and the ability to put such knowledge into practice were as important as the mere existence of rules or procedures on paper. Without these skills, the committee is unlikely to be able to maintain the community's trust, keep track of funds, and ultimately maintain the system in working-order.

### ***7.2.1 Community Organization Structures & Rules***

Rules and procedures are identified in the existing literature as an important component of organizational capacity development (UNDP, 2008; van Loon et al., 2010). The Partnership's policy theory identifies community organizations as an essential element of being able to develop and enforce such rules, thereby providing continued management of the projects.

According to all those interviewed, AsoFénix facilitated the election and organization of a committee and the finalization of a charter outlining rules and responsibilities. Before the project, an alcaldito had been responsible for making community decisions and for interfacing with other layers of government. Placing the project under joint-management of several committee members represented a significant change (Potreritos Final Report, 2006). Table 7.2 outlines the new rules that were established for the community. According to AsoFénix personnel and local committee members, these rules were compiled into a written charter that was signed by everyone in the community; however, it was unclear where the charter and rules were kept.

As there were no existing CAPS or other natural resource committees or rules in Candelaria when the project began, and no outside influences on rules were identified, the development of the committee and the rule outlined below can be attributed to the Partnership. The development of these structures and rules represents a positive impact of the Partnership on organizational capacity in Candelaria.

**Table 7.2 Water System Rules & Procedures in Candelaria**

<b>Resource-use Rules</b>	<b>Established Norm</b>	<b>Actual Compliance/ Enforcement</b>
<b>Ownership of the Land and System</b>	<ul style="list-style-type: none"> <li>Legal access for the committee and technician were secured for land where the pipes, panels, and tanks were installed.</li> <li>Community ownership (to be overseen by the committee) of the materials was established.</li> </ul>	<ul style="list-style-type: none"> <li>No problems accessing the land or equipment were reported.</li> </ul>
<b>Payment</b>	<ul style="list-style-type: none"> <li>Flat fee: C\$ 32 per household per month; C\$ 16 for each additional nuclear family living under the roof</li> </ul>	<ul style="list-style-type: none"> <li>Until recently, most families were paying</li> </ul>
<b>Penalty for lack of payment</b>	<ul style="list-style-type: none"> <li>Charter signed by the community allows committee to cut off water</li> <li>To have service reinstated, family must pay all back-dues plus 100 Cordoba reconnection fee</li> </ul>	<ul style="list-style-type: none"> <li>In practice, committee allows for several months of delinquency during hard times provided families notify them in advance and arrangements are made for repayment</li> <li>Has cut water to nonpaying family</li> <li>Recent problems with the books have complicated enforcement</li> </ul>
<b>Regular cleaning and maintenance</b>	<ul style="list-style-type: none"> <li>Add chlorine to the tank weekly or biweekly</li> <li>Wash the tank every two months to prevent bacterial or algal growth</li> </ul>	<ul style="list-style-type: none"> <li>Yes, though precise frequency unknown because transparency is lacking (no records)</li> </ul>
<b>Community Organization Rules</b>	<b>Established Norm</b>	<b>Actual Compliance/ Enforcement</b>
<b>Committee Structure</b>	<ul style="list-style-type: none"> <li>At least four members of the committee: coordinator, treasurer, secretary, and technician.</li> </ul>	<ul style="list-style-type: none"> <li>Variable</li> </ul>
	<ul style="list-style-type: none"> <li>Coordinator calls meetings and facilitates communication</li> <li>Secretary keeps records and acts as check on Treasurer</li> <li>Treasurer collects money and works with Secretary on record keeping</li> <li>Technician performs maintenance, fixes problems, communicates severe problems to AsoFénix</li> </ul>	<ul style="list-style-type: none"> <li>No written reference for the duties/tasks of members</li> </ul>
	<ul style="list-style-type: none"> <li>Representatives elected by the community</li> </ul>	<ul style="list-style-type: none"> <li>Yes</li> </ul>
<b>Frequency of Meeting</b>	<ul style="list-style-type: none"> <li>Committee meets every month to review books and discuss issues</li> </ul>	<ul style="list-style-type: none"> <li>Yes, until committee change in 2010</li> </ul>
	<ul style="list-style-type: none"> <li>Committee meets every two months with the community to review status</li> </ul>	<ul style="list-style-type: none"> <li>Meeting irregularly. Approximately every six months.</li> </ul>
<b>Compensation for Technician</b>	<ul style="list-style-type: none"> <li>300 cordobas per month for maintenance (repairs, regular cleaning)</li> </ul>	<ul style="list-style-type: none"> <li>Yes</li> </ul>

### ***7.2.2 Monitoring & Accountability***

Systems that allow the committee to monitor community usage of the system are important to tracking compliance and provide an essential measure of transparency and trust. Conversely, it is important that the responsibilities and activities of the committee be apparent so that it can be held accountable for problems resulting from their mismanagement.

#### ***a) Monitoring Community Compliance***

Accounting and record-keeping procedures are essential to proper monitoring, but because accounting and record-keeping are not common skills in poor, subsistence-farming communities, training is necessary to develop monitoring capacity. According to the community Technician, the Coordinator (who was not available for interview), was present at the initial trainings.<sup>14</sup> The committee Secretary, who joined the committee later, attested to having been trained in bookkeeping and money management from her fellow committee members. However, she was also attending school to become a teacher, therefore the possibility of outside skill development cannot be ruled-out. The records were organized and remarkably professional given the resources available and the lack of computing. The committee also said they were coached by AsoFénix in how to deal with community members who refused to pay. The Technician and the Secretary were confident in their “responsibility to enforce the rules” in accordance with the community charter (Secretary, February 8, 2011). All members of the committee attributed these record keeping skills to guidance provided by AsoFénix.

Despite the relatively organized level of record keeping, it must be noted that long-term MCC volunteers provided regular record-keeping support, occasionally reviewing books and presenting their findings at community meetings (Secretary, February 8, 2011). This could be considered evidence of on-going mentoring or dependence. According to the committee Secretary, this impartial review increased community confidence in the committee. After these volunteers left, there was pressure from some members of the community to assign a separate Treasurer, for added security. This restructuring has since led to problems with collection of payment and an erosion of trust discussed at greater length below. While it cannot be said definitively that the discontinuation of external review procedures definitely precipitated these disagreements, it does suggest that even with training, community trust in the system was too low for the committee to function without external validation.

There was significant evidence of monitoring capacity; however, the legitimacy of this monitoring appeared to depend significantly upon external review of community records. Therefore, independent capacity to monitor community compliance with the rules is found to be lacking.

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<sup>14</sup> The committee Coordinator was working in Costa Rica while this data was being collected. She only returned at the end of the timeframe and was present for the community meeting. Unfortunately, there was insufficient time to pose individual questions.

**b) Committee Accountability**

In general, the community appeared to exercise little oversight of the committee in Candelaria. There was a notable lack of documentation defining committee responsibilities, outlining duties, or monitoring committee-compliance with rules. When asked, committee members knew approximately what their duties were, but duties were not written down, nor did it seem clear that the other community members understood the different roles. It was unclear if members of the community not on the committee were sufficiently knowledgeable about the policies and the procedures to hold the committee members accountable.

Discussion at a community meeting in March suggested that the community did not understand why the Technician was getting paid for his work. Because the public was generally uninvolved in committee matters, committee members were responsible for monitoring each other, increasing the potential for abuse of the system.

That there was no means of record-keeping to ensure that the Technician was performing his maintenance duties, further demonstrates the lack of community oversight. No one in Candelaria complained about the Technician's work, and the honor system may well continue to function without incident; however, recent conflict over payments indicates that better records might be useful in the future. Because the Technician is compensated for his work, having credible records in place could preclude more serious disagreements down the line.

The most evident failure of the committee was its failure to maintain a regular meeting schedule. According to both the committee and the MCC volunteers, for many years the committee met monthly after collection of the dues to review accounts and discuss any issues or problems. Initially, the committee also held meetings with the community every two months as required by the charter. Over time, community interest and participation waned, and the community meeting schedule was changed to once every six months. Though seemingly practical and without consequence, this change allowed months to elapse without proper monitoring of, or reporting on, the community's finances.

This lack of monitoring allowed a new committee member to misappropriate funds for several months unnoticed. In mid-2010, the community elected a new Treasurer to provide a check on the Secretary, who had been performing the duties of both positions. According to the longstanding members of the committee, the new Treasurer refused to attend monthly meetings. This problem was compounded by the absence of the Coordinator, who was away working in Costa Rica. Without regular committee or community meetings, it was difficult for the committee to monitor payments and the community at large was not kept abreast of difficulties within the committee. In late March 2011, the committee finally met after four months. It was then found that many families appeared to have defaulted on payments or that payments made to the new Treasurer had gone missing. Though the details are still being resolved, it appears that the new Treasurer took advantage of the lack of regular oversight to manipulate the system to benefit himself and his family. By the time the discrepancy was discovered, several months had elapsed, severely eroding the community's trust and leading to broader conflicts. These events had serious repercussions and their implications for system sustainability and the ability of the community to resolve conflict are discussed in the final section of this chapter.

All-in-all, monitoring and record keeping procedures used to keep track of payments were not extended to monitoring the committee itself; there was no system for verifying the Technician's contributions; and there appeared to be little transparency surrounding committee duties and activities. This combined with recent lapses in meeting schedules, leads to the conclusion that community capacity to hold the committee accountable was lacking.

### ***7.2.3 Enforcement & Sanctions: Ability to Collect Payments***

The existence of rules does not mean that they are being enforced or that the committee is effectively eliciting compliance. Because the existence of, and adherence to, procedures is covered under monitoring and accountability, this section examines only the enforcement of payment rules and sanctions for nonpayment.

Until the recent reorganization of the committee and disruptions in record keeping, the committee commanded the respect of community members and collect regular payments from every household. Long-term Volunteers, who reviewed the books, reported no glaring lack of payment and reported: "the committee and community have a fairly strong relationship" (Long-term Volunteer, April 18, 2011). In recognition of the difficulties associated with seasonal farming income, the committee admitted to giving community members more leeway during difficult times, provided they were told in advance and later paid in full. Only once was the committee forced to cut off the water to a family. After eight months of delinquency, they felt "the right and responsibility as the committee to cut off their water" (Secretary, February 8, 2011). They were proud of having "[done] it right" and adhering to the rules (*Ibid.*). Quickly, the family "learned how important it is to have water," and it took only two to three weeks for the family to pay the arrears and the C\$100 fine to have their service reinstated (*Ibid.*). The committee was willing to exercise its power, and the penalty proved to be an effective mechanism for restoring compliance. More recently, problems have developed with the payment system, but these appear to be isolated problems of abuse rather than systemic lack of enforcement and sanctioning.

As the committee has demonstrated both willingness and ability to turn-off water to noncompliant households, it appears that through creation of the committee the Partnership has fostered sufficient capacity to enforce the rules.

### ***7.2.4 Conflict Resolution***

Perhaps the most important organizational deficiency observed was the lack of conflict resolution mechanisms and training. Without these mechanisms, it is impossible for the community to voice complaints or for the committee to deal with disputes.

Neither interviews nor observations uncovered any reference to conflict resolution training, rules, or procedures as part of the Partnership's capacity development efforts. Consequently, AsoFénix appears to have become the default mediator and problem-solver. Committee members admitted to turning regularly to AsoFénix in order to find solutions to disputes. Early on there were disagreements over payment tracking, and the committee was concerned

about keeping money within the community. With the help of AsoFénix, they developed a better bookkeeping system and began providing official receipts for payment, signed by the payee and the collector. Concern over keeping cash in the community was addressed in 2011 by setting up a bank account to which deposits can be made on a regular basis; however, this account is also registered to AsoFénix, creating a continued dependency. These examples were minor procedural issues that were quickly remedied through the implementation of new rules. In some respects, these problems and solutions reveal the strength of having a local NGO partner who can work to overcome early obstacles and continue to develop capacity within the community. Nevertheless, the complete absence of conflict resolution procedures independent of AsoFénix intervention is a definite weakness given the eventual goal of community management.

The community's recent inability to resolve conflict over missing payments highlights the importance of conflict resolution procedures and training. At the March 2011 meeting, it became apparent that community money was unaccounted for. Whether it was a case of mass defaults on payments, or the corruption of a committee member, neither the committee nor the community had a strategy for moving toward resolution. Without set procedures, the community debated for hours, everyone launching accusations but getting no closer to a solution. After the meeting, the committee turned immediately to AsoFénix, requesting their assistance, and even seeking to hire an outside party to deal with the books and the money collection. Despite nearly seven years of successful administration, the longstanding members of the committee felt their legitimacy had been gravely undermined. They were frustrated, disheartened, and ready to turn over management to an outside party. In light of these developments, the Partnership may choose to redefine its relationship with the communities by providing a source of outside arbitration, or by reorganizing payment collection; but, if they are to continue the proposition of developing community-maintained systems, they must help the communities develop policies and procedures for dealing with complaints and resolving broader conflicts.

In Candelaria, there was no evidence of conflict resolution training provided by the Partnership, nor were any rule or procedures put in place. This inattention to conflict resolution exacerbated tensions in the community, created dependency on AsoFénix in the face of internal disputes, and indicates that the Partnership has failed to develop this important capacity in Candelaria.

### **7.3 Exogenous Influences**

Because it is important to isolate capacity development resulting from the Partnership from the consequences of outside assistance, attention was paid to other collaborations in the community. Committee members received substantial on-going support from long-term MCC Volunteers related to bookkeeping and committee functions (Secretary, February 9, 2011; Long-term Volunteers, April 18, 2011). As these volunteers were not recruited through the Partnership, they could be perceived as an outside source of support; however, AsoFénix was given authorization to allocate their time and chose to assign them to assist with the Partnership project in Candelaria. In accordance with the division of labor agreed upon by the NGO partners, AsoFénix was responsible for committee development and training in

Candelaria and received donor funds for that purpose (Candelaria Budget, 2003). If MCC volunteers had not existed, AsoFénix would have been responsible for mobilizing other resources in order to meet its obligations. Therefore this support is not considered exogenous.

Community members did not suggest there had been any other sources of training or support. ENACAL provided sanitation and hygiene training when the project was installed, but as this was organized by AsoFénix as part of the Partnership, it is not considered independent of the project. Until approximately 2010, AsoFénix was the only source of outside assistance in Candelaria. Recently, Plan Nicaragua (El Plan), another NGO partnership, has begun collaborating with the community. While the training and skills emphasized by El Plan did not overlap with those provided by AsoFénix, they did highlight how the training has lead to positive spillover-effects in terms of capacity building.

#### **7.4 Positive Spillovers: Network Capacity Level**

Because the Partnership does not seek to directly connect community or committee members to other organizations, the network level of community building was not systematically examined for each of the case study sites. However, in the case of Candelaria, the Partnership does appear to have influenced the ability of community members to develop new alliances. For several years, the community Technician and the Secretary have acted as community liaisons to another development NGO: El Plan Nicaragua. While the Partnership was not responsible for introducing El Plan to the community, the Technician directly attributed his confidence and ability to advocate for his community to his experiences with the Partnership. He enthusiastically emphasized the need to actively “build collaborations between AsoFénix and El Plan to increase the efficacy of both organizations in helping to meet Candelaria’s needs” (Technician, February 8, 2011). He was also responsible for organizing a meeting between AsoFénix and El Plan in the hopes that the two could combine their resources and skills for future projects in Candelaria (*Ibid.*). Some of this commitment is likely due to innate leadership characteristics, but his work with AsoFénix and on the committee provided him with the opportunity to further develop his skills and experience. Long-term Volunteers, who spent three years living and working in Candelaria, corroborated this view. As the result of AsoFénix:

*Especially the committee have seen the power they have to change their lives. They have become more intentional at pursuing their own projects with other organizations, trying to get projects done they want not just the projects the organization wants to do. Among the women in the community, especially the committee members, there has been a high level of empowerment causing them to be leaders and advocates* (Long-term Volunteer, April 18, 2011).

Although it was not seeking to develop network ties in or through the project in Candelaria, the Partnership does appear to have empowered local citizens to forge new ties and find new ways of advocating for their community. This can be seen as a positive impact of the partnership on capacity in Candelaria.

## 7.5 Preliminary Conclusions

Whether the community is able to address the technical, financial, and social challenges of maintaining a functioning system are key measures of their overall capacity. Despite mentoring, development of rules and regulations, and the existence of the committee described above, several observations pointed to the community's lack of sufficient capacity to maintain the system independent of on-going AsoFénix support. Table 7.3 summarizes the impact of the partnership on the capacities and indicators outlined in chapter 4 and measured by this study.

Despite six years of fee-collection, the community has not fully taken over financial responsibility for the system in the event of major repairs. The Technician is fully capable of addressing minor issues, but he is still dependent on AsoFénix for major repairs.<sup>15</sup> Organizationally, monitoring and sanctioning systems appear to have been working, but recent disputes and the inability to address conflict because of nonexistent dispute-resolution rules or procedures threaten to undermine the moderate independence achieved over the last several years. While the Partnership has succeeded in developing some capacities within the community of Candelaria, further capacity development would be necessary in order to reach the goal of independent management.

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<sup>15</sup> As pointed out by the GrnEmp TD, “the need for an ‘escalation path to outside resources’ will be true for anything that requires more than a screwdriver and a hammer. They don’t repair their radios, cell phones or TV’s (or wind turbines) either. The need for AsoFénix itself points to the rarity of solar pumping systems in Nicaragua” (July 13, 2011). It is true that there are currently very few, if any, other entities capable of making such repairs. However, the dependence here is both financial and technical. Given education levels in the communities and their remoteness, it may be unreasonable to assume that all maintenance can be performed with expertise from within the community, but this is the ideal currently described by the model. An alternative pathway that would be consistent with the current model would be for the community to use their funds to pay others (even AsoFénix) for needed repairs. The ability of the community to maintain financial stability under these circumstances would then have to be reevaluated. Currently transport, labor, and parts have been largely provided by AsoFénix, and therein lies the continued dependency.

**Table 7.3 Impact of Partnership on Capacity Development in Candelaria**

<b>Capacity</b>	<b>Indicator</b>	<b>Evidence of Impact</b>	<b>Points</b>
<b>Financial capacity</b>	Sufficient income to cover system expenses	Yes	1
	Demonstrated ability to pay for system repairs	No	0
<b>Technical capacity: training</b>	Evidence of formal technical training	No	0
	Evidence of informal technical training/mentoring	Yes	1
<b>Technical capacity: maintenance</b>	Ability to troubleshoot and maintain system independent of Partnership support	No	0
<b>Community organization structures &amp; rules</b>	Changes in or development of community organizations	Yes	1
	Changes in and development of rules	Yes	1
<b>Monitoring &amp; accountability: monitoring community compliance</b>	Clear records of community payments	Yes	1
<b>Monitoring &amp; accountability: committee accountability</b>	Regular committee meetings	No	0
	Regular meetings with the community	No	0
	Community knowledge of committee positions and responsibilities	No	0
	Public tracking of committee tasks and duties	No	0
<b>Enforcement &amp; sanctions: ability to collect payments</b>	Ability/willingness to enforce rules	Yes	2
<b>Conflict resolution</b>	Conflict resolution rules and procedures	No	0
	Evidence of conflict resolution training	No	0
	Ability to resolve conflict	No	0
<b>Positive spillovers: network capacity level*</b>	Increased networking abilities	Yes	-
<b>Total Points &amp; Designation</b>		<b>Low Impact</b>	<b>7</b>

\* Unique to Candelaria

## Chapter 8: Potreritos Case Study

The community of Potreritos is composed of approximately 45 households, only 30 of which have water.<sup>16</sup> In 2003, UNICEF and the local water authority, ENACAL, installed a well in Potreritos, providing them with a nearby source of clean water. At the time of installation, the project in Potreritos was designed to use water from this existing well, whose flow was substantial enough to supply water to additional communities, to provide water for over 500 people living in 100 households and in three distinct communities: San Diego, Paso Honda, and Potreritos. All three communities are located along the same road to San Jeronimo in the Municipality of Teustepe, Department of Boaco. Nevertheless, there is considerable distance between the communities as well as important socioeconomic differences between the three. While the people of Potreritos had only to walk to their well, the project had the potential to significantly improve access to water in the other two communities. The project was to be overseen jointly by elected members from all three communities, but after nearly four years of conflict and unsuccessful management, AsoFénix facilitated division of the system. The original well now only provides water to Potreritos. While AsoFénix continues to provide support for the project in Potreritos, it is no longer involved in water issues in Paso Honda or San Diego.

Though only the second Partnership project, Potreritos differed substantially from the first in its attempt to provide water to three different communities. This different configuration provides the opportunity to evaluate the model under different social circumstances, exposing different strengths and weaknesses than those observed in Candelaria, while also underscoring certain similarities.

Management of the system can be divided into two distinct periods: March 2006 to March 2010, and March 2010 to the present. Because these two phases are characterized by distinct management structures, rules, and community dynamics, they were evaluated separately. The first section of this chapter focuses on joint management of the system by all three communities, paying particular attention to factors that may have contributed to the system's demise and to the implications these have for the Partnership's model. The second section examines management of the system since March of 2010, under the single-community committee. It is during this phase that parallels can be drawn to the experiences in Candelaria. The chapter concludes with preliminary conclusions that provide the basis for discussion in chapter 11.

### Chapter 8a: Management of the Three-Community System

From the time of installation in March of 2006 until the system was downgraded in March of 2010, the water delivery system in Potreritos delivered water to three adjacent communities and was jointly administered by a committee of nine elected representatives. Because of time constraints and strained relations between the three communities, it was not possible to interview residents of Paso Honda or San Diego. It was therefore not possible to collect

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<sup>16</sup> Only 30 families have water because at the time of installation certain families were not interested in participating. Those families now have the option to join if they buy a water meter and assume responsibility for buying and installing pipe to bring water to their homes.

adequate data regarding financial and technical capacities developed during this initial phase. Given the data available it was possible to draw limited conclusions about the community organization and rule structures, monitoring, and enforcement. These shed light on several sources of conflict that appear to have affected outcomes and offer supporting evidence to conclusions from the existing literature. They also expose potential difficulties in extending the Partnership model to multiple communities.

## **8a.1 Organizational Capacity Level**

### ***8a.1.1 Community Organization Structures & Rules***

Table 8.1 outlines what could be gathered from interviews in Potreritos about the norms and rules governing the three-community system until March, 2010. As discussed in the previous case study, the simple existence of rules does not mean they are being enforced or that the committee is ensuring compliance. Therefore, the table also outlines reported problems with enforcement and compliance, which are discussed at greater length below. As both the committee and the rules were the direct result of the Partnership, the Partnership is considered to have had an impact on these dimensions of organizational capacity.

### ***8a.1.2 Monitoring & Accountability***

In management of the three-community system, irregular meetings and the lack of adequate monitoring capacity were obstacles to project sustainability. AsoFénix was of the understanding that the committee would compile payment data, meet monthly to discuss the system, and conduct a public meeting with members from all three communities every two months (AsoFénix ED, March 22, 2011). Residents of Potreritos reported that meetings were held much less frequently (Committee Members, March 3, 2011). Long-term Volunteers confirmed that the committee met amongst themselves approximately every six months, and reached out to the three communities at most once a year (Long-term Volunteers, April 18, 2011). When asked why the three-community system fell apart, residents of Potreritos reported that families in the other communities were consuming too much water, were not paying, and that the money was being used improperly (Committee Members, March 3, 2011).

Records are not available to confirm these claims, but whether or not the allegations are true, they point to the fact that lack of information, transparency, and communication fostered mistrust among the three communities. Few people knew who was paying, how much water was being consumed, or where the money was going. Meetings and information alone may not have been enough to bridge gaps between the three communities, but the complete lack of effort is likely to have exacerbated tensions and feelings of mistrust, ultimately contributing to the demise of the system.

Inconsistent meeting schedules and a nearly complete lack of communication and transparency between the committee and the public indicate that the Partnership did not develop capacities necessary to foster monitoring and accountability.

**Table 8.1 Water System Rules & Procedures in San Diego, Paso Honda, and Potreritos**

<b>Resource-use Rules</b>	<b>Established Norm</b>	<b>Actual Compliance/Enforcement</b>
<b>Ownership of the Land and System</b>	<ul style="list-style-type: none"> <li>Legal access for the committee and technician were secured for land where the pipes, panels, and tanks were installed.</li> <li>Community ownership (to be overseen by the committee) of the materials was established.</li> </ul>	<ul style="list-style-type: none"> <li>No problems accessing the land or equipment were reported</li> </ul>
<b>Payment</b>	<ul style="list-style-type: none"> <li>Metered system: C\$4.5 per meter</li> </ul>	<ul style="list-style-type: none"> <li>Problems between the communities</li> <li>San Diego, the wealthiest community consuming more</li> <li>Inconsistent payment because of lack of authority</li> <li>No remaining records of what funds were collected or existed</li> </ul>
<b>Penalty for lack of payment</b>	<ul style="list-style-type: none"> <li>Committee should cut water after two months of nonpayment</li> </ul>	<ul style="list-style-type: none"> <li>Committee lacked enforcement capacity</li> </ul>
<b>Regular cleaning and maintenance</b>	<ul style="list-style-type: none"> <li>Add chlorine to the tank weekly or biweekly</li> <li>Wash the tank every two months to prevent bacterial or algal growth</li> </ul>	<ul style="list-style-type: none"> <li>No reported problems, though precise frequency unknown because transparency is lacking (no records)</li> </ul>
<b>Community Organization Rules</b>	<b>Established Norm</b>	<b>Actual Compliance/Enforcement</b>
<b>Committee Structure</b>	<ul style="list-style-type: none"> <li>Three elected members from each committee. Precise roles uncertain. Overall coordinator was not from Potreritos.</li> </ul>	<ul style="list-style-type: none"> <li>Members of Potreritos did not recall having been part of the original committee</li> </ul>
<b>Frequency of Meeting</b>	<ul style="list-style-type: none"> <li>Committee meets every month to review books and discuss issues</li> </ul>	<ul style="list-style-type: none"> <li>Committee met every six months</li> </ul>
	<ul style="list-style-type: none"> <li>Committee meets every two months with the community to review status</li> </ul>	<ul style="list-style-type: none"> <li>Committee met all communities once a year</li> </ul>
<b>Compensation for Technician</b>	<ul style="list-style-type: none"> <li>Unknown</li> </ul>	<ul style="list-style-type: none"> <li>Unknown</li> </ul>

### **8a.1.3 Enforcement & Sanctions: Ability to Collect Payments**

Lack of willingness or ability to enforce rules and impose sanctions also appears to have undermined the three-community system. While records were lacking, by all accounts the committee was ineffective at compelling people to pay with regularity (Committee Members, March 3, 2011). According to Long-term Volunteers “many people would not pay for water and would threaten the Technician or committee if they tried to cut their water off” (April 18, 2011). Those elected to head the committee lacked the authority to force people to pay. The general public lost confidence in the ability of the committee to administer the system fairly, compounding tensions between the communities. The committee’s inability to enforce

payment rules indicates that the Partnership was not able to develop enforcement capacity for this three-community system.

#### ***8a.1.4 Conflict Resolution***

In the absence of adequate monitoring and enforcement, there were persistent conflicts over management of the water system. Given the absence of effective community-run conflict resolution systems, “AsoFénix was often called upon to mediate problems” (Long-term Volunteer, April 18, 2011). Despite their efforts at bridging differences, the communities consistently refused to work together, and AsoFénix eventually decided to dissolve the three-community system (AsoFénix ED, March 22, 2011). In 2010, AsoFénix ceased to work with San Diego and Paso Honda, but it has continued to work closely with Potreritos.

As in Candelaria, the Partnership overlooked the importance of conflict resolution mechanisms, and failed to develop necessary procedures and provide training. Without structures and training, the communities remained reliant on AsoFénix to mediate frequent disputes.

#### **8a.2 Exogenous Influences**

While the data above points to insufficient capacity to adequately monitor and enforce rules, interview responses suggest that social elements of the three-community site, combined with resource attributes and system failures, complicated the original committee’s inability to work together to develop adequate systems.

Important socioeconomic differences between San Diego, Paso Honda, and Potreritos appear to have contributed to a lack of cohesion between the three communities (AsoFénix ED, March 22, 2011; Long-term Volunteer, April 18 2011). Group characteristics—which include shared norms, a history of positive community experiences, homogeneity of identities and interests, and interdependence within the community—are recognized as an important determinant of successful community-management structures (Agrawal, 2001). In the case of this water system, these attributes, as well as trust, were completely lacking. San Diego in particular is known for being a more affluent community. It is located at the junction with a major highway, and residents therefore have greater mobility and access to markets and resources located in major population centers. Residents of San Diego were also widely considered to have more political connections (Long-term Volunteer, April 18 2011). Because they were more affluent, the citizens of San Diego could afford to use more water, but residents of Potreritos feared that members of other communities were depleting “their” resource (Committee Members, March 3, 2011). Dispute over resource ownership reveals a crucial point of conflict over the system. Because the system spanned three distinct communities, there appears to have been little shared identity or history of previous cooperation on which to build.

Incongruence between social boundaries and water-system boundaries appears to have been a major source of conflict over operation of the water system. Ostrom (1993) identified clear resource and user-base boundaries as a prerequisite for functioning systems. While the

boundaries were well defined, in the case of this system the boundaries drawn for the project did not correspond to preexisting social boundaries. For three years before the three-community water system was installed, Potreritos alone used the well to meet its water needs. San Diego and Paso Honda had their own wells, located in their communities, which drew from different sources. Once the new system was installed, water for all three communities came from the well in Potreritos. During interviews, residents of Potreritos repeatedly referred to “their” water, denoting a sense of resentment that they had been made to share (Residents, March 3-5, 2011). These comments were followed by claims that the other communities used too much water and were not paying into the fund. Although not documented by interview testimony from the other communities, it is reasonable to assume that following installation of the system members of the other two communities felt they too had a right to as much water as they could pay for.

Interviews with residents of Potreritos signal that people in Paso Honda and San Diego felt that Potreritos was trying to restrict their access to water from the system. In the first 4 years after installation, the system was plagued by a series of technical failures due to faulty equipment. A controller broke in late 2007. The pump’s motor was replaced in January of 2008, and the entire pump was replaced again in December of 2008. During these failures, San Diego and Paso Honda accused Potreritos of intentionally sabotaging the system to deprive them of water (Residents, March 3-5, 2011). San Diego and Paso Honda, being much farther from the well, had difficulties getting water from the well in Potreritos when the delivery system failed, whereas residents of Potreritos could use a hand-powered rope-pump to draw water from the well as they had before. Equipment failures are an unfortunate reality when dealing with technology, and they have occurred at all other project sites (though not with the same frequency); however, there was no evidence that such failures generated accusations and conflict in other communities. It is likely that in this case, mistrust and underlying social tensions lead to negative interpretations of these events, making already tense relationships between the communities even harder to navigate and overcome by means of capacity building efforts.

Examination of exogenous variables suggests that a lack of social capital and mismatch between social boundaries and system boundaries complicated the Partnership’s effort to develop capacities necessary for management of the three-community system.

### **8a.3 Preliminary Discussion & Conclusions About the Three-community System**

Table 8.2 summarizes the effects of the Partnership on organizational capacities for this system. While rules and structures were put in place, monitoring and enforcement associated with these rules were absent, rendering the rules useless. As rules and structures were the only indicators on which the Partnership was shown to have an impact, the overall conclusion is that in this case the Partnership failed to develop any of the capacities required to enable community management of the water system.

**Table 8.2 Impact of Partnership on Capacity Development for the Three-community System**

<i>Capacity</i>	<i>Indicator</i>	<i>Evidence of Impact</i>	<i>Points</i>
<b>Financial capacity</b>	Sufficient income to cover system expenses	-	-
	Demonstrated ability to pay for system repairs	-	-
<b>Technical capacity: training</b>	Evidence of formal technical training	-	-
	Evidence of informal technical training/mentoring	-	-
<b>Technical capacity: maintenance</b>	Ability to troubleshoot and maintain system independent of Partnership support	-	-
<b>Community organization structures &amp; rules</b>	Changes in or development of community organizations	Yes	1
	Changes in and development of rules	Yes	1
<b>Monitoring &amp; accountability: monitoring community compliance</b>	Clear records of community payments	No	0
<b>Monitoring &amp; accountability: committee accountability</b>	Regular committee meetings	No	0
	Regular meetings with the community	No	0
	Community knowledge of committee positions and responsibilities	No	0
	Public tracking of committee tasks and duties	No	0
<b>Enforcement &amp; sanctions: ability to collect payments</b>	Ability/willingness to enforce rules	No	0
<b>Conflict resolution</b>	Conflict resolution rules and procedures	No	0
	Evidence of conflict resolution training	No	0
	Ability to resolve conflict	No	0
<b>Total Points &amp; Designation</b>		<b>Low Impact</b>	<b>2</b>

Although the Partnership must accept responsibility for failure to develop capacities, important lessons can be drawn from this case study. Interviews with residents of Potreritos and NGO staff suggest that insurmountable social and economic differences between communities, combined with disagreement over which community the water belonged to, contributed to the inability of the three communities to work together successfully. Without more extensive interview data from San Diego and Paso Honda, which would likely reveal alternative interpretations of how the system was managed and why it fell apart, only limited

conclusions can be reached. Nevertheless, it seems reasonable to conclude that relinquishing control of the system to the community becomes more complicated when multiple communities are involved.

Because there was little information about the training provided to develop individual or organizational capacities, it is impossible to say with certainty that these social tensions could not have been overcome by means of more intense capacity-development efforts. Evidence did suggest that there was minimal organizational capacity to monitor and enforce procedures or to resolve conflict. Nonetheless, attention to social capital in the literature and descriptions of inter-community relations suggest that a lack of trust and persistent social tensions would have complicated management of the system notwithstanding additional capacity development efforts. From the perspective of AsoFénix, “combining 3 communities in one project was a very poor choice, but AsoFénix has learned from it” (Long-term Volunteer, April 18, 2011). The lesson extracted from this case has been that consonance between social boundaries and project boundaries affects capacity development efforts and should be considered carefully when selecting sites and designing projects.

## **Chapter 8b: Management of the Potreritos-only System**

After several years of persistent conflict between the three communities, in March of 2010 the water system was reconfigured to only deliver water to Potreritos. At a meeting facilitated by AsoFénix in March of 2010, Potreritos elected a new water committee consisting of only members from Potreritos. New rules were devised and the new committee was expected to continue management of the smaller system. Few capacities were transferred from the old committee to the new one, necessitating renewed efforts at capacity building. Chapter 8b is therefore an examination of capacity development over the last year in response to this reconfiguration. While efforts are arguably still under way, evaluation of the current state of such efforts has the potential to focus attention on capacities that are most in need of additional development and consideration.

### **8b.1 Individual Capacity Level**

#### ***8b.1.1 Financial Capacity***

Upon dissolution of the three-community committee, whatever funds existed were not transferred to Potreritos, thereby leaving the committee to start building reserves from zero. Shortly after the reorganization, the solar-powered DC pump broke. AsoFénix took charge of repairing the pump; and, in the meantime, an AC pump that could draw power from the newly installed national electrical grid was installed to provide water to the system.<sup>17</sup> This was originally meant to be a temporary solution, but AsoFénix has since expressed interest in leaving the community connected to the grid and moving the panels to a more remote community that does not have a grid connection. Whether the AC pump is replaced with a solar pump or the solar-powered DC pump is reinstalled will have important financial implications.

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<sup>17</sup> At the time of project installation there was no electricity in Potreritos, but the community was recently connected to the national grid.

Table 8.3 outlines preliminary financial calculations based upon income and expenses from the last year and new rules for payment of the technicians. Most importantly, the numbers show that at current rates the committee is barely breaking even, even when everyone pays in full. It would take at least over 23 years for the community to raise \$900 for a new AC pump.<sup>18</sup> This is despite the fact that rates were doubled when the system was downsized to serve only one community. Even if the DC pump were replaced, saving the community money on electricity, it would take the community approximately 19 years to replace it. These are just estimated calculations, and it is important to note that the committee approved a new fee system in March of 2011, therefore revenue may change.<sup>19</sup> At present, whether the community keeps the AC pump, or returns to the DC system, these numbers cast doubt on the likelihood that the community will be able to independently finance any major repairs.<sup>20</sup>

Because the community is unlikely to be able to finance repairs regardless of the pump used, it is evident that the Partnership has not developed community financial capacity to manage the system in Potreritos.

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<sup>18</sup> According to records, in exactly twelve months, the committee had collected a total of C\$4820 (\$215), an average of C\$400 per month (\$18). One-third of this income (C\$1574) was spent on electricity for the pump. Another third was spent on materials for maintenance and repair. This has left the community with a reserve of C\$1750 (\$78) in savings (assuming they recover outstanding payments) as of March 2011. Judging from previous expenditures and according to AsoFénix numbers, a DC pump with a five year warranty costs approximately \$2000 and must be shipped from the United States. In contrast, an AC pump costs only \$900 and is available locally.

<sup>19</sup> Residents of Potreritos expressed extreme price sensitivity. All those interviewed commented that they had cut their water use in half when the price doubled, choosing to bathe and wash clothes at nearby rivers and old wells rather than using water from the system. Consequently, revenues are unlikely to be much higher with the new fee system.

<sup>20</sup> If the community is to gradually accept responsibility for future maintenance expenses, it is reasonable to suggest that any final decision about how to proceed should be made by the local community and the committee, not AsoFénix. They should be responsible for carefully weighing the pros and cons of each scenario and deciding which option best suits their financial needs. Other options, such as selling electricity back to the grid from the panels might also be explored.

**Table 8.3 Financial Status in Potreritos**

Item	Calculation/Source	Cordobas (C\$)	Dollars (\$)
Monthly Dues collected	Community records - 30 families x 1.5 cubic meters average consumption	400	18
Monthly payment of Technicians	New regulations state that one day of work will be compensated at C \$100 (Average monthly cleaning and fee collection requires 2-3 days of work)	200 - 300	9 -13
Monthly Electricity Bill	Previous year's expenses	130	6
Monthly Balance (assuming 2 days of technician labor)	Income vs. Expenses	65	65
Total Reserves (Approximate, as of March 2011)	Community records audited by AsoFénix	1550	69
Annual reserve accumulation with AC pump (assuming 2 days of technician labor per month, and no other expenses)	(400 income - 200 technician fees -130 electricity) x 12 months	840	38
Expected Reserves after 5 Years with AC pump (assuming 2 days of technician labor per month, and no other expenses)	(400 income - 200 technician fees - 130 electricity) x 12 months x 5 years	4,200	188
Annual reserve accumulation with DC pump (assuming 2 days of technician labor per month, and no other expenses)	(400 income - 200 technician fees - electricity) x 12 months	2,400	107
Expected Reserves after 5 Years with DC pump (assuming 2 days of technician labor per month, and no other expenses)	(400 income - 200 technician fees) x 12 months x 5 years	12,000	537

### ***8b.1.2 Technical Capacity: Training***

Despite reconfiguration of the system and election of an entirely new committee, no one on the committee had received formal training (Committee Members, March 3, 2011); therefore, there is no evidence that the Partnership has made efforts at developing technical capacity.

### ***8b.1.3 Technical Capacity: Maintenance***

The community's two Technicians were jointly able to repair pipes, purchase materials, and perform routine cleaning for the tanks, but remained dependent on AsoFénix for major repairs (Technician, March 3, 2011). Community members living next to the tanks confirmed that the tanks were cleaned and chlorine added on a regular schedule. As repairing pipes and cleaning the tanks are relatively easy tasks, the Technicians did not require extensive training or support (Technician, March 3, 2011); these skills are therefore not a reflection of capacity.

development by the Partnership. Although they had been trained in turning the electricity on and off, the Technicians said they knew little about the solar panels and their maintenance and would need more training in order to maintain them.<sup>21</sup> As in Candelaria, the Technicians were also completely dependent upon AsoFénix for troubleshooting related to the pump or any advanced technical difficulties (Technician, March 3, 2011). The entire committee admitted to not having been trained since reconfiguration of the system, and members were open about their dependence on AsoFénix for assistance with technical and social issues (Committee Members, March 3, 2011).

Both the lack of training and continued dependence on AsoFénix for maintenance indicate that the Partnership has not developed technical capacity in Potreritos.

## **8b.2 Organizational Capacity Level**

### ***8b.2.1 Community Organization Structures & Rules***

Once the project was downsized, the committee was organized according to the same structure as employed in Candelaria. Table 8.4 outlines the norms and rules established after the reorganization of the system in March of 2010 and well as problems in enforcement and compliance. For the sake of comparison, details of rules and enforcement from the previous three-community phase were also included, and are shaded in orange. In March of 2011, some rules were changed in response to community concerns. These more recent changes are also included, and all current rules are highlighted in green. Intermediate rules are left in white. Unlike in Candelaria, there was no record of an official charter that had approved and signed by all families in the project area. Therefore, the rules listed are those recognized by the committee and by AsoFénix.<sup>22</sup>

Because the community and AsoFénix developed these rules in direct response to the project, their existence can be attributed to the Partnership. Therefore, the Partnership has been successful and developing new organizational structures necessary for management of the system.

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<sup>21</sup> At present, this does not represent a problem because the panels are not in use.

<sup>22</sup> After the meeting in March of 2011, the new Long-term Volunteers (who will be in Nicaragua for 3 years) began the task of formalizing rules and solidifying community approval and understanding of committee rules and responsibilities.

**Table 8.4 Water System Rules & Procedures in Potreritos**

<b>Resource-use Rules</b>	<b>Established Norm</b>	<b>Actual Compliance/Enforcement</b>
<b>Ownership of the Land and System</b>	<ul style="list-style-type: none"> <li>Legal access for the committee and technician were secured for land where the pipes, panels, and tanks were installed.</li> <li>Community ownership (to be overseen by the committee) of the materials was established.</li> </ul>	<ul style="list-style-type: none"> <li>No problems accessing the land or equipment were reported.</li> </ul>
<b>Payment</b>	<ul style="list-style-type: none"> <li>March 2006 - April 2010: C\$4.5 per cubic meter</li> </ul>	<ul style="list-style-type: none"> <li>Each connected household had a meter to be read by the Technician on a monthly basis</li> <li>Problems between the communities.</li> <li>Wealthier community consuming more</li> <li>Inconsistent payment (and no remaining records) because of lack of authority</li> </ul>
	<ul style="list-style-type: none"> <li>March 2010 - March 2011: C\$10 per cubic meter</li> </ul>	<ul style="list-style-type: none"> <li>Community Technician and Coordinator go to all houses on the 15<sup>th</sup> of every month to read the meters and collect fees</li> <li>Since March 2010, good record of payment collection</li> <li>Some families connected, but gone, don't pay anything</li> <li>Water consumption has dropped dramatically since the price has risen. This combined with need to pay for electricity has drastically reduced funds for maintenance</li> </ul>
	<ul style="list-style-type: none"> <li>As of March 2011: C\$10 minimum payment; second cubic meter of water is free; C\$ 10 per cubic meter starting with the 3<sup>rd</sup> cubic meter.</li> </ul>	<ul style="list-style-type: none"> <li>Effectiveness/satisfaction to be determined</li> </ul>
<b>Penalty for lack of payment</b>	<ul style="list-style-type: none"> <li>Committee should cut water after two months of nonpayment</li> </ul>	<ul style="list-style-type: none"> <li>One family was cut off because their meter was broken. They were forced to buy a new meter on their own, and could then be hooked up again.</li> <li>Committee willing to wait longer</li> </ul>
<b>Regular cleaning and maintenance</b>	<ul style="list-style-type: none"> <li>Add chlorine to the tank weekly or biweekly</li> <li>Wash the tank every two months to prevent bacterial or algal growth</li> </ul>	<ul style="list-style-type: none"> <li>Yes, though precise frequency unknown because transparency is lacking (no records)</li> </ul>

**Table 8.4 Water System Rules & Procedures in Potreritos (continued)**

<b>Community Organization Rules</b>	<b>Established Norm</b>	<b>Actual Compliance/Enforcement</b>
<b>Committee Structure</b>	Before March 2010: Three members from each committee. Precise roles uncertain. Overall coordinator was not from Potreritos.	<ul style="list-style-type: none"> <li>• Members of Potreritos did not recall having been part of the original committee</li> </ul>
	Since March 2010: Coordinator calls meetings and facilitates communication  Secretary keeps records and acts as check on Treasurer  Treasurer collects money and works with Secretary on record keeping  Technician performs maintenance, fixes problems, communicates severe problems to AsoFénix	<ul style="list-style-type: none"> <li>• No written reference for the duties/tasks of members</li> <li>• Members were unable to describe their precise roles</li> <li>• Confusion over duties/roles: Technician performing duties of Treasurer</li> </ul>
	Representatives elected by the community	<ul style="list-style-type: none"> <li>• Yes</li> </ul>
	Committee meets every month to review books and discuss issues	<ul style="list-style-type: none"> <li>• Before March 2010: committee met every six months</li> <li>• After March 2011: compliance to be determined</li> </ul>
<b>Frequency of Meeting</b>	Committee meets every two months with the community to review status	<ul style="list-style-type: none"> <li>• Before March 2010: committee met all communities once a year</li> <li>• After March 2011: committee had not met with community since election in 2011 - were waiting for AsoFénix to call a meeting</li> </ul>
	Before March 2011: nothing	<ul style="list-style-type: none"> <li>• Lead Technician and Coordinator decided, without consulting the community, that their water would be free in compensation for their time.</li> </ul>
	After March 2011: C\$100 for a six hour day of labor to be paid from the community fund.	<ul style="list-style-type: none"> <li>• All community members, including the committee should pay for water</li> </ul>

### **8b.2.2 Monitoring & Accountability**

#### **a) Monitoring Community Compliance**

Review of the committee's financial records revealed minimal knowledge and a lack of sufficient training. Despite minimal coaching, committee members were keeping track of monthly payments and tracking expenses; however, these records were not well organized,

difficult to interpret, and were not being shared regularly with the general public. Development of some form of record system was a definite improvement over the previous committee. The efforts at record keeping reflected commitment to fulfilling committee obligations, but they also reaffirmed that limited formal training in how to keep records had been provided. The cluttered and disorganized format was particularly ill-suited to presentations at a community meeting. There was also no system for providing receipts or verification of payment.

Although training had not yet been provided, efforts initiated in March 2011 suggested that AsoFénix was aware of this deficiency and that more formal training would soon be provided. During the time of data collection, a new pair of long-term volunteers consolidated the books and helped the committee present results at a public meeting.<sup>23</sup> One of their primary goals for the ensuing three years was to provide administrative and organizational training to committee members in Potreritos (New Long-term Volunteers, March 22, 2011). Despite these positive developments, the present lack of skills in Potreritos and the long delay in training the community to keep records and monitor payments must be taken as a failure of the Partnership to develop monitoring capacity.

### **b) Committee Accountability**

Even after the committee was reorganized, the committee failed to improve its meeting schedule and the flow of information from the committee to the general population. The Coordinator and the Technician met monthly to collect dues and record payments. Other members of the committee met informally, on an *ad hoc* basis, to coordinate repairs or discuss payments; however, everyone on the committee admitted that there had been no community-wide meeting about the water system in over a year (Committee Members, March 3, 2011). The last public meeting was the one in which AsoFénix facilitated election of the new committee. The committee cited tensions within the community over new rules and fees as the reason for the failure to hold meetings. In light of potential conflicts, the committee had elected to wait for AsoFénix to come and mediate the discussion. The committee was aware of resentment in the community over the rise in water prices imposed when the system was downsized. The increase in price was necessary in order to increase the financial viability of the system when the number of users shrank from 100 households to only 30, but the committee did not feel empowered to face the community on their own. This clearly demonstrates insufficient capacity on the part of the committee to manage the system independently.

More than in other communities, committee members in Potreritos seemed to lack understanding of their specific roles or responsibilities to the community. When asked outright what their roles were, the Technician was the only member able to describe his or her role or the overall duties they had as a community (Committee Members, March 3, 2011). The Coordinator said his duty was to keep the community informed, and to tell them about

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<sup>23</sup> Reorganization of the system coincided with a period of transition and replacement of Long-term Volunteers. These volunteers has been responsible for mentoring in other communities. It is therefore possible that the delay in providing training is in part due to unfortunate timing and a shortage of available volunteers to attend to unexpected training needs in Potreritos.

meetings; but he had not called a meeting in a year because he was waiting until AsoFénix's ED could return to help resolve problems (Coordinator, March 3, 2011). Although there were several members of the committee without specific roles, the Technician had assumed responsibility for collecting the fees, which should have been the role of the Treasurer. As there was minimal understanding of roles and responsibilities within the committee itself, it seems reasonable to assume that the public was similarly uninformed of the committee structure. Ill-defined roles have the potential to erode checks and balances designed to maintain record keeping integrity, and the potential to complicate designation of responsibility in the case of mismanagement.

The committee's continued dependence upon AsoFénix to facilitate meetings and their confusion over the tasks and responsibilities indicate that the transition to the new committee is not complete. More support is needed to enable the committee to take responsibility for the water system and be accountable to the community; therefore, the Partnership has not succeeded in developing adequate community capacity related to monitoring and accountability.

#### ***8b.2.3 Enforcement & Sanctions: Ability to Collect Payments***

Increased authority to elicit consistent payment represents an important area of improvement since the transition in management in 2010. Official review of committee records in March of 2011 showed that most families are paying their bills. Of the five families that had outstanding bills, only two had missed multiple payments. Most families that had missed a payment resumed payments the following month. Overall, only C\$200 (\$9) was owed to the committee, nearly half of which (C\$80) was due from the community school, for which a payment procedure had not yet been established.

Interview data also suggested that the committee was exercising its power to turn off water so as to compel people to pay. One family could not be accurately charged because their water-meter was broken by a farm animal (Resident, March 3, 2011). The committee members requested that they replace the meter, and when after several months the family had not done so, their water was shut off (Technician, March 4, 2011). The family then replaced their meter, and their water was restored. Similarly, another woman who was too poor to pay for her water had stopped receiving water (Resident, March 4, 2011). These examples suggest that the committee has the will and the authority to enforce the rules, which is a positive improvement over the previous committee. Committee members cited the rules and the responsibility vested in them by AsoFénix as justification for these decisions, but they had not received any coaching on how to deal with conflicts that might arise from such enforcement (Committee Members, March 4, 2011). Accordingly, this newfound capacity to enforce the rules is more likely due to a different community dynamic and respect for those elected than overt capacity development efforts.

Since the transition to the new committee, there has been significant improvement in enforcement and sanctioning in Potreritos, but only some of it can be attributed to the Partnership. The Partnership can be credited for reconfiguring the system, and the committee did express a feeling of empowerment rooted in AsoFénix's support of their authority; even

so, some of this progress appears to be the product of changed social dynamics rather than direct capacity-building efforts by the Partnership. The conclusion is therefore that the Partnership has had a moderate impact on capacity building for enforcement in Potreritos.

#### ***8b.2.4 Conflict Resolution***

The unwillingness of the committee to address several issues within the community demonstrates a lack of adequate conflict resolution training and procedures. As mentioned above, the committee elected to postpone meeting with the public rather than engage them in a discussion of why the fees were raised. This, as well as the inability of the committee to proactively negotiate solutions to community and committee concerns, indicates a lack of preparation for dealing with dissatisfaction or conflict.

The lack of conflict resolution procedures and training was first evident in the inability of the committee to negotiate viable solutions for helping particularly impoverished community members. When the price of water increased from C\$4.5 to C\$10 in March of 2010, one single, childless woman in the community found herself unable to pay for water. She had participated in the initial phases of the project, donating the labor and funds required as part of construction efforts. When she approached the committee about her problem, she was told that if she could not pay, her water would be disconnected (Resident, March 4, 2011). Rather than calling a meeting and negotiating a solution with the community, the committee turned off her water, in spite of the hardship this imposed on her. At the March 2011 meeting facilitated by AsoFénix, the woman was finally able to voice her concern publicly, and the community agreed to allow her free water. In exchange she was to donate her meter (worth \$60) to another family that wanted to connect to the system but could not afford the device. That the problem was resolved relatively easily demonstrates that the community is willing to be flexible; however, when regular meetings are not held, and conflict resolution procedures are not in place, the community is not empowered to forge solutions. This is particularly important because unresolved conflicts are a source of tensions and division within the community that could ultimately threaten stability of system and of the committee.

Unilateral decisions by committee members represent another example of the committee's inability to address problems and reinforce the previous conclusion that the committee lacks accountability to the public. Frustrated by the lack of payment for their work, the Technician and the Coordinator awarded themselves compensation without consulting the committee or the community. Rather than presenting their dissatisfaction to the community and negotiating fair compensation, they stopped paying for their water usage. As they were responsible for the record-keeping, they did not have to consult other members of the committee, nor were such benefits extended to other members of the committee, including the young Technician responsible for chlorinating the water and cleaning the tank. It was not until AsoFénix reviewed records and noticed the lack of payment that the matter was brought before the entire community. At that time, a system of compensation was devised that would include anyone performing regular work (New Long-term Volunteers, March 22, 2011). The ability of committee members to invent rules without oversight by the other committee members or the public has the potential to undermine public confidence. Such actions demonstrate both a lack of accountability and inadequate procedures for bringing such grievances to the fore.

Reluctance to hold meetings and address grievances without the mediating and legitimizing presence of AsoFénix demonstrates the inability of the community to resolve conflict. This deficiency is immediately attributable to the minimal emphasis the Partnership has placed on conflict resolutions procedures or training and constitutes a consistent shortfall in the Partnership's efforts to develop community capacity.

### **8b.3 Exogenous Influences**

There was no evidence of training or support from non-Partnership organizations in Potreritos. Nonetheless, those capacities that were observed, including the Technician's ability to repair the system and keep records, and the committee's authority to enforce rules, do not appear to have resulted from Partnership efforts. Given the lack of guidance provided by the Partnership and the minimal skill demonstrated, the capacity displayed is more likely the result of previously existing skills-sets and a natural increase in compliance associated with moving authority to members of Potreritos proper.

### **8b.4 Preliminary Discussion & Conclusions**

It appears that until recently, one year after the reconfiguration, little formal effort has been directed at capacity development in Potreritos. Table 8.5 summarizes the impact the Partnership has had on capacity development in Potreritos. The data show that at present, the Partnership has had minimal impact on individual or organizational capacities in Potreritos.

Financial and technical capacities are minimal. Monitoring of payment, though existent, is not sufficiently organized to provide a basis for inducing compliance. Committee roles are ill-defined, and lack of committee accountability has allowed certain members of the committee to abuse their power. While enforcement has improved dramatically, this is attributed to respect for authority within the community rather than Partnership efforts. As evidenced by a failure to address several community concerns, conflict resolution and problem solving capacity are lacking. The overall lack of capacity development in Potreritos has meant continued dependence of the new committee on AsoFénix and suggests that, unless there are changes, the committee is unlikely to develop the ability to manage the system on its own.

**Table 8.5 Impact of Partnership on Capacity Development in Potreritos**

Capacity	Indicator	Evidence of Impact	Points
<b>Financial capacity</b>	Sufficient income to cover system expenses	No	0
	Demonstrated ability to pay for system repairs	No	0
<b>Technical capacity: training</b>	Evidence of formal technical training	No	0
	Evidence of informal technical training/mentoring	No	0
<b>Technical capacity: maintenance</b>	Ability to troubleshoot and maintain system independent of Partnership support	No	0
<b>Community organization structures &amp; rules</b>	Changes in or development of community organizations	Yes	1
	Changes in and development of rules	Yes	1
<b>Monitoring &amp; accountability: monitoring community compliance</b>	Clear records of community payments	No	0
<b>Monitoring &amp; accountability: committee accountability</b>	Regular committee meetings	No	0
	Regular meetings with the community	No	0
	Community knowledge of committee positions and responsibilities	No	0
	Public tracking of committee tasks and duties	No	0
<b>Enforcement &amp; sanctions: ability to collect payments</b>	Ability/willingness to enforce rules	Yes (but only partially due to the Partnership)	0.5
<b>Conflict resolution</b>	Conflict resolution rules and procedures	No	0
	Evidence of conflict resolution training	No	0
	Ability to resolve conflict	No	0
<b>Total Points &amp; Designation</b>		<b>Low Impact</b>	<b>2.5</b>

### **8b.5 Additional Lessons from Potreritos: Sustainability of Benefits?**

Despite the bleak analysis of current conditions, renewed efforts at capacity building in the community are a reason for hope and expose important differences between the Partnership

model and other models of development employed in Nicaragua.<sup>24</sup> Given the reconfiguration of the committee and the system, it could be argued that the capacity development process is still underway. The events in Potreritos point to one key strength of the Partnership model: the existence of a partner on-the-ground with close relationships to local communities. In the absence of AsoFénix, it is unlikely that a new committee would have emerged from the dissolution of the three-community system. It would have been even more difficult for Potreritos to secure funds to replace the DC pump when it broke shortly thereafter.<sup>25</sup> The system is likely to have disintegrated further, ultimately leading the community to return to hand-pumping water from the well. While the reconfiguration is far from over, and has not been executed rapidly, the community's connection to AsoFénix ensures that efforts are still being made to develop the skills and structures necessary to maintain the smaller system. Continued AsoFénix support does not conform to the ideal of the Partnership model—community management—but the most fundamental goal of the partnership, the provision of clean water directly to people's homes, has been maintained. In a field where examples of failed infrastructure projects abound, at the very least these projects have not been abandoned. In an effort to better understand the possible strengths of the Partnership's model, exploratory contrast of the Partnership's model with that of another NGO operating in Nicaragua is provided in appendix E.

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<sup>24</sup> An example of a different development model being employed in Nicaragua is provided in appendix E.

<sup>25</sup> The pump was replaced with an AC pump, which is available locally. However, troubleshooting the DC pump and/or securing a new DC pump without AsoFénix and GrnEmp would have been logistically impossible. The Partnership is one of the few sources of knowledge on these systems in all of Nicaragua. DC pumps are not available on the local market. This dependence is therefore due to lack of supply-chains and general experience with solar-water pumping in Nicaragua, not a failure of capacity building. While the Partnership does seek to develop local supply-chains when possible, it is beyond the capacity development goals of the partnership.

## Chapter 9: Bramadero Case Study

The third case study for this evaluation was conducted a thirty-minute bus ride up the dirt road from Potreritos, in the community of Bramadero. Approximately 220 people live there, divided among 40 households. In the years before the installation, the community faced severe water shortages and was the most water-stressed of those included in this study. For several months of the dry season, families were forced to walk several kilometers over hilly terrain to the community of El Jocote to draw water from a private well. According to the project proposal and community members, “women, children and men haul water—it is so time consuming and physically-demanding that every member of the household has to carry the buckets” (Potreritos Final report, 2006). Water collection is typically the responsibility of women and children. That even men participated in water collection suggests an extreme hardship in supplying families with enough water to meet their basic needs. Having seen the work done in Potreritos, the people of Bramadero contacted AsoFénix directly to request their help in developing a project.

Installed in November of 2007, Bramadero was the third water project initiated by the Partnership. The water pump was originally powered by solar panels, as the national grid did not extend to the community until recently. However, in November of 2010 the community reported that the pump was not pumping as much water as it had before. The source of the problems has yet to be identified, but the solar pump was replaced with an AC pump, which draws electricity from the grid. Although economically similar to Candelaria and Potreritos, interview data indicate that Bramadero had significant social, political, and religious differences from the other communities. These differences appear to have affected project outcomes and point to important external influences on the effectiveness of the Partnership model and community management.

### 9.1 Individual Capacity Level

#### 9.1.1 Financial Capacity

The committee did not make accounting records available, therefore reconstruction of Bramadero’s financial status was based on information provided by the Coordinator, Technicians, and community members, and confirmed by NGO staff and the observations of Long-term Volunteers. Because their responses could not be verified by documents, the following reconstruction is only an estimate. According to AsoFénix, the committee, and all those interviewed, the payment structure was similar to that of Potreritos before March of 2011. Each family had a meter, and paid according to usage. Until the DC pump was replaced in November of 2010, the fee was C\$4.5 per cubic meter. This was then raised to C\$10 per cubic meter. According to the committee and those interviewed, the rise in price was required at least in part to offset the electricity bill for the AC pump installed after the system failed.<sup>26</sup> Those interviewed expressed a willingness to pay between C\$20-30 per month for water. Everyone said they had stopped using as much water from the system when the prices rose,

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<sup>26</sup> At the time of the installation, the grid did not extend to Bramadero. Therefore fees high enough to cover electricity costs were not considered.

generally halving usage by using river-water to bathe and wash clothes. Table 9.1 depicts the financial status of Bramadero based upon estimated income, expenses, and reserves.

**Table 9.1 Financial Status in Bramadero**

Item	Calculation/Source	Cordobas (C\$)	Dollars (\$)
Monthly Dues collected	Committee testimony and approximate calculation based on fees and usage: 40 families x 2 cubic meters average consumption	800	36
Payment of Technicians	Committee testimony	300	13
Payment of Electricity Bill	Committee testimony confirmed by AsoFénix	500 to 600	22 to 26
Monthly Balance	Income vs. Expenses	0 to -100	0 to 4
Total Reserves (Approximate, as of March 2011)	Committee testimony	17,000	760
Annual reserve accumulation with AC pump (assuming 500 per month in electricity, and no other expenses)	(800 income - 300 technician fees - 500 electricity) x 12 months	0	0
Expected Reserves after 5 Years with AC pump (assuming 500 per month in electricity, and no other expenses)	(800 income - 300 technician fees - 500 electricity) x 12 months	0	0
Annual reserve accumulation with DC pump (assuming no other expenses)	(800 income - 300 technician fees) x 12 months	6,000	268
Expected Reserves after 5 Years with DC pump (assuming no other expenses)	(800 income - 300 technician fees) x 12 months x 5 years	30,000	1,342

As indicated by these basic calculations, since the installation of the AC pump in 2010, the committee has been either breaking even or drawing on reserves in order to finance electricity to the pump and payment of the Technician. No income is being added to the reserves, undermining the very premise of the model, which is based upon the collection of fees for maintenance and repairs.

As in Potreritos, AsoFénix was exploring the option of moving the solar panels to a more remote community; however, NGO staff members were aware of the high costs of energy in Bramadero.<sup>27</sup> These numbers indicate that if reserves were depleted, Bramadero could face an immediate shortfall of income. This would mean turning off the pump and shutting down the system even if the equipment is still fully functioning. Therefore, unless the DC pump is

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<sup>27</sup> Higher energy costs are likely due to the configuration of the system and the additional energy required to draw water from the well and push it up to the tanks. The water is lifted more than two times higher in Bramadero than in Potreritos and travels much greater distance.

repaired and replaced, the declining balance would not only shorten the long-term viability of the project, but it would require complete redefinition of the goals of the project.

These numbers also make it clear that, even at the current level of reserves, the community is not prepared to finance substantial repairs. Under the current model, and given what the communities are willing to pay for their water, it takes years for any community to build up sufficient resources to fund major repairs. Even then, they remain financially vulnerable and ill equipped to face multiple failures.

Even before installation of the AC pump, the community had not assumed financial responsibility for the project. Previous problems with the controller in Bramadero were rectified with the help of AsoFénix because it was still under warranty (History of Bramadero solar pumping system, no date). When the DC pump was recently replaced with a temporary AC pump, AsoFénix made the purchase. After three and a half years, the community could not have bought the replacement AC pump (\$900) on its own, and fully replacing the DC pump would require over seven years of savings, which is beyond the standard warranty and the likely lifespan of the pumps. Given the community's current balance, even a comparatively smaller repair—replacement of the controller (costing approximately \$400)—would eliminate over half of their reserves. If they were truly left to be responsible for these costs, as well as the cost of hiring someone to perform the expert labor, the systems would rapidly go bankrupt and fall into disrepair. Numbers and the history in Bramadero indicate that the Partnership has not been successful in developing financial capacity for independent maintenance of the project.

### ***9.1.2 Technical Capacity: Training***

In Bramadero, there was some documentation of training. AsoFénix's ED conducted at least one training for the committee on the basic operations of the panels and the pump. This training was attended by the GrnEmp TD and was documented in photos provided in the final report. The training consisted of “explaining the meaning of the LEDs on the controller, and the use of the manometer and flow meter” (Bramadero Final Project Report, 2007). It also covered maintenance of the panels, pipes, meters, and valves (GrnEmp TD, June 15, 2011). At the time of the training AsoFénix and GrnEmp also provided a manual in Spanish outlining the weekly, monthly and semiannual maintenance to be performed, and describing troubleshooting using diagrams and pictures. While in theory this manual could have been useful, there was no evidence that it was being used; and, when asked, the Technicians did not know where it was (Technicians, March 15, 2011). Both Technicians explicitly mentioned that they would need more training in order to operate and maintain the solar panels (Technicians, March 15, 2011).

A single training session represents some effort, but is unlikely to develop comprehensive ability to manage the system. GrnEmp's TD admitted that one training session is insufficient to build technical capacity (July 13, 2011), and the Long-term Volunteers suggested that “communities need more of a partner to walk alongside them for several years, transferring knowledge and abilities” (April 18, 2011). Nevertheless, there was little evidence of such ongoing training or mentoring in Bramadero. Because some effort was made to develop the

committee's ability to manage the system, the Partnership is given credit for training, but not mentoring Bramadero in order to develop their technical capacity.

### ***9.1.3 Technical Capacity: Maintenance***

By all accounts, the community remains heavily reliant on AsoFénix for technical support. While “the Technician could fix basic things, like broken pipes and other small issues...the committee is very dependent on AsoFénix” (Long-term Volunteers, April 18, 2011). Other members of the community commented that even when facing minor difficulties, “the committee could use more training to help them fix problems, like fix pipes. As is, they can do some of it, but [AsoFénix personnel] have to come out at times” (Community member, March 15, 2011). The Technicians professed to have little knowledge of the solar system. One even commented, “when we were using the DC pump, [AsoFénix] would send someone for solar panel maintenance,” suggesting that even routine cleaning of panels and electrical connections was performed by AsoFénix. For more complex problems with the electricity system or the pump, AsoFénix was invariably called out to fix the problem or find a temporary solution (Technicians, March 15, 2011; Long-term Volunteers, April 18, 2011). When the DC pump was replaced, AsoFénix was called to troubleshoot. Everyone interviewed in the community was aware that AsoFénix had changed the pump, and they were “waiting” for the AsoFénix’s ED to return with a solution (Residents, March 15-17, 2011).

Even though training was provided at the time of installation, evidence suggests that Bramadero does not have the technical capacity to manage their system without AsoFénix support. The Partnership has therefore not succeeded in developing capacities needed for technical independence.

## **9.2 Organizational Capacity Level**

### ***9.2.1 Community Organization Structures & Rules***

As in the other communities, there was no evidence of previously existing committees or organizations with norms and rules related to resource use. In Bramadero people drew from their own wells and nearby waterways until the dry season, at which point they were subject to rules and restrictions imposed by the owner of a more distant well in El Jocote. Table 9.2 outlines the new norms and rules established by the community with support from AsoFénix. According to the committee, a charter was formulated establishing the rules, but there was no copy in the community. Evidence of the charter was similarly lacking in the AsoFénix records, so the rules documented are those detailed by the committee and corroborated by sources from AsoFénix. As in other communities, the creation of these new rules and structures can be attributed to the Partnership.

**Table 9.2 Water System Rules & Procedures in Bramadero**

<b>Resource-use Rules</b>	<b>Established Norm</b>	<b>Actual Compliance/Enforcement</b>
<b>Ownership of the Land and System</b>	<ul style="list-style-type: none"> <li>The land holding and surrounding the well was bought by AsoFénix for the purpose of environmental preservation and improvement</li> </ul>	<ul style="list-style-type: none"> <li>No problems accessing the land or equipment were reported</li> <li>The Coordinator and one of the Technicians oversee the land and take care of fruit trees planted as part of environmental restoration</li> </ul>
<b>Protection of the Solar Panels</b>	<ul style="list-style-type: none"> <li>A house was built near the well and solar panels to provide a surveillance post</li> </ul>	<ul style="list-style-type: none"> <li>Members of the Coordinator's family (he or one of his two sons) sleeps in the house built above the solar panels to deter thieves</li> </ul>
<b>Payment</b>	<ul style="list-style-type: none"> <li>November 2007 - March 2010: C \$4.5 per cubic meter</li> </ul>	<ul style="list-style-type: none"> <li>Each connected household had a meter to be read by the Technician on a monthly basis</li> </ul>
	<ul style="list-style-type: none"> <li>March 2010 - March 2011: C\$10 per cubic meter</li> </ul>	<ul style="list-style-type: none"> <li>Committee Coordinator and Technician make rounds once a month to read meters and collect fees</li> <li>Some families connected, but gone, don't pay anything</li> <li>Water consumption has dropped dramatically since the price has risen. This combined with need to pay for electricity has drastically reduced funds for maintenance</li> </ul>
<b>Penalty for lack of payment</b>	<ul style="list-style-type: none"> <li>Committee should cut water after two months of nonpayment</li> <li>If arrangements are made in advance, late payment can be arranged during the dry season</li> </ul>	<ul style="list-style-type: none"> <li>In practice, the committee will not cut off water</li> </ul>
<b>Regular cleaning and maintenance</b>	<ul style="list-style-type: none"> <li>Add chlorine to the tank weekly or biweekly</li> <li>Wash the tank every two months to prevent bacterial or algal growth</li> </ul>	<ul style="list-style-type: none"> <li>Yes, though precise frequency unknown because transparency is lacking (no records)</li> </ul>

**Table 9.2 Water System Rules & Procedures in Bramadero (continued)**

<b>Community Organization Rules</b>	<b>Established Norm</b>	<b>Actual Compliance/Enforcement</b>
<b>Committee Structure</b>	<ul style="list-style-type: none"> <li>At least four members of the committee: coordinator, treasurer, secretary, and technician.</li> <li>Coordinator calls meetings and facilitates communication</li> <li>Secretary keeps records and acts as check on Treasurer</li> <li>Treasurer collects money and works with Secretary on record keeping</li> <li>Technician performs maintenance, fixes problems, communicates severe problems to AsoFénix</li> </ul>	<ul style="list-style-type: none"> <li>In practice, there is only a Coordinator and two Technicians</li> <li>Overlap of roles. Coordinator and younger Technician also perform duties that would be performed by a Treasurer or Secretary. Coordinator collects money that is then deposited by the Technician</li> </ul>
	<ul style="list-style-type: none"> <li>Representatives elected by the community</li> </ul>	<ul style="list-style-type: none"> <li>Two elections held</li> <li>New Technician was not elected</li> </ul>
<b>Frequency of Meeting</b>	<ul style="list-style-type: none"> <li>Committee meets every month to review books and discuss issues</li> </ul>	<ul style="list-style-type: none"> <li>Committee meets every 4 or 5 months</li> </ul>
	<ul style="list-style-type: none"> <li>Committee meets every two months with the community to review status</li> </ul>	<ul style="list-style-type: none"> <li>Community-wide meetings only held when there is a problem</li> <li>These meetings generally called by AsoFénix</li> </ul>
<b>Compensation for Technicians</b>	<ul style="list-style-type: none"> <li>Technicians and Coordinator compensated</li> </ul>	<ul style="list-style-type: none"> <li>Primary Technician receives 300 cord per month for cleaning and chlorinating the tanks</li> <li>Coordinator compensated for watching solar panels by being allowed to grow crops (tomatoes) on AsoFénix land near the well.</li> </ul>

### **9.2.2 Monitoring & Accountability**

#### **a) Monitoring Community Compliance**

Payment monitoring records were not available in Bramadero, but evidence suggests that committee members lacked capacity to keep clear records. Committee members indicated that they collected and recorded payments, but they would not share their accounting documents (Technician, March 15, 2011). Long-term Volunteers commented that the committee was also “not well trained in accounting practices, community organization principles, and conflict resolution” (Long-time Volunteer, April 18, 2011). The Coordinator traveled at least once to the AsoFénix office in Managua for guidance and assistance in compiling financial records (Long-term Volunteer, June 9, 2011), but he did not use the books as intended: as a mechanism for exposing noncompliance during community-wide meetings, thereby stimulating social-pressure to pay (Long-term Volunteer, April 18, 2011). It is possible that monitoring practices have improved since the Long-term Volunteers left Nicaragua in September of 2010.

Because records were not made available for this study, and no community members outside the committee had seen them or attended a meeting in many months, it must be concluded that sufficient monitoring was not taking place (Residents, March 15-17, 2011). The Partnership has therefore not developed capacity related to community monitoring in Bramadero.

**b) Committee Accountability**

As in the other communities, the willingness or motivation to maintain regular meeting schedules appeared to be lacking. Although the members of the committee claimed they met regularly to discuss bill collection and to keep the community abreast of payments and problems, testimony from other residents and volunteers indicated otherwise. Long-term Volunteers who lived in the community reported that “based on [their] experience the committee was meeting on its own maybe once every 4 to 5 months, and meeting with the community only when there was [sic] problems and the meetings were mainly set up by AsoFénix (probably about every 8 months)” (April 18, 2011). Families in the community not related to a committee member could not remember the date of the last meeting and had no knowledge of the current financial state of the system, but they seemed unbothered by the lack of information (Residents, March 15-17, 2011).

According to statements from the Long-term Volunteers, the meetings may not have been taking place because the committee was “unsure about how to go about holding community meetings and giving information about who has or hasn't paid in the community” (June 9, 2011). On several occasions AsoFénix personnel visited the community and helped it conduct the meetings. Still, in the absence of direct outside intervention, neither the meetings nor the enforcement of payment rules, took place. When asked about the lack of meetings, people looked puzzled—perhaps because no regular schedule had ever been established (Residents, March 15-17, 2011).

In Bramadero, the committee appeared to only have three members who regularly attended to committee duties. While other people were cited as having been elected, the committee “in all honesty [was] really just [the Coordinator]”, who was assisted with payment collection and maintenance by the two Technicians (Long-term Volunteer, June 9, 2011). The committee Coordinator identified other residents who had been elected to the committee, but they did not appear to have specific roles, and they were not present in the community at the time of data collection. No one was identified as an elected Treasurer, or Secretary. Instead, it was clear from interviews with all three primary committee members that the Coordinator and the Lead Technician were acting as the Treasurer and Secretary by collecting money and keeping records. The other Technician also assisted with money management by making regular trips to deposit the money in the bank.

No one on the committee or in the community appeared to have a good sense of the structure and duties of the committee members, and as in the other communities, there was no publicly available information. The second Technician also admitted to not having been democratically appointed. Upon resignation of a previous member he was asked to fill the void and was trained in basic system maintenance and rules by the other Technician. The

committee asserted that the tanks were being cleaned regularly; but, as in the other communities, no maintenance log was provided and there was no system of monitoring the Technician's work in place. There was therefore no way to prove that regular maintenance was being performed on the panels or the tanks.

Compared to people in other communities, residents of Bramadero appeared indifferent to the committee and to the water system. They were content to have water, though displeased with the higher prices, but they were hesitant to discuss details. In general, the impression was that of a system being loosely maintained by a few individuals, rather than that of an integrated and accountable community organization. Because the committee rarely held meetings, because duties were ill-defined and unassigned, and because little tracking of activities was taking place, the Partnership cannot be given credit for impacting any of the indicators related to committee accountability.

### ***9.2.3 Enforcement & Sanctions: Ability to Collect Payments***

According to residents and Long-term Volunteers, collecting payments was not a problem, but statements from the Technician suggest enforcement was not a priority. The committee met its responsibility to collect dues, and most families met their obligations to pay. However, because the payment records were not available, it was difficult to confirm with certainty that obligations were being met. The Lead Technician admitted that 4 or 5 families had difficulty paying, and in these cases they were obviously reluctant to turn off their water. The rules required shutting off the water after two months of nonpayment, but in practice the Technician expressed sympathy for his fellow citizens: "those that don't pay don't do it because they don't want to pay, it's because they don't have money" (Technician, March 15, 2011). Instead, the unofficial committee policy was: "if they tell committee in advance, we can arrange something so they can pay when they have more income" (*Ibid.*). While the committee did not present this as a problem, it was unclear whether the rest of the community was aware of these practices, as the meetings in which the community would have been informed of delayed payments were not taking place. As mentioned above, AsoFénix had visited a number of times to assist with meetings and rule enforcement, but without outside pressure from AsoFénix, rule enforcement was not a priority.

Data regarding enforcement and sanctions is rather mixed. Payment collection was not considered a problem within the community, but this may have been because of lack of enforcement on the part of the committee and infrequent dissemination of information to the community as a whole. In the face of this conflicting evidence, the Technician's statements—which indicate reluctance to enforce the rules—are given more credence. Considering reluctance to enforce the rules without assistance from AsoFénix, the Partnership cannot be considered successful in developing the capacity to enforce rules and apply sanctions.

### ***9.2.4 Conflict Resolution***

While the community members themselves did not mention conflicts related to the water system, outside observers noted the lack of conflict resolution skills and heavy dependency on AsoFénix for support. One example of conflict avoidance was explained above in the

section on rule enforcement. Rather than cut off water to people who were not paying, the committee members waited until AsoFénix was present to enforce the rules. The second example demonstrates either a reluctance or an inability of the committee to solve collective problems related to the system in the face of unexpected water shortages.

Bramadero was the only community visited that had faced repeated dry-season water shortages after installation of the system. These problems resulted from unforeseen characteristics of the aquifer in which the well was drilled.<sup>28</sup> Nevertheless, the community's response to the water crisis does point to lack of capacity to adequately address such challenges.

In particular, the winter of 2009 was unusually dry, leading to water shortages in the summer of 2010. The water level in the well providing water to the tanks dropped dramatically and “in the driest times, [the community] would only get 5-10 gallons of water once every 5 days” (Long-term Volunteer, April 18, 2011). According to Long-term Volunteers, when water for the system was insufficient in the summer of 2010, “families that lived in the lower part of the system would take as much water as they could get when the tank was open, leaving little if none for people higher up on the system because the water would never reach the higher houses” (April 18, 2011). The Coordinator, “tried to talk with families, but didn't really seem like he had much success” (Long-term Volunteer, June 9, 2011). Instead, people “quickly went back to the way it was before” walking to El Jocote and depending on family and community connections to “at least get them a 5 gallon bucket of water” (*Ibid.*).

Community members confirmed that there was no meeting held at the time of the crisis and that they resumed their long-distance water collection (Residents, March 15-17, 2011). Rather than having the skills and authority to call a meeting, organize the community, and find a solution to these challenging conditions, underlying power structures prevailed. Those closest to the well, who are the “major players” in the community, got as much water as they could, leaving others to manage without the system until the rains returned (Long-term Volunteer, June 9, 2011).

In this situation, not even AsoFénix was called in to negotiate a more equitable solution or to help with future planning. Since the water shortage, the committee has regularly communicated the need to use water from the system judiciously during the dry season (Technician, 2011; Residents, March 15-17, 2011). Because of the scarcity, all families used waterways or other wells for bathing and washing clothes, and everyone interviewed said the committee wanted people to be aware of the shortage of water and the need to conserve. Still, no plan or rationing system was devised to ensure that everyone would get an equitable share from the system if water should run low again (Residents, March 15-17, 2011). While some might see the lack of conflict resulting from this event as a sign of overall resilience, it reflects poorly on the ability of the committee to manage the system, set rules, and meet the

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<sup>28</sup> The lack of water also has serious implications for the design of the system and the future viability of the current water supply. According to the AsoFénix Engineer, two methods were used to locate the well: “traditional” water seeking methods; and drilling and water testing. Determination of the precise reasons for the shortage of water, and of whether this represents a failure to properly investigate water resources, are beyond the scope and expertise of this study. Should the NGOs and communities have the resources and the desire to improve water supply, further hydrogeological studies would be required. It may ultimately be necessary to install a second well.

community's needs without simply abandoning the infrastructure and returning to previous practices.

Evidence suggests that the committee was reluctant to hold meetings out of fear of conflict. It also shows that it was unable to find equitable solutions in the face of water shortages. Because of these observations and a dearth of evidence to suggest that conflict resolution procedures and training were provided, the Partnership is considered to have had no impact on conflict resolution capacity in Bramadero.

### **9.3 Exogenous Influences**

Observations and interviews gave no reason to suspect that external sources of aid or capacity building had influenced outcomes in Bramadero; however, evidence from interviews did suggest that social tensions within the community might have influenced the overall lack of community investment in the system. As mentioned in the case of the three-community system based in Potreritos, shared norms, values, and experiences have the potential to influence the outcomes of collective action structures (Agrawal, 2001). According to interviews, the community was significantly divided along familial, political, and religious lines. The original committee comprised people from both groups, but later the community decided to appoint only people from one family (Long-term Volunteer, April 18, 2011). A general reluctance to talk openly about conflicts within the community made it difficult to ascertain the degree to which these social tensions influenced committee behavior and project outcomes. These social tensions may, however, help to explain the infrequency of meetings and the reluctance of the Coordinator to hold meetings without AsoFénix. In the face of a relatively divided community, even a well trained Coordinator may not have felt confident in his ability to hold productive and uncontentious meetings. The absence of conflict resolution procedures likely made that more difficult as well. Without collecting extensive background information on communities, it would be difficult for the Partnership to eliminate the possibility of social tensions eroding the prospects for community-based management. However, once such tensions become apparent, extra effort could be made to craft monitoring and conflict resolution mechanisms that can reduce uneasiness and foster trust, thereby facilitating committee oversight of the projects.

It is interesting to note that, with the exception of a few community leaders, the community as a whole appeared surprisingly unconcerned with the committee and with maintenance of the system. This is a stark contrast to other communities, where uninformed community members expressed outrage at not being informed of issues or failures (Residents in Candelaria and Potreritos, March 2011). International development literature documents the potential for dependency problems when communities do not feel a sense of ownership and responsibility for the projects (Gibson et al., 2005). This attitude was confirmed by a volunteer who described Bramadero as a community that had become "very accustomed to receiving aid for free and have come to expect it" (Long-term Volunteer, June 9, 2011). Though AsoFénix actively tries to break the cycle of free aid by emphasizing community ownership, making people work to install the system, setting up payments, and helping them to form a committee (AsoFénix Community Organizer, February 15, 2011), this appears to have been unsuccessful in the case of Bramadero. Community tensions may help to explain

these results in Bramadero, but future research into the precise conditions that resulted in such apathy would be necessary to make conclusive statements. This information might be useful in helping the Partnership to avoid communities likely to become dependent or in devising methods to overcome these obstacles in the future.

#### **9.4 Preliminary Discussion & Conclusions**

Capacity development in Bramadero has fallen short of the desired community-management of the system. Table 9.3 shows that the Partnership's overall impact has been low. As stated by a Long-term Volunteer familiar with all of the sites in this study, Bramadero "more than most other communities, has become almost entirely dependent on outside organizations to solve problems in their community" (April 18, 2011). Both financial and technical capacity are lacking, and the continued use of a DC pump has the potential to force the system to be turned off if outside financial assistance is discontinued. Monitoring and accountability practices are lacking, and evidence suggests that conflicts within the community deter committee members from holding regular meetings. The committee was overly lenient on delinquent residents, and in times of crisis the committee was unable to facilitate equitable solutions. Overall, Bramadero is still largely reliant on financial, technical, and organizational support from AsoFénix.

**Table 9.3 Impact of Partnership on Capacity Development in Bramadero**

<b>Capacity</b>	<b>Indicator</b>	<b>Evidence of Impact</b>	<b>Points</b>
<b>Financial capacity</b>	Sufficient income to cover system expenses	No	0
	Demonstrated ability to pay for system repairs	No	0
<b>Technical capacity: training</b>	Evidence of formal technical training	Yes	1
	Evidence of informal technical training/mentoring	No	0
<b>Technical capacity: maintenance</b>	Ability to troubleshoot and maintain system independent of Partnership support	No	0
<b>Community organization structures &amp; rules</b>	Changes in or development of community organizations	Yes	1
	Changes in and development of rules	Yes	1
<b>Monitoring &amp; accountability: monitoring community compliance</b>	Clear records of community payments	No	0
<b>Monitoring &amp; accountability: committee accountability</b>	Regular committee meetings	No	0
	Regular meetings with the community	No	0
	Community knowledge of committee positions and responsibilities	No	0
	Public tracking of committee tasks and duties	No	0
<b>Enforcement &amp; sanctions: ability to collect payments</b>	Ability/willingness to enforce rules	No	0
<b>Conflict resolution</b>	Conflict resolution rules and procedures	No	0
	Evidence of conflict resolution training	No	0
	Ability to resolve conflict	No	0
<b>Total Points &amp; Designation</b>		<b>Low Impact</b>	<b>3</b>

## Chapter 10: Cuajinicuil Case Study

Located 40-minutes walk from the nearest road, Cuajinicuil is a small, isolated community in the municipality of San José de los Remates, in the Department of Boaco. In selecting the site, AsoFénix worked with the local municipality to identify a community that was not slated to be connected to the grid. Like many other rural communities in the area, its 100 residents are subsistence farmers who live without running water and, until recently, electricity. In June of 2010, the Partnership installed a combination of a one-kilowatt wind turbine and a 500-watt solar array. The system was designed to provide electricity to illuminate 14 households and to eventually power a water system similar to those described in the previous case studies.<sup>29</sup>

As the collaboration's first small-scale home electricity project, the installation in Cuajinicuil was an opportunity for both GrnEmp and AsoFénix to expand into new technology: wind power. Wind energy has been touted as a less expensive means of producing more energy than solar systems, and thus more benefit, for underdeveloped communities (Corbyn, 2007). Prior to the Cuajinicuil project, neither NGO in the Partnership had extensive experience with this technology; but collaboration with another NGO in Nicaragua, blueEnergy (bE), provided the opportunity for both Partnership NGOs to learn new skills, gain experience with new systems, and test the applicability of the community-management development model to new technologies. Based on the Atlantic coast in Bluefields Nicaragua, bE had been working with small-scale wind energy since 2003, and it wanted to expand into potable-water and mini-grid development. At the time, AsoFénix and GrnEmp had developed a combination of individual and joint expertise in solar energy and solar water pumps, in micro-hydro, in mini-grid construction, and in community development in Nicaragua, but they had little experience with wind systems (AsoFénix ED, January 25, 2011). These differences in skills provided an excellent opportunity for all NGOs to exchange knowledge and test their models with new technology.

Cuajinicuil differs from the previous scenarios in important ways, allowing the model to be tested under different circumstances. Not only did the installation at Cuajinicuil involve electricity, but the community was much smaller. A new NGO was involved in designing and installing the system.<sup>30</sup> Further complicating analysis is that, although the electricity installation had been completed on paper for 10 months when data collection began, it became clear that rules and community organization structures had not yet been solidified. While these circumstances make immediate comparisons to the other cases more difficult, careful attention to the impact of these differences on capacity building outcomes has the potential to reveal different strengths and limitations in the Partnership model and on the overall ability of the Partnerships to develop capacities under different conditions.

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<sup>29</sup> At the time of data collection the water system had not yet been completed.

<sup>30</sup> While project proposals describe the project as a three-way partnership, observations and conversations revealed that the three-way collaboration did not meet the definition of Partnership as outlined in chapter 4 of this study. bE assumed the role of a contracted manufacturer who built the turbine and provided technical support. The traditional Partnership was still responsible for all fundraising, community organizing, and on-going support.

The following chapter examines the impact of the combined solar-wind installation in terms of the same variables used for the previous three case studies.

## **10.1 Individual Capacity Level**

### ***10.1.1 Financial Capacity***

At the time of data collection, final payment rates had not yet been set, but observation of the rule-making process suggested that fees were likely to remain lower than desired by AsoFénix, and than necessary to truly cover maintenance costs. At the time of a February meeting, which was called by AsoFénix, the community could not recruit sufficient support to raise the fee from C\$25 to C\$40 per month. Baseline data collected by AsoFénix before the project began indicated that the community had previously paid an average of C\$50 per month to fuel kerosene lamps. Despite admitting to improvements in their quality of life, and despite listening to pleas from the AsoFénix staff, the electricity committee Secretary, and a few community elders, over half of those present resisted paying more.<sup>31</sup> Consequently, the new rate was set at C\$30, pending further discussion.

At the current rate, the community will bring in C\$5040 (\$225) each year. Table 10.1 outlines the costs of replacement parts, but does not include the costs of travel to the site or labor required to conduct repairs. Proponents of small-scale wind turbines tout them as a cheaper, locally sourced alternative to solar electricity (Dunnett, Khennas, and Piggott, 2001; Corbyn, 2007); however these claims of greater efficiency and cost effectiveness assume availability of reliable wind, availability of an appropriate site, a reliable turbine design, and locally available maintenance knowledge to perform low-cost repairs (Piggott, 2000; Dunnett et al., 2001). They also assume more maintenance, but lower up-front costs; which, considering transportation costs in reaching Cuajinicuil, might not apply in this case (GrnEmp TD, July 13, 2011). In contrast to these maintenance costs, solar panels require very little maintenance aside from occasional cleaning to remove dust or debris that reduces energy production (GrnEmp TD, July 13, 2011). The site at Cuajinicuil does have a photovoltaic (PV) that can continue to provide some electricity, but it provides much less energy than the turbine. Since installation in 2010, the stator and dumpload have already been replaced. Equipment, travel, and labor costs were covered by bE and AsoFénix, bE work being covered by a one-year warranty.

Prices in table 10.1 show that if problems persist and routine maintenance continues to require regular replacement of components and technological assistance, the community will be unable to finance on-going maintenance at current fee levels. Even if these “quirks” are resolved (as bE engineers hope will happen within the first few years after installation) (GrnEmp TD, July 13, 2011), at current rates the community will not save enough money to replace the battery-bank every five years. Because the community is so small, and willing to pay so little, it is unlikely that it will be able to become financially independent of the

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<sup>31</sup> These statements were based on observation of a community meeting held in February, 2011. Members of each family were required to sign-in, thereby proving that representatives from every household were present and able to participate in the decision-making process.

Partnership for maintenance of this system. The Partnership has thus far not developed the community's financial capacity to manage the system.

**Table 10.1 Costs of Replacement Parts for Turbine & Electricity System**

Equipment	Price (\$)	Notes
Battery Replacement	\$330-350 per battery	The nature of the system requires that all six batteries be replaced at once, even if only one is damaged. Therefore the replacement costs would be \$2640-\$2800. Well-maintained batteries should be replaced every 5 years, at minimum.
Stator	\$200	Stator for this turbine was custom built by bE.
Dumupload	\$235 (commercial)	The replacement installed in May 2011 was custom built. While cheaper for the NGOs in this case, the labor to build it was essentially donated.
Blades	\$245	

*Source:* Wind-energy Engineer at bE

### **10.1.2 Technical Capacity: Training**

Unlike in the previous case studies, there was significant evidence of formal and informal technical training in Cuajinicuil. In late November of 2009, one of the Cuajinicuil Technicians, along with the permanent Engineer from AsoFénix, attended 44 hours of intensive wind-energy training provided by engineers at bE; however, funds were only available for one technician from the community to attend (Former bE Engineer, June 3, 2011). According to both the AsoFénix Engineer and the community Technician, trainings were thorough and informative, covering both theory and practice. Records show that principles of wind energy, turbine location and data collection, turbine construction, turbine maintenance, and troubleshooting were covered: a vast amount of information to absorb in a short period of time, particularly for non-engineers (Training documents, 2009; (Former bE Engineer, June 3, 2011). To help with knowledge retention and future maintenance, a manual elaborating the functions and workings of the system was provided as a reference to be consulted during minor repairs (Informe Final Cuajinicuil, 2010; Technician, April 13, 2011).

The Technician who attended the trainings had access to the most knowledge, but there was also evidence of hands-on training and support for all three Technicians. All three Technicians had helped with the system installation and wiring the houses. For those that had not attended the formal training, much of their knowledge had been acquired through experience and working closely with the AsoFénix Engineer (Technicians, February 16, 2011). This hand-on training was on-going. When called out to address problematic noises being made by the turbine, the AsoFénix Engineer was careful to allow local Technicians to perform the work.

He tested their knowledge by asking them questions, and it was evident from their participation in the decision-making that they were familiar with the systems. They appeared to lack confidence more than skill, and the AsoFénix Engineer spent several hours reviewing the basics of the system and how to monitor electrical output, use tools, and perform maintenance. He also reminded them to look at the manuals and materials they had been provided on electricity in general and on the system in particular. Unfortunately there was only one copy, and those who had not been able to attend the training had not been previously aware the materials existed (Technicians, April 14, 2011). Providing multiple copies would be an easy way of reinforcing that knowledge. Overall, the AsoFénix Engineer was sensitive to the concerns and insecurities of the Technicians and made a noticeable effort to strengthen their knowledge and give them confidence in their ability to perform basic maintenance.

Considerable evidence of training and mentoring reveals that the Partnership made considerable effort at building technical capacity in Cuajinicuil; consequently, it is awarded two points for technical capacity building.

#### ***10.1.3 Technical Capacity: Maintenance***

Despite the initial and on-going training provided in Cuajinicuil, the nature of the technology has made it difficult for local technicians to truly assume responsibility for maintenance and repairs. Both the Engineer and the local Technician agreed that the trainings were informative and helpful, but given the complexity of the material and the difficulties associated with wind-turbine maintenance, even more intensive training may have been inadequate to prepare them for the challenges associated with wind energy. Though he had written his engineering thesis on wind energy, a former engineer at bE, described his experience with wind in the following way: “Wind turbines in particular are difficult. Took me six to eight months to wrap my head around it, but I learned most of it on the go. It’s a really hands-on experience and machine. Unless you spend a lot of time with it, you don’t get to know it. It’s hard to maintain the systems” (June 3, 2011).

Similarly, despite the training, the Technicians did not feel comfortable performing routine maintenance on their own (Technicians, April 13, 2011). When noise from the turbine signaled problems, the Technicians preferred to call AsoFénix and wait because “they were afraid to mess it up” (Technician, February 16, 2011). On multiple occasions during the data collection period the AsoFénix Engineer and Interns were called out to address problems. At one point, the community went over a month without wind electricity and had to depend solely on the solar panels. As the solar system is substantially smaller, residents reported having to turn out lights early because not enough energy was being produced (Residents, April 12-14, 2011). Once AsoFénix arrived, the local Technicians were heavily involved in the repairs. Decisions were made jointly, and the Technicians demonstrated good mechanical knowledge of the turbine. While this bodes well for their future capacity, it does not change their current reliance on AsoFénix, and it suggests that more on-going training and support need to be provided before they are confident enough to assume full responsibility for routine maintenance.

Some of the technical problems experienced with the turbine also went beyond the expertise of the AsoFénix Engineer. By the time AsoFénix was able to visit the site, damage to the turbine had been so severe that new parts were required. Together the local Technicians and the AsoFénix Engineer attempted a temporary fix to restore the power supply while AsoFénix requested a replacement stator and additional expertise from bE.<sup>32</sup> By experimenting with new technology, the Partnership inadvertently created dependence on expertise outside the established network.

Considering the complexity of wind power, current prospects for independent community maintenance of this system appears bleak. Despite more extensive capacity development efforts than observed in other cases, the Partnership has not succeeded in developing community capacity to manage technical aspects of the system on their own.

## **10.2 Organizational Capacity Level**

### ***10.2.1 Community Organization Structures & Rules***

In Cuajinicuil it was evident that there were vocal leaders in the community prior to the project, but interview responses determined that there was no specific committee or formalized rule structure prior to the Partnership (Long-term Volunteer, April 18, 2011; Residents, February 15-17, 2011). One interesting observation was that although the electrical system had been installed for nearly a year at the time of data collection, the details of the committee and the rules were still being formalized. Social-organizing staff at AsoFénix was actively working on establishing written rules to be formally validated by the community. Table 10.2 depicts the existing norms and rules discussed at the meeting and recognized by the community at the time of data collection. Among the items still under negotiation were meeting schedules, the tariff-structure, and fee collection procedures.

Some rules and norms have been fully established, but because many were still under formulation, the Partnership is not credited with having fully-established rules. As all members of the committee had been elected, credit for this indicator was awarded.

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<sup>32</sup> blueEnergy is in a remote area of Nicaragua, which adds both time and expense to requests for technical assistance.

**Table 10.2 Water System Rules & Procedures in Cuajinicuil**

<b>Resource-use Rules</b>	<b>Established Norm</b>	<b>Actual Compliance/ Enforcement</b>
<b>Ownership of the Land and System</b>	<ul style="list-style-type: none"> <li>Legal access for the committee and technician were secured for land where the electrical house, panels, and turbine tower were installed.</li> <li>Community ownership (to be overseen by the committee) of the materials was established.</li> </ul>	<ul style="list-style-type: none"> <li>No problems accessing the land or equipment were reported</li> </ul>
<b>Payment</b>	<ul style="list-style-type: none"> <li>June 2010 - February 2011: C\$25 per month flat rate</li> </ul>	<ul style="list-style-type: none"> <li>Several families had not yet paid</li> <li>March 1 deadline was established for all back-payments</li> <li>Regular collection schedule and procedure was still not established</li> </ul>
	<ul style="list-style-type: none"> <li>February 2010 - Onward: C\$30 per meter</li> <li>AsoFénix would like it to be at least C\$50 (average payment for fuel before the project)</li> </ul>	<ul style="list-style-type: none"> <li>Upon visit in March 2011, new fee was still not agreed upon</li> <li>Some families had still not paid</li> <li>Regular collection schedule and procedure was still not established</li> </ul>
<b>Penalty for lack of payment</b>	<ul style="list-style-type: none"> <li>The committee, has not yet established a penalty</li> <li>At February 2011 community meeting, AsoFénix representatives reminded the entire community and the committee that this step needed to be taken</li> </ul>	<ul style="list-style-type: none"> <li>NA</li> </ul>
<b>Regular cleaning and maintenance</b>	<ul style="list-style-type: none"> <li>Before the February visit, there was no firmly established schedule for turbine maintenance</li> <li>Wind turbine should be lowered for preventive maintenance at least once every six months</li> <li>Maintenance to the solar panels and battery system should be conducted monthly</li> </ul>	<ul style="list-style-type: none"> <li>In practice, the Technicians were reluctant to lower and dismantle the turbine by themselves</li> <li>Technicians were performing maintenance on batteries</li> <li>Committee provided with necessary tools and possession formally signed-over by every committee member</li> </ul>

**Table 10.2 Water System Rules & Procedures in Cuajinicuil (continued)**

<b>Community Organization Rules</b>	<b>Established Norm</b>	<b>Actual Compliance/ Enforcement</b>
<b>Committee Structure</b>	<ul style="list-style-type: none"> <li>At least four members of the committee: coordinator, secretary, treasurer, and technician</li> <li>Coordinator calls meetings and facilitates communication</li> <li>Secretary keeps financial records</li> <li>Treasurer works with Secretary to manage funds</li> <li>Technician performs maintenance, fixes problems, communicates severe problems to AsoFénix</li> </ul>	<ul style="list-style-type: none"> <li>Coordinator, Secretary/ Treasurer, and three Technicians</li> <li>Coordinator and Secretary collect money together - there is no Treasurer</li> <li>Still no formal system of bookkeeping, Secretary would like a notebook to keep track up funds</li> </ul>
	<ul style="list-style-type: none"> <li>Representatives elected by the community</li> </ul>	<ul style="list-style-type: none"> <li>Yes</li> </ul>
<b>Frequency of Meeting</b>	<ul style="list-style-type: none"> <li>Committee meets every month to review books and discuss issues (AsoFénix standard)</li> </ul>	<ul style="list-style-type: none"> <li>Committee has yet to agree upon fixed meeting schedule</li> </ul>
	<ul style="list-style-type: none"> <li>Committee meets every two months with the community to review status (AsoFénix standard)</li> </ul>	<ul style="list-style-type: none"> <li>No</li> </ul>
<b>Compensation for Technicians</b>	<ul style="list-style-type: none"> <li>No system of compensation was devised - Topic broached at February 2011 meeting</li> </ul>	<ul style="list-style-type: none"> <li>NA</li> </ul>

### ***10.2.2 Monitoring & Accountability***

#### ***a) Monitoring Community Compliance***

Monitoring and compliance procedures were still being solidified throughout the period of data collection. According to the committee Secretary, she had not yet received much formal training in record keeping or collecting and monitoring payments. However, she was in the unique position of being an elementary school teacher who was pursuing degrees in education and management. On several occasions the Secretary expressed the need for a notebook in which to keep records, but in the meantime, she had taken it upon herself to keep records in notebooks she used for her teaching (Secretary, February 16, 2011). This reflects a lack of communication or preparation on the part of the Partnership. It is reasonable to assume that initial supplies would have been provided or that procedures for buying necessary supplies with community funds would have been developed or otherwise explained. The Secretary's general confidence and ability to problem solve in spite of minimal training reflects the interference of outside sources of skill development. The organizational skills she had learned as a teacher and a student were useful to her work on the committee but are not attributable to capacity building by the Partnership.

Although some monitoring was in place, the committee had not yet begun to meet regularly to share information regarding community compliance. A means of sharing the monitoring between committee members and the public has not yet been established. Because the minimal monitoring progress could not be attributed to the Partnership, its impact on monitoring capacity is judged to be negligible.

### **b) Committee Accountability**

Based upon interviews with local committee members, a formal meeting schedule had not been established for sharing information with the community. The committee was aware that they should be meeting among themselves every month and with the broader community every two months, as suggested by AsoFénix, but they were not holding regular meetings. Because the community is very small, it was easy for them to meet informally, which they had done several times; however, this was not part of a routine nor at regularly set intervals (Secretary, April 13, 2011). All three Technicians expressed interest in a fixed schedule, saying a schedule would make it easier to bring up problems with the turbine and communicate issues to the public (Technicians, April 14, 2011).

The committee appeared aware of their roles, but AsoFénix was still in the process of establishing the basic rules and helping the community develop a fully-formed committee. During the February community meeting, the AsoFénix Social Organizer reiterated the role of the committee and reminded the community as a whole that they had not yet completed a charter or formalized rules. No means of tracking the committee's or the Technician's activities has been established. AsoFénix's presence at the community meeting indicates that these details had not been forgotten; but, given that the community had not developed procedures independently, it is incumbent upon AsoFénix to facilitate finalization of rules more directly. Experience in other communities demonstrates that rules and responsibilities of community and committee members related to the projects are not easily accessible to the community as a whole. Because the process is still taking place in Cuajinicuil, both AsoFénix and the committee have the opportunity to solidify roles, duties, and structures and make them publicly available from the beginning.

At present the lack of clarity that persists nearly a year after installation reflects a lack of organization on the part of the Partnership's capacity-building efforts. Consequently, the Partnership's does not appear to have had a substantial impact on establishing committee accountability to date.

#### **10.2.3 Enforcement & Sanctions: Ability to Collect Payments**

While the community was still negotiating a final fee for the electricity, the payment process was not sufficiently organized to ensure that the community was paying even the initial fee for their electricity use. The Secretary, who was in charge of collecting fees with help from the Coordinator, had not established a routine for collecting fees (Secretary, April 13, 2011). At the February meeting the Secretary called upon those households that had not yet paid to submit any outstanding payments by the end of the month. She did not, however, make the names of delinquent families public. The community verbally agreed to the payment deadline, but many of these fees had not yet been collected when committee members were re-interviewed at the end of March. Both she and the Technicians expressed frustration that people were not coming to her to submit their payments (Committee Members, April 13-14, 2011). This suggests that more coaching or training is necessary from AsoFénix on how to collect fees. In other communities, committee members go from home to home on a specific date, rather than waiting for people to come to them. This establishes a clear routine and an

expectation of timely payment. A regular meeting community schedule, where the names of those who have not paid are made public, is also designed to put social pressure on nonpaying households. As no meeting schedule, nor a penalty for nonpayment, had been established, the committee had no means of enforcing the rules.

Considering that norms of payment collection and sanctions have not yet been formalized, it is evident that the Partnership has not yet developed enforcement and sanctioning capacity in Cuajinicuil.

#### ***10.2.4 Conflict Resolution***

None of the committee members reported having attended formal conflict resolution training, and it was evident from the still-evolving system of rules and procedures that there was no conflict resolution system in place (Residents, April 14, 2011). Other than minor disagreements over fee-levels, no conflicts were reported. Nevertheless, evidence from the literature, as well as the case studies suggests that it would be beneficial to conduct training and have procedures in place before conflicts arise. As in other communities, the Partnership has thus far had no impact on the capacity to resolve conflict in Cuajinicuil.

### **10.3 Exogenous Influences**

In this case study, two exogenous influences appear to have influenced the capacities observed within the community: other sources of education and training, and innate leadership characteristics. As previously mentioned, the skills used by the Secretary to develop preliminary tracking of records were developed outside of the Partnership. Several community members were members of a local grain cooperative, but when asked what if any skills were transferable to the electricity system, they denied any influence. These particular individuals were also not members of the committee. Otherwise, there was no sign of skills from other organizations or experiences influencing community capacity. One Technician has also applied to participate in a renewable energy training program being organized and funded by the municipality of San José de los Remates, but he had not yet been notified of his acceptance.<sup>33</sup> Any future evaluation of capacities would have to consider training gained through this program; however, it is also important to note that the Technician was hoping his experience with AsoFénix would make him a more competitive candidate. Should he be accepted, his ability to obtain higher education could also be considered a positive spillover from the project.

Interview data also suggested that individuals on the committee have a history of providing leadership and direction within the community despite the lack of formal organizational structure (Residents, April 14, 2011; Long-term Volunteer, April 18, 2011). As suggested by the literature, a propensity toward leadership is likely to facilitate skills acquisition and capacity development.

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<sup>33</sup> This training program is part of a regional renewable-energy plan mentioned in chapter 5. AsoFénix has been involved in planning and implementation of the plan.

## 10.4 Preliminary Discussion & Conclusions

Table 10.3 summarizes the Partnership's impact on capacity indicators in Cuajinicuil, showing the overall impact to be low. In most areas of capacity development, Cuajinicuil appears to need additional support. It is unlikely that the community will be able to assume financial and technical responsibility for the system in the near future, if at all. It is also evident that better monitoring procedures are needed to ensure accountability of both the committee and individual households. Lax monitoring and payment collection procedures, combined with unspecified sanctions for noncompliance, mean that the committee presently lacks the ability to enforce rules. Though conflict has not yet become an issue in Cuajinicuil, no effort has been made to develop rules or procedures to address future disputes. The Partnership can still take action to develop the capacities necessary to a competent community-management structure, but as present it has not adequately developed any of the capacities identified by their policy theory or by the academic literature.

Because social elements of the Cuajinicuil project are still being executed, for certain variables it may be more appropriate to evaluate the implementation process than the actual impact the project has had. A three-year post-installation window was initially proposed for the cases in this study to allow for project maturation and a full evaluation of impact. At the time of the site visits for this study, the project had only been installed for 10 months. Given the evident immaturity of the committee and the direct involvement of AsoFénix in continuing to shape community structures, establish norms, develop rules, it is difficult to assess how structures will evolve and what the final impact will be. Still, the degree to which social processes designed to support the project are still being developed one year after the project was installed and began providing energy to the community, raises important concerns with the implementation of the Partnership model. Even AsoFénix staff admitted that committee organization and rules should have been completed before the installation was complete (AsoFénix Engineer, 2011). Comments from bE staff and AsoFénix volunteers suggested that technological elements of the projects were “rushed to keep the project on schedule” and satisfy donors (Long-term Volunteer, April 18, 2011; former bE Engineer, June 3, 2011). This rushing seems to have resulted in technological development that outpaced the social development. As a result the project is being managed by a community organization that is only partly formed.

Finally, the above analysis suggests that the suitability of wind energy for future projects should be reexamined.<sup>34</sup> Interviews with bE personnel about their experiences with wind, calls into question the suitability of wind technology for these kinds of small-scale community-based projects. If it takes fully-trained engineers six to eight months to become comfortable with the technology, is it really appropriate to assume that rural farmers will be able to assume control after several months? Given that hands-on training and knowledge

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<sup>34</sup> Many of the maintenance problems in Cuajinicuil appear to have resulted from design and quality difficulties associated with “artisanal” turbine production. It is possible that turbines purchased from a manufacturer with better quality control processes and an established track record for reliability would be easier to maintain and require much less repair and engineer/technician labor (GrnEmp Engineer, July 13, 2011). As this would increase upfront costs, efficiency compared to solar panels would have to be evaluated. It is beyond the scope of this study to determine what role wind turbines in general should play in future projects. The results here only suggest that the suitability of locally produced turbines in particular be reconsidered.

**Table 10.3 Impact of Partnership on Capacity Development in Cuajinicuil**

<b>Capacity</b>	<b>Indicator</b>	<b>Evidence of Impact</b>	<b>Points</b>
<b>Financial capacity</b>	Sufficient income to cover system expenses	No	0
	Demonstrated ability to pay for system repairs	No	0
<b>Technical capacity: training</b>	Evidence of formal technical training	Yes	1
	Evidence of informal technical training/mentoring	Yes	1
<b>Technical capacity: maintenance</b>	Ability to troubleshoot and maintain system independent of Partnership support	No	0
<b>Community organization structures &amp; rules</b>	Changes in or development of community organizations	Yes	1
	Changes in and development of rules	No	0
<b>Monitoring &amp; accountability: monitoring community compliance</b>	Clear records of community payments	No	0
<b>Monitoring &amp; accountability: committee accountability</b>	Regular committee meetings	No	0
	Regular meetings with the community	No	0
	Community knowledge of committee positions and responsibilities	No	0
	Public tracking of committee tasks and duties	No	0
<b>Enforcement &amp; sanctions: ability to collect payments</b>	Ability/willingness to enforce rules	No	0
<b>Conflict resolution</b>	Conflict resolution rules and procedures	No	0
	Evidence of conflict resolution training	No	0
	Ability to resolve conflict	No	0
<b>Total Points &amp; Designation</b>		<b>Low Impact</b>	<b>3</b>

transfer regarding the system continues, it may be possible for the Technicians to assume greater responsibility in the future, but it appears that wind power is likely to require prolonged training.

The Partnership's relative inexperience with this complicated technology has also meant that the NGOs themselves cannot maintain the system without outside assistance. In theory, dependence on outside entities for maintenance should not be an issue, as the community should be trained and capable of upkeep on their own; but as demonstrated by each of these

case studies, in practice, AsoFénix has been largely responsible for major maintenance. By involving another NGO in the collaboration and by installing technology with which they were largely unfamiliar, the Partnership inadvertently created dependency, not on AsoFénix, but on an outside NGO over whom they have no control.<sup>35</sup> This has meant the community has had to wait substantially longer for problems with the system to be resolved, leaving them without services for longer periods than observed in the other case studies. While capacity-building efforts were insufficient to transfer management at other sites, the failure of the system in Cuajinicuil to provide consistent electricity represents a more significant loss of key benefits (and hence impact) at this particular site.

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<sup>35</sup> While bE was described as a partner organization, their role in the project was essentially to supply the wind turbine and provide training on how to use it. GrnEmp and AsoFénix were responsible for all social aspects of the projects, and now that bE's one-year warranty has expired, bE is not required to provide on-going support for the system.

## Chapter 11: Cross-case Comparison & Conclusions

*What impact do GrnEmp-AsoFénix-Community partnerships have on capacity development for both NGOs and the local communities that participate in the partnerships (as measured by financial resources; technical skills and knowledge; organizational structures, procedures, and rules; the ability to monitor and enforce these rules; and conflict resolution mechanisms)?*

Returning to the central questions proposed by this study, this chapter examines what the four case studies combined suggest about the Partnership's impact on capacity development. Table 11.1 summarizes the findings of the four case studies, including both phases of the system in Potreritos. Following the format of the individual case study chapters, the impact of the Partnership on each capacity is evaluated in greater detail. Overall impact on each capacity was determined by evaluating the number of indicators influenced across the four primary case study communities.

### 11.1 Individual Capacity Level

#### 11.1.1 Financial Capacity

The Partnership was not successful in developing financial capacity for independent management of the system in any of the communities studied. Only Candelaria exhibited potential to be able to take over responsibility for expenses in the future, but none of the communities had been required to assume such control. In light of these findings, overall impact of the Partnership appears to be very low.

In part, failure to develop financial capacity resulted from an inability to raise enough money to cover expenses. Because of low rates, had communities been asked to cover expenses they would have quickly run out of money, and the systems would have fallen into disrepair. However, there was also evidence that the communities' relationships with AsoFénix promoted problems of free-riding similar to those identified by Gibson et al. (2005). Because the Partnership demonstrated interest in keeping the systems running and a willingness to pay for repairs, there was no pressure on the communities to raise rates or consider the true value of the services provided. In these cases, having a dedicated NGO Partner was a double-edged sword. Without the Partnership, the systems run the risk of breaking-down, but as long as NGOs provide support, it is difficult to establish a community's true willingness to pay and maintain the system. Suggestions for future research into how to overcome these challenges and how to improve the Partnership's impact are provided in appendix A.

Table 11.1 Cross-case Comparison of Impact

Capacity	Indicator	Points	Candelaria	Potreritos (3-community system)	Potreritos (1-community system)	Bramadero	Cuajinicuil	Overall Impact on Indicator	Overall Impact on Capacity Level
Financial capacity	Sufficient income to cover system expenses	1	Yes	-	No	No	No	Low	Very Low
Technical capacity: training	Demonstrated ability to pay for system repairs	2	No	-	No	No	No	None	None
Technical capacity: maintenance	Evidence of formal technical training	1	No	-	No	Yes	Yes	Moderate	Moderate
Community organization structures & rules	Evidence of informal training/ mentoring	1	Yes	-	No	No	Yes	Moderate	Moderate
Monitoring & accountability: monitoring community compliance	Ability to troubleshoot and maintain system independent of Partnership support	2	No	-	No	No	No	None	None
Monitoring & accountability: committee accountability	Changes in or development of community organizations	1	Yes	Yes	Yes	Yes	Yes	High	High
Enforcement & sanctions: ability to collect payments	Changes in and development of rules	1	Yes	Yes	Yes	Yes	Yes	High	High
Conflict resolution	Clear records of community payments	1	Yes	No	No	No	No	Low	Low
	Regular committee meetings	2	No	No	No	No	No	None	None
	Regular meetings with the community	2	No	No	No	No	No	None	None
	Community knowledge of committee positions and responsibilities	1	No	No	No	No	No	None	None
	Public tracking of committee tasks and duties	2	No	No	No	No	No	None	None
	Ability/willingness to enforce rules	2	Yes	No	Partial	No	No	Low/Moderate	Low/Moderate
	Conflict resolution rules and procedures	1	No	No	No	No	No	None	None
	Evidence of conflict resolution training	1	No	No	No	No	No	None	None
	Ability to resolve conflict	2	No	No	No	No	No	None	None
	<b>Total Points</b>	<b>23</b>	<b>7</b>	<b>2</b>	<b>2.5</b>	<b>3</b>	<b>3</b>		
	<b>Impact Designation</b>			<b>Low Impact</b>	<b>Very Low Impact</b>	<b>Very Low Impact</b>	<b>Very Low Impact</b>		

### ***11.1.2 Technical Capacity: Training***

With the exception of Potreritos, most communities had received some degree of formal or informal training and exhibited the ability to attend to minor repairs. The failure in Potreritos may be explained by that system's recent collapse and the need to remobilize capacity development efforts. Training and mentoring methods were inconsistent and there was no overarching format or strategy for developing capacity. Only Cuajinicuil showed evidence of both informal and formal training. Nevertheless, the Partnership was found to have moderate impact on technical capacity across the four cases. These results suggest that more effort could be made to standardize training and opportunities for on-going support, both of which are discussed in more detail in appendix A.

### ***11.1.3 Technical Capacity: Maintenance***

None of the communities had developed enough capacity as a result of the Partnership to assume responsibility for troubleshooting or major maintenance and repairs; therefore, the Partnership's impact on technical capacity is found to be minimal. Because overall evidence of formal training or mentoring was inconsistent, it is difficult to say conclusively whether the communities's inability to develop the capacities necessary for managing these systems originates from an implementation failure or a fundamental flaw in the model's design. It is possible that the communities would be able to maintain their own systems if given better training and skills. Conversely, it may prove difficult, impossible, or inefficient to expect each small, rural community to develop technical and engineering expertise needed to successfully manage complex infrastructure. It must be acknowledged that some degree of dependence on GrnEmp is likely to persist because certain equipment and warranties are not available in Nicaragua. This reflects structural and supply-chain limitations inherent to working in developing countries, not a problem with the Partnership's efforts. Further research and experience would be necessary to determine whether the Partnership's model should be reevaluated. Possible courses of action based upon both assumptions are provided in appendix A.

### ***11.1.4 Overall Impact on Individual Capacity***

Averaging results from financial and technical capacity, the Partnership is found to have had low impact on overall individual capacity development related to the projects. Attempts at training and skills development were comparatively strong, whereas the ability to financially and technically manage the system remained deficient.

## **11.2 Organizational Capacity Level**

### ***11.2.1 Community Organization Structures & Rules***

The ability to develop new committee structures and rules was one of the Partnership's capacity building strengths. While rules were still under development in Cuajinicuil, the Partnership was actively working with the community to solidify these structures. Because all communities had established organizational structures and rules to assist in management of

the new infrastructure, the Partnership's impact on this indicator of organizational capacity was found to be high.

### ***11.2.2 Monitoring & Accountability***

#### ***a) Monitoring Community Compliance***

Only one community, Candelaria, was found to have the capacity to maintain clear and consistent records that could be used to hold families accountable for their contributions to the systems. Some of the capacity in Candelaria could be attributed to mentoring by long-term AsoFénix volunteers, but some was likely the result of outside training. Interview and observational data suggested that across all four communities training related to record keeping and monitoring was minimal. Mentoring was inconsistent and provided primarily in times of crisis. The overall lack of monitoring in these communities leads to the conclusion that the Partnership's impact on monitoring capacity has been low.

#### ***b) Committee Accountability***

None of the communities demonstrated sustained ability to hold regular committee meetings or meet with the community. Candelaria initially held regular meetings, but its ability and willingness to do so waned over time, both because the community lost interest and because committee members had other obligations. Additionally, public knowledge of committee duties and responsibilities, and the public's ability to monitor maintenance and other committee activities, were lacking. These elements of organizational capacity are essential to promoting accountability of the committee to the public. Their absence across all communities indicates that the Partnership has had no impact on capacities necessary for creating accountable committees.

### ***11.2.3 Enforcement & Sanctions: Ability to Collect Payments***

Evidence of community capacity to enforce rules and impose sanctions was mixed. Candelaria and the new system in Potreritos demonstrated the ability and willingness cut off water supplies in response to nonpayment, but in Potreritos only some of this capacity could be attributed to Partnership efforts. In Bramadero, unavailability of records made establishing enforcement patterns difficult, but statements suggested that the committee was reluctant to impose sanctions. Because official sanctions had not yet been established in Cuajinicuil, it is not surprising that enforcement capacity was lacking. Additional research into why some committees are less hesitant than others to enforce the rules, including more in-depth interviews with committee members, could help to establish how the Partnership can empower committees to enforce rules. Testing other sanctioning mechanisms or researching enforcement mechanisms used by other community-management organizations might also help to determine whether making payment records public—with the intention of creating public pressure for families to pay—is the most effective enforcement strategy. Because of the diverse circumstances surrounding enforcement capacity, the Partnership is found to have had low to moderate impact on the development of sanctioning capacity in project communities.

#### ***11.2.4 Conflict Resolution***

The ability to resolve conflict was a capacity identified in the literature rather than through examination of the Partnership's policy theory or practices. It is therefore less remarkable that the Partnership was found to have had no impact on developing conflict resolution procedures or providing related training, and that communities were unable to resolve conflicts without external mediation. While the Partnership has heretofore overlooked the relevance of conflict resolution to their goals, evidence from academic literature and experience within the project communities indicate that the capacity to resolve conflict is essential to effective community-based management. Investigation into how to incorporate conflict resolution into the development model is advisable.

#### ***11.2.5 Overall Impact on Organizational Capacity***

Review of all the indicators indicates that the Partnership's overall impact on organizational capacity has been low.

### **11.3 Final Conclusions**

The results presented here reveal the following answer to the central question: The Partnership has had little impact on capacities needed for independent community management of the systems they install. It appears that rather than allowing communities to fully manage projects on their own, the Partnership attempts to develop some capacities related to minor financial or technical disruptions and to routine monitoring. On-going support for major financial, technical, and social problems are still largely provided by AsoFénix, with GrnEmp support as necessary. Although the Partnership falls notably short of its capacity development goals, it is important to note that in all cases the goal of providing clean water and electricity to poor Nicaraguan communities has been met. This is no small feat; but, as the number of Partnership projects grows, the resources needed to maintain support of existing projects will likely threaten the sustainability of even these achievements. It is therefore in the interest of the Partnership and the communities to devise new methods or models for transferring as much responsibility as possible to communities (or new entities) in order to ensure the long-term viability of its development projects.

### **11.4 Future Research**

The preceding paragraphs outlined areas of future research related to the evaluation criteria used in this study. In addition to those suggestions, this study also points to additional gaps in the overall literature that might warrant further investigation. Data from this study support conclusions from existing research that group characteristics and social capital have the potential to influence capacity building and overall sustainability outcomes. However, the precise nature of these relationships remain unclear. This study also suggests that mismatch between system and social boundaries might be an important determinant of project success. Experiences in Bramadero and with the three-community system in Potreritos suggest that smaller, more closely knit communities are better suited to the committee-managed model advocated by the Partnership. Lack of social cohesion, rivalry, and the potential for conflicts

over rights to resources appear to give rise to conflicts that threaten the ability to monitor and enforce rules effectively. Future research could help to elucidate the specific impact of different group characteristics and dynamics on community-management outcomes. It may also be useful to the Partnership in selecting future project sites and provide insight into how to modify capacity development efforts in the face of these challenges.

In response to this report's findings, the Partnership may choose to reinvigorate its capacity development efforts, or to reevaluate the stated goal of community management and the Partnership's policy theory. Additional research into the feasibility of establishing true financial and technical responsibility, and social independence for community systems will be essential to selecting a realizable path. In particular, research into the viability of setting prices that would enable communities to pay for equipment repair and outside labor and expertise will be important improving the current development model. This might include more formal evaluation of willingness and ability to pay for water and electricity services. It is not the place of this study to prescribe a course of action; but, in the interest of stimulating further discussion, appendix A provides preliminary policy and research suggestions based on information from literature, interviews, and field experience accumulated throughout the course of this study.

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## Appendix A: Lessons & Recommendations

As making recommendations is beyond the scientific scope of this paper, the recommendations below reflect opinions of the author and are not necessarily grounded in social-scientific analysis. Nevertheless, they are based on information, observations, and intuition gathered over the course of this study. Where possible, these recommendations are supported by existing literature or the opinions of other development professionals. In other cases they are the result of reflection by the author. Consequently, these recommendations are not intended to be policy prescriptions; instead they aim to present a variety of options in order to provoke discussion and stimulate further investigation.

### A-1 Individual Capacity Level

#### *A-1.1 Financial Capacity*

Interestingly, only Candelaria, which did not have water meters in place to track usage, exhibited the potential to take over financial control of their system. The flat rate provided guaranteed funds from each family every month, eliminating lower revenues during the wet season and providing overall stability. In contrast, the metered system used in Potreritos and Bramadero appears to have backfired because of extreme sensitivity to price and the availability of free sources of non-potable water for bathing and washing clothes. This means that consumption, and revenue, are likely to drop when money is tight or water is plentiful. Meters were installed in part to encourage conservation, but the implications for financial sustainability of the systems, as well as the environmental impacts of continuing to releasing soap and other chemicals directly into waterways, may also be worth consideration. Given the sensitivity to price, the partnership can investigate several options: setting flat fees based upon population and estimated costs, setting higher usage-based fees, or abandoning the goal of self-sufficiency in favor of other models.

One of the reasons prices were set so low was that communities were encouraged to participate in price-setting (Observation of community meetings in Cuajinicuil and El Jocote, February, 2011). Community rule-making is seen as an important part of community-buy-in to the project (AsoFénix Community Organizer, February 15, 2011), but given the price-sensitivity of these poor communities, it may be counterproductive. Observations in Cuajinicuil and El Jocote suggest that there will always be a segment of the population who will push for the lowest-possible price. The goal of community participation is admirable, but if it ultimately sets the system up for failure, or results in AsoFénix assuming financial responsibility for a system that the community itself was unwilling to fund, community involvement simply hinders the financial stability of these systems.

As the provider of the initial equipment, the Partnership has the ability to impose a base-rate. This could be based upon average consumption and rates charged by the utility company, or based upon estimated costs for actually maintaining the system. If higher prices were agreed to before construction of the project, there would likely be less public resistance to higher rates. Higher prices from the outset might reinforce the notion that water and electricity are valuable commodities. Anecdotal evidence suggested that community residents were willing

to pay much higher prices for electricity from utility companies than they were for water or electricity provided by the Partnership.<sup>36</sup> It is possible that this is because of the unspoken assumption that the system will be maintained even if the community does not raise sufficient funds. As long as the Partnership NGOs continue to provide help, it is not in the rational interest of the individual communities to agree to pay more. However, as the number of Partnership and independent AsoFénix projects continues to grow, the financial burden of maintaining these projects is likely to become overly burdensome to the Partnership or to AsoFénix. Even if initial donor funding is set aside to pay for the replacement parts and the staff time need for major repairs, these funds will eventually run out. Unless other funding or sustainability mechanisms are put in place, the threat of eventual collapse will persist.

Other options include seeking out donor sources of funding for on-going maintenance, and attempting to forge partnerships with government agencies, both of which require a shift from the current development model. Depending on Nicaraguan regulations, it might also be feasible for AsoFénix to collect and pool fees from many different project sites and to assume the role of a regional provider of basic services. In general, funding for maintenance of development projects is much more scarce than funding for new projects, and examination of ENACAL's budget also suggests that funds are scarce for rural water projects.

Further research or experimentation is needed to say conclusively what impact these scenarios will have on community consumption, but given current financial instability at most of the systems, there is little justification for not exploring other options.

#### ***A-1.2 Technical Capacity: Training***

Statements from Partnership staff and volunteers and evidence from the literature point to important changes that might help to improve technical capacity through training. GrnEmp TD acknowledged that “any single event training session is normally insufficient. There will always be a need for coaching/mentoring or refresher sessions, at least for a while. That’s true for the technical side as well as for the social side, as people learn by doing” (July 13, 2011). This sentiment was echoed by Long-term Volunteers who advocated long-term mentoring and follow-up (April 18, 2011). Previous studies have also found that human capital—and in particular higher numbers of trained and educated individuals—was found to be an important determinant of water project success (Sara and Katz, 1998; Madrigal et al., 2011). These ideas are complimentary and suggest that any effective training strategy should be drawn out over time, and should reach as many people in the community as possible.

When only a few individuals possess the confidence and skill necessary to participate in system management, the community’s ability to select new leadership is constrained, leading to over-dependence upon a few qualified individuals (Madrigal et al., 2011). This has important implications for committee accountability. If the community is unsatisfied with a member of the committee, in theory, he or she can be replaced. In practice, because the communities are small and access to training opportunities and higher education are limited, there may not be a replacement with the necessary skills to credibly perform the needed tasks.

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<sup>36</sup> This is based on conversations with a few families in Candelaria, Potreritos, and Bramadero, all of whom admitted to paying much more for electricity than anyone was paying for water.

Therefore, on-going training opportunities are key to the ability of the community and the committee to adapt to changing social conditions.

The need for training a broader segment of the population was also evident within the case study communities. In case study communities, because training was targeted only at the committee members, and was generally provided on a one-off basis, it did not develop levels of human capital necessary to allow for turnover or replacement of committee members. In all three water-project communities, turnover of committee members appeared to be rare. Once elected, people stayed on the committee. Because of socioeconomic conditions in Candelaria, the general lack of human capital and access to on-going training appeared to significantly strain committee functions. Community members regularly leave for prolonged periods to work abroad and raise money for their families. At the time of data collection, the committee Coordinator had been working in Costa Rica for nearly four months. Her absence contributed to a critical disruption in the committee meeting schedule, but there were no procedures in place for finding a temporary replacement, nor were there many qualified candidates willing to take her place (Candelaria Committee Members, February 9, 2011). Candelaria's Technician also expressed the desire to pursue work outside of Nicaragua, but he was torn between his responsibilities in Candelaria and his need find profitable work (Candelaria Technician, February 9, 2011).<sup>37</sup> These statements confirm that dependence on a few individuals can be detrimental to the long-term sustainability of the projects (Madrigal et al., 2011). It is unreasonable, and likely unsustainable, to expect community leaders to sacrifice their family's needs for those of the community. While these examples are from Candelaria, the socioeconomic conditions and pressures on committee member are by no means unique to that community. These experiences indicate that broadly targeted training, as well as opportunities to continue and refresh training could improve stability and sustainability.

Evidence from the literature and observations in the communities suggest that restructuring training so that it reaches a broader segment of the population might increase community capacity and enhance the stability of the committees and the systems. As is, nearly all training appears to be provided on an ad hoc basis either immediately after the installation or in response to problems. Making training efforts more consistent across communities and systematizing both formal and informal training might generate more consistent and traceable results. Extending formal training over time would also provide the added benefit of giving the community members time to absorb information and apply it to real challenges before immediately calling for help.

As the number of Partnership projects grows, the collaboration may want to consider developing a regular training/refresher schedule open to committee members or general citizens from all project communities.<sup>38</sup> These could be held in the AsoFénix office at regular intervals, and content could be based on the needs of new committees, requests from communities with established projects, or needs observed by volunteers working in individual

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<sup>37</sup> The problem might be solved by allowing for the election of temporary replacements who could bear responsibility for continuing committee duties during prolonged absences; but at the moment, there is certainly no other technician capable of taking over maintenance.

<sup>38</sup> Considerations for illiterate

communities. By providing on-going training for all communities at once, AsoFénix could use resources more efficiently and limit travel expenses incurred by employees.<sup>39</sup> Such an approach might also have the benefits of improving network ties among communities and fostering information sharing and support between communities. These methods could be applied beyond technical skills related to the equipment to include training in monitoring and record keeping and conflict resolution. Creating greater breadth and depth of knowledge for regular citizens as well as community members would hopefully make it easier to replace committee members, thereby strengthening accountability, smoothing transitions, and providing a greater degree of overall stability.

Regular group training sessions and the opportunity to exchange ideas with other committees may have been helpful in the case of Potreritos. As there was no formal procedure for providing renewed or on-going training, the “later elected committees received little support and were expected to manage everything” with little support from AsoFénix (Long-term Volunteer, April 18, 2011). Because of understandably limited NGO resources, the committee had to wait over a year for AsoFénix to renew their commitment to capacity development in Potreritos. An established system for regular training and learning from existing committees could help to develop capacity more rapidly in the face of dramatic changes to committee structure. The process would still take time, but committee members would have access to some form of more immediate support.

Another option might be create rules or processes for providing training only after an election or transition. Such trainings could be provided by trained community members, AsoFénix staff, or could be paid for by community funds.<sup>40</sup>

Although most committee members expressed interest in further training, their actual willingness and ability to dedicate time to such training need to be explored. The viability of this model would depend upon social, economic, and cultural tendencies that might influence their efficacy. In particular, it would be useful to gauge interest within existing project communities.

Up until this point, the Partnership has treated each project site independently; however, in reality they are creating a network of communities that need similar skills and face similar challenges. At present, AsoFénix is responsible for providing support to each community on an individual basis. By reorganizing the system so that communities can learn together, share information, and perhaps even pool resources, AsoFénix has the potential to significantly improve the efficiency of its capacity development efforts. Such reorganization may not ultimately lead to complete self-sufficiency of the communities, but it might relieve some of the growing burden on AsoFénix.

#### ***A-1.3 Technical Capacity: Maintenance***

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<sup>39</sup> In order to off-set travel costs and opportunity costs (lost work) for community members, this could be framed as a separate, regional educational project and funds could be solicited from private donors.

<sup>40</sup> Outsourcing training and dedicating a certain portion of community funds to committee training, would likely be contingent on establishing greater financial stability within the communities.

This study raised important questions about the feasibility and efficiency of training technicians in every community to perform a wide-range of troubleshooting, maintenance, and engineering tasks. This was particularly apparent in the case of wind technology, where trained engineers expressed reservations about the technology and its suitability for small-scale development work (Current bE Engineer, April 25, 2011; Former bE Engineer, June 3, 2011). Even GrnEmp staff members admit that technical self-sufficiency is an ideal, not a reality. In light of these challenges, the following suggestions merit further investigation:

- Providing more thorough maintenance schedules and logs would likely improve general maintenance. Technicians knew cleaning schedules for the tanks, but were unsure of how often to clean panel surfaces and electrical connections, or rid panel boxes of insects. As a result, these appeared to happen when an AsoFénix Engineer visited. Additional training or more visual manuals may be necessary for technicians that are illiterate.
- Training a regional technician that could be paid by communities to address technical challenges beyond the expertise of the local technician.
- Raising rates so that reserves could be used to pay AsoFénix or other experts (who would be hired as contractors rather than providing).

## **A-2 Organizational Capacity Level**

### ***A-2.1 Community Organization Structures & Rules***

Although the establishment of organizational structures and rules was the area in which the Partnership had the highest impact, observations suggested the process might be improved. In Cuajinicuil in particular, development of infrastructure outpaced the development of supporting social structures. This was likely in response to project timelines and pressure from donors; however, it suggests that social resources were overstretched, and that more funds and corresponding personnel could be assigned to community organizing to ensure that social development keeps pace with technical advancement.<sup>41</sup>

### ***A-2.2 Monitoring & Accountability***

#### ***a) Monitoring Community Compliance***

The ability to keep clear and efficient records, provide receipts, and present results to the community were lacking in many communities. These skills should be covered in formal and/or informal capacity development. As discussed in section A-1.2, this sort of training could be provided to more than just committee members and incorporated into a more encompassing system of on-going training.

#### ***b) Committee Accountability***

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<sup>41</sup> In particular it might be worth dedicating project funds to hire or pay for more social organizing staff at AsoFénix. When the Partnership was young, AsoFénix's ED was largely responsible for community organizing and training. As the number of projects has grown, his responsibilities have increased dramatically. Given the current state of growth, it would benefit both partners to consider permanently shifting some community organizing responsibility to other staff in order to ensure that capacity development on all levels is accomplished.

In all communities, committee accountability was found to be lacking. A few basic systems for tracking committee behavior, and associated training, might help improve accountability (again taking into account limited literacy). The importance of regular committee and community meetings should also be emphasized. The following measures might help to foster greater committee accountability:

- Publishing a copy of the charter, rules, and committee roles/duties for display in a public meeting place, or to be brought to each of the meetings, could help to reinforce rules and provide the community with a means of holding their representatives accountable.
- More general community training on these rules and the development of widely-recognized dispute-resolution mechanisms might also foster greater community involvement and accountability.
- A log book to track committee functions as well as routine cleaning, maintenance, and repairs performed by a technician. This could be particularly important when the technician is getting paid.

#### ***A-2.3 Enforcement & Sanctions: Ability to Collect Payments***

Recommendations on how to improve enforcement and willingness to sanction are limited. Public pressure from other residents is the primary mechanism for ensuring compliance and obviating the need to sanction. In communities where rules had been finalized, information was regularly disseminated, and the committee was respected, people generally submitted payments. More data would be needed to confirm that the public pressure mechanism is working as intended. For the time being, reinforcing the importance of regular community meetings—in which payment information is present to the public—appears the best course of action.

#### ***A-2.4 Conflict Resolution***

The Partnership does not appear to have considered the importance of conflict resolution procedures to ensuring proper management of the systems and community's independence. Further investigation into developing appropriate procedures is recommended so that necessary knowledge and capacity can be transferred to the communities.

If in-community conflict resolution procedures are not deemed feasible, the Partnership should at least consider developing standard conflict resolution/grievance rules and procedures for all projects. These could be administered by AsoFénix or another mediating entity. At least they would offer committee and community members an avenue for raising and resolving concerns before they escalate or reduce confidence in the committee. At present no such mechanism exists. As a result, problems fester and are only aired when AsoFénix is present at meetings, or as in the case of Potreritos, they are resolved by unilateral and inequitable manipulation of power. Establishing AsoFénix as a designated mediator may require redefinition for the Partnership's goals, but having standardized procedures might allow for quicker and fairer resolution of disputes and decrease the chances that problems will undermine other achievements.

## Appendix B: Elaboration of & Reflection on Data Collection Methods

Documents, including project proposals, reports, and budgets provided an overview of each of the projects. To the extent available, budgets were used to reconstruct the financial exchange. Over the course of three and half months these were supplemented by observations of AsoFénix operations as well as informal conversations and interviews with the AsoFénix Engineer, Community Organizer, ED, and interns. Interviews were also conducted with GrnEmp staff, including the Engineer, Executive Director, Program Director, Intern Coordinator and interns.

For all cases, prolonged stays in the communities, including tours of the systems, visiting with local families, meeting with the committees, and participating in daily life helped to formulate a more complete picture of the community dynamic. Interviews with community members were conducted informally so as to reduce the likelihood of biased responses. In each of the four cases, all members of the water committee were consulted to determine resource management rules, except those who were working in Costa Rica. Efforts were also made to visit as many homes as possible in order to talk to people about the reliability of the systems. As these visits were generally dependent upon my contacts within the committee or the community, they may not include marginalized community members.

Written interviews with two long-term AsoFénix volunteers, who lived and worked in several of communities over the course of five years, helped to reconstruct patterns of resource use and governance within the community (frequency of meetings, frequency of problems with the system, to what extent the community was able to perform maintenance).

In three of the communities (Candelaria, Potreritos, and Bramadero) direct observation of community meetings was possible, providing valuable insight into the details of the community management process. In cases where direct observations contradicted testimony from committee or community members, observation was given more weight.

Interviews asked local NGO and community members to recall their situations before the partnership in order to reconstruct pre-intervention and intervention stages. Interviewees were also asked for their opinions on how communities and organizations might have evolved in the absence of the partnership. They were also asked to recall training during the implementation phase as well as conditions, challenges, and accomplishments during the post-intervention stage.

Data for the control group, El Jocote, was obtained by staying in the community and speaking to community members before formal planning had begun, as well as attending committee elections and project installation down the line. These communities were asked similar questions about community structure and resource use and how those had evolved over time. These questions are elaborated in appendix D.

## **Appendix C: Overview of Data Sources**

### **AsoFénix**

Interviews (2/24/2011 & 3/22/2011) and informal conversations with Executive Director  
Interview (4/14/2011) and informal conversations with the Permanent Engineer  
Interview (2/15/2011) and informal conversations with the Community Organizer  
Interview (6/15/2011) and informal conversations with GrnEmp/AsoFénix Engineering Intern  
Communications with AsoFénix Accountant (4/18/2011)  
Written interviews with Long-term Volunteers (4/18/2011 & 6/9/2011)

3.5 months of observation while working and living in the AsoFénix office in Managua  
(1/18/2011 - 4/29/2011)

### **Green Empowerment**

Phone interview with the Executive Director (5/12/2011)  
Phone interview with the Program Director (5/11/2011)  
Informal interviews, personal communication, and observation of Technical Director  
Personal communication with and observation of Intern Coordinator & Partnership Liaison

### **Candelaria**

2 interviews with committee members  
9 informal interviews with households  
Observation of committee meeting (3/30/2011)  
Observation of committee-community meeting (3/31/2011)  
Written interview with Long-term Volunteers (3/18/2011 & 6/9/2011)

2 visits: 2/7/2011-2/11/2011 & 3/30/2011- 3/31/2011

### **Potreritos**

Group interview with entire committee (3/3/2011)  
Individual interviews with Coordinator, Lead Technician  
7 informal interviews with households  
Observation of community meeting (3/22/2011)  
Written interview with Long-term Volunteers (3/18/2011 & 6/9/2011)

2 visits: 3/1/2011 - 3/5/2011 & 3/22/2011 - 3/24/2011

### **Bramadero**

Interview with Committee Coordinator (3/15/2011)  
2 interviews with community Technicians (3/15/2011)  
6 informal interviews with households  
Written interview with Long-term Volunteers (3/18/2011 & 6/9/2011)

2 visits: 3/15/2011-3/18/2011 and 4/26/2011

### **Cuajinicuil**

3 interviews with three local technicians  
2 interviews with committee members  
Observation of community meeting (2/15/2011)  
4 informal interviews with households  
Written interview with Long-term Volunteers (3/18/2011 & 6/9/2011)

2 visits (corresponding to technical maintenance on the turbine): 2/15/2011-2/17/2011 and 4/12/2011-4/14/2011

### **El Jocote**

Observation of community meeting and election (2/24/2011)  
Interview and tour with newly elected committee members (3/24/2011)  
Visit and tour of community with MIT student group (3/24/2011-3/25/2011)  
Visit and observation of project installation (4/20/2011 - 4/22/2011)  
3 informal interviews with households (3/23/2011)

### **blueEnergy**

Interview (4/25/2011) and correspondence with bE Engineer and Technical Team Lead  
Interview with Nicaraguan Community Organizer (4/25/2011)  
Phone interview with previous bE Engineer and Technical Team Lead (6/3/2011)

Project site visits 4/24/2011 - 4/27/2011

### **Visits to Other Communities**

El Corozo: 1/28/2011-1/30/2011 - informal interview with lead Solar Panel Technician  
Palo Solo: 2/18/2011 - observed solar installations as part of revolving solar fund; informal interview with Technicians from revolving solar fund project  
Sonzapote: 3/23/2011 - observed repair of broken pipes; informal interview with Committee Coordinator

## Appendix D: Interview Questions

Table D1 outlines the approximate questions asked in order to elicit information related to each level of NGO capacity. Table D2 outlines the interview questions and data sources asked related to community capacities. As mentioned before, interviews in communities were conducted informally. This informal style may have had some consequence for the comparability or the uniformity of the data, as questions were not always phrased in the same way, or asked in the same sequence; however, for the sake of eliciting more truthful and therefore accurate responses, it was deemed better not to behave as a formal evaluator or donor who was checking up on the projects and processes. Every effort was made to ask the same questions of people in different positions and to be sure that information answering each question was obtained from as many sources as possible. Those data sources are also included in these tables.

**Table D1 Operationalization of Variables for NGO Impact**

Capacity	Indicators	Questions	Sources Consulted
<b>Financial Capacity</b>	<ul style="list-style-type: none"> <li>• Greater access to funds</li> <li>• Growth in independently secured income and independent projects</li> </ul>	<ul style="list-style-type: none"> <li>• How important was GrnEmp to the development of financial capacity at AsoFénix?</li> <li>• What impact has partnership with GrnEmp had on AsoFénix's financial stability?</li> <li>• What financial capacities has AsoFénix helped to develop at GrnEmp?</li> <li>• How are funds for GrnEmp partnership projects allocated? Who controls spending?</li> </ul>	<ul style="list-style-type: none"> <li>• NGO EDs</li> <li>• GrnEmp PD</li> <li>• NGO &amp; project budgets</li> <li>• AsoFénix project records</li> </ul>
<b>Exogenous Influences on Financial Capacity</b>	<ul style="list-style-type: none"> <li>• Other partnerships</li> <li>• Other sources of funding</li> </ul>	<ul style="list-style-type: none"> <li>• What other partnerships or sources of funding did your organization have?</li> <li>• How did these affect your financial capacity development?</li> <li>• Has there been growth in funding that has not been the result of the Partnership?</li> </ul>	

<b>Capacity</b>	<b>Indicators</b>	<b>Questions</b>	<b>Sources Consulted</b>
<b>Technical Capacity</b>	<ul style="list-style-type: none"> <li>• Formal training provided by the Partnership</li> <li>• Mentoring, skills development, and technical support provided by the Partnership</li> <li>• Increased technical responsibility on Partnership projects</li> <li>• Increased capacity through volunteers</li> <li>• Increases in other skills</li> <li>• Increased technical knowledge attributable to the Partnership</li> </ul>	<ul style="list-style-type: none"> <li>• How important was GrnEmp to the development of financial capacity at AsoFénix?</li> <li>• What technical capacities has AsoFénix helped to develop at GrnEmp?</li> <li>• How much technical support did GrnEmp provide for the projects?</li> <li>• How many formal GrnEmp facilitated trainings were held? How useful was the knowledge conveyed?</li> <li>• What other knowledge-enhancing opportunities the partnership provide?</li> <li>• What other kinds of technical support does GrnEmp provide?</li> <li>• How might the projects in Nicaragua been different without the Partnership (or would they even have been possible)?</li> </ul>	<ul style="list-style-type: none"> <li>• NGO EDs</li> <li>• GrnEmp PD &amp; TD</li> <li>• AsoFénix technical staff</li> <li>• AsoFénix project records</li> <li>• GrnEmp &amp; AsoFénix interns</li> </ul>
<b>Exogenous Influences on Technical Capacity</b>	<ul style="list-style-type: none"> <li>• Other partnerships</li> <li>• Other sources of technical assistance or training</li> </ul>	<ul style="list-style-type: none"> <li>• What other partnerships or sources of technical training or volunteers did your organization have?</li> <li>• How did these affect your technical capacity development?</li> </ul>	
<b>Organizational Capacities</b>	<ul style="list-style-type: none"> <li>• Improvements in formal reporting procedures and management practices attributable to the Partnership</li> </ul>	<ul style="list-style-type: none"> <li>• Were there any formal or informal efforts made by the Partnership to develop or synchronize internal policies and procedures?</li> </ul>	<ul style="list-style-type: none"> <li>• AsoFénix ED</li> </ul>
<b>Network Capacities</b>	<ul style="list-style-type: none"> <li>• Increase in ties with other NGOs, government actors, development professionals, suppliers etc. attributable to the Partnership</li> </ul>	<ul style="list-style-type: none"> <li>• Have you developed connections with donors as a result of the Partnership?</li> <li>• What other connections have you made as a result of the Partnership?</li> </ul>	<ul style="list-style-type: none"> <li>• NGO EDs</li> <li>• GrnEmp PD &amp; TD</li> <li>• AsoFénix technical staff</li> <li>• AsoFénix project records</li> <li>• GrnEmp &amp; AsoFénix interns</li> </ul>
<b>Enabling Environment</b>	<ul style="list-style-type: none"> <li>• Increased influence over the planning process</li> </ul>	<ul style="list-style-type: none"> <li>• How has the policy context changed in Nicaragua?</li> <li>• How has AsoFénix been involved in or effected by those changes?</li> </ul>	<ul style="list-style-type: none"> <li>• AsoFénix staff</li> </ul>
<b>Division of Labor &amp; Other Capacities</b>	<ul style="list-style-type: none"> <li>• Increased efficiency due to division of labor</li> <li>• Efficiency resulting from AsoFénix performing community-organizing work</li> <li>• Efficiency resulting from GrnEmp interfacing with foreign manufacturers and donors</li> </ul>	<ul style="list-style-type: none"> <li>• What is the most important contribution each of the partners makes to the partnership?</li> <li>• What have been the most obvious challenges related to the partnership? Strengths?</li> <li>• How, if at all, has the partnership evolved over time?</li> </ul>	<ul style="list-style-type: none"> <li>• NGO EDs</li> <li>• GrnEmp PD &amp; TD</li> <li>• AsoFénix technical staff</li> <li>• GrnEmp &amp; AsoFénix interns</li> </ul>

**Table D2 Operationalization of Variables for Community Case Studies**

<b>Capacity</b>	<b>Indicators</b>	<b>Questions</b>	<b>Sources Consulted</b>
<b>Financial Capacity</b>	<ul style="list-style-type: none"> <li>• Sufficient income to cover system expenses</li> <li>• Demonstrated ability/willingness to pay for system repairs</li> </ul>	<ul style="list-style-type: none"> <li>• Does your community have a payment scheme to raise money for maintenance? Is there enough money to cover maintenance costs?</li> <li>• Where has funding for replacement parts or maintenance come from?</li> <li>• How much money does the community fund have now?</li> </ul>	<ul style="list-style-type: none"> <li>• Community Technicians</li> <li>• Committee Members</li> <li>• Individual households</li> <li>• Long-term Volunteers</li> </ul>
<b>Exogenous Influences on Financial Capacity</b>	<ul style="list-style-type: none"> <li>• Other partnerships</li> <li>• Other sources of funding</li> </ul>	<ul style="list-style-type: none"> <li>• Do you receive assistance from organizations other than AsoFénix to pay for maintenance or fix problems?</li> </ul>	
<b>Technical Capacity: Training</b>	<ul style="list-style-type: none"> <li>• Evidence of formal technical training</li> <li>• Evidence of informal technical training/mentoring</li> </ul>	<ul style="list-style-type: none"> <li>• Did anyone receive any formal education as a result of the partnership?</li> <li>• Did you receive any training once elected to the committee? What kind of training? Who provided it? Who else attended this training?</li> <li>• Do you feel you could use more training or help in managing the system or the committee? If so, in what areas specifically would you like more training?</li> <li>• Have you attended trainings facilitated by other organizations?</li> <li>• How did you learn how to maintain the system?</li> <li>• What other forms of assistance does AsoFénix provide in your community?</li> </ul>	<ul style="list-style-type: none"> <li>• NGO EDs</li> <li>• GrnEmp TD</li> <li>• AsoFénix technical staff</li> <li>• Community Technicians</li> <li>• Committee Members</li> <li>• Residents</li> <li>• Long-term Volunteers</li> </ul>
<b>Technical Capacity: Maintenance</b>	<ul style="list-style-type: none"> <li>• Ability to troubleshoot and maintain system independent of Partnership support</li> </ul>	<ul style="list-style-type: none"> <li>• How reliable is the water or electricity service in your community?</li> <li>• When there are problems, how long does it take for the system to be repaired?</li> <li>• Who was responsible for resolving these problems?</li> <li>• What, if any, difficulties has the community encountered in maintaining the infrastructure?</li> <li>• What additional skills might have been helpful in addressing these problems?</li> </ul>	<ul style="list-style-type: none"> <li>• AsoFénix ED</li> <li>• Community Technicians</li> <li>• Committee Members</li> <li>• Residents</li> <li>• Long-term Volunteers</li> </ul>
<b>Exogenous Influences on Technical Capacity</b>	<ul style="list-style-type: none"> <li>• Other partnerships</li> <li>• Other sources of technical assistance or training</li> </ul>	<ul style="list-style-type: none"> <li>• Have you received any assistance with maintenance from other organizations?</li> <li>• Have you received training from other organizations?</li> <li>• What other organizations work in or help the community?</li> </ul>	

<b>Capacity</b>	<b>Indicators</b>	<b>Questions</b>	<b>Sources Consulted</b>
<b>Community organization structures &amp; rules</b>	<ul style="list-style-type: none"> <li>• Changes in or development of community organizations</li> <li>• Changes in and development of rules</li> </ul>	<ul style="list-style-type: none"> <li>• Did you have a community council prior to partnership? If so, how often did it meet?</li> <li>• What were its duties and responsibilities?</li> <li>• How often does it meet now?</li> <li>• How have these duties changed?</li> <li>• Did you have community resource rules prior to the partnership? If so, how were they enforced?</li> <li>• What new rules have been implemented as a result of the partnership?</li> </ul>	<ul style="list-style-type: none"> <li>• AsoFénix ED</li> <li>• Committee Members</li> <li>• Residents</li> <li>• Long-term Volunteers</li> </ul>
<b>Monitoring &amp; accountability: monitoring community compliance</b>	<ul style="list-style-type: none"> <li>• Clear records of community payments</li> </ul>	<ul style="list-style-type: none"> <li>• How do you keep track of who pays?</li> <li>• May I see how you keep records?</li> <li>• Do you provide receipts?</li> </ul>	<ul style="list-style-type: none"> <li>• Committee Members</li> <li>• Residents</li> <li>• Long-term Volunteers</li> </ul>
<b>Monitoring &amp; accountability: committee accountability</b>	<ul style="list-style-type: none"> <li>• Regular committee meetings</li> <li>• Regular meetings with the community</li> <li>• Community knowledge of committee positions and responsibilities</li> <li>• Public records of committee tasks and duties</li> </ul>	<ul style="list-style-type: none"> <li>• How often does the committee meet?</li> <li>• How often does the committee meet with the community?</li> <li>• What prevents meetings from being held more frequently?</li> <li>• What are the roles of individual committee members?</li> <li>• How many people are on the committee? Who else?</li> </ul>	<ul style="list-style-type: none"> <li>• Committee Members</li> <li>• Residents</li> <li>• Long-term Volunteers</li> </ul>
<b>Enforcement &amp; sanctions: ability to collect payments</b>	<ul style="list-style-type: none"> <li>• Existence of enforcement policies and procedures</li> <li>• Ability/willingness to enforce rules</li> </ul>	<ul style="list-style-type: none"> <li>• What new enforcement mechanisms exist?</li> <li>• Do people pay for their water on time?</li> <li>• What are the rules regard nonpayment?</li> <li>• What do you do when people do not pay?</li> <li>• Have you had to shut off water to any households?</li> </ul>	<ul style="list-style-type: none"> <li>• AsoFénix staff</li> <li>• Committee Members</li> <li>• Residents</li> <li>• Long-term Volunteers</li> </ul>
<b>Conflict resolution</b>	<ul style="list-style-type: none"> <li>• Conflict resolution rules and procedures</li> <li>• Evidence of conflict resolution training</li> <li>• Ability to resolve conflict</li> </ul>	<ul style="list-style-type: none"> <li>• Are there any conflict resolution rules or procedures?</li> <li>• Have there been any conflicts in the community? How were they resolved?</li> <li>• How do you solve disagreements?</li> </ul>	<ul style="list-style-type: none"> <li>• Committee Members</li> <li>• Long-term Volunteers</li> <li>• Observation</li> </ul>

## Appendix E: Preliminary Comparison to Other Development Models

In an effort to isolate the impacts of this specific partnership model a few interviews and site visits were conducted with employees of Renew—another development NGO that installs wind turbines and solar panels and develops other small-scale projects on the Atlantic Coast of Nicaragua.<sup>42</sup> As Renew does not provide extensive on-going support, nor does it rely on the formation of a committee or the paying of dues for project maintenance, it provides an interesting contrast to the Partnership model. Interviews were conducted in an attempt to answer such questions as: would the Partnership have obtained similar results by simply installing infrastructure in communities, or with interventions not based on the Partnership's capacity development model? These interviews were limited to two Engineers and a Community Organizer at Renew. Because the geographic and social conditions were considerably different from prevailing conditions in Boaco, these observations and opinions can only provide limited insight into the value of the GrnEmp-AsoFénix model or project execution. Nevertheless, the stark contrast in results suggests the importance of on-going training, financing mechanisms, and solid community organizations.

According to these Renew volunteers and employees, the Renew model of development differs substantially from that of the Partnership. The most important difference was the lack of stable financing mechanisms and continued support. While in theory the Partnership model aims to provide minimal on-going support for its projects, in practice, AsoFénix provides substantial financial, technical, and social assistance for years after installations are completed. According to Renew's Community Organizer, communities are told from the beginning that they will be solely responsible for maintaining the system following installation (Renew Community Organizer, April, 2011). Unlike the Partnership, Renew has largely adhered to this policy. Communities that receive Partnership projects are also told they will be responsible for managing the system, but the Partnership chooses to intervene in the face of difficulty rather than letting project disintegrate completely. Of the 9 projects installed by Renew, interview sources said only two were still running (Renew Engineers, April, 2011). In contrast, all Partnership projects, even those not evaluated by this study, were still providing water or electricity. One of the possible reasons Partnership communities have not raised rates or taken over financial responsibility for their projects is that they have been able to rely on Partnership NGOs. Evidence from the Renew case indicates that motivation and appropriate financing schemes are also important considerations.

Renew staff members cited financial, social, and technical difficulties as reasons for project failures. In particular, many of the energy installations were used to power community buildings. It was therefore impossible to collect any funds for maintenance. Electricity did not reach individual houses, so motivation on the part of families to contribute money was minimal (Renew Staff, April, 2011). Technicians were also unlikely to perform regular maintenance because they did not enjoy the benefits of electricity at home (*Ibid.*). These examples of free-riding and of reluctance to contribute to communal projects suggest that

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<sup>42</sup> The name Renew has been invented in the interest of protecting the anonymity of the sources and the organization's reputation. Data for this section was collected through interviews and site visits conducted in April, 2011.

providing benefits to individual households can contribute to financial stability and increases motivation for maintaining the project.

These observations yield only limited conclusions or comparisons of how Renew and Partnership projects are run in the post-intervention phase and how that translates into project sustainability; they do however, reiterate the challenges of expecting small, poor, communities to manage their projects without continued support. While the Partnership has not been successful at developing local capacity to address some of these issues, for the time being it has managed to ensure that projects continue to function and provide benefits.

Renew, which places little emphasis on developing management structures or providing on-going support, has had a much higher rate of failure. These interviews suggest the importance of community organizing work and an on-going relationship with, and support from, local NGOs. Both development models point to the difficulties of providing infrastructure and capacitating community management systems from the outside. The failure of communities working with either the Partnership or Renew to manage projects on their own suggests that investigation into alternative models of on-going management is necessary for development of sustainable projects. Further research on the ways in which donors or outside entities can facilitate the creation of effective community-management structures is necessary. Such research could establish whether aid organizations can, under any circumstances, be catalysts for development of community organizations. It could also consider whether it is reasonable to assume that communities can acquire the necessary skills and resources to manage expensive and somewhat complicated technologies. Exploration of other models, including pooling financial and technical resources, and providing centralized training could also help both NGOs revise their models to better address challenges related to individual and organizational capacities.