FREEDOM PIPES AND SLAVERY BUCKETS: Q'EQCHI' WOMEN'S LIVELIHOOD STRATEGIES IN GUATEMALA

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ABSTRACT

Many marginalized people in rural areas of the global South are trapped in a cycle of poverty that prevents them from accessing resources. Access to safe drinking water is one of the elements of this cycle that seems to influence mechanisms to get out of poverty. The complex nature of this cycle reveals how, inadequate water provision services, exacerbate the obstacles that individuals, households and communities (particularly women and girls) face to challenge inequality and social exclusion. Disenfranchisement is by no means inevitable, however, and there appear to be processes by which marginalized people are able to transform intangible resources—such as the ability to read, write, and speak the dominant language of society—into dignity and assets that are vital for their livelihoods.

In this thesis, I explore the different ways in which two indigenous communities from the humid tropical forest of Eastern Guatemala manage to access water, and how that water access mediates and is mediated by their livelihood strategies. Qualitative and quantitative analyses based on fieldwork conducted in summer 2005 show how in one village, the combination of those intangible resources (particularly education, leadership and command over local and dominant languages), propels a positive feedback loop that links an improved water provision service to education. The lack of human capabilities in the other village, however, appears to profoundly obstruct the capacity of individuals and
communities to access basic resources, particularly water, perpetuating and reinforcing in this way the cycle of poverty.

I place this research within the literature on political ecology, water and gender, and rural livelihoods. In the process of reviewing these bodies of literature, this thesis makes three contributions related to the social dimensions of water: (1) women are multiple users of water; (2) the livelihood approach has a place in research on water, gender, and livelihoods; and (3) there is a symbiotic relationship between individual human skills and collective social organization.
In memoriam of Sandra Patricia Coc, a young Q’eqchi’ woman from the lowlands of Izabal
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CHAPTER 1

INTRODUCTION: THE ROLE OF WATER IN HUMAN WELL BEING

1.1 The Problem

While many people around the world consume safe drinking water by easily accessing the tap of their kitchens, presently more than two thirds of the total population of the planet struggles every day to provide water for their families (Secretariat of UN-Water, 2005). Currently 1 billion people lack access to safe drinking water. Approximately 2.4 billion people do not have access to basic sanitation systems. Furthermore, more than two million people, of whom 90% are children under the age of five and usually from developing countries, die every year from diseases associated with unsafe drinking water, inadequate sanitation and poor hygiene (World Health Organization, 2005). Women and girls are especially disadvantaged by challenges in accessing water since, in most instances, it is their responsibility to provide and manage water for their households (World Water Assessment Programme, 2003). The time spent collecting water often prevents women and girls from attending school and engaging in other social and productive activities that are crucial to their livelihoods (Secretariat of UN-Water, 2005; Crow and Sultana, 2002). By 2006, girls constituted most of the 115 million children not enrolled in school (Water Assessment Programme, 2006).
The significance of understanding the role of water resources and their complex historical, geographical and gendered dimensions cannot be overemphasized. Researchers continue to approach water issues from different perspectives, trying to decipher the pervasive inequalities surrounding access to water. My aim in conducting this research project is to study the social aspects of water at multiple scales, where an emphasis is placed on the social aspects that surround human-water interrelations. For this purpose, I focus on the livelihood strategies and the social relations of Guatemalan villagers as they seek to access water at multiple scales. In addition, I examine the process by which spaces of social participation to access water are produced, transgressed, transformed, and reconfigured.

1.2 Research Questions

The social and political dimensions of water access have been studied by geographers from different perspectives. For example, there has been much attention to conflict over water resources between nations, within urban metropolises, and in the context of large water development projects (Bakker, 1999; Harris, 2002; Sneddon, Harris, Dimitrov, and Ösezmi, 2002; Swyngedouw, 1997, 1999, 2004). However, these studies have paid relatively little explicit attention to the everyday struggles of subaltern groups to provide their households with water. Yet these everyday struggles, as Harris (2002) points out, are important for understanding water use dynamics at larger scales. Furthermore, a focus on micro-scale processes allows us to see potential success stories where subaltern groups have been able to challenge power inequalities and disenfranchisement.
There are also many localized case studies, particularly those related to health practices, individual perceptions and water provision technologies. However, many do not locate their findings within broader structural processes and inequalities that permeate power relations at multiple scales (Wescoat, 2003). As many countries in Latin America, including Guatemala, move towards negotiating changes or establishing new national water policies—whose principles have been infused by neoliberal policies and market principles (Budds, 2004)—a better understanding of these micro-scale processes is essential to inform water and development policies.

In response to this, my research seeks to understand how people situated in socioecological systems use their water resources, and how issues of access to, and quality of water, shape their livelihood strategies. Toward this end I ask the following questions:

- In places where water service provision is inadequate, what strategies do individuals, households and communities use to access water, in what ways, and with what outcomes?
- What are the conditions under which certain social relations influence access to water?
- In what instances are these social relations produced, changed or transformed over time across space?

In this thesis I draw on different bodies of literature, and I also incorporate recent fieldwork conducted in summer 2005 to do two things: First, I review how recent

1 The term socioecological emphasizes the dialectical character of social and ecological change, whereby all human undertakings that produce ecological alternations are inherently social in character and vice versa (Sneddon, et al., 2002:672).
research in political ecology, water and gender and rural livelihoods has approached the
social relations of people surrounding water access.\textsuperscript{2} The conceptual approach of this
thesis, rooted in political ecology, stem from the notion that the relationships between
nature and society are understood through an analysis of the ways in which access and
control over resources are exercised, and their implications for sustainable livelihoods
(Robbins, 2004). I also draw on the rural livelihoods framework (Bury, 2004; Ellis,
2000), which is one of the foundations of the methodological framework that I use to
analyze the capabilities and strategies rural people marshal to survive, make a living, and
increase their well-being by accessing assets and services, particularly water. Second, to
strengthen this analysis, this research draws on empirical and qualitative evidence from
fieldwork conducted among two indigenous rural communities located in the Sarstún
Watershed Protected Area in the humid tropical forest of Eastern Guatemala.

1.3 Political Ecology and Water Politics

Water has played a central role in social modernization, as ‘waterscapes’ have
been transformed by means of the spatial transformation of nature and society. This
process of transformation or ‘modernization’ is a combination of social and natural
processes of continuous change characterized by social power relations structured
through convergent notions of progress, emancipation and ‘betterment’ (Swyngedouw,
1999:445). This process of modernization is embedded in historical and geographical
time-and-place specific processes that result in a dynamic geographical production of the

\textsuperscript{2} Yet this thesis is not a comprehensive survey of the literature on water resources. Rather, this research
focuses on the processes by which social relations are constituted within socioecological systems in relation
to issues of livelihood in households and communities.
socionatural: Lefebvre’s writings on the production of nature (Swyngedouw, 1999:446, 449). In his discussion of the production of the Spanish Waterscape, Swyngedouw (1999) critiques the traditional approaches to water resources that separate the different aspects of the hydrological cycle into discrete and independent objects of study. Rather, Swyngedouw draws on the political ecology tradition to show that nature and society are profoundly intertwined. This interrelation, however, is by no means homogenous or harmonious. Conversely, it is highly contested and constantly geographically reconfigured.

Drawing on Harvey’s dialectic perspective—including the non-neutrality and constant creation, destruction, combination and separation of the relations, processes and fluxes embedded the production of socionature—Swyngedouw extracts six principles for the political-ecological study of water: (1) water can only be understood by reconstructing its process of production; (2) the process of hybridization\(^3\) has ontological and epistemological priority over any other category (i.e. nature, text, or society); (3) “any-thing” or every quasi-object/cyborg/hybrid\(^4\) can be used to study the archaeology of the production of its socionature; (4) the study of this archaeology is a never-ending open and contested process; (5) knowledge and practice are always positioned in a maze of social power relations that conceptualize and produce socionature; and (6) the socionatural production goes beyond the binary differences between society/nature, material/ideological, real/discursive (1999:448). What is at stake here is the political

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\(^3\) Hybridization is a production process of becoming and continuous transgression (Swyngedouw, 1990: 447).

implications of who acts, who controls and who has the power to produce a specific type of socionature and for what purpose. The role of geography, then, becomes the “excavation and reconstruction of the production of socionature” (Swyngedouw, 1999:461). The crux of the matter in the study of water within political ecology is the analysis of the process by which social natures are produced and with what effects (Budds, 2004). Moreover, third world political ecology stresses that environmental change and the costs and benefits derived from it are unequally distributed. This unequal distribution dynamic exacerbates existing social and economic inequalities. The political implications of the latter alter the power relations among actors (Bryant and Bailey, 1997:29).

Society and nature are embedded in a complex metabolism. Political ecology offers a means to analyze this dialectic relation (Johnston, Gregory, Pratt and Watts, 2000). Political ecology is widely seen as a combination of concerns about ecology and a generally defined political economy. The center piece of nature-society studies is the social relations of production and their historical, political and economic context. Some emphases in political ecology have been: (1) the dialectic relation between society and land-base resources; (2) regional and spatial accounts of degradation linked through chains of explanations; and (3) the influences of external structures in land management (Johnston, et al. 2000). In the early beginnings of political ecology, Piers Blaikie (1985) for example, challenged a colonial model that blamed poor rural dwellers for soil erosion. By introducing a framework based on political economy and a class analysis of soil erosion, Blaikie was able to reveal how powerful elites, including the state, perpetuated rural soil erosion in favor of capital accumulation through Malthusian discourses of
overpopulation and resource scarcity and technocratic solutions. If capital accumulation would be threatened, then soil erosion would become a problem (Robbins, 2004).

Water development schemes, as with soil erosion, are highly politicized issues that cannot be understood in isolation from their social, historical and economic contexts. As Karen Bakker (1999:210) has argued when discussing water governance and the politics of hydropower in the Mekong River, two discourses link the regional geopolitical imagination in water development policies: (1) water as a scarce resource; and (2) capitalism as a neutral force for growth, development and integration in the Post-Cold War era or a natural economic era. Furthermore, water development policies and development strategies work around the creation of a problem and the solution of that problem. Individuals, institutions, and communities then gather around what Hajer has called ‘storylines’ which are highly contested sets of ideas that bring together actors with the purpose of not only discussing an issue, but also producing knowledge about that issue (Bakker, 1999:211). Bakker asserts that discourse analysis then becomes another important tool in the analysis of the production of socionature, especially when it comes to water development policies. Contemporary and older terms used in water development policy: (e.g. river basin management, watershed management, and more recently Integrated Water Resources Management\(^5\) (IWRM) and many other quasi-objects), are therefore deeply rooted in the production of socionature.

Political ecology has emphasized, among other issues: the profound understanding and reconstruction of social natural transformations; the spatial and

\(^5\) Integrated Water Resources Management (IWRM) is a concept that arose at the International Conference on Water and Environment held in Dublin in 1992 and in Chapter 18 of *Agenda 21*, a document from the United Nations Conference on Environment and Development (UNCED), Rio de Janeiro, 1992
regional analysis of land-base resources vis-à-vis degradation and external structures; and
takes a close look at the political implications of unequal power dynamics to control
access to resources (Johnston, et al. 2000). Alternative takes on water governance and
water politics in general, on the other hand, have highlighted the role of discourses within
water development policies, and the importance of situating the discussions on water
development on a broader political, socio-economic and historical context (Bakker,
1999).

This thesis employs a theoretical framework that emphasizes: (1) the indivisibility
of the interrelation between nature and society: socionature and its contentious and
changing dynamics (Swyngedouw, 1999; Blaikie, 1985; Robbins, 2004); (2) the highly
politicized character of geopolitical metaphors used in water development policies
(Bakker, 1999; Budds, 2004); and (3) questions over who controls the production of
socionature, for what purpose, with what outcomes and under what circumstances
(Bryant and Bailey, 2000; Budds, 2004; Swyngedouw, 1999). In what ways are we
supposed to understand how people in different places (not only physical locations but
also socio-economic hierarchical positions)? How do we produce different configurations
of socionature? And how do these configurations change the power relations at different
layers of society across space? Because different processes are predominant at different
dimensions or scales, a multiscalar theoretical and methodological strategy becomes
crucial to understand the complexity of what happens to people in different places
(Sheppard and McMaster, 2004). Multiple dimensions are considered through a multiple
scale approach, since it is unimaginable today to examine them individually (Sneddon, et
al., 2002). Geographic scale analysis, then, is a way to examine the realities from different actors situated in distinct positions on the power spectrum of society.

1.4 Scaling Water Resources

The configuration, contestation and transformation of scales are essential when studying how old and new configurations of control over water have been produced. Although water may seem ubiquitous, issues of access and quality make water’s availability dramatically uneven between and within localities. Understanding how issues of subalternity and power influence water access may explain these existing inequalities.

Because of the unique social and ecological properties of water, its appropriation and transformation becomes embedded in multiple ecological, political, economical and social power relations that operate in multiple yet unsteady geographical scales. While scale refers to one or more levels of representation, experience or organization of geographical processes, geographic scale is also the central organizing principle on which geographic differentiation occurs (Johnston, et al. 2000). Scalar ecological and regulatory configurations, then, are not fixed, but rather are a result of a constant flux of socio-spatial and environmental dynamics that are continuously contested and transformed (Swyngedouw, 1997, 2004). Therefore, what is at issue here is not a particular geographical scale but rather the process whereby particular scales become created and transformed. The production of geographic scales and not the scales themselves is the desired research focus (Smith, 2004). These new scales are the means through which new configurations of social power are spatialized, reinforcing or changing the control and
access to water of some, over the repression, exclusion and subordination of others. This dynamic process, which has been referred by Smith (2004) as “jumping scales”, illustrates the reason why command over a particular scale within a socio-spatial context is of paramount importance (Swyngedouw, 1997:142).

When studying water resources, the scale of analysis is problematic because water flows at multiple sites and the exclusive emphasis on any one site would inevitably deny attention to others. Therefore Swyngedouw (1997) insists on a process-based approach where the starting point of analysis is neither the local nor the global, but rather the mechanisms of scale transformation and transgression arisen through social conflict and struggle. In this paper, I amplify the Swyngedouw’s definition of conflict and struggle to advocate for a broader concept whereby this amplified definition captures the socio-spatial relations of everyday life struggles of individuals over the transformation and domination of water resources.

According to Smith, scales emerge as a result of the dialectic cooperation and competition that involves social struggles and relations of social reproduction, and are fundamental in the production of scale (Smith, 2004). Therefore, the role of social relations is essential in order to explain the reconfiguration of scales vis-à-vis changes in the transformation of nature. This is because the social relations are embedded in temporal and spatial relations of power, what Massey (1993) has called “the geometry of power,” i.e. the multiple relations of domination-subordination and participation-exclusion through which socioecological systems are transformed (Swyngedouw, 1997:144).
Yet the production of scales can only be empowering as long as it generates geographically differentiated spaces by means of specific identities and social relations (Smith, 2004). In his study of the reinvention of irrigated landscapes in the Andean region under the Incan State and the colonial and post-colonial regimes, Zimmerer (2000) calls for a sensitivity to scale linkages and a social and enviro-cultural construction of scale changes to rescale at multiple levels. Central to the concept of scale linkages is an understanding on how connections and historical disruptions in the past influence current waterworks and water related practices. The idea of scale linkages is important because it stresses, in the case of Latin America for example, how pre-Hispanic and colonial configurations of socionature in relation to water have collided with contemporary water development schemes.

The issue of geographical scale is relevant to this thesis because it recognizes the process through which individuals produce, transform and command power hierarchies to produce spaces of social participation to access resources. Since this study deals with issues of quality of and access to water in marginal rural localities, the discussion of scales leads to ways of thinking about the livelihood strategies and social relations by which people, households and entire communities are able to change the configurations of socionature that govern their access to water and other vital resources for their livelihoods.

The social relations that people create to access water are, to some degree, conflictual relations produced by the tensions resultant from convergent priorities and understandings of the significance of water resources. While nation-state conflicts have long been acknowledged, household scale, local scale, community scale and issues
pertaining to livelihoods that connect all these scales have tended to be overlooked. A multiscalar approach, then, reveals the complexity of water in relation to social relations and livelihoods.

1.5 Water and Livelihoods

Now, how do we move from concepts of scale transformation, jumping scales, scale bending, and scale linkages to empower all members of society and improve human livelihood potential? A connection between water and livelihoods may establish an avenue of inquiry to examine livelihood needs, and the dynamics of water ecosystems at multiple spatial scales at which different ecological processes work (Sneddon, et al., 2002).

1.5.1 Applying the Rural Livelihood Framework to Issues of Water

Livelihoods have been studied in the literature on water, conflict and gender in different ways. For example, livelihood dynamics have been approached from different perspectives: (1) competing priorities in terms of water allocation schemes (Sneddon, et al., 2002; Upadhyay, 2005); (2) conflicting livelihood strategies and uses of water (Harris, 2002); (3) the influence of gender and class power asymmetries on water access (Cleaver, 1998; Crow and Sultana, 2002; Upadhyay, 2005); and (4) the variation of livelihoods concerns in women’s motivations and strategies with respect to water management (Cleaver, 1998). Although livelihood has been a key theme in recent research on issues of water, conflict and gender, this literature has not explicitly deployed the rural livelihood framework. Because this framework helps to think about rural poverty through identifiable concepts and processes, it has been widely applied in other
areas on inquiry for example: sustainable rural livelihoods (Bebbington, 1999; Scoones, 1998); urban poverty reduction strategies (Moser, 1998); livelihoods and diversity in developing countries (Ellis, 2000); systems of exchange and the relationship between forest products and vulnerability (McSweeney, 2004); and the role of human capabilities, poverty and access to resources (Bebbington, 1999; Bebbington and Perreault, 1999). The rural livelihood framework, then, has the potential to inform our understanding on the role of water in people’s livelihoods emphasizing not only material assets poor people use to make a living, but also the complex and diverse social relationships they nurture to improve the quality of their lives. For these reasons, the rural livelihood framework informs various aspects of my research, from the selection of a household survey to generate primary data, to the analysis of human capabilities and social relations to access water.

Beyond the concept of means of support, subsistence and making a living, livelihood constitutes a way of making a living more meaningful (Bebbington, 1999; McSweeney, 2004). Furthermore, a livelihood is composed by capabilities and claims to assets (e.g., human, natural, produced, and social capital), and access to activities, mediated by social relations and institutions, that in conjunction determine the living earned by households and individuals (Chambers and Conway, 1992:7; Ellis, 2000:10). In the 1990s, several scholars and researchers produced a vast body of literature to generate a new way of thinking about rural poverty through this analytical framework. For instance, Chambers and Conway (1991), Scoones (1998) and Carney (2002), have written discussion papers and reports under the auspices of the Institute of Development Studies and the Department for International Development (DFID) both financed by the
Government of the United Kingdom. The concepts and methods contained in these papers were used mainly in DFID-financed aid projects carried out by humanitarian and Non-Governmental Organizations (NGOs) in the developing world.

Later on, these and other scholars and researchers from other countries—especially from the United States and England, publishing in academic journals—have built upon the initial concepts and other new ideas in order to apply, re-think, adapt and emphasize certain elements of the framework. Moreover, recent applications of the livelihood framework have stressed its contribution to geographic research concerned with the nexus between global and local change (Bury, 2004). One of the strongest critiques in relation to the adoption of the framework and its different incarnations around the world, mainly applied into development programs, is that little empirical research has been conducted to operationalize it locally in order to fully grasp the realities of the poor (Bebbington 1999; Bebbington and Perreault 1999; Bury 2004; Chambers 1995; Ellis 2000; McSweeney 2004, Perreault 2003).

While there are various versions of the framework, all the different approaches are concerned with poverty reduction, sustainability and livelihood strategies. In addition, these different perspectives share the notion that the asset status of poor individuals or households are crucial to understand their available options, the strategies they adopt to survive and their vulnerability to adverse events. The concepts presented in this framework, as well as the understanding of how poor people cope with crisis and survival, are important because they can help organize ideas into manageable categories, identify starting points and critical processes, and help with prioritizing the means
through which change can happen to improve people’s livelihood opportunities (Ellis 2000).

According to Bebbington, at minimum, the framework should be able to capture: the diverse assets that people employ to construct livelihoods; the way in which people depend and sustain their assets; the ability of people to transform assets into income, dignity, power and sustainability; consumption levels that reduce their poverty; a better quality of life according their own notion of quality; human and social capabilities to use and defend assets in a better way, and an asset base that will sustain these transformations (1999:2028, 2029).

In consideration of issues on water, gender and livelihoods, the following section analyses how conventional frameworks drawing on the traditional roles of women and men in relation to water use and access have shaped policies and material realities of water management schemes. Additionally, the next section outlines the elements of an alternative framework to understand how gender and livelihoods play out in water development policy.

1.5.2 Water, Gender and Livelihoods

The role of gender in current water development policies has been incorporated with disparate outcomes. Current water policies, in different forms, originate largely from the Dublin Guiding Principles stemming from the 1992 Dublin Conference on Water which introduced a holistic view of water resource management (Cleaver, 1998). The development and water resource management policies resulting from this holistic view place emphasis on a gender sensitive approach that has generated an interest in promoting

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6 The Dublin Guiding Principles were outlined during the International Conference on Water and the Environment (ICWE) held in Dublin, Ireland, January 1992.
greater involvement of women in policy formation by means of the production of a 
prototype rural female water user. The women portrayed in this prototype are agents of 
change, involved not only in fetching water but also in raising funds to construct or 
improve water supply infrastructure. By the efficiency obtained through water 
management and distribution, women can become productive agents because of the 
leverage they achieve by simply having water closer to their homes. Furthermore, women 
will also implement and monitor proper hygiene and sanitation practices. In sum, 
according to this view, through women, all water related problems can eventually be 
solved efficiently (Cleaver, 1998).

However, involvement of women in water management schemes may not be 
sufficient to resolve water related problems. In this light, Cleaver (1998) criticizes policy 
and development approaches based on this mainstream prototype by noting that these 
approaches contain a narrow sectoral bias. For example, irrigation planners are 
concentrated on production, while health planners are preoccupied with the quantity and 
quality of water used in the household as a reproductive unit. Approaches to water project 
planning and participation are highly technical and based on infrastructure planning 
schemes; indeed, technology is defined as the major goal where stakeholders’ 
involvement is justified on the grounds of greater efficiency and effectiveness. In 
addition, Cleaver (1998) points out that the Dublin Conference’s view of the participation 
of women is eminently apolitical and it constitutes in itself the solution to problems of 
water. Therefore, some of these policy approaches may not be able to make a solid 
connection between individual participants and the social context that surrounds human-
A counterargument or alternative view of where the solution to sustainable, equitable water management, then, relies on an alternative system of assigning values based on women’s perceptions of work and factors that influence their choices in terms of water use. The main idea of an alternative model is to account for women’s and men’s own varying valuations of water, the role of water in people’s livelihoods, use practices, suppliers definitions and gendered decision making processes in the household. Based on White et al.’s classic 1972 study of water use in East Africa, there are three main lines of inquiry to determine context specific values of water: (1) the amount of water used in each household, the social use and its social cost; (2) the effects of water on working productivity and community level well-being; and (3) the culture and natural conditions that affect the choice of individual households make about the amount of water used and the sources they use (Cleaver, 1998:296). Finally, Cleaver calls for a gender analysis framework through which there is an interconnection among issues of individual agency and collective action whereby social relationships, infrastructural provisions, complexity, diversity and change are combined at multiple scales. A critical gender-based framework, then, clearly differs from conventional water development frameworks. While Cleaver's normative critiques and arguments may be important to advance water and development policy, it begs the questions: what does an alternative model look like? Under what conditions such a framework can be conceptualized?

Ben Crow and Farhana Sultana’s 2002 study of gender, class and access to water in Bangladesh, may help to answer these questions. Crow and Sultana identified four modes whereby people access water in poor rural areas of the global south: (1) ownership to land and a pump to groundwater; (2) market access or purchase of water; (3) common
property access through rivers, ponds or public tanks; and (4) state-constructed provision systems in the form of local, municipal tap or pumped water in irrigation projects (2004:711). Property relations in the first mode and social arrangements in the second influence dramatically the access to water of poor households because they either lack land, or they have to engage in time-intensive activities to access low-quality water. Gender relations and material inequalities also influence water security (quantity, quality and reliability) and scarcity through a wide variety of social processes (Crow and Sultana, 2002:711).

Social relations in this context are produced by a process of subordination in which women and the uses of water commonly associated to them, have been undervalued and neglected. The contribution of women and girls to social reproductive and livelihood activities related to household water use has also not been examined well in terms of the time spent and the detrimental effects of enduring an intensive and harsh task such as collecting water. This is where the fieldwork of this thesis was designed to fit in within the debate over water and livelihoods. By highlighting the role of women in providing their households with water in two rural villages, I explore the role of water in women’s and men’s livelihood strategies, as well as the existing outcomes resulting from changes in water access across space. This gender differential process is necessary in order to properly understand the intrinsic dynamics of accessing water.

Gender-based analyses that account for differences in use, access and interpretations of water are important. While water provision service in industrialized societies is relatively even across gender and socio-economic status, in the global south, an understanding of the differences within social dimensions is still fundamental. These
differences, then, determine who is included, who is excluded, who does the job of providing water, what the consequences are, and who makes the final decisions pertaining to access to water. The social relations that influence access to water, and how gender and material inequalities shape this dynamic may be crucial elements in this analysis. In sum, the significance of the impact of social relations on water access shapes policy in two ways. First, material inequalities in water access become evident when notions of wealth and well-being in poor households are determined by the capacity of their members to access land and other resources. Second, as societies have defined different roles for women and men, the gender division of labor and decision-making process are profoundly affected by these pre-established roles.

The asymmetry of gender relations also influences water access in relation to livelihood strategies. Crow and Sultana (2002), for example, explore the shrimp export industry in rural Bangladesh and its social and environmental impacts on women and livelihoods. They found an association between land transformation into saline ponds and ecological disruption of the Sundarban Mangrove Forest, lack of access to potable water and less land available to cultivate crops, fruits, vegetables and to raise animals. Because of the process by which the landscape is modified in order to create space to produce a marketable commodity (shrimp), the consequences not only affect the local and regional ecology, but also the way in which former sources of livelihoods are neglected in favor of a large, industrial process of shrimp cultivation. Therefore, the apparent creation of jobs in the shrimp industry might obscure the impact of new spatial arrangements of land and resource use.
Conflict may also emerge as a result of competing water resource needs. In her conceptualization of conflict geographies of the Southern Anatolia Water Project (GAP) in Turkey, Leila Harris (2002) stresses other local-scale conflicts that are central to understand this conceptualization of conflict, such as gender. In her study, Harris suggests that even in the absence of interstate conflict between Turkey, Syria and Iraq as a result of GAP development and the diversion of Tigris-Euphrates waters, conflicts at the intrastate scale may emerge, under a broader notion of conflict that includes social conflicts related to gender, local power dynamics, identities, or conflicts over opposing livelihood strategies or resource needs. A broad definition of conflict geographies, then, includes the juncture of interstate conflict, intrastate conflict, historical conflicts, local power dynamics, and opposing uses of ecological resources all intersected with axes of race, class, ethnicity, and gender (Harris, 2002).

The conceptualization of conflict gains relevance when dealing with large water development projects. Interestingly, instead of focusing on interstate conflict or ‘water wars’, Harris pays more attention to the articulation of potential conflict at multiple scales. For instance she considers the household in terms of gender inequalities occasioned by tensions between different livelihood strategies and understandings of appropriate use of water; within and between communities due to different crops that might benefit from certain water conditions and water use practices in contrast to others; or between different types of livelihoods such as nomadic versus established agriculture. In these examples, Harris illustrates how a broader conceptualization of conflict captures a wide variety of tensions that represent potential sites of conflict. This broader sense of conflict, however, recognizes that conflict can also be reduced as a result of the
reconfiguration of water provision schemes. For instance, GAP development may reduce conflict caused by economic inequalities that historically have infused separatist movements in Southeastern Turkey.

Although conflict might often be present in issues of water access, I will argue that the potential for mutual cooperation cannot be entirely discarded. As Harris (2002) has pointed out, existing conflict may also be curtailed by the benefits of water development policies. Indeed, by focusing on conflict upheaval or conflict stagnation, other apparent non-conflictive scenarios are being ignored. For example, the absence of broadly defined conflicts may obscure less evident and more subtle struggles of individuals to access water in situations where explicit scarcity is not obviously stated, and when quality rather than simply access to water is a chief concern.

It is now well established that the role of gender is important to understand rural water management schemes. In her case study of gendered livelihoods and multiple uses of water in North Gujarat, India, Upadhyay (2005) discusses how recognition of women’s roles as multiple users of water will not only help ensure reliable and adequate access to domestic water but also promote the productive use of water for enhancing rural livelihood and sustaining the household economy. As Crow and Sultana (2002) have shown in Bangladesh, ideas related to gender roles—women as domestic users of water and men as productive users—are based on a patriarchal hierarchy of the gender division of labor through which women are subjected to subordinated roles. In some instances, for example, males have objected to water labor-saving technology based on notions of inappropriate women’s behavior as a result of a supposed increase in leisure time.
As Upadhyay (2005) and others have shown, the current practice of water allocation in Banaskantha district in India as in many parts of the developing world is greatly unequal and represents an extra burden on poor women, their health, time and livelihoods. The absence of a proper intra-community and intra-household water allocation policy may be the result in confrontation within and between households due to allocation priorities, especially in places where water availability is inadequate. Since rural women have less social and political power to fight for their water use rights, their water needs are often marginalized (Upadhyay, 2005). The recognition of the unequal power structures that shape specific societies is essential to understand water allocation dynamics. Furthermore, Upadhyay (2005) makes an important claim based on the lack of political power that many women have over the decision making process. Seen through this light, water household allocation is not enough to ensure women’s access to water. Rather, a focus on the social relations including the power gender dynamics within and between households may better suit a determination of proper water allocation.

Proper household allocation, along with an understanding of gender dynamics, may foment household livelihood strategies. While water requirements for domestic and productive uses such as orchard farming and livestock are minimal in comparison to industrial and agricultural uses, what is at stake is proper allocation (Upadhyay, 2005). Allocation would ideally be based on a realistic estimation based on norms and water use practices. For instance, the potential to grow vegetables and other similar crops around the house as well as adequate water provision for livestock should be taken into account. These uses of water are sometimes forgotten and thus left out in water allocation estimations by planners (Upadhyay, 2005). Hence, place-specific norms adapted to local
realities are certainly necessary for proper water allocation and adequate micro-scale household water provision is crucial to develop micro-scale livelihood strategies. Of course, supplementary aspects such as access to education and credit opportunities are also important.

Women’s contribution to household income may increase their participation in the decision-making process. An emphasis on gender roles of domestic and productive (irrigation and livestock) water users helps explain how these roles allow women to improve their socio-economic status (Upadhyay, 2005). In that way, a focus on gender roles and responsibilities as multiple users of water allows for an analysis of income and expenditures associated with water-based home enterprise. Members of the household who do not contribute directly to household income have little say in decision making and resource allocation. A great number of women in the developing world are economically dependent on their partners (Upadhyay, 2005). In cases where water allocation has reduced the time women spend collecting water, and where water is used to foster a commercial enterprises and household welfare such as livestock and family gardens, it has been demonstrated that resulting income generation has improved women’s bargaining power within the household and consequently increased their participation in the decision making process with regards to intra-household resource allocation. The notion of women as breadwinners and capable of sustaining their households (or at least contributing economically to household welfare) destabilizes the pre-established gender roles in many societies and may create potential intra-household conflict (Upadhyay, 2005).
Nonetheless, without the proper place-specific conflict resolution mechanisms, women, in spite of having new livelihood strategies that enable them to contribute to the household income, may end up risking family stability. In that sense, Upadhyay’s study probably exemplifies the rural female water use model that Cleaver critiques (outline in the beginning of this section). While Upadhyay has engaged in a gender analysis, she has failed to account for processes of collective action that might prompt women to challenge traditional roles. Despite the fact that Upadhyay has recognized the need to take into consideration domestic uses of water, she then quantifies these uses from a market economic perspective, conferring primacy to household income contribution from water use and aligning herself along with conventional water and development policy makers.

Collective action may be one way to create spaces of social participation for women to challenge and transform the fixidity of social roles. Cleaver (1998b), for example, analyzes the incentives and institutions that shape water resource management. According to Cleaver, conventional water and development models oversimplify incentives and motivations, prioritizing income generating and productive considerations and assuming linkages between these incentives, individual behavior and collective action. While the conventional view concentrates on formal institutions, Cleaver’s case study from Zimbabwe (1998b) suggests that women and men may be motivated by different incentives to participate in water resource management. Moreover, a focus on formal institutions disregards informal institutional arrangements whereby women are central. These formal institutions may contradict local practices based on place-specific social relations such as reciprocity.
In this thesis, I take inspiration from the way in which Crow and Sultana, and also Cleaver, have conceptualized water and gender. Upadhyay has illustrated the limitations of market economic models that on the one hand see women’s apolitical involvement in water development management as “the solution” to water problems and, on the other, privilege market economic incentives over social motivations and priorities. My framework is concerned with an alternative model that emphasizes how issues of water access and quality affect women and men in different ways at different locations. As livelihood strategies receive special attention, the rural livelihood framework provides me with some analytical tools to gather and analyze primary data on productive activities. In the same way, however, I have tried also to evaluate non-quantifiable issues of well being and social development based on human capabilities, community organization and identity construction.

1.6 Summary of Literature

The former sections have reviewed areas of inspiration I came across throughout the literature review process. Now I discuss how I incorporate these ideas into my research. This thesis examines how access to and quality of water influence the livelihood strategies of women and men in a rural context where water service provision is inadequate. Using a theoretical framework based on a combination of principles of political ecology, water and gender and rural livelihoods, I incorporate issues of scale to emphasize how actors situated at different physical and hierarchical positions in society manipulate the production of scale to challenge and change the configurations of social natural processes that rule their control over resources (see Figure 1.1). While conflict
plays an important role in issues about water access, I highlight the fact that conflict per se may be a centrifugal force that undermines other important but more nuanced notions of the social aspects of water. Finally, drawing on an ethnographically informed comparative study, I intend to draw on an alternative framework to analyze issues of water, gender and livelihoods. In this alternative framework, women’s participation alone may not be enough to advance water development policy. Rather, water policy should be assessed by taking into consideration the political implications of the spaces of social participation that access to water opens for individuals and communities.
Figure 1.1: Theoretical Framework to Study the Social Dimensions of Water
1.7 Outline of Thesis

Here in Chapter One, I have set the scene for the formulation of the research problem of this thesis, the general research questions undertaken, and the conceptual framework of the literature on political ecology, water and gender and rural livelihoods based on which this investigation draws. Chapter Two then revisits the research questions presented in Chapter One. In addition Chapter Two details the study site, methods and data collection process of fieldwork conducted in rural Eastern Guatemala. Chapter Three expands the definitions and elements of the rural livelihood framework with the purpose of apply these concepts locally. In addition, in Chapter Three, I also draw on a qualitative analysis of the fieldwork study to discuss how the interrelation between human and social capital may, in specific cases, propel the creation of other types of capital within the spheres of the civil society and the state. The statistical and quantitative analyses from the fieldwork are then presented in Chapter Four. Chapter Five then discusses the main contributions this study makes to the relevant literature that has been cited and reviews the thesis' main conclusions.
CHAPTER 2

STUDY AREA AND FIELD METHODS

2.1 Introduction

With the purpose of understanding the social relations of people as related to water access, Chapter One reviewed recent literatures at the intersection of political ecology, water and gender and rural livelihoods. In order to operationalize the adoption of the rural livelihood framework outlined previously, I conducted fieldwork in rural Guatemala in summer 2005 in two indigenous rural communities located in the Sarstún River Watershed Protected Area in the tropical forest area of the Izabal department, which is located in Eastern Guatemala (Figure 2.1). I was drawn to this area because, despite the abundant rainfall, proximity to Guatemala’s largest lake and the nation’s most developed water-based transportation and settlement networks, only 20% of the population has access to a household water connection (Livingston Water Division, 2005) in contrast to 55% in rural areas nation-wide (Joint Monitoring Programme for Water Supply and Sanitation, 2004). For those with no household access, ground and surface water must be carried from a variety of locations, almost exclusively by women and girls. In the study villages I found that, on average, each of the women without access to piped water spend approximately 418 hours per year collecting water, carrying approximately
21 liters of water per day. Figures 2.1 and 2.2 show a woman from Buckets Village after spending a large portion of her day fetching water, and the containers she uses to carry water. This is one of defining characteristics of life for women in one of the villages. What intrigued me was that, just three hours away in a very similar village, the majority of the population did not live this way because they have access to piped water. Furthermore, in my conversations with women in this ‘piped’ village, they frequently talked about how much life has changed over the last two years—i.e., since they had piped water. According to my informants, women in this village are able to engage in social and productive activities formerly impossible due to time constraints. Women themselves attributed this difference to piped water. Understanding the social, cultural and political conditions under which this difference came to be—that is how two villages, otherwise similar, had become water-emancipated and the other one not—became an important goal of this thesis.

Paradoxically, the two study villages are situated within an important ecological system whereby on the one hand natural resources are abundant and the stakes over conservation are high, and, on the other hand, an environment in which basic services, particularly water service provision, are insufficient to meet the basic needs of the population. The study site is also a place of contested territories. On March 2005, the Sarstún River Watershed (in which the communities are located) was declared a protected area by the Guatemalan Government.
Figure 2.1: Woman from Buckets Village. Source: Fieldwork by L. Lundine, July 2005.

Figure 2.2: Containers used to transport and store water in Buckets Village. Source: Fieldwork by L. Lundine, July 2005.
According to one national environmental non-governmental organization, FUNDAECO, from an environmental perspective, the Sarstún Watershed is important because it embodies one of the few remaining fragments of the pristine ecosystems of the Gulf of Honduras and the Mesoamerican Biological Corridor, which connects forests and ecosystems from Belize to Honduras. The Sarstún Watershed is comprised of karstic mountains, low elevation tropical forests, extensive wetlands, mangrove swamps, coastal and estuarial ecosystems. This area is a site of refuge, migration and reproduction of several unique and endangered species such as the manatee (FUNDAECO, 2005). The Sarstún Watershed covers a territorial extension of 35,202 hectares in Guatemala and it is the home of approximately 5,000 people from sixteen villages, including the villages in this study. The transformation of the region into a protected area is beyond the scope of this thesis. Yet the associated zoning plans and the consequent restriction in the use of particular resources, as well as the resource management plans resulting from it, will have a profound impact on the livelihoods of the inhabitants of the region.

2.2 Revisiting Research Questions

Returning to my original questions, the critical issues at stake are: an inadequate water provision service in a territory with rich natural resources and supposed effort at conservation; poor quality of water; and a marginalized population with unfulfilled needs but at the same time a diverse set of productive activities, some of which are constrained

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1 At the time of writing this thesis, for the first time in history, the Guatemalan Supreme Court had ruled against the resolution that converted and determined the zoning of the Sarstún River Watershed into a protected area in favor of an appeal presented by the Catholic Church Land Commission on behalf of several Q'eqchi' communities (Pelicó, 2006).
by, among other factors, issues of access to water. As it will become apparent in the water quality analyses (see section 2.4.5 The Quality of Water in the Villages), having piped water is not equivalent to having high quality water. Therefore, it becomes clear at this point that this study is not only about water quality. Rather this study seeks to understand the different ways through which people in marginal areas use and access water in support of their livelihood strategies. I focus particularly on the livelihood strategies and social relations these people marshal in order to access resources, particularly water.

The role of social relations is vital to access water in three different ways: first, the social relations mediate how households and individuals access assets, activities and capital. Second, the social relations are deeply influenced by gender, whereby the division of labor is based on societal gender roles, ownership of productive assets and command over decision-making processes which have traditionally favored men, and the prioritization of male-associated uses of water over domestic ones. Finally, the social relations are the link between individuals, households and communities that allow us to understand how subaltern people have been able to transgress the configuration of socio-economic power and hierarchies to access water and other resources that are important for their livelihoods.

- Thus, if it is not about water quality, what difference might it make to have piped water in a community?
- How do the people in a place with an apparent abundance of natural resources, but with deficient water provision service, use their water resources and what
difference does it make to have or not have piped water in the process of making a living?

- By what livelihood strategies and social relations do marginalized individuals, households and communities access water, in what ways and with what outcomes?
- If benefits are associated with pipes, by what processes do some communities succeed or fail to access piped water?
- What are the conditions under which spaces of social participation to access water are created, reconfigured and transformed into capital and assets?

In order to answer these questions, in the following sections I describe the study area and I explain the field methods employed to gather primary data. Before discussing the methodology of this study, however, I introduce in the next section a brief history of the Q'eqchi'.

2.3 The Q'eqchi'

The first settlers of both of the study villages were Q'eqchi' people originally from the Department of Alta Verapaz, which borders Izabal to the West, and from other towns in Izabal around the shores of Rio Dulce (Figure 2.3). Some authors suggest that Q'eqchi' displacements follow known pre-Hispanic communication routes. The watersheds of the Polochic River, Rio Dulce, Izabal Lake and Sarstún River, for example, have historically constituted ideal trading and travel routes through which itinerant merchants, migrant workers and explorers have reached the South of Petén and Belize for hundreds of years (Adams, 1965; Arrivillaga, 1985; Sapper, 1985). Currently, the
Q’eqchi’ are the second largest ethnic group in Guatemala with a population of more than 800,000 (Instituto Nacional de Estadística, 2002).

Little is known about the Q’eqchi’ in pre-Hispanic times besides the fact that there was an indigenous nobility and that the Kingdom of the post-Classic Quiché was not able to conquer them, suggesting a complex degree of social organization and relative independence from the remainder of Middle America (Wilk, 1997; King, 1974). The Q’eqchi’ occupied a strategic and mountainous zone in the Verapaz region between the lowland forests to the north and the temperate highlands to the south and west, which facilitated their trade and commerce from at least the Early Classic period (c. a. d. 300).

One the main characteristics of the pre-Hispanic Verapaz region is its apparent isolation caused by periods of resistance vis-à-vis the main developments in Classic Maya and Mexican influence (King, 1974). Therefore, the Conquest and the colonial and post-colonial periods were greatly affected by the nature of the pre-Hispanic Verapaz, which was influenced profoundly by a relative isolation and independence from Middle America (King, 1974).

Concentrated on the conquest of powerful kingdoms of western Guatemala, the Spanish did not engage in conquering the Q’eqchi’ until 1529 (Wilk, 1997). However, the Q’eqchi’ and their Pokomchi neighbors resisted the Spanish invasion for some years. In 1537, the Dominican Friar Bartolomé de las Casas was granted permission for five years to pacify the Q’eqchi’ of Tezulutlán or “land of war” by peaceful and religious methods. This great experiment of Q’eqchi’ pacification has been examined from different perspectives and has tended to emphasize its humanitarian and peaceful nature, in

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2 Verapaz means land of peace—the name given by the Dominicans after Fray Bartolomé de las Casas.
contrast to the violent means used with other Maya groups, while deemphasizing the profound social, economic, demographic and political transformations of the Dominican period. These notions have resulted in the false claim that because the Q’eqchi’ were not militarily subjugated, their traditional way of life survived relatively intact through colonial times (Wilk, 1997). Conversely, others claim that the strong influence of the Dominicans, including the system of *reducciones*\(^3\), explains why some pre-Hispanic features such as the *tzolkin* and *haab*, calendar systems used in ancient times, survived in other parts of Guatemala but not in the Verapaz (Schackt, 2002).

The current inequalities and social exclusion to which the indigenous people from Guatemala are subjected are rooted fundamentally in the history of colonialism that pervade the material and discursive realities of today. In the case of the Q’eqchi’, the German coffee empire that existed between 1877 and 1944 is also known as the “second conquest”, whereby thousands of Q’eqchi’ people were displaced from their lands, subjected to forced labor *mandamientos* and fraudulent payment systems called *habilitaciones* (Wilk, 2002:48). The German domination of the coffee industry initiated with the occupation of communal Indian land, that only ended in 1944. During the 1940s, the liberal government led an agrarian reform. After World War II expropriation and the abolition of forced labor were two of the by-products of this period. The agrarian reform, however, has never fully been implemented (Cambranes, 1985).

While some forced labor established by the *mandamientos* was abolished after the independence from Spain (1821), it was reintroduced in the Verapaz region in the form of

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\(^3\) *Reducciones de indios* was an institution championed by the Dominican Friars that aimed at confining the native population in a clustered geographic area in order to control their labor and tax them (Wilk, 1997; Martinez Pelaez, 1972).
vagrancy laws and debt servitude during the coffee boom of the 1870s (Wilk, 1997).

Displaced from their communal lands and forced to work in the coffee farms, the Q’eqchi’ initiated a period of migration that led them to establish new settlements in: (1) the North and Northeastern regions of Guatemala including in El Petén; (2) the East including Izabal; (3) the Toledo District of Belize and (4) migration to urban areas in Guatemala. After the coffee empire ended in 1944, the land the labor relations that originated in that era have barely changed. Nickel and zinc mines in the Verapaz region and Izabal are owned by foreign capital and continue to dispossess the Q’eqchi’ from their lands and exploit their labor (King 1974; Carter 1969).

Another wave of migration occurred in 1970 when Q’eqchi’ families abandoned their homeland due to the fact that non-Q’eqchi’ mining and cattle ranching expanding into their lands and an increase of political and economic oppression (Wilk, 1997). The Q’eqchi’ and many other indigenous groups in Guatemala were subject to a state terror campaign during what became a 36-year civil conflict. The first massacre in Alta Verapaz took place in Panzós in 1978 when more than a hundred Q’eqchi’ people were killed while they were marching to protest against abuses perpetrated by plantation owners (Grandin, 2004; Wilk, 1997). In the early 1980s, the government initiated systematic massacres against the Maya which caused massive displacements of the population. During 1981-1982, approximately 80% of the inhabitants of the provinces of Quiché, Huehuetenango, Chimaltenango and Alta Verapaz (Figure 2.3) abandoned their homes at least temporarily (Wilson, 1995). When the 36-year civil war concluded, Guatemala’s state had assassinated two hundred thousand people, disappeared forty thousand and tortured thousands more. Guatemala’s civil war is by far one the bloodiest in the
American continent (Grandin, 2004). According to the Catholic diocese, approximately ninety five villages were destroyed in Alta Verapaz alone during this period, most of them Q’eqchi’ communities (Wilson, 1995). The suffering of the Q’eqchi’ during the civil war in Guatemala has been documented elsewhere (see Grandin, 2004 and Wilson, 1995). For the purposes of this thesis, it suffices to say that during this period of terror, some of the Q’eqchi’ people were able to flee their homeland to other places including Izabal. Others remained under military surveillance and spatial confinement. Villages, where local institutions had previously been established, were especially targeted by the state because of their potential to become sympathetic to the revolutionary movement, affecting greatly the social fabric of the Q’eqchi’ and many other indigenous groups (Wilson, 1995).

2.4 Study Area and Villages

The Department of Izabal is located in the Atlantic Coast on the Northeastern Region of Guatemala in Central America (15° 44’06” N - 88° 36’ 17”W). The capital of the department is the City of Puerto Barrios, located 308 kilometers Northeast of Guatemala City. Izabal borders the Department of El Petén, Belize and the Caribbean Sea to the North and East; the Department of Zacapa to the South; Honduras to the East; and the Department of Alta Verapaz to the West (Figure 2.3). The territorial extension of Izabal is 9,038 km² (8.3% of Guatemala’s area) and it has a population of 314,306 (2.4% of Guatemala’s population). Two of the most important rivers in Guatemala, the Polochic and the Motagua, flow through Izabal into Lake Izabal, the largest lake in the country. Other rivers that flow directly into Lake Izabal are the Sauce and Amatillo Rivers. The
Sarstún River and Río Dulce flow into the salt waters of Amatique Bay, East of Lake Izabal. Río Dulce is part of the drainage system of Izabal Lake. Several lagoons can be found in the mouth of Polochic River into Lake Izabal (Mejia and Curley, 2004). Izabal is divided into five administrative subdivisions or municipios: Puerto Barrios, El Estor, Los Amates, Morales, and Livingston. The overall population in Livingston, the municipio where my fieldwork took place, is 48,588 inhabitants of whom an estimated 48% are Q’eqchi’, 42% are mestizo or ladino, 9% are Garífuna, and > 1% are Culi-Hindú (Instituto National de Estadística de Guatemala, 2002). My fieldwork focused on two villages located in the eastern part of Livingston (Figure 2.4) referred to here under the pseudonyms of Buckets Village (which has no piped water), and Pipes Village (where residents have access to piped water).

The villages are located in the Izabal Depression landform, specifically in the karstic reef platform emerged from Río Dulce. The forest cover is characterized by a broadleaf forest and a mix of broadleaf forest and cultivated land. Overall, the area has been classified under the Holdridge Life Zones as a very humid tropical forest. The soils are sedimentary type from Cenozoic and residual origin (SIG-MAGA, 2003; FUNDAECO, 2005).
Figure 2.3: Map of the Republic of Guatemala and the study area. Source: Adapted from the Perry-Casteñeda Library Collection, 2000
Figure 2.4: Study villages located in this general area. Source: FUNDAECO, 2002
In general, the quality of these soils has an unstable nutrient balance caused by the leaching of essential minerals and nutrients. Hence, the lush vegetation is not necessarily a sign of fertile soils (Wilk, 1997). In this region, unlike other parts of Guatemala, the soils are not volcanic. The topography in this region ranges between 70 and 115 meters above sea level.

The quality of life in this region is little different than in the rest of rural Guatemala. With regards to poverty, for example, 56% of Guatemala’s total population lives in poverty, of which 16% live in extreme poverty. The general levels of poverty in the region show that 52% of the population lives in poverty. That is 8% of the regional distribution of total poverty at the national level (Instituto National de Estadística, 2000). With a fiscal deficit of 1.5% of the Gross Domestic Product in 2005 and tax collection around 10% of GDP, Guatemala has one of the lowest tax/GDP ratios in Latin America, which is the main source of revenue used to improve social conditions. Currently, the state of Guatemala has been unable to increase its tax take (Paiz Fredel and Scher, 2006).

In terms of water provision services, from the 133 communities that constitute the rural area of the municipio of Livingston, only 45 of them have piped, but not purified water (Infopressca, 2005).

With regards to education, in spite of recent improvements in educational coverage at the national level, Guatemala still has the second highest rate (34%) of female illiteracy in Latin America (SEPREM, 2004). Indeed, in 2004 national educational indicators showed that half a million girls between the ages of 7 and 14 were not registered in primary school in contrast with 300,000 boys. In 2000, throughout the rural
areas of the country, only 59 of every 100 girls attended primary school (SEPREM, 2004). In Livingston, with a rural population of more than 80%, a high percentage of the total population (68%) never attended school, and 37% never finished their first year of education (Instituto Nacional de Estadística, 2002).

In terms of health services, in Livingston the only two health centers available are located in urban areas: Livingston and Fronteras/Rio Dulce. The main hospital is in Puerto Barrios, the capital of the province, which is located at 16 nautical miles from Livingston and it is only accessible for the people of the municipality of Livingston by boat. Nine smaller health posts are located in some rural areas, making it almost impossible for most people living in remote villages to access health services. In addition, because of climate and humidity, the region is excellent for mosquito growth which leads to malaria and dengue. Since most of the population lack piped purified water, there is a tendency to store water in containers. If not handled appropriately, water storages are conducive to increase mosquito larvae production that ultimately may lead to malaria and dengue outbreaks. Therefore, one of the most serious public health problems in the region is related to water management. In addition, because of the non-existent human waste disposal systems along with a lack of piped and purified water, households are subject to other diseases such as diarrhea. In 2000, for all of Guatemala, acute diarrhea was the second leading cause of morbidity (45.1/1,000) and mortality (3.6/10,000), exceeded only by respiratory infections and pneumonia. Diarrhea alone caused 43% of the total deaths registered in children under five (Instituto de Incidencial Ambiental, 2004).
2.4.1 Characteristics of the Population in the Study Villages

The information gathered on household composition reveals that the population from the study villages shares some characteristics (Table 2.1). One hundred percent of the participants are Q'eqchi'. Moreover, the demographic data gathered suggest that these two villages represent the typical rural community found elsewhere in the literature (e.g., Ellis, 2000; Carter, 1969; McSweeney, 2004, Wilk, 1997). In general, the mean number of years of education in female adults in both villages is low (0.87), and only a small percentage of women are literate (37%). Furthermore, when assessing the ability of the participants to communicate in Spanish, using a scale of 0-3 where 0 was used to depict no knowledge of Spanish and 3 fluent Spanish, the mean average of females (1.12), and was particularly low in both villages in comparison with the mean average of males (2.15).
<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean or % of obs. = 1</th>
<th>Min - Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of persons living in household</td>
<td>60</td>
<td>6.5</td>
<td>2-15</td>
</tr>
<tr>
<td>Children born</td>
<td>60</td>
<td>4.8</td>
<td>1-12</td>
</tr>
<tr>
<td>Years of formal education in household</td>
<td>60</td>
<td>4.6</td>
<td>0-12</td>
</tr>
<tr>
<td>Adult female born in village (no=0; yes=1)</td>
<td>60</td>
<td>46.7%</td>
<td></td>
</tr>
<tr>
<td>Age of adult female</td>
<td>60</td>
<td>34.3</td>
<td>19-63</td>
</tr>
<tr>
<td>Years of formal education, female adult</td>
<td>60</td>
<td>0.87</td>
<td>0-9</td>
</tr>
<tr>
<td>Literacy, female adult (no=0; yes=1)</td>
<td>60</td>
<td>36.7%</td>
<td></td>
</tr>
<tr>
<td>Years of living in village, female adult</td>
<td>60</td>
<td>27.0</td>
<td>2-62</td>
</tr>
<tr>
<td>Spanish fluency, female adult (scale 0-3)</td>
<td>60</td>
<td>1.1</td>
<td>0-3</td>
</tr>
<tr>
<td>Adult male born in village (no=0; yes=1)</td>
<td>54</td>
<td>57.4%</td>
<td></td>
</tr>
<tr>
<td>Age of adult male</td>
<td>53</td>
<td>41.4</td>
<td>21-84</td>
</tr>
<tr>
<td>Years of formal education, male adult</td>
<td>59</td>
<td>1.9</td>
<td>0-11</td>
</tr>
<tr>
<td>Literacy, male adult (no=0; yes=1)</td>
<td>59</td>
<td>64.4%</td>
<td></td>
</tr>
<tr>
<td>Years of living in village, male adult</td>
<td>59</td>
<td>31.0</td>
<td>2-60</td>
</tr>
<tr>
<td>Spanish fluency, male adult (scale 0-3)</td>
<td>59</td>
<td>2.1</td>
<td>0-3</td>
</tr>
<tr>
<td>Adult male speaks some Garifuna</td>
<td>59</td>
<td>10.2%</td>
<td></td>
</tr>
<tr>
<td>Number of males in household 15-64 years old</td>
<td>60</td>
<td>1.6</td>
<td>0-5</td>
</tr>
<tr>
<td>Number of females in household 15-64 years old</td>
<td>60</td>
<td>1.6</td>
<td>1-4</td>
</tr>
</tbody>
</table>

Table 2.1: Demographic characteristics of the study villages, both villages. Source: Survey, 2005.

2.4.2 Pipes Village

Pipes Village is located at approximately 2.5 km. from the City of Livingston which is the main City in the municipio of Livingston. There are neither roads nor motor vehicle access to the village; rather, the only way to reach the village is by walking on a trail that borders the Quehueche River. This trail goes through lush vegetation and rocky hills that do not exceed 150 masl. Therefore, every item leaving or entering the village
has to be carried. The village has a population of approximately 350 inhabitants, of whom
the majority is Q’eqchi’ (Livingston Health Center, 2005). The village has a primary
school run by the Guatemalan Ministry of Education, electricity and non-purified piped
water. It does not have sewage or trash removal. No health services are available in the
village.

Figure 2.5: Boy walking to school in Pipes Village. Source: Fieldwork by L. Lundine,
July 2005.

2.4.3 Buckets Village

In Buckets Village there are no roads or motor vehicle access either. However,
there are two ways to get to Livingston: by walking from the village through a trail of
approximately 6 km that goes through Pipes Village, or by walking from the village to
the shores of Tatín River along a trail of approximately 3 km. The easiest way to get from
the shores of Tatín River to Livingston is by taking a trip of approximately 20 minutes in
a motorized boat or a two-hour canoe trip. Buckets Village has a population of approximately 280, of whom the vast majority are Q'eqchi' (Livingston Health Center, 2005). The village has electricity and an elementary school that is administered by a school committee formed by members of the community. Presently, there is neither access to piped water nor sewage or trash removal services. Health services are not available in Buckets Village.

Figure 2.6: Family from Buckets Village. Source: Fieldwork by L. Lundine, July 2005.

2.4.4 Similarities between Villages

Although neither community has health services, because of their physical proximity to association Ak’ Tenamit, a local non-profit organization mentioned in detail elsewhere on this thesis (see Chapter Three, Section 3.4.1), the people from this village
and other surrounding villages in the region (including Pipes Village), can access education and health services if they become members. Ak’ Tenamit has two locations on the shores of the Rivers Lámpara and Tatin located at approximately 4 km from Buckets Village. The house construction characteristics in both villages were similar. Most of the houses are built from a combination of wood and corn stalk walls with palm thatched roofs. Only few houses have concrete floors, room divisions or tin roofs.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Buckets Village</th>
<th>Pipes Village</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>~280</td>
<td>~350</td>
</tr>
<tr>
<td>Piped water</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Drainage system</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Primary school</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Electricity</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Distance to nearest health clinic</td>
<td>3 km</td>
<td>2.5 km</td>
</tr>
<tr>
<td>Distance to main town</td>
<td>6 km</td>
<td>2.5 km</td>
</tr>
</tbody>
</table>

Table 2.2: A comparison of the main characteristics of the study villages. Source: Fieldwork by L. Lundine, 2005

2.4.5 Needs and Productive Activities in the Villages

In this section I introduce a general overview about the ways in which the people in these two villages make a living to meet their basic needs. This information is important because it illustrates how people access not only their means of sustenance but also basic services, particularly water. Understanding the strategies by which the people in these villages access resources may help understand the processes and outcomes resulting from different ways to access water. While Pipes Village can access, although with some difficulty, the closest regional market in Livingston to sell their products, for the people from Buckets Village this option constitutes a labor-intensive endeavor. In
order to acquire some luxury items, especially traditional textiles and bedclothes, this village (like many other villages around Northeastern Guatemala and Belize), is served by itinerant Q’eqchi’ merchants commonly known as cobaneros who travel carrying heavy loads on their backs.

In terms of livelihoods, the population in these two villages depend upon a combination of subsistence agriculture, permanent and occasional wage work (i.e. construction workers or maintenance personnel with the municipal government or private corporations, during some weeks of the agricultural cycle without intense activity), including wage fishing. Other diverse commercial activities including handicraft production, sale of domesticated animals, sale of non-agricultural products (i.e. bread and prepared food) and the administration of a community tourist center are carried out for the whole year (see Figure 2.7).

Figure 2.7: Productive activities in both study villages. Source: Household survey by L. Lundine, 2005.
In open-ended questions designed to understand the livelihood calendar, participants were asked to single out the time of the year and the different necessities for which cash was needed the most. First, participants identified several seasons based on the agricultural calendar and other important events: wet-season planting (November and December); dry-season planting (May); in-between season (August-September) and the beginning of the school year (January). Second, participants chose one season. For the grand majority of participants in both villages, cash was needed the most during both planting seasons. The next option selected was the in-between season. According to my informants, this is the time of the year where food becomes scarce because the reserves accumulated during both harvests decrease (May and October). Only a minimal percentage identified the school year as a time where cash was needed the most. Overall, then, there appear to be two financial "bottlenecks": one due to cash shortage during both planting seasons to buy herbicides and to pay for food of the laborers in agricultural labor exchange arrangements. The other bottleneck is related to lack of food for household consumption caused by the decrease of basic grains reserves because these grains sometimes are sold to obtain cash.

Next, participants reported for what purposes cash was to be used. Based on multiple responses given per each respondent, the most prominent cash needs in both villages were for food, non-staple-food supplies (soap, clothes, sugar and coffee), agricultural inputs and medicine and health expenses (Table 2.2). The high percentage of food responses might have been caused by the fact that some participants reported under food the meals that are needed to feed the people helping their households in reciprocal
agricultural labor, although the goal of the interview was to report only staple and daily food consumption (corn, beans, meat, fish, fruit and vegetables) within the household.

Conversely, others reported this type of food under agricultural inputs. In the same way, the distinction between food and home supplies may have not been easy to discern, since some respondents reported coffee, sugar and flour as food rather than as non-staple-food supplies.

<table>
<thead>
<tr>
<th>Cash Needs</th>
<th>Percentage of Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>66.7%</td>
</tr>
<tr>
<td>Home supplies (sugar, coffee, soap and clothes)</td>
<td>61.7%</td>
</tr>
<tr>
<td>Agricultural inputs including seeds and food for labor</td>
<td>38.3%</td>
</tr>
<tr>
<td>Medicine and health expenses</td>
<td>23.3%</td>
</tr>
<tr>
<td>Education (school supplies, fees)</td>
<td>10.0%</td>
</tr>
<tr>
<td>Communal committee fees</td>
<td>5.0%</td>
</tr>
<tr>
<td>Electricity fees</td>
<td>3.3%</td>
</tr>
<tr>
<td>Pay for land</td>
<td>3.3%</td>
</tr>
<tr>
<td>Home construction materials</td>
<td>1.7%</td>
</tr>
</tbody>
</table>

Table 2.3: Responses from open-ended questions regarding cash necessities in both villages. (n=60) Source: Household survey by L. Lundine, 2005

2.4.6 The Quality of Water in the Villages

In terms of rainfall patterns in the region, annual registers from the closest meteorological station indicate an average of 211 days of rain and 2,960 mm of precipitation in 2004 (INSIVUMEH, 2004). Therefore, apparently, rainfall and water availability may not be the most serious problem the people in the region face, but rather access to potable water. In this regard, results from open-ended questions revealed that behind this apparent water abundance, availability and quality of water for household use are by no means constant and water indeed becomes scarce and turbid during the dry season. Although this was not a main goal of my research, it seemed important to get a
good understanding of aspects of water use beyond mere access. Therefore, with the purpose of shedding light on these issues, I undertook a parallel research endeavor to assess the quality of water of the study area. In this section I show the parameters, methodology used and main findings of the water quality sampling analyses.

Thirty water samples from systematically selected households were collected to determine water quality. The samples were taken from both study villages: Buckets Village with no access to piped water, and Pipes Village where the majority of the population (87%) has access to piped water. One of the parameters analyzed was the presence of total coliform bacteria including E. Coli. Total coliform bacteria are naturally present in the environment and are used as an indicator that other, potentially-harmful, bacteria may be present. E. coli and fecal coliform bacteria are bacteria whose presence indicates that the water may be contaminated with human or animal wastes (Gadgil, 1998). Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches or other symptoms. They may create a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems (EPA, 2005). The other parameter analyzed was Nitrate. Nitrate is a chemical contained in fertilizer and human and animal wastes. Infants younger than six months who drink water containing high levels of nitrate could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blueness of the skin (EPA, 2005).

The medium used to process the water samples and determine water quality was Coliscan Easygel® from Micrologylabs (http://www.micrologylabs.com). The chemical component Nitrate was analyzed using Insta-Test Strips® from LaMotte
Water samples were collected on two separate occasions from systematically selected households. Samples were taken from the container used for water storage in the house and selected water sources in the villages, including springs, ground water, rivers, creeks and water tanks. Collected water samples were then transported to a test site. All water samples were taken with the idea of replicating the water use practices of the study population, for example their unsterilized cup was used to collect water (Quick et al., 1996). Samples were individually put into 30mL collection bottles, out of which 5mL were mixed with the Coliscan Easygel® medium and plated immediately on Petri dishes.

A bacteria density analysis was performed to identify the cfu/ml (colony forming units per 1 mL) in each village (Buckets Village: n=15; Pipes Village: n=15). All samples were then classified depending upon presence or absence of total coliforms and *E. Coli* separately, using a scale of 0-3 (Figures 2.9 - 2.12). No significant differences were found between villages. Presence of total coliforms and *E. Coli* bacteria was found in both villages. This is consistent with previous bacterial analyses carried out in other parts of Guatemala where the level of total coliforms and *E. Coli* found in drinking water sources exceeded the maximum permissible levels of contamination of less than 1 organism per 100 mL (Instituto de Incidencia Ambiental, 2004; Gadgil, 1998). In that sense, evidence from this analysis suggests that piped water does not reduce contamination. Therefore, the differences between villages with regards to water are not related to health issues. Rather, the differences are based on specificities of access, for example distance between households and water sources as well as convenience. The same water samples were tested for Nitrate and all of them yielded negative results.
Figure 2.8: Water quality test site: Source: Fieldwork by L. Lundine, July 2005
Figure 2.9: Total coliforms in Buckets Village, Coliscan Easygel®, (n=15). Source: Water Analysis by L. Lundine, July 2005
Figure 2.10: Total coliforms in Pipes Village, Coliscan Easygel®, (n=15). Source: Water Analysis by L. Lundine, July 2005
Figure 2.11: *E. Coli* in Buckets Village, Coliscan Easygel®, (n=15). Source: Water Analysis by L. Lundine, July 2005
Figure 2.12: *E. Coli* in Pipes Village, Coliscan Easygel®, (n=15). Source: Water Analysis by L. Lundine, July 2005

### 2.5 Methods

During July and August of 2005, I conducted fieldwork over seven weeks in two villages: Pipes Village (with access to piped water), and Buckets Village (without). I gathered 60 household surveys (30 in each village). The survey was conducted in the local language Q’eqchi’ and in Spanish, and it was applied to more than two thirds of the total households in each village. Eighty percent of the respondents were the adult female heads of household. I also conducted 20 semi-structured interviews with key informants along with participant observation and 30 water samples to assess water quality.
2.5.1 Household Selection

Before gathering data, I conducted a wealth-ranking appraisal to select the participant households for the survey and water sampling (Ellis, 2000; Ellis and Bahiigwa, 2005). This appraisal was undertaken with several purposes: (1) to build a list of households and their physical locations; (2) to identify place-specific criteria to determine wealth; (3) to classify proportionally the participant households depending upon their position in the socio-economic and cultural ranking categories: poorest, medium and better off. In both villages, the health promoters—community members who hold voluntarily positions to provide basic health care—led this process since they are responsible for keeping updated basic population censuses, and are most likely to have a general overview of their communities. The lists that we made yielded 44 households in Pipes Village and 45 in Buckets Village. Therefore, the target total sample of 60 household surveys; 30 in each village, covers slightly more than two thirds of the total number of households.

The criteria used to determine wealth were: (1) home construction characteristics based on quality of roofs, floors and existence of room divisions; (2) additional material assets used in entrepreneurial activities such as those utilized in a small general store; and (3) remoteness from the main hamlet measured in distance. While it was not feasible to reach an exact proportion of households in each of the ranking categories, particularly in cases when participants at previously selected households either where out of town or refused to participate, I tried to represent the variety of socio-economic backgrounds in the sample as much as possible by including households from each of the three ranking categories. Finally, respondents’ individual participation was filtered through four basic
criteria: position in relation to the wealth-ranking appraisal, age, being the adult female or male head of a household and willingness to participate voluntarily in an interview. The participants were all inhabitants of the two studied villages and were in the age range of 18-65.

2.5.2 The Household Survey

A copy of the household survey used in Spanish is enclosed as Appendix A. The household survey covered seven areas: a) local and ecological knowledge; b) water use; c) family network; d) household composition; e) health practices; f) assets and productive activities; and g) well being. Based on the principles of the rural livelihood framework, this survey was designed to tease out information about household water use, assets, capital and activities. In that sense, section a dealt with questions on natural capital by focusing on the perceptions from participants about their physical environment. Based on recent studies that demonstrate how women’s livelihoods, social activities and general well being is constrained by access and quality of water (Cleaver, 1998; Crow and Sultana, 2002; Upadhyay, 2005), section b was created to reveal patterns of water access, quality and use with a particular emphasis on women’s role in managing household water. For this reason, this survey purposely targeted mainly women. However, in instances when women were absent or not available, men also participated in the survey.

Expecting to detect some type of relationship between water access and human capabilities, particularly years of formal education, labor availability as well as social participation, section d and e solicited information about human capital through questions related to household composition for example age of participants, number of dependants, years of formal education, skills, labor availability, and health status. In terms of social
capital, section c and g drew out information about family support networks and general well being associated with changes, independence and social participation in community life. The section on wealth and productive activities, section f, recorded data on produced capital and emphasized questions that referred to household necessities, activities, material assets including animals, and household characteristics. This last section was created in order to disentangle the way in which the study population makes a living vis-à-vis their local context and current access to assets, especially water.

Questions in each of these sections were designed in order to elicit detailed information through a combination of quantitative and qualitative inquiry. The open-ended questions were designed to capture the nature of the seasonality in the villages with regards to the different productive activities realized in each household and illness occurrence throughout the calendar year. Additional questions, especially those related to household composition and wealth and productive activities, also collected quantitative data.

2.5.3 The Semi-Structured Interviews and Participant Observation

In addition to the household surveys, 20 semi-structured interviews, following the methodology outlined by De Walt and De Walt (2002), were gathered among community leaders from the study villages, members of national and local NGOs, and public officials at the local and national level. These semi-structured interviews stressed aspects related to social and human capital, and in the ways in which the relationships between households and institutions mediated households’ access to assets. I also conducted participant observation in the study site and surrounding areas before and during the data collection process with the purpose of understanding issues of water use and livelihoods.
That is, I lived seven weeks in the region participating and learning about the complexities of everyday life.

2.5.4 The Data Collection Process

An important aspect of the household survey is the flexibility with which some sections were developed. After spending some days in the field and testing several trial surveys with high school students and members from the community, questions were reformulated in order to suit the specificities of the villages and the local language, Q’eqchi’.

For instance, the section regarding wealth and productive activities was based on a seasonal calendar of activities relevant to the communities. In the same way, the sections of water use and health practices were also adapted to specific conditions in the villages and a climatic season calendar.

During my fieldwork in Guatemala, the national environmental organization CALAS (Centro de Acción Legal, Ambiental y Social de Guatemala) introduced me to key players from non-governmental and public entities in Izabal. Furthermore, CALAS helped me understand and recognize current political and environmental dynamics relevant to my research. In Izabal, the association Ak’ Tenamit, provided me with local contacts and logistic support including a local Q’eqchi’ interpreter and transportation.

When collecting data in the villages, nonetheless, my position as an independent student-researcher was continuously made clear to the participants.

While collecting data in Buckets Village Marcos, an Ak’ Tenamit high school student from another village, accompanied me and served as interpreter and fieldwork assistant. Since some people in the villages are illiterate, the household survey was read to them and their answers were translated back to me into Spanish. Therefore the
translation of responses, to some extent, was filtered by the interpreter. In contrast, in Pipes Village, different members of the community council served as interpreters. While I learned a great deal from these people when conducting the interviews, some answers, especially those regarding changes in life and community participation, might have been influenced by the presence of these leaders. Before every interview, an informed consent process took place according to the Human Subjects requirements from the Institutional Review Board of the Ohio State University.

Figure 2.13: Marcos, fieldwork assistant collecting water samples. Source: Fieldwork by L. Lundine, July 2005.

2.6 Conclusion

This research draws on literature about the social aspects of water and rural livelihoods, but also incorporates recent fieldwork conducted in two Q'eqchi' villages in
the tropical forest of Northeastern Guatemala. The study area was chosen because in spite of the apparent resource abundance and preoccupation over biodiversity conservation, it is a place where the delivery of basic services for its inhabitants, particularly water, is deficient. Furthermore, life in the study area cannot be characterized in homogenous terms since variation in water access was found between villages. Having piped water, however, is not synonymous of water quality. In that sense, evidence showed that total coliform bacteria, including *E. Coli*, were present in water samples analyzed in both villages. One of the purposes of this research is to understand why having piped water might make a difference in the ways in which the people of the study villages make a living. Toward this end several field methods were employed: household surveys, semi-structured interviews and participant observation. The following chapter discusses the main findings of the fieldwork and focuses on a qualitative analysis.
CHAPTER 3

SOCIAL ORGANIZATION AND HUMAN CAPABILITIES IN EASTERN GUATEMALA

3.1 Introduction

Rural life is much more than a diverse set of productive activities used to survive. Individuals and communities in rural areas of the global south are as much part of a dynamic changing world based on complex social relationships as are people in the industrial North. Recent critiques therefore call for a conceptualization of rural livelihood frameworks informed by ethnographic data (Bebbington, 1999; Bury, 2004, McSweeney, 2004), and a more nuanced understanding of rural life beyond the notion of the four capitals: produced, human, natural and social (Chambers, 1995; Bebbington and Perreault, 1999). In response, this chapter has two objectives: First, to delve further into the main elements and tenets of the rural livelihood framework to clarify some of its main concepts; and, second, to analyze the nature of the social relationships that people marshal to access resources in the context of two rural communities in the humid tropical forest of Eastern Guatemala, and their connections with other actors outside their localities among the spheres of civil society and the state. For this purpose I draw on the literature of the rural livelihood framework (Bebbington, 1999; Bury, 2004; Chambers,
1995; Chamber and Conway, 1991; Ellis, 2000; Moser, 1998; Scoones, 1990) to apply its main tenets, particularly human and social capital, in a qualitative analysis based on fieldwork conducted among two indigenous Q’eqchi’ communities of the municipio of Livingston in the Province of Izabal, Guatemala (see Chapter 2, for information on study area and the Q’eqchi’).

Based on data collected in 2005 and in order to complement the quantitative analysis on water use and productive activities that will be discussed in Chapter Four, in this chapter I draw on semi-structured interviews and informal conversations gathered among members of the study villages, community leaders, public officials, and members of local and regional civic organizations. Therefore, the main goal of this chapter is to address three of the research questions laid out in Chapter Two:

- By what livelihood strategies and social relations do marginalized individuals, households and communities access water, in what ways and with what outcomes?
- If benefits are associated with pipes, by what processes do some communities succeed or fail to access piped water?
- What are the conditions under which spaces of social participation to access water are created, reconfigured and transformed into capital and assets?

Special attention is paid to the social relationships that different actors construct in order to negotiate access to resources and basic services at two different scales: the village and the region. That is, the process by which certain types and combinations of social relations are transformed into capitals or assets, and how these specific capitals and
their combinations foster access to resources and other types of capital within the logic of the civil society and the state.

The starting point of this analysis follows on ideas developed by Bebbington and Perreault (1999) with regards to social capital, development and access to resources in highland Ecuador. By studying the mechanisms of expansion of human and social capital, Bebbington and Perreault showed how households and communities accessed natural capital, particularly land, and produced capital (i.e. technology and credit). Their study focused on the ways in which the relationships between networks and organizations and popular bilingual education programs within rural indigenous population of Guamote, Ecuador fostered capital formation at different scales. In addition, they emphasized the relationships between indigenous organizations and other actors such as the state, NGOs, the church, local governance and civil society (Bebbington and Perreault, 1999).

3.2 The Rural Livelihood Approach

Over the last two decades, household-level analysis has played a pivotal role in the examination of human-environment interactions, particularly in cultural ecology research in geography, providing avenues to a more detailed understanding of spatially aggregated information (Zimmerer, 2004). In the livelihood framework, the basic unit of analysis is the household. The conventional definition of household, developed by Meillassoux in 1981, refers to the social group that resides in the same place, shares the same meals, and makes joint or coordinated decisions over resource allocation and income pooling (Ellis 2000:18). An expanded definition considers spatially diverse contributions where applicable, to include migrants and others who make intermittent or
regular contributions to the household well-being. The rural livelihood framework attempts to distinguish among the different survival strategies within the household by uncovering the complexity of income diversity strategies and asset possessions. However, many analyses lack a deeper assessment that, to some extent, unveils in a more substantial manner the tangible and intangible factors that influence men’s and women’s decisions to engage in different survival strategies, particularly their participation in local organizations (Agrawal and Gibson, 2001).

The notion of the household as a homogenous, fully cooperative organization has been previously challenged based by two main arguments. First: all members of the household pursue the same objectives. Second, the notion that pooling is carried out from all resources (Meinzen-Dick and Zwarteveen, 2001). It has been demonstrated that women and men allocate resources in very different ways. For instance, women are more likely to dedicate a higher proportion of the income under their control on food and health care for family members, especially children (Meinzen-Dick and Zwarteveen, 2001). Netting (1993) supported these arguments based on the notion that uncritical household studies assume “joint utility functions” within the household where in reality there may be immense and unequal power dynamics, patriarchal domination and exploitation of women and children (Netting, 1993:80).

In addition, households are dynamic and constantly changing, and their activities exhibit a great level of variability between and within cultures (Wilk, 1997). Therefore, assumptions based on a unitary household model for policy purposes may not yield appropriate outcomes unless critical examinations of the heterogeneity of household individuals are undertaken. For many social scientists, however, the household is still a
key unit of analysis, as it constitutes the smallest group that maximizes a utility function, is task oriented and holds culturally defined values (Ellis, 2000; Netting, 1993).

Beyond their material aspect, assets are relevant because their experiential and material meaning in human needs. Therefore assets are not only resources but also constitute the means through which people become agents of change, capable of challenging pre-established structures of power (Bebbington, 1999). Assets are defined as stocks of capital that can be used, directly or indirectly, to generate survival and improve household well being (Ellis, 2000). Since assets have been conceptualized as stocks of capital, different types of capital have been identified within the livelihood framework. For Ellis (2002), there are five types of capital: natural capital, physical capital, human capital, financial capital and substitutes, and social capital. More generally, however, four types of capital have been identified. Those are: produced, human, natural and social capitals (Bebbington, 1999; Bebbington and Perreault, 1999; Bury, 2004; Scoones, 1998).

Produced capital is constituted by savings, interchangeable liquid assets, regular flows of money (i.e. remittances, pensions, earned income, etc.). Produced capital also refers to infrastructure, for example: buildings, transportation, and electrical services (Bury, 2004). Human capital is equated to human capabilities such as skills, education, knowledge, good health, and physical capability to engage with the different livelihood strategies of the household (Bury, 2004; Ellis, 2000; Scoones, 1998). Natural Capital usually has been conceptualized in reference to non-renewable resources such as minerals and soils as well as renewable resources such as forests, the ecosystem and environmental services (hydrological cycle, pollution sinks, etc). In addition, natural capital has also
been associated with natural resources stocks, for example: soil, water, air, genetic resources, etc. (Bury 2004; Scoones, 1998:7).

Social capital is a concept that encompasses the social resources (networks, social claims, social relations, affiliations, associations) from where people and entire communities depend on to engage successfully in livelihood strategies (Scoones, 1998). Additionally, social capital also deals with reciprocity within and between households and communities founded on social relations and trust (Moser, 1998). Finally, Bebbington talks about cultural capital to capture a set of meaningful practices associated with cultural references of a specific place that enable and empower people to act and resist in a way that, the other four type of capitals alone cannot achieve. Furthermore, Bebbington (1999) suggests that cultural capital might be the basis to sustain and boost the other types of capitals.

In that sense, what is at stake here is the capacity of individuals and societies to acquire through different means social, cultural, natural or produced capital in order to challenge dominant rules which pervade existing power structures and constrain their access to resources. The process by which this renegotiation of the rules of the game is made possible never occurs in a vacuum. Rather this process takes place in the sphere and through the logic of the state, market and civil society (Bebbington, 1999). As a matter of fact, one of weaknesses of some of the proponents of social capital, Putman (1993 in Bebbington and Perreault, 1999) for example, is the lack of a critical and multiscalar analysis of the mechanisms through which social capital influences the actions of the state, market and civil society.
Interestingly, the elucidation of one of the critiques of social capital in the literature—particularly the issue of nexus between these spheres—might also relate to the very intrinsic nature of social capital: social relations. For example, by examining the changing dynamics behind the relationships individuals foster within the state, market and civil society, it may be possible to understand the outcomes these relationships have on the social and spatial allocation of the different types of capital (Bebbington and Perreault, 1999).

Finally, the concept of sustainable livelihoods has not always been clearly defined, creating a conception of narrowness and confusion around its application. Clarifying its meaning, then, becomes essential (Scoones, 1998). The term owes its origins to the definition proposed in 1987 by the Advisory Panel of the World Commission on Environment and Development.

Chambers and Conway later modified and proposed a working definition:

a livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood which is sustainable can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term (1991:6)

Therefore, sustainability not only refers to a static state, but also to a continuous process of improvement, or as Chambers (1995) has put it, 'sustainable' is about the longer-term and livelihood refers to the myriad of activities which make up a living. The concept of 'sustainable livelihoods', then, encapsulates not only the satisfaction of
present basic needs, but the ability to cope with vulnerability, change and uncertainty across time and space.

3.3 The Role of Human Capabilities and Social Organization at the Micro-Scale

3.3.1 Social Organization to Access Education

For the Q'eqchi' of Livingston Guatemala, social organization in community life is one of the main foundations of life. As Carter (1969), Wilk (1997) and Wilson (1995) have demonstrated in El Estor, Izabal, the District of Toledo, Belize and Alta Verapaz respectively, Q'eqchi' social organization has been woven around agricultural cycles and traditions, and it has been extended to other realms. In the two villages where my field work took place, this reality was by no means different. A strong sense of social organization was evident since the first day I visited the villages. According to Margarito, the village mayor, social organization is the backbone of Buckets Village. Members of established committees deal with a wide variety of daily affairs from school administration to productive activities such as handicraft production, chicken farms and corn grinding mills. While some committees are more formally established, others are based on informal structures.

One example of local organization is the local school committee in charge of managing the only primary school (1st to 6th grade) in town. This committee belongs to PRONADE, the National Community-Managed Program for Educational Development led by the Ministry of Education. PRONADE was created to expand educational services to rural areas through decentralization processes and through direct involvement from parents. By 2004, PRONADE has reached more than 4,000 communities and 400,000
children around the country (Rojas, Valerio and Demas, 2005). The school committee from Buckets Village, for example, has an executive board in charge of running every aspect related to school administration, such as hiring teachers, buying school supplies, and preparing daily meals for children. There are two broad views about PRONADE. One highlights that PRONADE is a highly unequal alternative to traditional schools that transfers the responsibility of the state to provide education to private organizations and parents (Morales, 2006). Moreover, this position stresses the problems PRONADE faces such as the lack of job stability and pension system for teachers, the low levels of quality of education, and improper financing for the communal committees. The other position praises PRONADE and singles it out as one example of financial and managerial decentralization in Latin America (Rojas, et al., 2005)

In contrast to Buckets Village, Pipes Village has a traditional primary school run directly by the Ministry of Education. This arrangement has resulted in some interruptions in the school cycle due to continuous absences and lack of teachers. Under this arrangement, the Ministry of Education directly hires teachers. Brigido, the local mayor of Pipes Village, complained about the lack of accountability that the teachers have to the community, since teachers feel their employer, in this case the Ministry of Education, is represented by a supervisor located at a distant office who rarely, if ever, visits them. These two examples are interesting because they illustrate the process of capital formation and transformation through which these communities have been able to access primary education. The results of the comparative study presented in the next chapter show how people from Buckets Village have smaller percentages of literacy and a weaker command over Spanish. In this village, adults provided their children with
access to primary education through social organization and PRONADE. Pipes Village, on the other hand, where adults have higher percentages of literacy and a better command over Spanish, depend more on the state for the education of their children. The natural question on how one village has a PRONADE school and the other a school run by the Ministry of Education, however, is beyond the scope of my thesis.

Both villages, however, have monolingual teachers who teach exclusively in Spanish. Parents in both communities expressed to me how important it is for them that their children learn Spanish and for that reason they preferred native Spanish-speaking teachers. Parents from the study villages confirm what has been found in other indigenous communities throughout Latin America, where parents want their children to speak Spanish at school to succeed in society (Cummings and Tamayo, 1994). Evidence from PRONEBI (National Program of Bilingual Education in Guatemala), however, suggests that in localities where bilingual education has been introduced, students surpassed their counterparts from traditional monolingual programs in school subjects and mastery of Spanish (Cummings and Tamayo, 1994). Moreover, studies of bilingual education have revealed that within the four dominant indigenous languages in Guatemala, the Q’eqchi’ region showed the highest dropout and repetition rates for the 1986-1990 period. The difference found in the performance of Q’eqchi’ schools was associated with the fact that the Q’eqchi’ region is exceptionally rural and constituted by dispersed and small settlements (Richards and Richards, 1990).

My conversations with the women of my study further illustrate these points. When I inquired about their experience at school, some of them told me that they did not

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1 Due to political sensitivities, I was not able to explore further this question.
know what was going on during the first years in school because did not understand their teacher. Some of them got discouraged and dropped out. Others persevered, but were not able to learn how to read and write because it took them a couple of years to learn Spanish. By the time they learned enough Spanish to perform properly in class, their time in school had come to an end since their parents needed them at home to help. In fact, many women of my study were probably contributed to the high drop out and repetition rates observed in the studies on bilingual education conducted in the late eighties.

3.3.2 Social Organization to Make a Living

Social organization is fundamental for agricultural labor. In that regard Margarito and Brigido explained to me how the *Cambio de Mano* (inter-household reciprocal labor) system works. During the different agricultural cycles (clearing, planting and harvesting), work is organized and distributed throughout the members of the village. Depending upon the magnitude of the work undertaken, a group of men is set aside. Then a person, usually an elder member of the community, is in charge of keeping a written record of working days. Those days then are to be repaid. This system, however, is to some degree unequal and contingent. While some households have intra-household and technically free labor based on the number of working-age males within their own kinship networks, others (usually the poorest, the youngest and the most recently established households), depend more on inter-household labor. Furthermore, some sons-in-law tend to work more for their fathers and fathers-in-law without receiving equivalent, or indeed any return labor. As the survey results have revealed (see Chapter Four), the small number of adult working-age men at the household level in the two study villages explains the significance of reciprocal labor in these communities. This means that labor is scarce
among these villages, and without these types of arrangements, some households may not be capable to engage in agricultural endeavors. More than just a tradition, the *Cambio the Mano* is a reflection of how material constraints are intertwined with symbolism, social relations of reciprocity, cooperation as well as uneven power relations.

Although women do not participate in agriculture as much as men do, they do play an important role in the *Cambio de Mano*. The tradition establishes that the host must feed the laborers. Therefore, women start working several days before the actual *Cambio de Mano* takes place, grinding massive quantities of corn for the tortillas and preparing one of the special meals from the Q’eqchi’ cuisine (usually turkeys, or pigs). According to Margarito and Brigido, the *Cambio de Mano* is more than just work. This tradition actually creates a space and time to catch up with friends, tell jokes, and discuss important issues going on in the community. After a day of hard work, having a good meal and sometimes even live music in company of other members of the community is more than just a regular labor day.

This is precisely one of the reasons why the breeding of domesticated animals is so important for these villages. While chickens are incorporated into the regular diet, other animals such as pigs and turkeys are used not only as sources of cash but also to feed the laborers in the *Cambio de Mano*—and therefore effectively access labor. When corn becomes scarce, however, households are not able to feed animals with large corn consumption such as large pigs and turkeys. In these cases, households ought to use their last resource, chickens, to feed the laborers thus putting at risk one of the few sources of protein for their family. As the open-ended questions have shown, corn indeed becomes scarce particularly during the months of August through September, which is the time of
the year between harvests. Because of the few options to make a living in these two villages, households are forced to sell part of their basic grain reserves to obtain cash, without meeting their consumption needs.

3.3.3 Social Organization to Access Water Resources

Since the Cambio de Mano is an effective way to organize and acquire labor, similar schemes based mostly in communal labor have been extended to other areas beyond agriculture such as the construction of houses and other infrastructure projects. Pipes Village has been particularly effective in implementing social organization based on communal labor schemes to improve the quality of life by building and securing access to produced and human capital. Brígido, for example, proudly talked to me about how piped water was first introduced to the village. After dealing with endless forms and meetings in Livingston the Municipality finally agreed to provide them with most of materials and technical assistance to build two water tanks and a water distribution system. In exchange, the villagers had to transport all the materials and build the tanks and the system themselves. “We worked very hard in order to have access to piped water. We carried all the cement, steel and pipes on our backs to build those huge tanks and the distribution system. It is worthwhile, though. The women in the village do not have to spend time and energy carrying buckets anymore.” Currently the village council, the highest level committee in the community, is in charge of the maintenance of the system. Although water is not being purified, the village council regularly cleans and monitors the operation of the tanks. Instead of paying a monthly fee for water services, users pay on a voluntary basis a fee to buy cleaning supplies.
While the participation of the villagers in building water tanks and a distribution system deserves recognition, the fact that the state and the local government did not deliver this minimum infrastructure needs to be acknowledged as well. In that sense, the provision of pipes in this village may reside on a contradiction that is both a success and a failure at the same time. A failure because communal work schemes like this one may serve the purposes of unequal public resource allocation regimes that seek to transfer the role of the state to provide infrastructure to private individuals. A success because the significance of household water provision services should not be seen only in terms of water infrastructure per se, but rather in terms of its experiential character and social relations. In this context, then, it is plausible to visualize how members of a marginalized community have been able to challenge existing power structures to create a space of social participation through which claims over resources can be articulated and materialized.
3.3.4 Social Organization to Participate in Democracy

The village council or COCODES (Communal Social Development Committee) in both villages is the local version of a wider public institution established throughout the country with the purpose of promoting citizenship participation vis-à-vis social development and land tenure policies. While the national, regional, provincial and municipal levels of the council have existed for almost two decades, the community level was incorporated only in 2002, as a result of 1996 National Peace Agreements. For Brígido, in his dual role as village mayor and president of the COCODES, the village council is more than a simple committee. In a village without police or basic services, the village council represents the state and civil society in one entity. “If there is a problem in the village, or the need to represent our people, I am responsible of dealing with it. The
members of the COCODES and me are the only authority we have here.” None of the members of the COCODES receive a salary for their work, so they usually work and serve as members of COCODES on the side.

COCODES is becoming an ubiquitous element of community life. In terms of the power dynamics in the COCODES, Margarito told me that a group of elders in each village selects several nominees for the executive board: president, vice-president, treasurer, and two other council members. The general assembly then votes to elect their favorite candidates to serve for a three-year period. In small communities such as Buckets and Pipes Village—each with less than 300 inhabitants—there is a good chance of being a COCODES member at least once in a lifetime. COCODES is not an isolated institution. Every president of the COCODES attends a bi-weekly meeting in the Municipality of Livingston whereby the members of the COMUDES (Municipal Committee of Social Development) deliberate and learn about relevant issues going on in the communities of the municipio.
Figure 3.2: Community council, Pipes Village. Source: Fieldwork by L. Lundine, July 2005

The extent to which the COMUDES is successful at providing a space for social participation as well as serving as a spring board to access resources effectively, is debatable and beyond the scope of this thesis. Nonetheless, at the community level, COCODES has provided a mechanism through which members of isolated communities with little access to spaces of political participation, are exercising an incipient democracy through the election of their representatives and the experience of being elected members, building in that way the first steps towards one type of social capital formation.
3.3.5 The Combination of Social Organization and Human Capabilities

In the case of Pipes Village, the ability to access piped water can be a result of COCODES, along with a strong social organization and communal work tradition. Communal organization and social organization at the community level alone may have not been enough to secure an infrastructure project of this magnitude. The forms that needed to be filled out in Livingston, the petitions submitted and the meetings attended depended upon the individual skills and capabilities or human capital available in the community, specifically with regards to reading, writing and Spanish skills. Many villages of the region have submitted petitions, but only some have been successful. It is here where the fundamental differences between villages become important. As the assets pentagon\(^2\) describes (Figure 3.2), Pipes Village has a higher percentage of literate adult women and men and a better command over Spanish. Its members were therefore in a better position to negotiate access to the supplies needed to build a piped water system. In this context, it is possible to hypothesize that those human capabilities, combined with a communal social organization were thus essential and determinant to access water resources. Pipes Village, then, exemplifies how a combination of social and human capital fostered this community to build and access productive capital in the form of household water supplies.

With regards to Buckets Village, the school committee as member of PRONADE has been able to administer a primary school for more than two years now. Even though the school faces tremendous limitations, the sense of ownership and the experience that the committee members have acquired is paramount. For example, they have engaged

\(^2\) The area in this pentagon represents an approximate visualization of relative asset endowments of the social units compared between villages.
with managing funds and dealing with other spheres outside their communities in regional meetings organized by the Ministry of Education, as well as hiring and supervising the school teacher directly. These experiences have enabled them to pursue other activities beyond school administration. This is especially true in cases where former members of the school committee have transitioned to become leaders of other committees. Furthermore, in a village where the state could not afford to manage a school, the villagers themselves have been able to access human capital in two ways: first by securing education for their children; and second, through skills and valuable experience they have marshaled by participating in the school committee. As the results from quantitative analysis have revealed, the years of formal education in the household unit as a whole, including the education of children, is significantly higher than the years of formal education observed individually in adult females and males. This difference, then, demonstrates how parents have managed to provide their children with more education than they achieved for themselves. Therefore, in spite of the low levels of literacy and Spanish fluency found in Buckets Village, the transformation of social organization into human capital may pay off for future generations.

The democratic and participatory properties of COCODES, nonetheless, should not be overemphasized. The participation of women, for instance, is still minimal and perhaps more symbolic than representative. Moreover, the current power dynamics might, to some degree, perpetuate existing inequalities excluding certain households that do not conform to the accepted social standards. In both villages I found some marginalized individuals: non-Catholics, traditional healers, elder individuals without
children in the village, and single mothers. All told me that they felt at times left out from spaces of social participation.

![Assets Pentagon](image)

Figure 3.3: This assets pentagon describes the study villages. Buckets Village is high on natural and cultural capital but low in human capital (literacy and Spanish fluency) and physical capital (piped water) and not as strong as Pipes Village in social capital. Source: Fieldwork by L. Lundine, July 2005. Pentagon adapted from Carney (1998)

### 3.4 The Role of Social Organization and Human Capabilities at the Macro-scale

The sense of regional life in the municipio of Livingston is influenced greatly by its people and geography. Surrounded by rivers, the Caribbean Sea, canyons, and mountain ranges, Livingston is a place where Q’eqchies, Garifuna, Ladinos, and Culí
(Hindu) people meet an increasing foreign retiree population. For some villagers, this is one of the most attractive features of the region. Manuel, an inhabitant of Pipes Village, said to me that the interaction he has with people from different ethnicities is one of the things he appreciates the most about living in Livingston. In the place where he came from, he only knew Q’eqchi’ people like himself. In contrast, in Pipes Village he has had the opportunity to establish relationships with Ladin, Garifunas, and even people from other countries such as the Kekchi from Belize. Manuel actually spoke three languages: Q’eqchi’, Spanish, and some Garifuna. The Q’eqchi’, with 48% of the population, constitute now the largest ethnic group in Livingston. Importantly, in 2004 for the first time in the political history of Livingston, a person of Q’eqchi’ origin was elected municipal mayor.

On the other hand Livingston, as many other parts of Guatemala, lacks of adequate basic health, sanitation and education services. The vast majority of rural people do not have access to purified household water. Primary and high schools are located mostly in urban areas, and the health centers available are insufficient to cover the demand in the region, especially in remote rural areas. With limited resources but an enthusiastic attitude, the staff of the local office of the Parasite-Vector Disease Control from the Ministry of Health, talked to me about the work they do in order to curtail malaria and dengue. Most of their work is based on prevention, education and epidemiologic surveillance, and they work directly with community health promoters. The health promoters are volunteers from each rural community in charge of providing rudimentary care and keeping updated censuses. Although this and other offices try to coordinate trainings with the health promoters, the miniscule staff and limited budget
they have do not allow them to deliver an appropriate service. Nonetheless, this poorly funded network of voluntary health promoters and overworked public officials from the Ministry of Health have a relationship that, in some ways, allows them to share information and potentially could be used to increase coverage of health services in the communities. For instance, in both villages where I worked, the health promoters had an updated population census, a mental map of the physical location each household and all the water sources in the village, as well as a general understanding of the health needs of the people in their communities. Both promoters had been trained in some basic health care at least once.

According to the results on water use (see Section 4.2.1), the study villages clearly represent a microcosm of the health problems of Guatemala. Based on the daily water consumption estimates from people without access to piped water, which are below the minimum human requirements, sanitation and optimal health practices become hard to achieve. Furthermore, for households without access to piped water, storing and transporting water may be conducive to spread of mosquitoes and bacteria.

3.4.1 The Civil Society as a Vehicle to Access Education and Social Participation

Considering the present state of Livingston, the role of the civil society becomes crucial in facilitating access to resources. In Guatemala, as in many other countries throughout Latin America, non-government organizations (NGOs) have pioneered participatory approaches with the rural poor, filling the gap the state has left because of its incapacity for reaching the rural and urban poor (Alvarez, 1997). NGOs have not only facilitated access to basic services, but also have provided spaces of political participation for the rural poor to articulate demands to the state for wider democratization processes
(Bebbington, A., Graham Thiele, Penelope Davies, Martin Prager and Hernando Riveros, 1993). One of the largest civic organizations in the region where my study took place is

Asociación Ak’ Tenamit\(^3\). Founded in 1992, Ak’ Tenamit now serves more than 9,000 people in 45 communities in the region, delivering 24-hour primary healthcare services, a floating dental clinic, one primary school, training facilities, organic gardens, two restaurants for tourists, one handicraft store, and a boarding technical high school with capacity for more than 300 students. While the main focus of Ak’ Tenamit has been primary and high school education and health services, potable water systems have been introduced to a couple of communities in the past.

Ak’ Tenamit is constituted by an executive board, a general assembly, a group of technical advisors, and a team of international volunteers. In addition, staff, students, community leaders and parents are represented in separate councils before the general assembly. To become a member of Ak’ Tenamit, households from the region have to accrue credits through working hours either in agriculture, maintenance of the facilities, or cooking. The credits achieved through working hours are then used towards services in the health clinic and education of children in the schools. The facilities of Ak’ Tenamit, one in Barra Lámpara and the other in Tatín River, were built by parents and students themselves. This system of membership greatly empowers parents and children to participate and work with Ak’ Tenamit. Furthermore, in my conversations with members of nearby communities and students, I perceived a genuine sense of belonging. A woman I met, for instance, preferred walking a longer distance to be seen at the Ak’ Tenamit clinic, rather than at the health center in the main town. “Here, the nurses speak my

\(^3\) Ak’ Tenamit means “new home/place” in Q’eqchi’
language and I feel more comfortable.” Julián, a member of Buckets Village also aired his concerns regarding the lack of resources Ak’ Tenamit suffers due to the high demand of its services. In Julian’s case, that meant sending only two of his five children to school. “We have to find new ways and new sources of money, or better ways to use what we have, so more children have the opportunity to study. In the last general assembly we discussed this issue” he said. What was interesting to me about his comment was the way in which he approached the situation. Instead of blaming the institution for not admitting all his children, he felt the problem was a problem that of the entire community. Moreover, he was also somehow critical with regards to intra-community and intra-household resource allocation.

3.4.2 Civil Society as a Vehicle to Construct Cultural Capital

Because of the flexibility of the tutorial learning system implemented by Ak’ Tenamit at their schools, cultural aspects can also be incorporated. Therefore, reinforcement of the written and spoken local language (Q’eqchi’) and Mayan and indigenous history play a significant role in the curricula. Moreover, during community and parents meetings, Q’eqchi’ rituals were performed. Although confusion, internal fragmentation, and tensions sometimes arise from issues related with Q’eqchi’ indigenous culture at the regional level, Alejandro, the school spiritual leader, is optimistic. “I am confident that by engaging with a critical historical study of Q’eqchi’ and Mayan indigenous writings, along with an open inter-generational dialogue based on the current realities most indigenous peoples face today, common themes and goals can be found to develop a local Q’eqchi identity vis-à-vis a national indigenous movement,” he said. “That’s why is so important to incorporate issues of Q’eqchi’ culture in our
curricula and engage children in it.” During recent years, for example, *Ak’ Tenamit* conducted a regional training program for young Mayan spiritual guides. After three years of continuous training, the first cadre of guides is already replicating their knowledge. Some have even been invited to national Pan-Mayan activities.

Alejandro believes that having the freedom to express one’s own identity is essential to develop as a human being. All the other aspects of life (family, land, environment, community, livelihoods, justice and gender) also gravitate around issues of identity and culture. For Alejandro and many other indigenous leaders, the Agreement on Identity and Rights of Indigenous Peoples signed in 1995—based on the Convention (No. 169) on Indigenous and Tribal Peoples in Independent Countries Adopted by the General Conference of the International Labour Organisation in September 1991—is instrumental because it formally enables them to practice many different aspects of their cultures. The processes by which Q’eqchi’ identity is being constructed, as Alejandro has expressed, is fluid, disparate and internally fragmented. In any case, it seems to me that the young students from *Ak’ Tenamit* will be active participants in this process. As Bebbington (1995) has suggested, culture and claims over identity clearly can be expressed in terms of cultural capital that may solidify the formation of other types of capitals related to education, social participation and access to other basic needs.

In that sense, the indigenous movements in Livingston have been catalyzed around issues of land, evolving through claims over access to other resources such as health and education. From state and private property schemes to protected areas and unclaimed territories, the geographies of land tenure in Livingston are highly contested. Today, for many Q’eqchi’ communities, the legal status of their land is not only uncertain
but it also represents a legal conundrum that is very difficult to decipher. In their quest for solutions, however, some communities have been able to tackle this issue in two ways. First of all, some communities have been able to articulate a position to establish local civic organizations to deal with land issues. Second, they have built alliances with other actors beyond the community boundaries. According to Roberto and Angel, two community leaders actively involved in land issues throughout the region, one of the most serious problems Q’eqchi’ communities presently face in Livingston is related to land tenure. While there are some discrepancies among indigenous leaders about the ways in which the problems are to be approached, the consensus lies on the need to secure their families with a place to live and work. In that sense, beyond the fragmented nature of the land movement in Livingston, indigenous leaders have been able to negotiate, to some degree, the right to negotiate, by securing a place at the negotiation table and establishing relationships with other individuals in order to articulate claims over land.

The social fabric of the Q’eqchi’ has been profoundly damaged during centuries of unfair labor conditions, land dispossession and state repression (Grandin, 2004; Wilk, 1997; Wilson, 1995). The stories elders from the region tell are still charged with memories of suffering, injustice and fear. Middle aged leaders, on the other hand, still remember experiences they lived through during the armed conflict that afflicted Guatemala between 1960-1996. In this context, the relevance of social participation in the lowlands of Izabal is paramount. Whereas Q’eqchi’ civil organizations are still in their infancy and consequently have severe limitations—particularly when it comes to facilitating mechanisms of conflict resolution to articulate a strong position vis-à-vis the
interests of other actors such as the Catholic Church and foreign sponsors and collaborators—their very existence is a tremendous achievement. In that regard, the role of community leaders such as Angel and Roberto is vital to strengthen and maintain their human capabilities for a social purpose and the greater good of their people. The integration of other members of the civil society into the indigenous movement in Livingston is also crucial. Recently, as events around the zonation plans of the Sarstún River Watershed Protected Area have evolved, it seems like the gap between the goals of environmentalists and the claims of Q’eqchi’ leaders is getting wider. As one biologist from Guatemala City told me “I cannot either understand or communicate with indigenous people. My western way of seeing the world prevents me from reaching out to them.”

3.5 Conclusions

In the rural villages of the humid tropical forest of Livingston and in the nation as a whole, the way in which people draw on a complex combination of livelihood strategies and relationships to improve the quality of their life is not that different from other societies. With regards to the research questions raised in the beginning of this chapter, in this chapter I have explored how the process by which these rural villages have accessed water has implied internal social organization, individual skills used for communal purposes, leadership and the creation of linkages with external networks to negotiate access to resources in a way that has already delivered some outcomes. These actions, consequently, have been accompanied by a compromise to get involved in the management of resources through community committees, councils and organizations of
the civil society. In this context, the process by which social relations have been transformed is relevant as long as these relationships have the power to construct and transform assets into access to resources, livelihoods, dignity and power to challenge social exclusion. As this analysis has demonstrated by comparing two rural villages, the conditions under which the transformation process of social organization into assets (particularly water) occurs is profoundly curtailed by obstacles directly related with human capabilities such as illiteracy and lack of skills to communicate in the dominant language of society.

At the regional level, the Q’eqchi’ constitute the plurality of the population in Livingston. Finally represented in the municipal level, today the political sphere will no longer be an abstract idea but rather a reality that can be achieved. Therefore, spaces of social participation (e.g., COCODES and COMUDES) used to access basic resources particularly water, may be transformed into broader social arenas to articulate further claims over resources. In terms of civil society, Ak’ Tenamit has played a key role in providing basic services to marginalized Q’eqchi’ communities, especially education and health. The sustainability of their operation will depend, to some degree, upon the ability of their leaders to keep opening spaces of social participation within their constituency, and to secure long-term financial support without compromising their principles. While water is just one of the many urgent issues on the agenda in Livingston, participation of the leaders from the indigenous movement on regional debates over access to basic resources particularly land, health services and education is fundamental.

Finally, the significance of Agreement on Identity and Rights of Indigenous Peoples cannot be overemphasized. The fact of recognizing the rights of indigenous
peoples is a good start but it does not guarantee the social inclusion of indigenous peoples into the political and public sphere of Guatemala's society. Rather, Guatemala is the epitome of what Charles Hale has called “Neoliberal Multiculturalism,” i.e. the consumption of the cultural neoliberal project by accepting minimum cultural rights while rejecting and alienating the rest (Hale, 2002). Therefore, without proper mechanisms of social inclusion and participation of all the different sectors within the Guatemalan society on the decision making process, new agreements may only perpetuate old ways with new labels. In that regard, the nature of these mechanisms is two-fold: first, the capability of marginalized groups to accumulate enough human capacity that can be transformed into social capital, not only to articulate a discourse but also to secure a position in the negotiations at the national level, becomes crucial to achieve a more distributive justice with regards resources use. Second: the capacity of actors from other political spheres to respect and recognize indigenous rights in order to communicate their concerns and understand the needs of marginalized people is pivotal if coalitions are to be reached one day.
CHAPTER 4

WATER USE, SANITATION AND PRODUCTIVE ACTIVITIES IN TWO Q'EQCHI' VILLAGES

4.1 Introduction

This chapter addresses three of the research questions:

- What difference might it make to have piped water in a community?

- How do people in a place with an apparent abundance of natural resources, but with deficient water provision service, use their water resources and what difference does it make to have or not have piped water in the process of making a living?

- By what livelihood strategies do marginalized individuals, household and communities access water, in what ways and with what outcomes?

The pseudonyms used to identify the study villages are: Buckets Village, without any access to piped water; and Pipes Village where most of the participants in this study had access to piped water. While elements of the qualitative analysis are introduced here, Chapter Four focuses mostly on an analysis of the qualitative information gathered through semi-structured interviews and participant observation.
4.2 Survey Results: Quantitative Data

Based on descriptive statistical analyses and non-parametric tests performed in the software package SPSS, the following section of the thesis shows the summary statistics for selected variables from the total 60 household surveys gathered in both villages. This quantitative analysis is based on results obtained through detailed and open-ended questions as well as participant observation and semi-structured interviews. In addition, non-parametric Mann-Whitney U Tests were conducted in order to highlight substantial differences between both study villages. The first section of the survey results introduces the findings associated with issues of water use and access in the study villages. The next section, then, focuses on the differences of having piped in the process of making a living among women from the study communities. The subsequent sections analyze the outcomes and differences resulting from water access and use, particularly with regards to sanitation, health practices and productive activities. Finally, I discuss the positive feedbacks between water and education.

4.2.1 Water Access and Use in the Humid Tropical Forest of Rural Eastern Guatemala

The ways in which people access water are remarkably different among the study communities. In Buckets Village, for example, people access surface and spring water from different sources. For this purpose, women and children fetch water for their household on a daily basis. Water is then stored for household consumption. In contrast, the people from Pipes Village have access to piped water. In most instances, there are one or two faucets in each household from where members of the family obtain water. Piped

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1 The Mann-Whitney U Test is one of the most powerful non-parametric tests used as an alternative to the parametric t-test but that avoids the t-test assumptions. The Mann-Whitney U Test is used to test whether two independent groups have been drawn from the same population (McGrew and Monroe, 2000; Siegel, 1956).
water, however, is not subject to any purification process and it is not installed in all the households in the village. In general terms, 43% of total participants in this survey from both villages had access to piped water.

![Image of a faucet in a village setting](image)

Figure 4.1: Faucet at Pipes Village. Source: Fieldwork by L. Lundine, July 2005.

According to the section on water use in the survey, both villages exhibit daily water consumption estimates with a mean number of 5.54 gallons of water (21 liters) per household. Although it was difficult for many participants to provide accurate data on daily number of gallons of water used—particularly in the Pipes Village where most of the interviewees do not monitor this anymore—this figure is the closest approximation available for water consumption patterns in the area. This conservative estimation, nonetheless, is actually significantly below the minimal human requirement of 50 liters per capita per day to assure consumption and basic hygiene (Gleick, 1996; World Health Organization, 2003). Given that the mean number of persons in household is 6.47, then
the daily estimation of water use per capita of 3.24 liters resembles more closely the minimum human water consumption requirement of 2.5 liters and does not take into consideration other uses of water such as of sanitation, food production and animal breeding (Gleick, 1996).

Since water, regardless of the source is not purified, 68% of the participants boil water for drinking purposes. Only 25% perform this procedure all the time, however, in spite of 87% of participants in both villages who think that water may cause diseases if not treated before drinking (Table 4.1). Among the reasons given for not boiling water, some respondents argued that children and some adults disliked the flavor of boiled water.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Both Villages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
</tr>
<tr>
<td>Access to piped water (no=0; yes=1)</td>
<td>60.0</td>
</tr>
<tr>
<td>Distance from source, one-way trip (minutes)</td>
<td>60.0</td>
</tr>
<tr>
<td>Daily trips to fetch water</td>
<td>60.0</td>
</tr>
<tr>
<td>Daily water consumption in gallons</td>
<td>28.0</td>
</tr>
<tr>
<td>Boil water before drinking (no=0; yes=1)</td>
<td>60.0</td>
</tr>
<tr>
<td>Always boil water (no=0; yes=1)</td>
<td>41.0</td>
</tr>
<tr>
<td>Bath at drinking water source (no=0; yes=1)</td>
<td>60.0</td>
</tr>
<tr>
<td>Wash clothes at drinking water source (no=0; yes=1)</td>
<td>60.0</td>
</tr>
<tr>
<td>Classify water (no=0; yes=1)</td>
<td>34.0</td>
</tr>
</tbody>
</table>

Table 4.1: Water access and use in both villages. Source: Survey by L. Lundine, July 2005.

Water access is significantly different in Pipes Village, since 86% of the participants have access to piped water (Table 4.2). The other 14% of the population access water through springs, rivers and creeks. The domestic uses of water are also
significantly different in Pipes Village. For example, washing clothes is a chore that is being done less often near rivers and springs and more frequently close to the faucet. Bathing, however, is an activity that is still being done at the river in both villages. A larger percentage of women in Buckets classify water depending on its use (drinking, cooking and personal hygiene) in different containers, while fewer people follow this practice in Pipes Village. No differences were found in relation to water transportation and handling since in both villages women use one-gallon plastic containers to transport and store water, most (80%) stored it for only one day, and in the majority of cases containers were covered with lids. The use of plastic containers to store water might be conducive to bacteria reproduction into drinking water if not managed properly (Baty, 2004).
<table>
<thead>
<tr>
<th>Variables</th>
<th>Buckets Village</th>
<th>Pipes Village</th>
<th>Mann-Whitney Coefficient</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean or % of obs. = 1</td>
<td>Min - Max</td>
<td>n</td>
</tr>
<tr>
<td>Access to piped water (no=0; yes=1)</td>
<td>30</td>
<td>0.0%</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Distance from source, one-way trip (minutes)</td>
<td>30</td>
<td>10.1</td>
<td>3-30</td>
<td>30</td>
</tr>
<tr>
<td>Daily trips to fetch water</td>
<td>30</td>
<td>3.7</td>
<td>1-10</td>
<td>30</td>
</tr>
<tr>
<td>Daily water consumption in gallons</td>
<td>25</td>
<td>5.2</td>
<td>1-15</td>
<td>3</td>
</tr>
<tr>
<td>Boil water before drinking (no=0; yes=1)</td>
<td>30</td>
<td>67.0%</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Always boil water (no=0; yes=1)</td>
<td>20</td>
<td>40.0%</td>
<td>21</td>
<td>37</td>
</tr>
<tr>
<td>Bathe at drinking water source or faucet (no=0; yes=1)</td>
<td>30</td>
<td>30.0%</td>
<td>30</td>
<td>37</td>
</tr>
<tr>
<td>Wash clothes at drinking water source or faucet (no=0; yes=1)</td>
<td>30</td>
<td>30.0%</td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>Classify water (no=0; yes=1)</td>
<td>30</td>
<td>30.0%</td>
<td>4</td>
<td>25</td>
</tr>
</tbody>
</table>

Table 4.2: Non-parametric statistical test (Mann-Whitney U) of water access and use between villages. Source: Survey, 2005. Mann-Whitney U Test (only significant coefficients are shown) confidence level of results: *** $p \leq .01$; ** $p \leq .05$; *$p \leq .10$

It is important to highlight that the measures of daily trips and distance from source at one time during the year may not be the only consideration to determine women's role in managing water. For example, my visit took place during the rainy season. During the driest months of the year (February through May), however, my informants told me that women walk longer distances (of more than an hour) to get cleaner water, enduring temperatures between $30^\circ$ and $33^\circ$ Celsius and the sun’s rays. Whereas my estimations yielded that women without piped water spend an average of 419 hours per year carrying an average of 21 liters per day, these data might change...
depending on the season. Hence, it is likely that women and girls invest much more time securing water for domestic purposes and in carrying heavier loads during the driest month of the year. Furthermore, I personally witnessed how women spent a great deal of their time near water sources, bathing young children and themselves, cleaning cooking utensils, and washing clothes. All these activities exceed the time and the physical burden captured by these statistics.

4.2.2 Differences of Water Access in the Process of Making a Living

In addition to the quantitative data gathered through the household survey, I complement this section with information collected throughout open-ended questions, semi-structured interviews, and participant observation. This analysis has the purpose of highlighting the differences that having piped water makes in the process of making a living, according to women’s own accounts of the importance of water in their lives. Toward this end, I examined women’s own motivations regarding water access in order to establish what activities were most important for them. As Cleaver has stressed, conventional rural development models assume women’s engagement in productive activities as a result of improved water access scheme, without exploring women’s additional incentives and priorities (1998). In that regard, through open-ended questions I asked participants from Buckets Village to talk about what they would do, hypothetically, with their time if piped water were introduced in their town. The question in Pipes Village required participants to indicate the activities that they are able to do now, which were not done before piped water was introduced (e.g., as a direct result of time released from collecting water). In general, the different responses show how important it is for women to engage in productive activities, but it also allows them to dedicate more time to
domestic activities, including child care, and to rest (Table 4.3). If responses are sorted out between villages, however, it becomes evident that the portfolio of productive activities of women in Pipes Village is more diversified since they were able to identify more subcategories under productive activities compared to women in Buckets Village (Table 4.4).

What do men from rural areas think about having piped water vis-à-vis women’s well being? In Asia, for example, some men have expressed concerns about inappropriate behavior of women as a result of more free time released from collecting water (Upadhyay, 2005). In Guatemala there was a case where young men from highland Guatemala sabotaged water distribution systems in order to obtain the social space to court young women near water sources (Pelíco, 2005). In contrast, many Q’eqchi’ men from the study villages thought otherwise. According to Alejandro from Pipes Village, before piped water was introduced in the village, women spent a great deal of their time in rivers and springs not only washing clothes and collecting water, but also gossiping and sometimes even arguing with each other. Today the river remains an important social space but not a place where women spend hours of their time. Other male key informants from Buckets Village expressed their concern because of the burden that collecting water represented for their wives, whereas male informants from Pipes Village were especially proud for having been successful in releasing women from such a strenuous task.
### Both Villages

<table>
<thead>
<tr>
<th>Responses</th>
<th>Percentage of obs. = 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other productive activities in general</td>
<td>16 27%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>4 6%</td>
</tr>
<tr>
<td>Handicrafts</td>
<td>4 6%</td>
</tr>
<tr>
<td>Ecotourism including, teaching and a trip to Belize</td>
<td>1 2%</td>
</tr>
<tr>
<td>Sale of non-agricultural products (i.e. bread, prepared food)</td>
<td>1 2%</td>
</tr>
<tr>
<td>Other domestic activities (including child care)</td>
<td>13 21%</td>
</tr>
<tr>
<td>Rest</td>
<td>6 10%</td>
</tr>
<tr>
<td>Respondent would be extremely pleased and happy</td>
<td>1 2%</td>
</tr>
<tr>
<td>Respondent cannot imagine life without piped water</td>
<td>1 2%</td>
</tr>
<tr>
<td>Don't know/Did not answer/Male interviewee</td>
<td>13 22%</td>
</tr>
<tr>
<td><strong>n=</strong> 60 100%</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.3: Responses from open ended questions regarding activities the participants would or currently do, as a result of piped water in both villages. Source: Survey, 2005

<table>
<thead>
<tr>
<th>Responses</th>
<th>Buckets Village</th>
<th>Percentage of obs. = 1</th>
<th>Pipes Village</th>
<th>Percentage of obs. = 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other productive activities in general</td>
<td>15 50%</td>
<td>1 3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>4 14%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handicrafts</td>
<td>4 14%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sale of non-agricultural products (i.e. bread prepared food)</td>
<td>1 3%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ecotourism including, teaching and a trip to Belize</td>
<td>1 3%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other domestic activities (including child care)</td>
<td>7 24%</td>
<td>6 20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rest</td>
<td>6 20%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondent would be extremely pleased and happy</td>
<td>1 3%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondent cannot imagine life without piped water</td>
<td>1 3%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Don't know/Did not answer/Male interviewee</td>
<td>1 3%</td>
<td>12 40%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>n=</strong> 30 100%</td>
<td></td>
<td>30 100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.4: Responses from open ended questions regarding activities the participants would or currently do, as a result of piped water between villages. Source: Survey, 2005
4.2.3 Outcomes and Differential Water Access and Use: Sanitation and Health Practices

The variables related to health and sanitation practices were introduced in this section, because they reveal important information about the health status of the study population which is considered a key element of human capital in the rural livelihood approach. Moreover, these outcomes are directly linked with fundamental differences of water access and use among the study villages. Here I review the results from open-ended questions in the section of sanitation and health practices during which respondents were asked to identify the season of the year in which members of their households suffered illnesses most frequently. Interestingly, the prevalence of illnesses was perceived differently in both villages. In Buckets Village, 62% of the respondents reported the dry season as the time of the year when more members of their household were sick more often. Conversely, in Pipes Village both rainy and dry season shared 29% of the responses while 42% of the people said that they and their family experienced illnesses throughout the year, regardless of the season.

Individual comparisons, nonetheless, showed larger percentages of malaria cases in Buckets Village (13.3%) in contrast to 0% cases reported in Pipes Village. As the preceding section revealed, inadequate water provision services in the humid tropics whereby people transport and store water may lead to spread of parasite and insect-born diseases. The higher incidence of malaria in Buckets Village might be an indicator of this reality that deserves further exploration in similar studies. Furthermore, according to the water analysis carried out (see Chapter 2, Section 2.4.5), the presence of total coliforms and *E. Coli* in the water samples collected in both villages is an indicator of water contamination. It is not surprising then to find no significant differences between villages.
when comparing a variable of chronic disease cases (malaria, cholera, malnutrition or asthma) versus acute diseases (diarrhea, fever, flu, pink-eye, chickenpox and accidents). All the previous diseases and illness related symptoms were reported at least once by participants, based on their recollection of illness occurrence among any member of their households during the last season. ‘Fever’ was the most mentioned symptom reported in both villages (50%). In terms of sanitation, no significant differences were found between villages, as 66.7% of the participants either burned or buried their non-organic trash. Only 48.3% of the households in both villages had a functional latrine. Finally, 80% of the interviewees believed that breastfeeding was the best food for infants.

4.2.4 Outcomes and Differential Water Access in the Process of Making a Living:

Productive Activities

In this section, I show and compare productive activities used in both study villages in the process of making a living. This information is important because it highlights differences found among villages that illustrate, on the one hand, the ways in which water access influences the livelihood strategies of the people from rural Eastern Guatemala. On the other hand, some of these productive activities are outcomes themselves of the ways in which people access water.

The open-ended questionnaire asked about productive activities and assets, whereby participants identified the main necessities in their households for which money was needed (see section 2.3.1). In addition, participants were asked to indicate the different ways in which they were able to meet those needs. Whereas the participants were not required to associate specific activities with needs, they reported different strategies they used to make a living and to fulfill their needs in general. As with the
identification of needs, respondents offered more than one response. The sale of agricultural products (corn, beans, hot peppers and bananas) in both villages was the activity with the highest percentage (82%), followed by sale of handicrafts (55%), wage work (53%) and sale of domesticated animals (33%). In terms of wage work, some participants had permanent wage work in Livingston, while others reported that they only worked some weeks and sometimes some months per year mainly in the construction sector, especially during the time of the year when the agriculture cycle does not require intense labor.

When data were disaggregated between villages (Figure 4.2 and 4.3), it was possible to visualize how Pipes Village had a more diverse portfolio of productive activities compared to Buckets Village. In that regard, participants from Pipes Village highlighted three additional activities: wage work as a fisherman, sale of non-agricultural products (i.e. bread, prepared food), and the fees collected through a community eco-tourism project. In addition, the percentage of participants that reported sale of domesticated animals as a livelihood strategy was significantly higher in Pipes Village.

The questionnaire also examined the breeding of domesticated animals—either for household consumption or for commercial sale—since this is a female-led activity. When comparing villages, the number of domesticated animals owned by women from Pipes Village exceeded the figures from Buckets Village particularly in terms of chicken, ducks and turkeys (Table 4.5).
Figure 4.2: Productive activities in Buckets Village. Source: Survey, 2005

Figure 4.3: Productive activities in Pipes Village. Source: Survey, 2005
Table 4.5: Non-parametric statistical test of domesticated animals, between villages. Source: Survey, 2005. Mann-Whitney U Test (only significant coefficients are shown), confidence level of results: *** $p \leq .01$; ** $p \leq .05$; * $p \leq .10$

4.2.5 Outcomes of Water Access: Positive Feedbacks between Water and Education

The preceding sections have emphasized the outcomes women have pursued once they were freed from the burden of carrying water, as well as the hurdles other women face to obtain water. I examine the original differences between villages and additional, but less tangible outcomes, resulting from an improved household water provision. These original differences are related to the human capacity and skills used by members from two similar villages to access water. As Chapter Three has illustrated (see Section 3.3.5), the capacity of the people from Pipes Village to challenge disenfranchisement is not just a function of social organization. Rather, it is more a product of the combination of leadership skills, political connections, and social organization that at a particular place and time, was instrumental to mobilize resources.

Does an improved water provision service alone spear head the type of outcomes found in Pipes Village? Evidence of my study suggests that water alone may not be sufficient to build up human capacity. Furthermore, if Buckets Village were to get piped
water tomorrow, women may not be able to do all the things women in Pipes Village are doing now because they have not accumulated enough human capital. Actually, the people from Buckets Village may be trapped in a cycle of poverty that is hard to break. Rather, there might be some pre-existing conditions that foster a particular symbiosis of human capacity and social organization. Consequently, this symbiosis is then conducive to increase the chances of marginalized people to break the cycle of poverty by improving their access to basic resources. How do marginalized people, then, manage to develop a human-social symbiosis? What are the main characteristics of the population that made a difference when it comes to access resources?

First of all, demographic data show striking differences between the population of the villages, particularly in terms of literacy and Spanish fluency. More specifically, variables that measured individual characteristics from adult females and males stressed variation with regards to skills. For example, the mean number of years of formal schooling in adult females was 0.53 in Buckets Village in comparison with 1.20 in Pipes Village. The percentage of adult women who knew how to read and write in Buckets Village was 20% in contrast to 53% in Pipes Village. The ability to communicate in Spanish (using a scale of 0-3), was also higher in Pipes Village, showing a mean of 1.53 in females and 2.63 in males in contrast to Buckets Village where a mean of 0.70 was found in females and 1.66 in males.
<table>
<thead>
<tr>
<th>Variables</th>
<th>Buckets Village</th>
<th></th>
<th>Pipes Village</th>
<th></th>
<th>Mann-Whitney Coefficient</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean or % of obs. = 1</td>
<td>Min - Max</td>
<td>n</td>
<td>Mean or % of obs. = 1</td>
<td>Min - Max</td>
</tr>
<tr>
<td>Number of persons living in household</td>
<td>30</td>
<td>6.2 3-15</td>
<td>30</td>
<td>6.7 2-12</td>
<td>30</td>
<td>4.8 1-9</td>
</tr>
<tr>
<td>Children born</td>
<td>30</td>
<td>4.8 1-12</td>
<td>30</td>
<td>4.6 0-12</td>
<td>30</td>
<td>4.6 0-12</td>
</tr>
<tr>
<td>Years of formal education in household (including children)</td>
<td>30</td>
<td>4.5 0-11</td>
<td>30</td>
<td>4.6 0-12</td>
<td>30</td>
<td>4.6 0-12</td>
</tr>
<tr>
<td>Age of adult female</td>
<td>30</td>
<td>33.8 19-63</td>
<td>30</td>
<td>34.7 20-57</td>
<td>30</td>
<td>34.7 20-57</td>
</tr>
<tr>
<td>Years of formal education, female adult</td>
<td>30</td>
<td>0.5 0-4</td>
<td>30</td>
<td>1.2 0-9</td>
<td>30</td>
<td>1.2 0-9</td>
</tr>
<tr>
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<td>20% 0-4</td>
<td>30</td>
<td>53% 0-9</td>
<td>30</td>
<td>53% 0-9</td>
</tr>
<tr>
<td>Spanish fluency, female adult (scale 0-3)</td>
<td>30</td>
<td>0.7 0-3</td>
<td>30</td>
<td>1.5 0-3</td>
<td>30</td>
<td>1.5 0-3</td>
</tr>
<tr>
<td>Age of adult male</td>
<td>23</td>
<td>41.4 21-78</td>
<td>30</td>
<td>41.3 23-84</td>
<td>30</td>
<td>41.3 23-84</td>
</tr>
<tr>
<td>Years of formal education, male adult</td>
<td>29</td>
<td>2.1 0-11</td>
<td>30</td>
<td>1.8 0-6</td>
<td>30</td>
<td>1.8 0-6</td>
</tr>
<tr>
<td>Literacy, male adult (no=0; yes=1)</td>
<td>29</td>
<td>57% 0-11</td>
<td>30</td>
<td>70% 0-6</td>
<td>30</td>
<td>70% 0-6</td>
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<tr>
<td>Spanish fluency, male adult (scale 0-3)</td>
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<td>1.7 1-4</td>
<td>30</td>
<td>2.6 0-3</td>
<td>30</td>
<td>2.6 0-3</td>
</tr>
<tr>
<td>Adult male speaks some Garifuna</td>
<td>29</td>
<td>3% 1-4</td>
<td>30</td>
<td>17% 0-3</td>
<td>30</td>
<td>17% 0-3</td>
</tr>
</tbody>
</table>

Table 4.6: Non-parametric statistical test of the demographic characteristics of the study villages. Mann-Whitney U Test (only significant coefficients are shown), confidence level of results: ***, \( p \leq .01 \); **, \( p \leq .05 \); *, \( p \leq .10 \)

The obstacles faced by households affect the capacity of women and girls to develop their full potential. Moreover, beyond the lack of leisure time, women are missing out not only opportunities to engage in productive activities, but also to participate in social and political life. In a place with insufficient basic services, particularly water, social organization is fundamental. For the women in Buckets Village, for example, after carrying 21 liters of water under the climatic conditions of the tropical...
humid forest, social organization becomes one more competing priority along with
domestic chores and activities to make a living. In the case of girls, attending school may
be one of those competing priorities that will actually make a difference in their future
development. With regards to differences between the study villages, although the
conditions related to education predated the introduction of piped water, once women and
girls are freed from the burden of carrying water, education becomes more feasible.

Therefore, what is at stake here is not just having piped water, but these pre-
existing conditions, particularly human capacity, that piped water then reinforces and
builds on to become a positive feedback loop that links water and education. In this
context, then, education is not only a pre-existing condition but also an outcome of a set
of processes of which piped water is part. The opposite is also true, as poor levels of
education, illiteracy, and a weaker command over Spanish appear to magnify the barriers
people face to challenge inequality in their quest to mobilize access to resources.

4.2.6 Summary of Most Relevant Variables

The ways in which people in the study villages use their water resources are
significantly different. While the majority (87%) of people from Pipes Village has access
to piped water, people from Buckets Village struggle everyday to obtain water. In that
sense, according to my estimations, each person without piped water consume
approximately 3.24 liters/per day which is barely the minimum daily water requirement
for human consumption. Consequently, data gathered on sanitation and health practices
reveal how health constraints in these two communities are inexorably tied to access to
and quality of water. For example, the incidence of diarrhea, fever, malaria and dengue
might be directly connected with the presence of total coliforms and E. Coli found in the
water analyses. In terms of productive activities, it became evident that Pipes Village has a much diversified portfolio of activities (e.g., breeding of domesticated animals, handicraft production, and fees collected through an eco-tourism project). Moreover, Pipes Village has larger number of domesticated animals may be a significant outcome of an improved water provision service. Finally, this analysis suggests that the differences between villages concerning years of formal schooling, literacy and Spanish fluency, are more than just outcomes. Rather, these assets associated with human capital are transformative capabilities that have the potential to break poverty cycles.

4.3 Conclusion

4.3.1 Water Access and Quality as an Asset and a Livelihood Strategy

The quantitative analysis pays explicit attention to the ways in which individuals provide their households with water. For this purpose I have emphasized domestic uses of water over productive uses such as irrigation. The gender division of labor in the study villages stresses the role of women and girls as water suppliers for their households and also as the main domestic users. These domestic uses of water, nonetheless, highlighted the informal small entrepreneurial uses of water associated with breeding of domesticated animals, handicraft production and the sale of non-agricultural products. This gender division of labor is consistent with the notion of women as multiple users of water found in the literature (Cleaver, 1998; Crow and Sultana, 2002; Upadhyay, 2005). Evidence of water use patterns show that women without access to piped water spend a large portion of their time collecting water.
Releasing women and girls from the burden of carrying water is one of the first steps towards expanding the options open to women. Women with access to piped water themselves attributed their engagement in productive activities to their released from time collecting water. In Buckets Village, though, women perhaps thought that having less of a burden and more time for reproductive activities was almost equally important as engaging in an additional commercial enterprise. My results suggest that women from Pipes Village had a more diversified portfolio of productive activities which may be an outcome of an improved household water supply.

Contrary to what has been found in Bangladesh and India (Crow and Sultana, 2002; Upadhyay, 2005), in Pipes Village domestic uses of water associated with women have not been neglected in favor of productive uses of water. Furthermore, in Pipes Village, to date, neither irrigation nor large commercial or industrial uses of water have been envisioned with the exception of the eco-tourism project. Rather, the piped water provision system was created purposely to serve domestic needs. With regards to the informal small enterprise that is being carried out, when comparing villages, two significant differences were evident: the breeding of domesticated animals and sale of non-agricultural products (i.e. baking bread)—both of which are carried out in Pipes Village. While the water requirements of these informal activities and the eco-tourism project are not presently competing with each other, studies have shown how competing uses of water may result in conflict and disadvantages for women because their uses of water are less visible and consequently ignored in water allocation priorities (Crow and Sultana, 2002; Harris, 2002; Sneddon, et al, 2002; Upadhyay, 2005). The competing uses
of water in the villages may be a potential point of tension in the future if proper water allocation does not contemplate women’s multiple uses of water.

As this research has demonstrated, the Q’eqchi’ communities from Livingston depend heavily on agriculture to subsist. In contrast to evidence from studies conducted in other regions where farmers produce enough basic grains to satisfy household consumption and sell excess production (Wilk, 1997; Carter, 1969), people from the study villages are forced to sell basic grains despite not meeting household consumption needs. The anxiety that some respondents expressed about food supply and cash sources during the in-between season (August-September) and a couple of cases of infant malnutrition found in the villages at the time of my visit illustrate this concern. Hence, alternative sources of income are crucial. Handicrafts are one source of income, but one that is not readily available because goods are received under consignment and payments come in installments. In addition, the production of handicrafts with a higher demand and remuneration (i.e. organic paper and derived products) requires more water and therefore constitutes a labor-intensive process for women without access to piped water and a competing priority for scarce water resources. Sale of domesticated animals, on the other hand, is paid in cash and therefore has advantages over handicrafts. Although no records of animal water consumption were collected in the study villages, studies in Asia have revealed how proper watering of livestock has increased the number of animals (Upadhyay, 2005). In that sense, the superiority of Pipes Villages in terms of number of domesticated animals versus the figures from Buckets Village may be a reflection of a better water supply and more time available for those women with piped water. It is here
where having piped water makes a difference in the process of making a living in the rural communities of the humid tropical forest.

The sale of non-agricultural products (i.e. bread and prepared food) observed in one village but not in the other also points to Pipes Village proximity to markets. This spatial distinction and the distance between Pipes Village and the main town are also being exploited by their inhabitants not only to gain market access to sell goods but also to access permanent and occasional wage fishing work and to exploit the tourist market. Given that Río Dulce and Livingston are two of the main tourist destinations in the country, both villages, but particularly Pipes Village, are in a good position to attract visitors to their community-managed eco-tourist project. When I inquired on how this project came to be, Carmen, a woman from Pipes Village, told me that a group of people including herself organized a trip to Belize where Kekchi people have a similar tourist enterprise. Upon their return, they started to look for funding sources to build a small eco-hotel consisting of a couple of rooms. According to her testimony, the fact that she did not have to collect water provided her with enough time to engage in this type of activities. Carmen also teaches a weekly course of handicraft production at Ak’ Tenamit. Currently, the eco-tourist center offers four bungalows, bathrooms, hiking trails, bird watching, cultural activities and food service. The construction of a restaurant and a visitors’ center is underway.

4.3.2 Water Access and Quality: A Precursor of Human Capabilities

While patterns of water use are important to explain women’s economic choices, other supplementary aspects of community life are also noteworthy to understand how issues of access to and quality of water affect people’s lives. In that respect, these case
studies explore other dimensions of the study population, including water use patterns as well as sanitation and health practices. With regards to sanitation and health, given the low levels of water consumption and the contamination of water exposed by the quality analyses, it is not surprising to find cases of malaria, diarrhea, fever and a few functional latrines. Furthermore, the estimated daily water consumption of people without piped water is barely enough to meet minimal human drinking needs, not even taking into consideration sanitation purposes. The incidence of malaria reported in Buckets village, is a case in point. For example, people knew about how to cover water containers properly when I asked them. Transporting and storing water, nonetheless, is troublesome because of weather conditions of the tropical forest and conducive to spread of mosquitoes that could eventually cause malaria.

Another important finding is that the literacy rates found in the study villages (36%) are lower than the mean of 52% for Q’eqchi’ women nationwide, and even lower than the national mean of 68% for rural women (Instituto National de Estadística, 2002). Whereas significant advances have been made over the last decade to improve access to education for the indigenous population in Guatemala (Informe Nacional de Desarrollo Humano, 2005), this study reveal that Q’eqchi’ women and girls from the lowlands of Izabal have not improved as much as other women and girls in other areas. This finding supports the relationship between poor access and quality of water and low levels of education among rural women from the global south (Secretariat of UN-Water, 2005; Crow and Sultana, 2002; Water Assessment Programme, 2006).

The differences found between villages were also remarkable. Compared to Buckets Village, the adult females from Pipes Village had a higher percentage of literacy,
and both females and males had a better command of Spanish fluency. This seems to indicate a fundamental distinction between two otherwise similar villages. This difference may lie on the human capabilities of their inhabitants and their capacity to transform those capabilities into assets. Moreover, the fact that one of these villages, precisely where human capacity is higher, has been successful in gaining access to piped water might not indicate causality but it is an interesting relationship that deserves further study. For instance, while having piped water makes a difference in the process of making a living, having piped water makes no difference in terms of health. Furthermore, having piped water is not enough to access resources. While piped water is an essential asset that fosters livelihood strategies, piped water is also part of a larger set of processes where social organization, human capabilities, and leadership are intertwined.

This chapter has emphasized the main attributes from the study villages and the main outcomes and differences derived from improved household water provision. The next Chapter, then, discusses the main contribution this study makes to the relevant literature and concludes with a summary and the policy implications of this research.
CHAPTER 5

CONCLUSIONS: THE SOCIAL DIMENSIONS OF WATER

5.1 Introduction

My study has found convincing evidence to support three arguments related to different social dimensions of water. First, women are multiple users of water. Although productive uses of water have been traditionally associated with men, my research in rural Eastern Guatemala confirms what the literature has found in Asia and Africa with regards to women’s entrepreneurial uses of domestic water. Second, the rural livelihood framework has a place in research on water, gender and livelihoods. Because women are multiple users of water, the rural livelihood framework is suited to explore productive activities and assets as well as women’s own individual and collective motivations with regards to water access and use. Third, there is a symbiotic relationship between human and social capital. When individual skills such as education, leadership, and command over local and dominant languages are put to a social use, entire communities are able to increase their chances of transforming those skills into access to resources. The objective of this chapter is to amplify these three contributions of my study in relation to the relevant literature reviewed in Chapter One. I also review the ways in which my research
challenges some of the main issues and findings highlighted throughout the preceding chapters.

5.2 Women are Multiple Users of Water

Conventional approaches based on traditional societal gender roles have perpetuated the dichotomy between domestic and productive uses of water, have pervaded many water resource and development policies (Cleaver, 1998; Crow and Sultana, 2002: Upadhyay, 2005). In that sense, gender has influenced profoundly the social relations to access water in three different ways. First, based on societal gender-based divisions of labor, women and girls undertake time-consuming daily responsibilities to collect water that prevent them from attending school and carrying out other activities. Second, in most of the developing world, men own the majority of productive assets and therefore the decision-making process related to resource use favors men. Finally, while economic uses of water have been associated with men, domestic uses have been attached to the women. This process of subordination of women has, in some ways, skewed the priorities of public spending and public spheres debates towards productive uses associated with men such as irrigation, while other uses associated with women such as drinking water, cooking and washing have been underemphasized (Crow and Sultana, 2002:713).

Results from the quantitative analysis in Chapter Four point to the ways in which rural women from the lowlands in Guatemala have used domestic water to engage in small entrepreneurial activities. Comparisons between two study villages have demonstrated how having piped water makes a difference when it comes to breeding
domesticated animals, producing higher-value handicrafts and selling non-agricultural products such as bread and prepared food. While women and girls are multiple users of water by taking full responsibility for domestic uses of water by fetching water for human and animal consumption (as well as bathing infants and small children and washing clothes and cooking utensils near water sources), my study confirms that they are also productive users of water. The men in my study, instead, cannot be associated with domestic uses of water confirming the gender division of labor based on patriarchal dominance observed elsewhere in the literature (see Crow and Sultana, 2002; Upadhyay, 2005). My research shows, however, that domestic uses of water are not always ignored over productive ones. Foremost, even though some of the productive activities identified in the study villages are led mainly by women, men also collaborated, although to a lesser degree, in some of these endeavors (i.e. providing rough materials for handicraft production, helping with domesticated animals, and taking care of young children while women were working). Hence, cooperation among household members, even in patriarchal societies, may not be entirely disregarded. Rather, domestic uses of water are sometimes privileged depending upon the local context particularly when the cost to embark on larger water development projects such as irrigation is unattainable.

The literature on water and gender has criticized emphatically a sectoral bias that not only favors productive uses of water but also assesses the benefits of water infrastructure in economic terms. For example, Cleaver (1998) discusses how the prototype of the rural female water user is an oversimplification that serves only to link women’s increased involvement in water management with concepts of efficiency, economic productivity and empowerment, disregarding social complexity, variation in
women's situations, motivations and strategies. According to Cleaver (1998), a focus on water as an economic good is dangerous because it leads to an underestimation of the importance of domestic uses. Foremost, Cleaver sustains that today several studies emphasize the benefits of water provision systems for women in terms of time and productivity rather than health benefits. While these claims may generally reveal that women's domestic burden can be reduced through improved water supplies, they are still narrow economic arguments, reducing social variables to numerical ones (Cleaver, 1998). What happens, then, when women themselves confer primacy to productive activities and livelihood strategies? Are these realities less legitimate than health and social motivations? Have economic arguments and variables necessarily to be vilified?

I agree with the concerns expressed in the literature on water and gender about a taken-for-granted supremacy of economic indicators, and evidence of my study suggests that issues of health, women's motivations, social complexity and productive activities are equally important. Each of them, in conjunction, plays a vital role in the ways different groups of people improve their quality of life. Moreover, the degree to which some of these elements become more relevant than others, at a particular place and time, will depend upon specific contexts of women, men, and children. In other words, while the advantages of water provision service manifest themselves in a place through a particular set of benefits, these explanations might not clarify what happens in a different location.

In these two villages, for example, water analyses revealed how water access and quality are not equivalent. A higher incidence of malaria, nonetheless, was found in the village without access to piped water, but similar incidence of total coliforms and
diarrhea were present in both villages. These findings expose the complexities and constraints behind managing and storing water in the humid tropical forest when water sources are located far away, and climate, combined with an inadequate water provision services, are conducive to waterborne and parasite-vector diseases. In terms or productive activities, non-parametric statistical analyses comparing villages accentuated significant differences that women themselves attributed to piped water access. How, then, are these intricate realities to be explained? Are either conventional or alternative frameworks robust enough to help us understand change in relation to water, gender, and livelihoods across space and time? Perhaps they are not because both of them try to deemphasize some of the social aspects of water. The water and gender literature highlights social motivations but underrates economic activities, while conventional frameworks do exactly the opposite. Furthermore, while the literature on water and gender advocates for alternative frameworks that account for variation and complexity instead of narrow approaches, their focus of attention away from economic motivations might be a limitation in itself. If we are going to make the case that women are multiple users of water, (which in some cases implies productive uses of water) we ought to be willing to navigate through economic concepts and definitions instead of downgrading them. Therefore, deciphering the particular context without overlooking the different social aspects that surround the human-water interrelation may be one of the keys to understand the role of water access in human well being.
5.3 The Rural Livelihood Framework to Study Water, Gender and Livelihoods

The rural livelihood framework is well-equipped to deal with issues of water, gender, and livelihoods precisely because of its capacity to approach variation, complexity and multiscalar perspectives. Conventional frameworks, conversely, suffer the absence of scale linkages as a determinant that diminishes enormously the possibility of many current water resources projects to think beyond localities and connect macro-scale processes at the community, regional, national and bio-system levels (Cleaver, 1998). While the household is still an important unit of analysis, it is important to recognize the internal social relations dynamic within the household and broader processes of collective action connecting several households and or family groups across production and reproduction (Cleaver, 1998).

One of the macro-scale spheres is the market. The rural livelihood framework, which owes its origins to the asset vulnerability framework developed in the economic literature concerned with the 1980s famine, clearly interconnects with economics and economic categories. Therefore, the economic dimension of the rural livelihood framework is an essential facet of the analysis as any other of its dimension (Carney, 2002). This is true even when researchers and practitioners, without a background or experience in economics or the private sector, have paid less attention to the role of the market and economic matters (Carney, 2002). Individuals and households—when choosing between clearing land to plant trees or a crop, or when deciding between making handicrafts and raising turkeys—are after all, making economic decisions. These economic decisions are fundamentally influenced by the structure and functioning of markets. How well markets work is based on many factors for example: trust,
information, infrastructure, contract enforcement, application of the rule of law, freedom of movement of goods and people, and market structure. The markets that do not work well are typified by high ‘transaction costs.’ One of the main goals of rural livelihood framework may be to reduce these transaction costs to attain sustainable livelihoods at multiple scales (Carney, 2002:23). Market related methodologies, then, are a way to improve our understanding of how the markets work. For example, in the Honduran Mosquitia, McSweeney (2004) employed a combination of trade network analysis along with archival and ethnographic research to expose the connections between remote rural areas and international capital such as local and international trade routes across time and space. By focusing on the everyday aspects of rural life—specifically how rural people mobilize important goods such as dugout canoes—McSweeney (2004) demonstrated how rural livelihoods are part of broader social and political processes at multiple scales and locations as opposed to the isolated and circumscribed imaginary conception of rural peoples. According to McSweeney a trade-based analysis has the potential to advance a more endogenous perspective on rural livelihoods, revealing that material quotidian realities are indissolubly linked to a system of cultural meanings in a particular place.

Rural poverty is complex and cannot be explained exclusively in economic terms. Poverty is not only about lack of assets and income. Poverty can be singled out from other types of deprivation, for example physical weakness and disability, isolation, vulnerability and powerlessness (Chambers, 1995). Deprivation is important because it allows the identification of different and locally-defined conceptions of wealth that are useful to distinguish among the poorest of the poor and most vulnerable, instead of assuming a constant state of poverty across space and time. In my study, for example, a
wealth-ranking appraisal helped me single out households with severe limitations and others with some advantages that otherwise may have been overlooked. Vulnerability also refers to defenselessness vis-à-vis external shocks, stress and risks and lack of ways to cope (Chambers, 1995). If deprivation is the absence of well-being, then, well-being is more than solely economic development, and reduction of poverty and suffering. Well-being encompasses a wider set of values through social development, good government and improvement of the quality of life. In the same vein, social development is a concept that refers to a just and equitable society in which individual and communities enjoy autonomy and well-being (Chambers, 1995). As Cleaver (1998) has stressed earlier, beyond pursuing economic incentives, individuals and communities also have social motivations.

According to Bebbington (1999) the rural livelihood framework should also focus on the forms of engagement, within and between households, with markets, state and civil society and how it is that the relationships produced by these engagements translate into distribution and transformation of assets. When households are capable of transforming assets into access to resources through their relationships with other households and other communities based on the logic of the market, civil society and the state is precisely when the idea of sustainable rural livelihoods becomes relevant. Furthermore, when it comes to exploring water resources and the human-water interrelations, concepts such as human, social, natural and produced capital are important because they force us to contemplate water from an integral perspective without resting importance on either social or economical motivations.
Because rural livelihoods are diverse, the rural livelihood framework expands our capacity to examine livelihood strategies that go beyond the conventional notions that portray rural societies as dependent exclusively on agriculture. Rather, it has been demonstrated that for many rural households, farming alone as an economic activity is not enough to survive (Ellis, 2000). With regards to water, a rural livelihood approach may not only focus on large industrial, agricultural or commercial uses of water such as irrigation, aquaculture or tourism, but rather on less obvious productive activities associated with the informal sector such as animal breeding and handicraft production. This study revealed that by tracing domestic uses of water, small entrepreneurial activities became evident. Moreover, these modest productive endeavors are extremely significant in a region where the process of making a living is basically a process of survival. In the study villages, non-agricultural sources of income such as the breeding of domesticated animals can have multiple outcomes: they are used to obtain cash, to improve the household diet, and also to access labor through agricultural labor exchange arrangements (see Section 3.3.2) Finally, because of the prominent role of human and social capital in the rural livelihood approach, the implications of improved water infrastructure systems in terms of health and involvement of women and girls in education and social and political life have a special place in the analysis because social participation are profoundly affected by gender societal roles.

5.4 The Symbiotic Relationship between Human and Social Capital

The significance of the different types of capital and their development, therefore, may not be assessed only in economic terms vis-à-vis their role in productive endeavors.
The abilities of reading, writing and speaking the dominant language of society enhance people’s ability to become agents of change by increasing their ability to question, dispute and put forward new ideas that challenge existing power structures. In that sense, the capability of manipulating the rules of the game—either by changing or learning how to navigate them—is a clear outcome of legitimate poverty reduction strategies (Bebbington, 1999). Recently in the literature on rural livelihoods, the central role of social capital in the livelihood strategies of the poor has received particular attention. This is mainly based on the notion of the integrative attributes and inherent relationships of social capital as a driving force to gain access not only to resources but to other actors beyond the realms of the household and locality (Bebbington, 1999; Bebbington and Perreault, 1999; Moser, 1998; Perreault, 2003).

Therefore, access and social capital are concepts to understand the connections between rural households and other actors and their relationships and transactions. These relationships and transactions—mediated by the logics of the state, the market and civil society—are specifically envisioned to access resources, influence the formal and informal rules of society—and to transform assets into goods and services (Bebbington, 1999). Furthermore, through social capital, it becomes possible to visualize that the intangible and influential importance of social relations is in fact a resource to access tangible resources (Perreault, 2003).

Moreover, since the stock of capital is always unequally distributed, socially and spatially, the challenge then lies to understand and foster of the mechanisms under which social capital is not only constructed but transformed into other forms of capital. This is especially important for marginalized people to gain rights of access to resources. In this
context, the formation of social capital by different actors and across different scales in terms of their interaction is a key element to understand social capital (Bebbington and Perrault, 1999). Perrault has been demonstrated that social capital cannot be examined in isolation from the symbolic meaning systems that embodies the cultural capital and that gives a meaning to social relations (Perreault, 2003).

In the excitement to depict social capital as a central element of the rural livelihood approach, it appears that the equally relevant role of human capital, as a precondition for spearheading social and other capitals under certain circumstances, may have been overlooked or deemphasized. This is especially true because it is important to understand what the most important assets are for some people, in specific places at specific times (Bebbington, 1999). Therefore, special attention should be paid not only to the processes and mechanisms of asset formation and transformation into income, good and services, but also to their impact on people’s own interpretation of well-being. While an emphasis on social capital focuses on the capability of people to engage in discussion through deliberation and negotiation skills in order to influence discourses at different scales (Bebbington, 1999), without the ability to read, write and speak in the dominant language, those human capabilities are seriously curtailed. People with lack of socio-economic and political power: the poorest, the women, the disabled, the socially or geographically isolated, some indigenous peoples and the young are especially affected by this reality.

Empirical evidence gathered among indigenous civil organizations in highland Ecuador, for example, has highlighted the critical role of bilingual education programs and the involvement of young leaders in up-and-coming indigenous organizations and
development programs (Bebbington and Perreault, 1999). Although this study does not directly attribute the involvement of young leaders to the bilingual education programs, there might be a symbiotic relation between both types of capital: human and social and consequent connections with other assets. The key element, perhaps, may be not human capital or human capital formation per se, but the social uses to which human capital is put (Bebbington and Perreault, 1999).

The main point I want to emphasize here is that beyond the debates of primacy of one type of capital over the other, it may be more fruitful to acquire a deep understanding of the conditions, processes and mechanisms under which a particular type of capital and combinations of assets may be more or less beneficial at certain point in time, in a specific place, to a specific group of people. As one of Bebbington's (1999) critical reflections has pointed out, through the rural livelihood analyses we need to understand the ways in which people not only access and transform, but also combine assets to construct their livelihoods.

My study, for instance, stresses the relevance of a combination between human capital and social capital, specifically literacy, Spanish fluency and community organization, through which other assets and outcomes have been experienced and materialized. A qualitative analysis of two rural villages, for instance, demonstrated how the lack of formal education in the adult population can be ameliorated by means of social organization and basic skills when it comes to fostering human capital for future generations (See section 3.3.1). In the case of Buckets Village, children have the opportunity to attend school thanks to the work of the school committee whose members administer the entire operation of the primary school. Their capabilities, nonetheless,
have prevented them from accessing other resources, particularly water. In contrast, the members of Pipes Village have been effective in using the human capacity of some local leaders and a solid communal work scheme to obtain piped water. Additionally, the connections that some of the community leaders from Pipes Village have nurtured have been translated into income-generating activities such as the community eco-tourism project. The education of their children, nonetheless, is constrained by a greater dependence on the state and a state supported education system. Finally, evidence of my research demonstrates how the number of years of formal education in the household (including children), has surpassed the adults’ figures, suggesting that households may rely on the human capacity of their children to access resources, as in the case of piped water where each household had to complete written forms.

Therefore, besides a combination of human capacity of community leaders and social capital at the community level, there might be an inter-generational element at the micro-scale whereby households of uneducated but socially active parents complement each other. The fact that children, particularly girls, from Pipes Village are released from collecting water may be conducive to increase their chances to spend time at school, particularly when parents experience first hand the advantages of having an educated person in the household. As studies of bilingual education in Guatemala have revealed, factors associated with bilingualism (that is the ability of their parents to speak a second language and opportunity cost proxies, which are the perceived economic value of a certain activity instead of attending school) strongly influence parents’ decision concerning the education of their children (Cummings and Tamayo, 1994).
The particular combination of human and social capital found in these two villages point to the way in which marginalized people have managed to increase their own chances and their families' to have a better life. In the region, this combination is accentuated by the work of Ak' Tenamit, whereby young people from remote villages have the opportunity to study a technical degree in exchange for their parents' labor. At the heart Ak' Tenamit's organizational structure is the power locals exercise in the general assembly, creating in that way a space of social participation where their children will be in a better position to articulate not only claims over resources but also to achieve social and political inclusion.

The spaces of social participation in the region and in the villages, however, are still incipient spaces of social inclusion. Whereas my study demonstrated how some women, such as Carmen from Pipes Village (see Section 4.3.1) have been able to engage in endeavors well beyond traditional gender roles, I cannot make generalizations. For example, although my research has highlighted some outcomes of having piped water such as informal economic activities led by women and more participation in social life, it would be too ambitious at this point to claim that an improved water infrastructure has allowed rural women to individually or collectively gain more social inclusion. Nonetheless, in the case of Buckets Village, where women and girls were overwhelmed with the burden of collecting water, lower levels of literacy and a poor command over Spanish were found in both adult females and males, when compared to Pipes Village. Is this a vicious cycle whereby not only women and girls but also entire communities are trapped into perpetuating poverty and lack of opportunities? It might be. As Figure 5.1 suggests, while my research cannot offer evidence of social and political empowerment
of women as a result of having access to piped water, my study might shed light on the complex nature of the obstacles they face to achieve it.

![The Buckets Cycle Diagram]

Figure 5.1: The buckets cycle shows how the lack of proper water provision service reverberates the cycle of poverty

5.5 Summary of the Thesis

The work contained in this thesis is about the everyday struggle that people with little political power endure to obtain water for their families. The fact of not having an appropriate source of water, either because the location is far away from home or because the water is not suited for human consumption, has a profound and immediate impact in the way people make a living. Other less visible impacts have to do with the capacity of people to face the complexities of society. Inadequate water provision services increase
the risk for young children of dying from diarrhea, and keeps young and elder adults vulnerable to other insect-borne diseases such as malaria and dengue. The daily, labor-intensive task of collecting water absorbs a tremendous amount of energy and time, preventing women and girls from doing other activities, whatever they might be. A sick and exhausted population may not be well equipped to articulate claims over a better access to basic resources, not to mention to challenge unequal power structures to defend their assets. There are times, however, when this vicious cycle of poverty can be broken. As my research shows, the combination of human capacity and social organization in two Q'eqchi’ villages, propelled the transformation of intangible social relations into access to tangible resources such as piped water and a school for the young. Having piped water, however, is not a panacea. Quality of water is still a serious concern that affects the people’s capacity and it represents the next battle to be overcome.

Chapter One shows why control over the production of social uses of nature (socionature), especially water, matters in understanding who has the power to produce particular configurations of socionature, with what purpose and with what outcomes. In this debate, geographic scale becomes relevant in this thesis because it emphasizes the process by which marginalized individuals change and transform the power hierarchies that rule their access to resources. In addition, this chapter examines how issues of water and livelihoods may not necessarily be associated with an explicit concept of conflict but a broader definition that accounts for conflicting uses of water. Finally the gender element in water and livelihoods may not only be achieved through the involvement of women in water management schemes, but rather through the examination of how
improved water provision systems foster the social and political participation of women and men in larger social processes.

Chapter Three examines the mechanisms and conditions under which the differences found in Chapter Four came to be, and examines current conditions in the study area. In addition, I focus on the process whereby the social relations that people from Eastern Guatemala marshal are created and transformed into access to resources, livelihoods and social inclusion. For this purpose, the main elements and tenets of the rural livelihood framework are introduced in order to contextualize its application locally. The qualitative analysis that informs this chapter has a multiscalar perspective that recognizes the importance of linking households with other spheres of civil society and the state at the regional level.

Chapter Four demonstrates how having piped water makes a difference in two Q’eqchi’ villages in the tropical humid forest of Eastern Guatemala. In this chapter, the ways in which people use and access water as well as their sanitation and productive activities receive special attention. Moreover, evidence from the quantitative analyses shows how access to household water is being used by rural women to expand their livelihood strategies. Other important findings reveal how inadequate water provision services, including piped but not purified water, seem to lead to a higher incidence of acute and parasite-vector diseases such as malaria and diarrhea. Finally, my research supports the relationship between poor access and quality of water and poor levels of education in rural women, exposing the reverberate effects of inadequate water provision services in human well being, and how fundamental distinctions between the human capacity of villagers might make a difference.
Chapter Five has illustrated the contribution my study makes to the literature on water, gender and livelihoods. These contributions focus on three arguments concerning the social dimensions of water: (1) women are multiple users of water; (2) the rural livelihood framework has a place in research on water, gender and livelihoods; and (3) there is a symbiotic relationship between human and social capital that ignites the capacity of people to access resources particularly water. Finally, these contributions point out to the ways inadequate water provision services restrain the human capacity of households, villages and regions to participate with dignity in society.

5.6 Limitations of the Study

During the fieldwork I conducted for this thesis, I relied heavily on interpreters to communicate with the participants of my study. Because my skills to speak in the local language (Q’eqchi’) were highly limited, the questions of my survey were filtered through the interpretations of a high school student in Buckets Village, and members of the community council in Pipes Village. While the presence of a student from another village may have not significantly influenced answers, being with members of the community council may have had an effect on the responses of some of the participants. In addition, I relied entirely on women’s own accounts of time allocation. Future studies based on individual daily records of time allocation might elicit more detailed data on how people allocate their time, and the extent to which improved water provision services influence their decisions of time use. In that respect, based on my observations, women in my study may have underestimated their calculations concerning distance to water source and number of daily trips.
Due mostly to time and budget constrains, I was not able to gather household surveys from additional surrounding villages. A larger number of observations from other villages in the region would have made possible to predict water access through statistical regression analyses. In addition, a larger number of participant villages in my study would have given me a better and broader understanding of the role of water on people’s livelihoods under different social, ecological and political circumstances at a regional level. Moreover, while my research focused on the way in which water access and quality affect people’s livelihoods today, an expanded study, geographically and time wise, would have also elicited information to explain change within and between villages. In any case, a more profound and prolonged study necessarily requires a better command of the local language.

Another limitation of my study has to do with the water sampling analyses. While water samples were transported from the village to the test site, a bucket with ice was used to transport them and keep them cold. Since a controlled temperature incubator was not available, fluctuations in room temperature were common during incubation time. According to temperature records taken during fieldwork, temperature range varied between 26° and 30° Celsius. Therefore all samples were incubated for 48 hours at room temperature. The main reason for the prolonged incubation is that the temperatures were below optimal for *E. coli* growth, namely below 37° Celsius. Therefore other bacteria, not identifiable through the medium used, could have grown taking advantage of lower temperatures and subsequently hiding *E. Coli* growth. Another important limitation of this analysis was the incapability of the media used to selectively identify and differentiate only coliforms and the *E. Coli* bacteria. Rather the media showed other non-
identifiable organisms. A second round of samples was taken during a short period of
time of each other. Similar studies would benefit from teaming up with local institutions
and universities to access proper resources and infrastructure adapted to the local
conditions. The local constrains—irregular electricity service, constant rain and humidity,
and difficulty of access to the villages—should also be taken into account when
conducting similar studies in the future.

5.7 Policy Implications

Two main policy implications arise from this thesis. The first policy implication is
directly related to water management. Rural populations, such as the ones in my study,
are being hurt dramatically by the lack of adequate basic services, particularly safe
drinking water. Although one of the villages has managed to access piped water, quality
is still a serious problem. In that regard, municipal authorities along with public health
officials should take advantage of existing channels of cooperation and not leave
communities alone when it comes to water management. The health promoters and the
community councils, for example, may constitute low-cost avenues to provide continuous
technical assistance and close monitoring to assure quality of water and prevent outbreaks
due to contaminated water. An alternative to the issue of quality of water could be the
installation of low-cost home made water filters. In that sense, municipal authorities and
regional civic organization should join efforts to explore the technology available. An
interesting option is the Biosand filter which is a water filtration and purification system
used in countries such as El Salvador and the Dominican Republic that produces clean
water for a little more than one U.S. penny per gallon, eliminating pathogens, toxins, and parasites, with zero cost of maintenance and no electricity requirements.

The Biosand filters were invented by the Canadian civil engineer David Manz who has shared his patent and personally has trained technicians. In the Dominican Republic, for instance, the Association of Manufacturers of Biosand Filters formed by local people, have installed many filters around the country and also provided a livelihood for their members (Asociación de Fabricantes de Filtros Bioarena, 2006). Organizations with a technical vocation and human capacity such as Ak’ Tenamit would be in an advantageous position to pioneer the introduction of this or a similar technology in rural Eastern Guatemala.

For many rural communities, but especially for those without piped water, it is important to find feasible ways to protect the current water sources. One way to do that would be to fence the area surroundings water springs to prevent access by domesticated animals. In terms of human waste disposal, either latrines or defecation sites should be located at a minimum distance of 50 meters from any water source to prevent run off and water contamination (World Health Organization, 2005). Transportation and storage of water in the humid tropics is also troublesome, especially if plastic containers are utilized for this purpose, since their use is conducive to bacteria and mosquito breeding. Easy, short-cut solutions to this issue, however, are problematic since the main problem lies in the inadequacy or inexistence of water provision services. Therefore, as long as rural communities are not able to satisfy their daily minimum human water requirements—which according to the World Health Organization is 50 liters per person of safe drinking
water—other alternatives related to prevention and education campaigns would be only palliatives that do not tackle the root of the problem.

The second policy implication is about women’s role in managing water. As my study confirms, rural indigenous women in Guatemala have severe disadvantages that block their full integration into society. The fact of not having a secure and safe source of drinking water near home is one of them. Although having an improved source of water makes a significant difference in the lives of women and children, particularly girls, the issue of women’s social inclusion is still unresolved. Conventional stereotypes of rural female water users have assumed that, once women become multiple users of water, there is an automatic increase in their bargaining power into the decision making process of resource allocation and well-being within the household. These same stereotypes, also assume an automatic process of osmosis between households whereby women’s collective involvement in community life is enough to challenge the traditional gender roles of society.

In this respect, development policies that target women should consider that investing in human capacity is equally important to involving women in water management, sanitation, and income-generating projects. As long as women are not able to read, write or communicate in the dominant language of society, the spaces of social participation and personal growth open to them are confined to their household. In that sense, development projects may be sounder if they are accompanied by literacy and bilingual education campaigns for both adult women and men, especially if they pay particular attention to the participation of women and girls not enrolled in school. Moreover, as evidence from other studies has demonstrated (Richards, 1990), bilingual
education should be considered at the primary level as well if drop out and repetition rates are to be lowered in the region. In the villages of my study, while the presence of women in communal committees is evident, their active inclusion in the decision making process is a whole different issue. The extent to which women gain spaces of social inclusion, nonetheless, depends directly upon their ability to transcend the barriers of social isolation. The ability to read and write constitutes one avenue to do so.

Furthermore, local authorities and development practitioners should advocate for the creation and implementation of mechanisms that promote genuine rather than symbolic spaces of social inclusion and participation of women in society at all levels. Otherwise, current patterns of social participation will only perpetuate existing silences and exclusions that have subsumed indigenous women to a triple process of subordination and discrimination based on their female, indigenous and poverty condition. In this context, in Guatemala—with few exceptions such as Nobel Peace Prize winner Rigoberta Menchú—the female subaltern, as Spivak has pointed out (1995), has no voice and cannot speak.
APPENDIX A

Encuesta Familiar

<table>
<thead>
<tr>
<th>Hora de Inicio:</th>
<th>Hora en que concluyó la encuesta:</th>
</tr>
</thead>
</table>

**Presentación [leer al participante]**

- ¿Comprende usted que su participación en la encuesta es voluntaria? [Sí o no.]
- ¿Comprende que, una vez comenzada la entrevista, usted puede terminarla cuando quiera? [Sí o no.]
- ¿Comprende que no voy a compartir las respuestas de usted con nadie más? [Sí o no.]
- ¿Si comprende todo esto, podemos iniciar la entrevista? [Sí o no.]

*Si responde Sí a la última pregunta, continúe con la encuesta, si responde NO, agradezca el tiempo de la persona.*

**Introducción:** Gracias por participar. En esta encuesta, no hay respuestas correctas ni incorrectas, sólo necesitamos que usted conteste con su opinión.

<table>
<thead>
<tr>
<th>Fecha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aldea</td>
</tr>
<tr>
<td>Casa Número</td>
</tr>
<tr>
<td>Género [marcar uno]</td>
</tr>
<tr>
<td>Masculino</td>
</tr>
<tr>
<td>Código del Participante</td>
</tr>
<tr>
<td>Código de la Encuesta</td>
</tr>
</tbody>
</table>

**Sección A. Conocimiento Local Tradicional y Ecológico - Cosmovisión Q’eqchi’**

[Le voy a hacer unas preguntas acerca de la naturaleza, los árboles, el agua, los ríos, los ojos de agua, los animales y sus cosechas].

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1. Recuerdeme por favor...... ¿Cuál es la palabra para decir “agua” en su idioma?
¿Existen diferentes palabras para diferentes tipos de agua (agua buena, agua mala, agua nacida, agua de lluvia [si lluvia es mencionada, pregunte acerca del ciclo hidrológico])?

2. ¿En su comunidad, existen historias relacionadas con el agua?
[Si la respuesta es sí, continúe aquí] ¿Cuáles son? Cuénteme.

3. ¿Hay más o hay menos cantidad de agua en su comunidad ahora que antes?
¿Cuál cree usted que es la razón?

4. ¿La calidad del agua en su comunidad es mejor o peor ahora que antes?
¿Cuál cree usted que es la razón?

5. ¿Qué piensa usted que va a pasar si el agua llega a secarse?

6. ¿Hay más o hay menos árboles en su comunidad ahora que antes?
¿Cuál cree usted que es la razón?

7. ¿Hay más o hay menos peces en el río en donde usted pesca ahora que antes?
¿Cuál cree usted que es la razón?

8. [Comparta una anécdota personal acerca del manati y después pregunte.....] ¿Qué piensa usted acerca del manati?

9. ¿Es el suelo de su comunidad mejor o peor ahora que antes?
¿Cuál cree usted que es la razón?

10. ¿Cuál es el cultivo más importante que usted cosecha?

11. ¿Existe algún cultivo que es cosechado solo en esta comunidad?
¿Qué cultivo?

12. [¿Qué utiliza el participante para cocinar? No haga esta pregunta, solo observe]

<table>
<thead>
<tr>
<th>Combustible</th>
<th>Marque si la escucha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leña</td>
<td></td>
</tr>
<tr>
<td>Gas</td>
<td></td>
</tr>
<tr>
<td>Estufa eléctrica</td>
<td></td>
</tr>
<tr>
<td>Otro (¿qué?)</td>
<td></td>
</tr>
</tbody>
</table>

Sección B. Uso del Agua
[Ahora le voy a hacer preguntas del agua que usa en su casa, para tomar, cocinar y para la higiene personal].
13. ¿De dónde obtiene el agua para uso de la casa?

<table>
<thead>
<tr>
<th>Agua potable en la casa (individual o comunal?)</th>
<th>Pozo (¿propiamente o comunal?)</th>
<th>Río/quebrada (¿cuál río/quebrada?)</th>
<th>Ojo de agua (¿cuál, en donde?)</th>
<th>Otro (¿cuál?)</th>
</tr>
</thead>
</table>

14. [Continúa aquí si la respuesta a la pregunta # 14 es agua potable en la casa] ¿Quién le presta el servicio de agua potable?

15. ¿Sabe usted qué le hacen al agua para que sea potable?

16. [Continúa aquí si la respuesta a la pregunta # 14 no es agua potable en la casa] ¿Cómo lleva el agua a la casa?

<table>
<thead>
<tr>
<th>Cubeta</th>
<th>Tinaja</th>
<th>Otro (¿cuál?)</th>
</tr>
</thead>
</table>

17. ¿A cuánta distancia está el lugar de donde trae agua?

18. ¿Cuántos viajes de agua hace al día/semana?

19. ¿Es fácil o es difícil acarrear agua?
   Cuénteme

20. ¿Qué haría con su tiempo si no tuviera que acarrear agua?

21. [¿Dónde guarda el participante el agua? No pregunte, solo observe]

<table>
<thead>
<tr>
<th>Pila</th>
<th>Tinajas</th>
<th>Tonel</th>
<th>Otro (¿cuál?)</th>
</tr>
</thead>
</table>

22. [¿Están los recipientes cubiertos? No pregunte, solo observe]

23. [Para ambas opciones (agua potable y otro tipo)] ¿Cuánto tiempo guarda el agua antes de usarla?

24. ¿Toca usted o alguien más el agua guardada con las manos?

25. ¿Su agua se puede tomar solo así o tiene usted que hacer algo antes de que se pueda tomar?

<table>
<thead>
<tr>
<th>Directo del chorro</th>
<th>Directo de los recipientes</th>
<th>Hierve el agua</th>
<th>Filtra el agua</th>
<th>Aplica cloro al agua</th>
<th>Otro (¿cuál?)</th>
</tr>
</thead>
</table>

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26. [¿En dónde se baña la gente? No pregunte, solo observe]

27. [¿En dónde lava la gente la ropa? No pregunte, solo observe]

28. ¿Usa la misma agua que trae para cocinar, higiene personal (lavarse las manos, cara, boca) y para tomar?

29. ¿Aproximadamente, cuánta agua al día utiliza normalmente?

<table>
<thead>
<tr>
<th>Categoría</th>
<th>Cuántas?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilas</td>
<td></td>
</tr>
<tr>
<td>Recipientes plásticos</td>
<td></td>
</tr>
<tr>
<td>Tinajas</td>
<td></td>
</tr>
<tr>
<td>Otro (¿cuál?)</td>
<td></td>
</tr>
</tbody>
</table>

30. ¿Compra usted agua?

31. ¿Cuánto le cobran?

Sección C. Historia Migratoria
[Ahora le voy a hacer preguntas acerca de los lugares donde ha vivido y de esta aldea].

32. ¿Cuánto tiempo ha vivido usted en esta aldea?

33. En comparación con otros lugares en donde usted ha vivido antes, ¿Cuál lugar le gusta a usted más?
   ¿Por qué?

34. ¿Con quién vive usted ahora?

<table>
<thead>
<tr>
<th>La casa de sus padres</th>
<th>La casa de los padres de su esposo(a)</th>
<th>En casa propia</th>
<th>Otro (¿cuál?)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

35. [Si el(a) participante no vive con sus padres, continúe aquí] ¿Dónde viven sus padres?

Sección D. Datos Demográficos –

36. Composición de la Unidad Familiar [Le voy a hacer preguntas sobre la gente que vive en su casa]

   D1. Genero
   D2. Relación con el(a) jefe de familia
   D3. Edad actual
   D4. ¿Nació esta persona en la comunidad?
**D5.** ¿Cuándo vino esta persona a la comunidad?

**D6.** Nivel de educación formal

**D7.** ¿Está esta persona estudiando actualmente?

**D8.** ¿Sabe esta persona leer y escribir?

**D9.** Número de niños(as) vivos(as)

**D10.** Cargo de liderazgo

**D11.** Otros idiomas

**Sección E. Salud [Le voy a hacer preguntas acerca de su salud y la salud de su familia].**

37. ¿Ha estado alguien de su familia enfermo o lastimado [Encuentre la palabra más general para “enfermedad” en el lenguaje local] durante la última semana?

38. ¿Qué tipo de enfermedad o lastimadura? [No lea las opciones al participante]

<table>
<thead>
<tr>
<th>Enfermedad/Accidente</th>
<th>Marque si lo escucha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catarro/gripe</td>
<td></td>
</tr>
<tr>
<td>Diarrea</td>
<td></td>
</tr>
<tr>
<td>Fiebre</td>
<td></td>
</tr>
<tr>
<td>Huesos rotos</td>
<td></td>
</tr>
<tr>
<td>Accidente (¿qué tipo?)</td>
<td></td>
</tr>
<tr>
<td>Otro (¿cuál?)</td>
<td></td>
</tr>
</tbody>
</table>

39. ¿En qué tiempo del año en la que se enferma más la gente?

40. ¿Ha estado alguien de su familia enfermo o lastimado durante la estación pasada [mencionar la estación del año con más incidencia de enfermedades. No lea las opciones al participante]

<table>
<thead>
<tr>
<th>Enfermedad</th>
<th>Marque si lo escucha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dengue</td>
<td></td>
</tr>
<tr>
<td>Malaria</td>
<td></td>
</tr>
<tr>
<td>Otro (¿cuál?)</td>
<td></td>
</tr>
</tbody>
</table>

41. ¿Hay letrina en la vivienda? No pregunte, solo observe

42. ¿Cómo se manejan los desechos? No pregunte, solo observe

43. ¿Cómo hace usted para que sus hijos estén sanos?

44. ¿Quiénes tienen la suerte de tener los hijos más sanos?

45. ¿Cuál es el mejor alimento para los bebés?
46. ¿Cree usted que el agua puede enfermar a la gente?
   ¿Por qué, cuéntame?

47. ¿Está usted enferma ahora?
   Cuénteme

48. ¿Estuvo usted enferma la estación pasada? [Mencionar aquí la época del año con la incidencia de enfermedades más alta]

Sección F. Actividades Productivas (Temporalidad)
[En esta sección, le voy a hacer preguntas basadas en un calendario que he preparado con ayuda de personas de la comunidad. Este calendario describe las épocas del año en que se más se necesita dinero y también la época del año en que la gente se enferma más].

49. ¿En qué tiempo del año en que usted más necesita dinero

   **Tiempo del Año [basado en el calendario]**

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
</table>

50. ¿Cuáles son las necesidades para las que necesita el dinero?

   **Categoría** | **Marque si lo escucha**
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Agua</td>
</tr>
<tr>
<td>Comida</td>
</tr>
<tr>
<td>Suministros para la agricultura (semillas, fertilizante, equipo de irrigación)</td>
</tr>
<tr>
<td>Salud (medicinas, hospital, doctor)</td>
</tr>
<tr>
<td>Educación (útiles escolares, cuotas, uniformes)</td>
</tr>
<tr>
<td>Suministros de pesca (equipo, gas para la lancha)</td>
</tr>
<tr>
<td>Otro (¿qué?)</td>
</tr>
</tbody>
</table>

51. ¿Cómo hace usted y su familia para conseguir dinero para las siguientes situaciones?
   [Prepare una situación hipotética para cada una de las épocas identificadas en el calendario].
[Marque una o más actividades]

<table>
<thead>
<tr>
<th>Actividad</th>
<th>Entrevistado</th>
<th>Esposo(as)</th>
<th>Niños</th>
<th>Otro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultura</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pesca</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trabaja para alguien en la aldea <em>(indique la actividad)</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trabaja para alguien en otra aldea/pueblo <em>(indique la actividad)</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remesas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Empleado profesional <em>(sueldo)</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negocio propio <em>(hace pan/tortillas, lácteos, huevos, miel, artesanías)</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Otro</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

52. ¿Cuántos animales hay en su casa y quién es el dueño(a)?

<table>
<thead>
<tr>
<th>Animal</th>
<th>¿Cuántos de cada uno?</th>
<th>¿Cuántos de cada uno?</th>
<th>¿Cuántos de cada uno?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>entrevistado</td>
<td>esposo</td>
<td>otro</td>
</tr>
<tr>
<td>Vacas, toros, becerros</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cabras</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pollos, gallinas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gansos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coches</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burros</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caballos, yeguas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Otro</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

53. ¿Cuántos quintales de (cultivo principal) cosechó el año pasado?

54. ¿Cuánta tierra tiene?
55. ¿Cuánta tierra siembra?

56. ¿Su esposa(o) tiene su propia tierra?

57. ¿Se cultiva esa tierra?
   ¿Cuánto?
58. [Observe las siguientes características en la vivienda, para uso familiar únicamente y no con propósitos de negocio]

<table>
<thead>
<tr>
<th>Característica</th>
<th>Marque si aplica</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[Use escala de ranking; 1=buena; 2=promedio= 3=malas condiciones]</td>
</tr>
<tr>
<td>Paredes de concreto</td>
<td></td>
</tr>
<tr>
<td>Espacio para tienda</td>
<td></td>
</tr>
<tr>
<td>Piso no de tierra</td>
<td></td>
</tr>
<tr>
<td>Estufa o comal de gas</td>
<td></td>
</tr>
<tr>
<td>Máquina de coser</td>
<td></td>
</tr>
<tr>
<td>Telar (¿qué tipo?)</td>
<td></td>
</tr>
<tr>
<td>Techo de concreto o de lámina</td>
<td></td>
</tr>
<tr>
<td>Otro (¿cuál?)</td>
<td></td>
</tr>
</tbody>
</table>

59. [Observe los siguientes objetos en la vivienda]

<table>
<thead>
<tr>
<th>Objetos</th>
<th>Marque si aplica</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carro/pick up</td>
<td></td>
</tr>
<tr>
<td>Motocicleta</td>
<td></td>
</tr>
<tr>
<td>Refrigerador</td>
<td></td>
</tr>
<tr>
<td>Teléfono (celular o línea)</td>
<td></td>
</tr>
<tr>
<td>Televisión</td>
<td></td>
</tr>
<tr>
<td>Radio</td>
<td></td>
</tr>
<tr>
<td>Bicicleta</td>
<td></td>
</tr>
<tr>
<td>Otro (¿cuál?)</td>
<td></td>
</tr>
</tbody>
</table>

G. Bienestar

60. ¿Ha cambiado la vida en su aldea?
   ¿Cómo, cuénteme?

61. ¿Cuándo era mejor la vida?
   ¿Por qué, cuénteme?
62. ¿Es feliz usted en esta aldea?
   ¿Por qué no?

63. ¿Dónde cree usted que vivirán sus hijos en el futuro?

64. ¿Se siente seguro(a) en esta aldea?

65. ¿Siente usted que puede tomar sus propias decisiones?

[Muchas gracias por su participación].

Summary of Household Survey (English Version)

Traditional and Local Ecological Knowledge

1. Remind me please.... what is the word for water in your language?
   Are there different words for different types of water (good water, bad water, spring water, rain
   [if rain is mention inquery about hydrological cycle])?

2. Are there any specific beliefs associated with water?
   [If the answer is yes continue here] Tell me about it.

3. Is there more/less water in your community now than before?
   What do you think is the reason?

4. Is the quality of the water in your community now better/worse than before?
   What do you think is the reason?

5. Are there more/less trees in your community now than before?
   What do you think is the reason?

6. Are there more/less fish now in the river/bay where you usually fish than before?
   What do you think is the reason?

7. Are there more/less animals now in your community to haunt than before? [If the manatee is
   mentioned jump to last questions of this section]
   What do you think is the reason?

8. Is the soil of your community now better/worse than before?
   What do you think is the reason?

9. What is the main crop you cultivate?

10. Is there a crop that is cultivated only in this community?
11. What is being used to cook? [Don’t ask this question, just observe]

**Water Use**

12. From where do you get the water for household use?

<table>
<thead>
<tr>
<th>Piped water (individual or communal)</th>
<th>Well</th>
<th>River/Stream</th>
<th>Water spring</th>
<th>Other (from where?)</th>
</tr>
</thead>
</table>

13. [Continue here if question # 14 is piped water] who supplies the piped water?

14. How the water is treated?

15. [Continue here if question is not piped water]. How do you transport the water?

<table>
<thead>
<tr>
<th>Carrying recipients</th>
<th>Other (what)</th>
</tr>
</thead>
</table>

16. How far is the main source of water?

17. How many times do you collect water per day/per week?

18. How difficult is to collect water?

*Tell me about it*

19. What would you do with your time if you did not have to transport water?

20. **Where is water being stored?** [Don’t ask, just observe]

<table>
<thead>
<tr>
<th>Pila</th>
<th>Tinajas</th>
<th>Plastic Container</th>
<th>Other</th>
</tr>
</thead>
</table>

21. **Are water storage recipients covered?** [Don’t ask, just observe]

22. [For both (piped water and other sources)] For how long do you store water before using it?

23. Is water ready to drink or do you do something with the water before drinking it?

<table>
<thead>
<tr>
<th>From the faucet</th>
<th>From the storage recipients</th>
<th>Boiled water</th>
<th>Filtered water</th>
<th>Chloride water</th>
<th>Other</th>
</tr>
</thead>
</table>
24. Where do people bathe? [Don’t ask just observe]

25. Where do your clothes are being washed? [Don’t ask just observe]

26. From where do you obtain water for personal hygiene (such as cleaning your face and brushing your teeth)?

27. What type of water is used to cook? [Don’t ask, just observe]

28. How much water do you use at your home in a normal day?

<table>
<thead>
<tr>
<th>Category</th>
<th>How many?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilas</td>
<td></td>
</tr>
<tr>
<td>Plastic containers</td>
<td></td>
</tr>
<tr>
<td>Tinajas</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

29. Do you buy water?

30. How much do they charge you?

**Ethnicity and Migration History**

31. How long have you lived in this place?

32. In comparison with places where you have lived before, what place do you like the best? *Why?*

33. Where do you live now?

<table>
<thead>
<tr>
<th>Your parent’s house</th>
<th>your husband’s parents</th>
<th>independent</th>
<th>other</th>
</tr>
</thead>
</table>

34. *If respondent do not live with parents, continue here* Where do your parents live?

35. With what group do you identify yourself?

**Demographic data**

36. Household Composition

- Gender
- Relationship with household head
- Age
• Were you born in this community?
• When did you come to this community?
• Years of formal education
• Currently studying?
• Know how to read and write?
• Alive children
• Leadership positions
• Other languages resides native

Health

37. Has anyone in your family been sick or injured [find the most general word in local language] in the past week?

38. What type of illness/injury? [Don’t read options to respondent]

<table>
<thead>
<tr>
<th>Illness</th>
<th>Check if applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colds</td>
<td></td>
</tr>
<tr>
<td>Diarrhea</td>
<td></td>
</tr>
<tr>
<td>Fever</td>
<td></td>
</tr>
<tr>
<td>Broken bones</td>
<td></td>
</tr>
<tr>
<td>Accident (which type)</td>
<td></td>
</tr>
<tr>
<td>Other (what)</td>
<td></td>
</tr>
</tbody>
</table>

39. What about the past wet season [verify what is the season with more illness incidence]? [Don’t read options to respondent]

<table>
<thead>
<tr>
<th>Illness</th>
<th>Check if applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dengue</td>
<td></td>
</tr>
<tr>
<td>Malaria</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

40. Is there a latrine in the household? [Don’t ask just observe]

41. How sewage water is being disposed? [Don’t ask just observe]

42. What do you do to keep your children healthy?

43. Who is lucky enough to have the healthiest children?

44. What is the best way to feed infants?
45. Do you think that water can make people sick?  
*Why? Tell me about it*

46. Are you sick now?

47. Were you sick the past wet season? *[verify what is the season with more illness incidence]*

**Wealth and Productive Activities (Seasonality)**  
*In this section, questions will be asked based on a calendar prepared with opinions of key informants. This calendar will describe the seasons in which cash is needed the most as well as when illness incidence is the highest.*

48. In what season do you need cash the most and what are the necessities for which you need the money?

*Fill out both charts simultaneously*

<table>
<thead>
<tr>
<th>Category</th>
<th>Check if Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td></td>
</tr>
<tr>
<td>Food</td>
<td></td>
</tr>
<tr>
<td>Agriculture inputs (seeds, fertilizer, irrigation equipment)</td>
<td></td>
</tr>
<tr>
<td>Health (medicines, hospital, doctor)</td>
<td></td>
</tr>
<tr>
<td>Education (school supplies, fees, uniforms)</td>
<td></td>
</tr>
<tr>
<td>Fishing inputs (equipment, gas for the boat)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Season [based on calendar]</th>
<th>Category [from above]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

49. How do you save up money needed in the future for each of the seasons? *[Structure a hypothetical situation for each season identified in the calendar exercise.]*
[Mark one or more of the following activities]

<table>
<thead>
<tr>
<th>Activity</th>
<th>Interviewee</th>
<th>Spouse</th>
<th>Children</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fishing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wage work in the village</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(indicate what)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wage work outside the village</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(indicate what)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remittances</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional employers (sueldo)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business self-employment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(baking, milk, cheese, honey,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>domestic services, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[Mark the technology/instruments currently used the previous activities]

50. How many of the following animals are there in your household and who is the owner?

<table>
<thead>
<tr>
<th>Animal</th>
<th>How many of each?</th>
<th>How many of each?</th>
<th>How many of each?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interviewee</td>
<td>Spouse</td>
<td>Other</td>
</tr>
<tr>
<td>Cows, bulls,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goats</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chicken</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ducks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geese</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hogs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hogs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Donkey</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

51. How many 100 pounds (quintales) of your main crop did you harvest last year?
52. How much land do you own?
53. How much land do you cultivate?
54. Does your spouse own his/her own land?
55. Is that land being cultivated?
   How much?
56. **[Observe the following characteristics of the household]**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Check if applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete walls</td>
<td></td>
</tr>
<tr>
<td>Space for tienda</td>
<td></td>
</tr>
<tr>
<td>Concrete floor</td>
<td></td>
</tr>
<tr>
<td>Gas stove or gas comal</td>
<td></td>
</tr>
<tr>
<td>Sewing machine</td>
<td></td>
</tr>
<tr>
<td>Loom (what type)</td>
<td></td>
</tr>
<tr>
<td>Concrete or zinc roof</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

57. **[Observe the following items in household]**

<table>
<thead>
<tr>
<th>Item</th>
<th>Check if applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car or pick up truck</td>
<td></td>
</tr>
<tr>
<td>Motorcycle</td>
<td></td>
</tr>
<tr>
<td>Refrigerator</td>
<td></td>
</tr>
<tr>
<td>Telephone (cellular or land line)</td>
<td></td>
</tr>
<tr>
<td>Television</td>
<td></td>
</tr>
<tr>
<td>Radio</td>
<td></td>
</tr>
<tr>
<td>Bicycle</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

**Wellbeing**

58. Has life in your village changed over the past years?
   *How? Tell me about it.*
59. When was life better?
   *Why?*
60. Are you happy in this community?
   *Why?*
61. Where do you think your children will live in the future?
62. Do you feel safe here?
63. Do you feel you can make your own decisions?

*[Thank you very much for your participation]*
LIST OF REFERENCES


