Examining "Willingness to Participate" in Community-Based Water Resources Management in a Transboundary Conservation Area in Central America

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Authorization to Submit Thesis

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Abstract

Community-based management (CBM) continues to expand as the amount of global natural resources diminishes. Often, CBM institutions do not lead to equitable access or sustainable resource use. Instead, addressing factors that motivate participation in CBM should be viewed as fundamental in effective and fair management practices. This study's primary objective was to investigate the drivers that motivate willingness to participate (WTP) in CBM, of water resources, in the Trifinio region of Central America. Literature on participatory management suggests five overarching constructs influence WTP: (1) sense of community (SOC), (2) water dependency, (3) perceptions of current water management (MANAGED WELL), (4) locus of authority, and (5) socio-economic variables. Household surveys collected data on these constructs from 62 households in Guatemala and Honduras in summer 2015. Multivariate regression models using these predictors explain 30% to 55% of the variance in WTP ($p \leq .05$). SOC was the most robust predictor of WTP (β=.455, $p \leq .01$), with MANAGED WELL and ownership of high value assets (e.g., vehicle) contributing to the model's predictive power. Based on the results of this research, I recommend enhancing social connections in local communities and nesting CBM programmatic design into municipal level governance to enhance efforts to establish water specific CBM institutions within Trifinio.

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Dedication

This thesis is dedicated to the wonderful supporting individuals in my life. First I'd like to thank my brother, mother, and father who always have supported my pursuits and encouraged me to always follow my passions to lead a full and vigorous life. Second, I dedicate this thesis to my furry cat companions who love me without condition. Finally, I'd like to recognize my remarkably patient and dedicated partner, Ben, who is always good, giving, and game for new experiences. Truly, any accomplishments without their encouragement would seem empty.

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Important Acronyms

Community based natural resource management (CBM)

Community based water resource management (CBWRM)

Exploratory factor analysis (EFA)

Millennium Ecosystem Assessment (MA)

Non-governmental organization (NGO)

University of Idaho (UI)

Trifinio Commission (TC)

Tri-National Water Agenda (TNWA)

Tropical Agricultural Research and Higher Education Institute (Spanish acronym CATIE)

Willingness to participate (WTP)

CHAPTER ONE: Introduction and Overview

In the last decade, environmental sustainability has taken on a larger role in political debates and natural resource management discussions. Specifically, the quantity and quality of water represent an urgent global concern. One of the most obvious sources of freshwater system degradation is deforestation, which pollutes waterways through increased sediment levels (Elias & Taylor, 2008; Nelson & Chomitz, 2006), and changes hydrologic regimes (i.e., the quantity and timing of available water) (Nelson & Chomitz, 2006; Spillman, Webster, Humberto, Waite, & Buckalew, 2000). From 1990 to 2000, approximately 4.2% of all global forested lands were lost; the world's tropical regions bore the brunt of the loss estimated at 7.8% (Mather, 2003). This rate of deforestation is unprecedented and has a direct effect on the state of freshwater ecosystems (MA, 2005).

To protect necessary ecosystems from further decline substantial research efforts are underway to generate new management and policy models. However, *how* to best manage public land and its natural resources is an issue that is constantly evolving and changing. Balancing the needs of many stakeholders requires constant attention in management models. Elinor Ostrom, winner of the 2009 Nobel Prize in Economics, stated that "the issues of how best to govern natural resources used by many individuals in common are no more settled in academia than in the world of politics" (Ostrom, 2009, p.1).

In the context of developing nations, the degradation of forest and water systems is prevalent. These changes in resource availability and land cover are primarily a result of agricultural or urban expansion (Tengberg et al., 2012). Within this predicament,

variety exists in determining the best practices to ensure maximum conservation of valuable natural resources while balancing the needs of populations who directly depend on those same ecosystems for well-being and survival.

One prevalent approach to this complex problem is involving the public in decision-making processes through participatory mechanisms. One of the more popular methods is referred to as "integrated management," because public perspectives are integrated within policy decisions that occur within governmental management institutions. Often, this is accomplished through community-based management (CBM) practices, where communities are tasked with managing a given natural resource at the local level. Local populations have a more vested interest in the sustainable use of natural resources than other institutions who do not directly rely on those same resources, which forms the base theoretical reasoning for such practices (Brosius, Tsing, & Zerner, 1998).

Integrated management of natural resources has been widely applied to a variety of locations globally such as England (Dougill et al., 2006), Central America (Green & Daoust, 2012), Brazil (Perkins, 2011) and Vietnam (Petheram & Campbell, 2010). Such management models have shown to increase the success of conservation efforts (Heathcote, 2009; Lee et al., 1992; Reed, 2008). In a literature review of participatory management, Reed (2008) stated that by examining local interests and concerns as early as permissible "it may be possible to inform project design with a variety of ideas and perspectives, and in this way increase the likelihood that local needs and priorities are successfully met" (p. 2420).

Despite increasing popularity of coupling government and community level

management into integrated CBM structures, there is a distinct lack of critical analysis that identifies factors that motivate people's willingness and ability to participate in such decentralization (Zanetell & Knuth, 2004). Understanding why people participate in such processes is not only an important academic inquiry, but also provides vital information to programs designed to decentralize natural resource management. Once factors that influence people's willingness to participate (WTP) are identified, policy-makers can better understand how and under what conditions local participation may be enhanced (Drijver, 1991).

Within the Trifinio Region, a transboundary watershed conservation area located in Central America, the local management agency, the Trifinio Commission (TC), aims to engage local communities in integrated water management across the region. Within this region, water has been declared a public good (Ministerio Federal de Cooperación Económica y Desarrollo, 2011; Franklin, Tither, et al., 2005), and is, thus, a common pool resource (CPR) being shared across three borders: Guatemala, Honduras, and El Salvador. However, the execution of integrated water resource management models is in its infancy, and has yet to be implemented at a regional scale (Green & Daoust, 2012).

Because the Trifinio Region has yet to fully implement an integrated management model, there is an opportunity to assess important household-level factors that contribute to individual WTP in integrated management models at the community level via community-based water resource management (CBWRM) programs. Examining what factors contribute to an individual's WTP in the decentralization of water resources management is a pragmatic approach to understanding the drivers behind individual motivation to participate in CBWRM. Accordingly, the *guiding research*

question for this thesis is: *What factors influence rural farmers' WTP in CBWRM practices in an international transboundary watershed?*

This question is explored throughout the rest of this thesis document. I discuss the theoretical foundations, methodology, and results of this study conducted using a mixed methods design (Creswell, 2009). Data collection took place in the summer of 2014, in five villages in the Trifinio Region (n=62). The information collected in this study contributes to the emerging body of literature on the individual drivers that contribute to WTP in CBM, providing empirical knowledge on the factors to consider when implementing integrated management models. By exploring WTP, this study contributes to understanding the drivers that influence WTP in a widely understudied type of resource, freshwater systems. Thus, this study aids in the continued effort to identify features that may increase the likelihood of sustained community engagement in natural resource management. These results contribute to the scholarly literature on the theoretical constructs of WTP models. Additionally, findings from this research are being shared with local partners in Trifinio to apply to continued efforts to decentralize water resource management in the Trifinio Region.

CHAPTER TWO: Justification & Theoretical Foundations

2.1 Participatory Management in Modern Literature

According to Heathcote (2009), many water management strategies have been unsuccessful, in part, because they fail to integrate the "full range of values and perspectives present among water users or agencies" (p. 11). Because of such failed strategies, participation by local communities in broader natural resource management institutions has become increasingly more popular and preferred over traditional protectionist styles of governance (Coulibaly-Lingani, Savadogo, Tigabu, & Oden, 2011; Shackleton, Campbell, Wollenberg, & Edmunds, 2002). This participatory mechanism is often called *integrated management*. The central tenant behind this strategy is simple: providing communities with the ability to collectively manage their local resources *should* increase the likelihood that those resources will be utilized in a sustainable manner as well as increase the likelihood that the needs of rural populations will be met (Blaikie, 2006; Heathcote, 2009).

There has been an increase in the number of campaigns to decentralize natural resource management in developing nations starting around the 1990s (Blaikie, 2006), but this approach is still a relatively new concept in watershed management (Heathcote, 2009). Yet, the need for integrated watershed management has become urgent. This is the case especially in international river basins because freshwater systems are degrading and there is a lack of cooperation in managing such shared resources (Heathcote, 2009).

One method in which integrated management has been implemented in developing countries is through establishing CBM institutions to partner with national

level governments. Often, communities in developing nations already have a management structure, though it may be informal. Government involvement in CBM practices varies depending on the country and location. Local management institutions are implemented in places where communities are managing CPRs, which range from shared agricultural landscapes, to community forests, to ocean-based fisheries, to fresh water systems. Globally, it is widely known that these systems are in decline or being damaged (MA, 2005). In the literature, there are often two common causes cited that lead to the degradation of CPRs: (1) the tragedy of the commons philosophy and (2) trust in others to follow regulations regarding the CPR in question (Hardin, 1968; Ostrom, 2010).

First, Hardin's (1968) foundational work, "The Tragedy of the Commons," outlines how common goods (i.e., CPRs) are in danger of being depleted by individuals in competition with one another because natural resources are limited and world population continues to grow (Hardin, 1968; Lundgren, 1999). Within this work, Hardin (1968) predicted that all commonly managed resources would inevitably end in depletion as long as population and open access to resources continued to grow unchecked. This philosophy encouraged privatization and regulations among shared spaces, while discouraging collaborative management of common resources (Anderson-White & Ford-Runge, 1995; Hardin, 1968). He argued "freedom in commons brings ruin to all" (Hardin, 1968, p. 1244).

The second common reason for CPR degradation is the inherent tendency of groups of people to mistrust the actions of others (Baland & Platteau, 1996; Garande & Dagg, 2005). Hence, people act in accordance with what will be most beneficial at the

individual or community level. Within the literature, individual trust and reputation within communities plays a significant role in any collectively managed resource (Ostrom, 2010). This relationship can also be applied to communities and governing agencies and/or non-governmental organizations (NGOs) (Dyer et al., 2014; Garande & Dagg, 2005; Petheram & Campbell, 2010). In order to manage CPRs effectively and fairly, there must be an inherent trust and past experiences of cooperation within a community (Agrawal, 2002; Baland & Platteau, 1996). This trust and community cohesiveness is often referred to as *social capital*.

Because of these common problems in CPR management, it is important to more closely examine some examples of CBM. Although the occurrence of participatory management practices are growing, the prevalence of failed attempts to establish fair and effective practices cannot be ignored (Table 1) (Araral, 2009; Kamoto, Clarkson, Dorward, & Shepherd, 2013; Ravnborg, 2008). According to Reed (2008), there is a "growing concern that stakeholder participation is not living up to many of the claims that are being made" (p. 2420).

Table 1: Examples of failed integrated community-based management institutions.

Failed CBM Institutions	Reasons for Failure
Malawi: after the 1997 Forest Act moved to a participatory structure in communities, village forest areas were generally reduced (Kamoto et al., 2013).	1. Corruption 2. Not involving *all* of the various stakeholder groups
Nicaragua: forest guards controlled who could cut down trees in the local tropical forest. When the people within the forest guards changed, new community actors were in charge of monitoring forest usage, which ultimately impacted fair access to the forest (Ravnborg, 2008).	1. Corruption 2. Inequity of resource access arose from a lack of fair monitoring
Philippines: annual irrigation fees throughout the country's 196 public irrigation systems were largely unpaid (43%) in 2002 (Araral, 2009)	1. Wealth disparities in communities 2. Corruption from ineffective enforcement of fee collection (government)

One of the common themes within failed CBM institutions is corruption (Blaikie, 2006; Kamoto et al., 2013; Ravnborg, 2008). This common finding relates to the previous discussion of how trust between individuals, and within communities, is an important component of successful CBM regimes. In short, where there is inequity in access, decision-making, and involvement within a CPR, corruption or exclusion become prevalent.

Additionally, heterogeneity within communities (e.g., wealth disparities, varied ethnic groups, etc.) also negatively impact CBM (Araral, 2009; Ravnborg, 2008). In order to address heterogeneity and corruption, increased face-to-face interactions and small-scale programs and/or discussions designed to enhance trust are frequently recommended. In contrast, factors important for successful CBM institutions include trust, shared cultural beliefs, and community cohesiveness (Table 2) (Dyer et al., 2014; Measham & Lumbasi, 2013; Ostrom, 2010).

Table 2: Examples of successful integrated CBM institutions.

Successful CBM Institutions	Reasons for Success
Democratic Republic of the Congo: conservation-based agricultural practices initiated by an outside agency successfully started a small-scale community-based business selling vegetables (Dyer et al., 2014).	1. Local involvement and empowerment 2. Trust between participants 3. Equity in access, work, and rewards
Kenya: the Ijara community voluntarily formed and now successfully manages the "Ishaqbini Hirola Community Conservancy" to protect the endangered hirola antelope (Measham & Lumbasi, 2013).	1. Collective action motivated by community 2. Cultural and spiritual ties to antelope
163 forests were examined in *13 countries including Guatemala and Honduras*. This large-scale study demonstrated that locations where communities are allowed to make rules regarding forest usage strongly correlated with vegetation density, suggesting that integrated management is important in forest conservation efforts (Hayes, 2006).	1. Community involvement rule establishment 2. Monitoring of forested systems

Although one can infer several patterns within successful CBM institutions, assessing each community individually is a necessary step because there is no "blanket"

approach to successful management (Heathcote, 2009; Zanetell & Knuth, 2004). Hence, the growing interest in CBM strategies should incorporate evaluation of its feasibility within specific communities and regions. Zanetell and Knuth (2004) suggested that an essential element of that feasibility evaluation is assessing the willingness of local community members to participate in management of local and regional natural resources prior to any programmatic interventions.

2.2 Willingness to Participate Theoretical Model

CBM relies on continued participation of stakeholders who manage CPRs for their individual community as well as regional well-being (Zanetell & Knuth, 2004). As discussed previously, there is a abundance of research on features of successful CBM institutions (Agrawal, 2002; Araral, 2009; Ostrom, 1990). While such research illuminates the characteristics of successful CPR management, it does not address the underlying factors that motivate *why* people are or are not WTP in such programs.

For this study, WTP is defined as an individual's interest and disposition towards contributing to future CBWRM initiatives. Within participatory management research, there has been a call for and movement towards assessing what factors influence people's WTP in CBM practices (Coulibaly-Lingani et al., 2011; Dyer et al., 2014; Zanetell & Knuth, 2004). By furthering community level research of WTP, we can continue to identify features that may increase the likelihood of significant community engagement in CPR management.

There is no single theoretical model when examining WTP in CBM. In part, this is because various types of CPRs all need management strategies specific to each community. Much of the literature focuses on WTP in community forests and fisheries,

not on water resources. While forests and fishery resources are tangible entities that can be counted and collected by users, water resources may be more difficult for individuals to observe and form perceptions on degradation. Thus, while most of the previous WTP models focus on forests and fisheries, there is a need to alter certain constructs to be specific to water systems. Figure 1 presents the theoretical model of WTP in CBWRM used in this thesis based on an extensive literature review on WTP constructs.

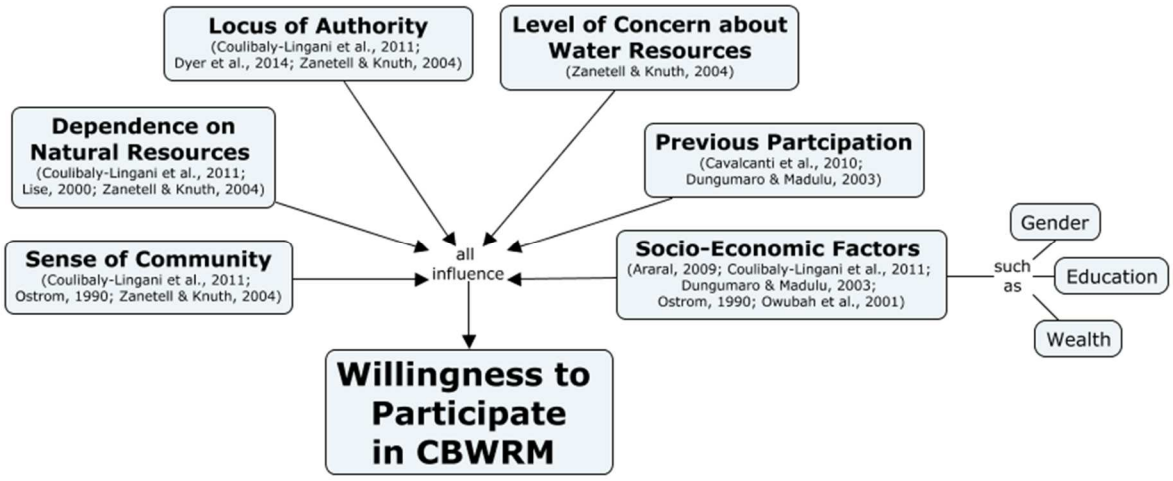

Figure 1: Summary of the willingness to participate in community-based water resource management theoretical model. There are six overarching factors that influence willingness to participate: (1) sense of community (positive relationship with WTP), (2) dependence of water resources (positive), (3) locus of authority (dependent on management at the local level), (4) level of concern about water resources (negative), (5) previous participation in initiatives (positive or negative), and (6) various socio-economic variables (positive or negative).

I hypothesize that six over-arching constructs are responsible for an individual's WTP in future CBWRM initiatives: (1) sense of community; (2) dependence on water resources; (3) locus of authority; (4) level of concern about water resource; (5) previous participation in other initiatives or programs; and (6) various socio-economic factors (i.e., gender, education level, and wealth). Additionally, consult Table 3 for a reference of variable definitions and code names. The remainder of this chapter discusses each of these constructs in more depth.

Sense of community. First, in rural community settings, there is an inherent reliance on, and bond between community members (Hay, 2009). These bonds have been called many names in different factions of social science and international development research. The most salient term within the literature is *social capital*, which classically is referred to as "the system of networks, norms, and trust relationships that enable communities to address common concerns" (Pronyk et al., 2008, p. 1560).

Within the literature, sense of community (SOC) and social capital are often described similarly, but are often recognized as two different constructs. Although different disciplines of social science operationalize social capital differently, most share the central idea that social connections have value. Arguably, SOC and social capital are related concepts that give value to social connections among groups of people (Perkins & Long, 2002). Within this study use the term SOC instead of *social capital* because previous participatory studies used SOC (e.g., Coulibaly-Lingani et al., 2011; Zanetell & Knuth, 2004), and high levels of SOC have been observed to aid in preparing and organizing social interventions at the community level (Buckner, 1988). Thus, within this study these social bonds will be referred to as SOC, which will be defined as the inherent level of trust, belongingness, and community established through living and working in shared spaces.

In modern research in international development, social bonds "are now viewed as important assets" (Meinzen-Dick, DiGregorio, & McCarthy, 2004, p. 202). Social bonds and connections within a community have shown to be a significant aspect in shaping individual participation in biodiversity conservation (Pretty, 2003), fisheries

management (Zanetell & Knuth, 2004), and forest management (Coulibaly-Lingani et al., 2011). Based on these previous findings, I hypothesize that SOC will positively influence WTP in CBWRM.

Dependence on water resources. Second, dependence on a natural resources has shown to influence an individual's WTP in CBM (Coulibaly-Lingani et al., 2011; Lise, 2000; Zanetell & Knuth, 2004). As mentioned above, modifying constructs slightly is required to understand WTP in community-based *water* resources management. For this study, the definition of *dependence on water resources* has been modified from the definition of dependence on landscapes posited by Raymond, Brown, & Weber (2010); and, thus, is be defined as: the functional connection based specifically on individual physical and emotional connection to water resources. This variable is referred to as DEPEND throughout the rest of this thesis. In the Trifinio Region, agricultural practices are the primary source of economic livelihood and means of subsistence (López, 2004). Hence, I hypothesize that DEPEND will positively influence WTP in CBWRM.

Locus of authority. Third, it is important to understand at what level management authority is preferred. The *locus of authority* (LOC) construct has shown to be an important factor within the participatory literature (Dyer et al., 2014; Zanetell & Knuth, 2004). This construct typically considers three levels of management preference: (1) government, (2) community, and (3) individual/family. Dyer et al. (2014) concluded that if individuals prefer to manage at the local level, rather than the government level, they were more likely to participate in forest management. They suggested that this phenomenon is most likely due to having a sense of ownership in decision-making within the community forests. Thus, if communities in Trifinio report a desire to manage

locally (i.e., family and/or community level), their corresponding WTP should be positively correlated. I hypothesize that respondents will prefer local level governance to a more centralized management structure because literature on integrated management suggests that people want to help manage shared spaces (Heathcote, 2009).

Level of concern about water resources. Fourth, Zanetell and Knuth (2004) demonstrated that a concern for local fisheries was a significant factor in their WTP model. Interestingly, their study revealed that a high level of concern for the fisheries in Venezuela had a negative relationship with WTP in fisheries management. They attribute this result to a "defeatist attitude," where people with high levels of concern believed that no intervention could solve the problems with the fisheries. This is an important construct to consider because of its initial puzzling relationship with WTP, and warrants further exploration within WTP studies. The term CONCERN indicates this variable throughout the rest of this thesis. I hypothesize that CONCERN will negatively impact WTP because of Zanetell and Knuth's (2004) findings.

Previous participation in other initiatives or programs. Fifth, Cavalcanti, Schläpfer, and Schmid (2010) demonstrated that previous participation in other programs or initiatives was an important indicator of WTP in future programs. A field experiment in fishing communities in Brazil revealed that fishermen who took part in previous participatory practices were more likely to participate in subsequent participatory programs (Cavalcanti et al., 2010). Despite this study's result that previous participation in management initiatives can influence future WTP, it is not often investigated within the literature. Theoretically, this construct could influence WTP

positively, as with the Brazilian fisheries example, or negatively depending on how well previous participation initiatives were facilitated and received within communities. The term PARTICIPATION indicates this variable throughout the rest of this document. I hypothesize that previous participation will positively contribute to WTP if previous participatory experiences were positive.

Socio-economic indicators. Several studies cite the importance of socio-economic variables in participatory management. Agrawal (2002) and Dungumaro and Madulu (2003) noted that heterogeneity in wealth influenced participation in CPR management programs. As discussed above, heterogeneity within communities can be a source of failed CBM institutions. One of the primary places in which heterogeneity can be observed is wealth, which makes it an important construct to measure within this model. The term WEALTH is used to refer to the wealth variable for the remainder of this thesis; I hypothesize that WEALTH will negatively impact WTP because issues of heterogeneity among other community members.

Additionally, the level of education received is a widely recognized construct, which impacts participation (Coulibaly-Lingani et al., 2011; Dungumaro & Madulu, 2003; Lise, 2000). Generally, as education levels increase, the more likely people are to participate in CBM. Education is an important variable within most international development research, making it an important factor to consider in this study. The term EDUCATION refers to level of education throughout the rest of this thesis. I hypothesize that EDUCATION will positively impact WTP because level of education frequently enhances awareness of local issues. Finally, it has been demonstrated that gender is an important indicator of participation because, in most places, men are considered the

"decision-makers" leaving women to tend to household and family matters (Dungumaro & Madulu, 2003; Lise, 2000). This social inequity towards women is frequently cited within international development research and campaigns, and is thus an important factor to consider within this study. The word GENDER refers to the gender variable throughout the rest of this thesis.

Table 3: Description of study variables

Variable	Abbreviation	Definition
Willingness to Participate	WTP	An individual's interest and disposition towards contributing to future community-based water resource management initiatives.
Sense of Community	SOC	The inherent level of trust, belongingness, and community established through living and working in shared spaces
Dependence on Water Resources	DEPEND	The functional connection based specifically on individual physical and emotional connection to water resources.
Locus of Authority	LOC	The preferred level that water resources management initiatives should occur.
Level of Concern about Water Resources	CONCERN	The reported level of concern regarding the current state of water resources at the community level.
Previous Participation in other Programs	PARTICIPATION	Identifies whether respondents had previously participated in any other programs or initiatives
Wealth Indicators	WEALTH	Asset measures: Car, motorcycle, horses, chainsaw, internet, electricity, cell phones, TV, chickens, goats, machetes, scythes
Gender	GENDER	Male or female
Level of Education	EDUCATION	Level of formal education completed

In summary, examining WTP is an important step in considering whether CBM practices are an appropriate mechanism for natural resource management in developing nations. Based on the literature, six overarching constructs should, theoretically, influence individual WTP in CBWRM: (1) SOC, (2) DEPEND, (3) LOC, (4) CONCERN, (5) PARTICIPATION, and (6) socio-economic variables (WEALTH, GENDER, EDUCATION).

CHAPTER THREE: The Trifinio Region

The shared borders of Honduras, El Salvador, and Guatemala characterize the Trifinio Region, making it unique in terms of the transboundary governance of natural resources (Figure 2). This region is considered to be an area rich with biodiversity and water resources (EDE Consulting GmbH, 2009; Franklin, et al., 2005; Green, 2012; Ministerio Federal de Cooperación Económica y Desarrollo, 2011). This region is a critical watershed for all three countries, and through this enormous watershed flows the Lempa River, which is 422 kilometers in length. The Trifinio Region encompasses the upper portion of the Lempa River watershed totaling 7.5 thousand square kilometers (Artiga, 2003). The Trifinio Region is estimated to have a total of three thousand species of plants, 300 species of birds, 90 species of mammals and 55 species of amphibians and reptiles (Ministerio Federal de Cooperación Económica y Desarrollo, 2011).

Figure 2: The Lempa River Basin in Central America
(Source: López, 2004).

3.1 The Human Component

Natural resources are increasingly under stress as the population in Trifinio continues to increase. In 2000, the region's population was estimated at approximately 670 thousand inhabitants, 70% of which lived in rural areas (Artiga, 2003). Of those populations that dwell in rural areas about 408 thousand are living in poverty. In this case, poverty is measured as per capita annual income less than 550.2 US dollars (approximately $1.50 per day) (Nelson & Chomitz, 2006). Population growth rates for the region are high, estimated at 1.6-3% per year (López, 2004), which is roughly an increase of 10 to 20 thousand people per year.

Agricultural production and tourism are the main economic activities in Trifinio (López, 2004). Agricultural production occurs primarily through small, single-family plots of about five hectares, and most of this land is devoted to subsistence crops (i.e., corn and beans) and coffee for commercial purposes (see Figure 3) (Ministerio Federal de Cooperación Económica y Desarrollo, 2011).

Figure 3: An example of a single-family farm plot, growing beans, corn, and bananas for subsistence.

3.2 Environmental Issues

One of the primary problems in Trifinio is water quality, which has degraded for a variety of reasons. First, high rates of deforestation occurring in the region lead to increased sediment loading (Clemente & Hernandez, 2010; Nelson & Chomitz, 2006). The removal of vegetation, whether for agriculture, fuel, or cattle, alters the normal hydrologic regime. Often, deforestation increases the amount of water entering a stream or river during precipitation, which leads to increased and faster runoff of rainfall, and less soil infiltration (Nelson & Chomitz, 2006). These increased water runoff trends change water levels and peak discharge rates (Spillman et al., 2000), as well as reduce the overall amount of water available during the dry seasons (Nelson & Chomitz, 2006). Deforestation of the area also releases sequestered carbon dioxide, which is a known contributor to increased global temperatures. See Figure 4 for examples of deforestation and contaminated water sources.

A. **B.**

Figure 4: Examples of A: deforestation and B: contaminated water.

Second, agricultural runoff in rural areas increases the amount of fertilizers and stock fecal matter entering waterways (Ministerio Federal de Cooperación Económica y Desarrollo, 2011; Spillman et al., 2000). Finally, poor sanitation practices regarding

clothes washing, hygienic practices, and raw sewage all diminish water quality to below what is considered allowable for human consumption in many areas (Ministerio Federal de Cooperación Económica y Desarrollo, 2011). The relationships between water quantity, quality, and deforestation are summarized in Figure 5.

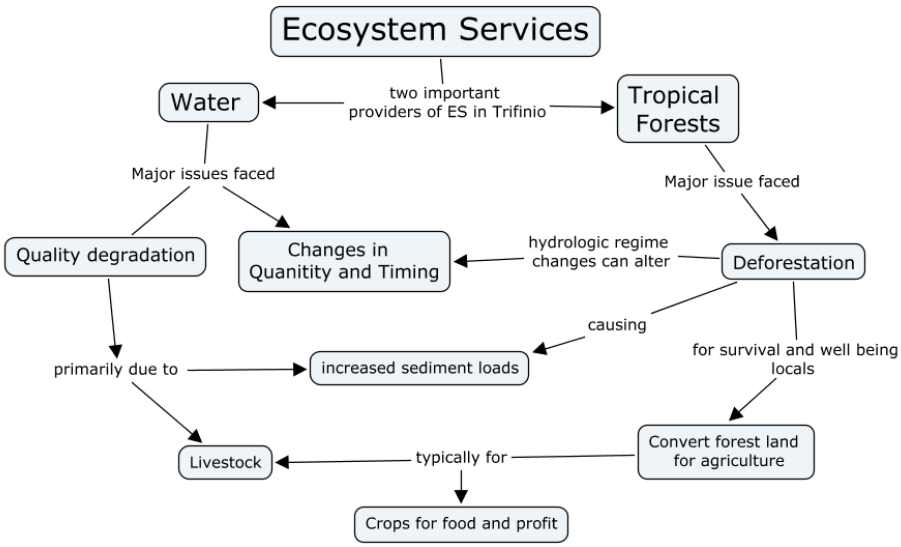

Figure 5: Summary of relationships between water related ecosystem services, deforestation, economic livelihood, and well-being.

3.3 Management of Trifinio's Natural Resources

The TC is responsible for natural resource management of the Trifinio Region. Recently, the TC declared the area as "one indivisible ecological region that should be managed by all three countries" (Elias & Taylor, 2008, p. 7). The TC is led by the vice presidents of all three countries, and an executive board (Artiga, 2003).

The Tri-National Water Agenda (TNWA), which was overseen by the TC, highlights management priorities, such as preserving watershed ecosystem services by specifically addressing water conservation and avoiding deforestation (Buch, Hernández-Vela, Jiménez, & Orellana, 2009). The TNWA also identified six broad categories for the improvement of water related ES (Table 4). This study provides useful

information to help in meeting the first objective within the TNWA.

Objective 1 focuses on governance and citizen participation in creating integrated management models for water resources in the region. It identifies the need for water resource management and development at different societal levels. The TNWA recognizes that the ways in which water resources are governed have important implications within international, national, regional, and local settings. Furthermore, the TNWA discusses the need for synchronized management efforts among these societal levels (Buch et al., 2009).

One of the specific goals discussed within this broad objective is to promote the construction of integrated management models of water resources starting from local experiences (i.e., CBWRM). Therefore, research that focuses on local perspectives of water resources and WTP in integrated management models is an important phase in the process of water governance decentralization in the region.

Historically, natural resource management in Trifinio utilized a top-down approach similar to the method that resource management agencies in the US used from 1900 to 1960 (Johnson, 2000), with some success (Artiga, 2003). For example, 49 thousand hectares of forest species for firewood, lumber, and river basin protection have been replanted since the start of the Trifinio Plan (López, 2004).

Interestingly, although reforestation campaigns were a common project, water conservation was not a part of the overall goals during the early years of resource management in the area (Artiga, 2003; López, 2004), which was one of its primary criticisms. However, the contemporary execution of water and forest conservation in Trifinio is slowly being transformed into a bottom-up structure that emphasizes

regional integration (Buch et al., 2009; Trifinio Comisión, 2011). Primarily, this is occurring via participation and input of local stakeholders in managing various small-scale watersheds. This is an important step toward integrated management of natural resources.

Table 4: List and descriptions of the six categories identified by TC for the improvement of water related ecosystem services (Source: Buch et al., 2009).

1.	**Governance and citizen participation**	This objective includes three parts: (1) participative improvement of a legal political framework and its application (2) strengthening of technical and operative abilities of public, private, and civil society's entities for the management of water resources, and (3) ensuring that various public and private stakeholder opinions are weighed fairly.
2.	**Coverage of access and sustainability for potable water and sanitation**	Identifying the current demands and estimate future ones is required to promote the coverage expansion of potable water and sanitation, ensuring the quality of water, its potability, and management of the effluent discharges.
3.	**Management of natural resources for the protection and restoration of water**	Reduce the threats of life and health in people, prevent harm to the goods, and make possible the reuse of water according to its quality. With emphasis on the water basin, the aim is to organize the protection and restoration of the areas with forest cover with the purpose of forest management and regulation of the water cycle.
4.	**Management of water resource knowledge**	This approach aims to provide key, precise, and timely information to the management of water resources. The information will be actualized and projected long-term, including biophysical variables such as water balance, as well as social variables such as the characterization of the supply and demand of water.
5.	**Promote the use of sustainable water resources**	This objective intends to promote the sustainable use of the water resource through the study of balances and water budget of the Trifinio Region, that allow the use of water as an ally in the fight against poverty, especially for the Guatemalan and Honduran population.
6.	**Economic, environmental, social and cultural appraisal of water**	The integrated management of water requires a perspective that visualizes its economical, social, environmental, and cultural value. Hence it becomes necessary to define the necessary tools and mechanisms that promote the protection, conservations, and rational use of this vital resource and its relationship to the forest. Thus, cultural, environmental, and social appraisals of water are required.

3.4 Surveyed Communities

The survey for this research (described in Chapter Four) was implemented in 62 households in five villages (Figure 6). Data collection took place in three communities in Guatemala: (1) Veguitas, (2) La Libertad, and (3) La Majada, and in two communities in the Copan Ruines Department of Honduras: (1) Sesesmil and (2) Nueva Estanzuela (Figure 7). For more detailed information and community descriptions, consult Section 5.1, or Appendix B. No villages were sampled in El Salvador due to time constraints.

Figure 6: An example of a respondent, with other family members present.

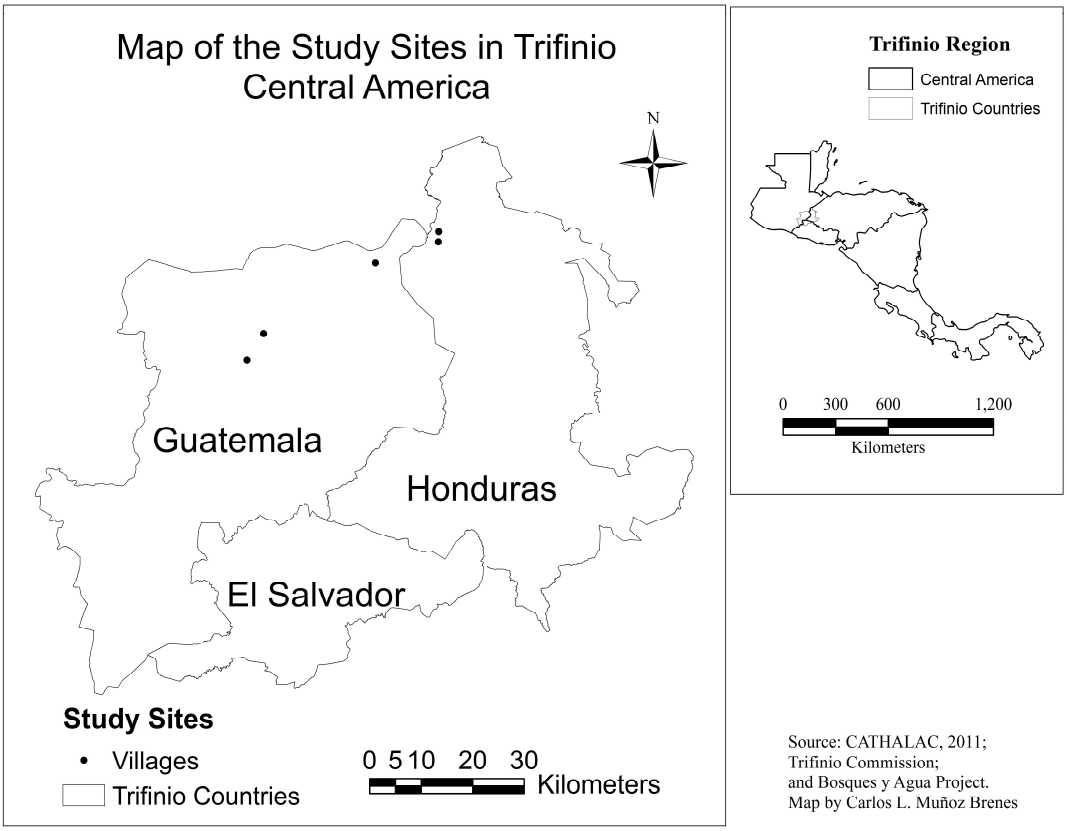

Figure 7: Map of the sampled communities.

3.5 Synthesis

The Trifinio Region holds a wealth of forests, water resources, and biodiversity (EDE Consulting GmbH, 2009; Franklin, et al., 2005; Green, 2012; Ministerio Federal de Cooperación Económica y Desarrollo, 2011). Management practices in this region are slowly changing to a bottom-up integrated management model, which requires some restructuring of the existing tri-national management organization (Buch et al., 2009). These decentralization efforts are focusing on enhancing community involvement in managing water resources at the local level. Such changes in management practices need to consider the perspectives, concerns, and knowledge of the rural populations they plan to engage in new integrated management models.

CHAPTER FOUR: Methods

It is well recognized that mixed methodology is important when conducting research in an international development setting (Perecman & Curran, 2006). Research designs, which include both quantitative and qualitative methods, broaden understanding of the study location and context (Creswell, 2009). By employing a mixed methods design, this study includes multiple perspectives on water resources and their management, and, thus, elaborates on quantitative findings. For this study, a household survey was designed to collect qualitative and quantitative data on WTP constructs, and the current perceptions of the state of water resources and their resources.

Quantitative analysis of the constructs in the WTP theoretical model provided data for understanding the statistically significant predictors of WTP for rural farmers in the Trifinio Region within multiple regression models (see Results Section 5.7). Additionally, descriptive statistics revealed general trends in farm crop composition, socio-demographic information, and perceptions of water quantity and quality (see Results Section 5.1, and Appendix B).

Furthermore, qualitative items were integrated within various sections of the quantitative survey in order to enhance the context of the quantitative information. These open-ended, qualitative questions gathered information on: (1) concern regarding water resources and (2) what current water management protocols are in each community. These qualitative questions give clarifying context to the quantitative analyses, which help us to better understand the region. See Section 5.8 for the analysis and results of these questions. For the complete survey consult Appendix A.

4.1 Data Collection

Survey instrument. This section outlines the operationalized constructs from the WTP model described in Chapter Two of this document. There are six overarching factors hypothesized to influence WTP initiatives: (1) SOC; (2) DEPEND; (3) LOC; (4) CONCERN; (5) PARTICIPATION; and (6) socio-economic factors (i.e., GENDER, EDUCATION, and WEALTH). All variables in the WTP theoretical model were rated on a five-point Likert scale (Figure 8) (Likert, 1932).

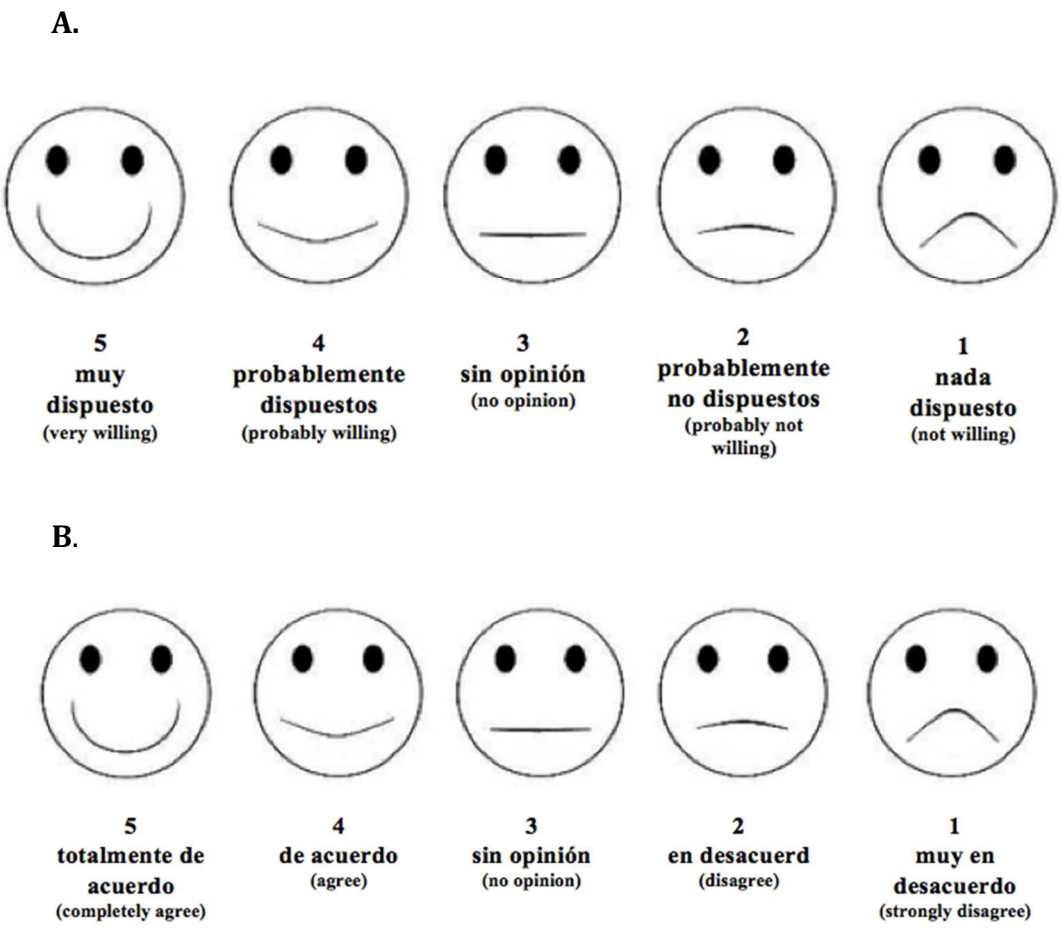

Figure 8: The Likert visual used during the interviews to visualize the differences in the numerical scales. A: This five-point scale was utilized to assess willingness to participate, and ranged from 5-very willing to 1- not willing. **B:** This five-point scale was utilized to determine attitudes toward a series of statements that comprised variables sense of community, dependence on water resources, and ranged from 5- completely agree to 1- strongly disagree.

The Likert scales ranged from: (1) strongly disagree, (2) disagree, (3) no opinion, (4) agree, and (5) completely agree, which assessed the respondent's attitudes toward each statement. The WTP variable also utilized a five-point Likert scale, which ranged from: (1) not willing, (2) probably not willing, (3) no opinion, (4) probably willing, and (5) very willing. Likert (1932) stated, "attitudes are dispositions toward overt action" (p. 9). Hence, the usage of this type of scale was appropriate for this context. A visual of the five-point scale was used to convey the different choices to respondents who were unfamiliar with this type of method and because of low literacy rates in the region.

Willingness to participate. WTP was operationalized through seven individual-level and two community level Likert scale items (Tables 5 and 6). Prior to the start of this section, enumerators posed a hypothetical scenario to each respondent. The survey script is as follows:

> "Suppose there was a program to empower your community to design a plan for managing water resources aimed at improving water quantity and quality. The hypothetical program might be facilitated by outside organizations (e.g., NGOs, government), but it would be the community's responsibility to take charge of the plan, to implement changes, and to monitor and enforce these changes. For each question below, please indicate your interest in participating in these activities on a scale of 1=not at all willing, 2=probably not willing 3=neutral, 4=probably willing, 5=very willing" (p. 14).

After presenting the hypothetical scenario, the enumerators ensured that the respondents understood the situation. A diagram with varying facial expression was used to enhance respondent understanding of the different levels of agreement.

Table 5: Operationalized Likert statements for willingness to participate at the individual-level. This Likert scale ranged from 5- absolutely willing to 1- definitely not willing.

Willingness to participate (individual)	Spanish translations
Attend meetings related to managing water resources in my community	Asistir a reuniones comunales relacionadas con la gestión del agua
Take a leadership role in managing water resources in my community	Tomar un papel de liderazgo para la gestión del agua en la comunidad
Work with other people in my community to manage water resources	Trabajar junto con otras personas de mi comunidad en el manejo de recursos hídricos
Work with people in other communities upstream (near me) to manage water resources	Trabajar con personas de otras comunidades (cercanas) en el manejo de recursos hídricos
Work with people that live downstream of me to manage water resources	Trabajar con personas aguas abajo (río abajo) en el manejo del agua
Change practices related to how my household uses water that lead to improvements in water resources	Cambiar las prácticas en mi hogar y la finca(s) relacionadas al uso del agua que ayuden a mejorar este recurso
Change where I collect water for my household	Cambiar el sitio de donde obtiene el agua para el hogar

Once the individual-level questions were completed, the enumerators would shift focus to community level WTP. This was done by saying, "now, please indicate how willing you think others in your community would be to participate in these activities (use same scale)" (p. 14). Two questions measured community level WTP (Table 6).

Table 6: Operationalized willingness to participate at the community level.

Willingness to participate (Community)	Spanish translations
Work collaboratively to manage water resources	Colaborar en la gestión y manejo del agua
Change their household and farm practices that would lead to improvements in water resources	Cambiar las prácticas en el hogar y la finca(s) relacionadas al uso del agua que ayuden a mejorar este recurso

Sense of community. Sense of community was operationalized via an adaptation of the 18-item neighborhood cohesion scale originally posited by Buckner (1988). Originally, this scale was designed to evaluate neighborhood sense of cohesion and community in Western settings. This scale is unique because it was designed to measure sense of community at the individual level, but can be extrapolated to the community level, which allows researchers to deduce the level of community cohesiveness

(Puddifoot, 1995). This unique property allows the scale to be useful in a variety of settings where community cohesiveness may influence community-based "planning, organization, or in mounting a social intervention" (Buckner, 1988, p. 772).

Zanetell and Knuth (2004) successfully applied the scale in three fishing-based communities in Venezuela. They suggested these communities were comparable to a neighborhood because "residents know of or have interactions with almost everyone living within the physical boundary of each village" (Zanetell & Knuth, 2004, p. 798). However, during pilot testing, they removed two original items because they were not appropriate within the context of their research (Table 7).

Within this study, in addition to dropping the same two statements as Zanetell and Knuth (2004), I dropped an additional three statements (Table 7). First, the two negatively worded questions were excluded because of suggestions from CATIE counterparts, who suggested that negatively worded statements would confuse respondents. Second, the final statement "living in this neighborhood gives me a sense of community" was excluded based on pilot tests because it required too much explanation.

Table 7: Buckner's original neighborhood cohesiveness scale adapted for sense of community variable. Zanetell and Knuth (2004) first modified this scale to measure sense of community in Venezuelan fisheries. [1] Item indicate items not used by Zanetell and Knuth (2004) or in this study; and [2] items indicate items not used in this study.

Buckner's (1988) original items	Items adapted for this study	Spanish translation
Overall, I am very attracted to living in this neighborhood	Overall you like living in this village	En general, le gusta vivir en esta comunidad
I feel like I belong to this neighborhood	You feel like you belong to this village	Se siente que pertenece a esta comunidad
I visit with my neighbors in their homes	You visit with your neighbors in their homes	Usted visita la casa de sus vecinos
The friendships and associations I have with other people in my neighborhood mean a lot to me	Friendships and relations you have with other people in your village mean a lot to you	La amistad y las relaciones con la gente significa mucho para usted
[2]Given the opportunity, I would like to move out of this neighborhood		NA
[1]If the people in this neighborhood were planning something I'd think of it as something ''we'' were doing rather than ''they'' were doing		NA
If I need advice about something I could go to someone in my neighborhood	If you needed advice about some- thing you could go to someone in your village	Si usted necesita consejo sobre algo, podría pedirlo a alguien de su caserío
I think I agree with most people in my neighborhood about what is important in life	You think you agree with most people in your village about what is important in life	Cree que está a de acuerdo con la mayoría de gente de su comunidad sobre lo que es importante en la vida
I believe my neighbors would help me in an emergency	You believe your neighbors would help you in an emergency	Usted cree que sus vecinos le ayudarían en una emergencia
I feel loyal to the people in my neighborhood	You feel loyal to the people in your village	Usted siente lealtad con la gente en su comunidad
I borrow things from and exchange favors with my neighbors	You borrow things and exchange favors with your neighbors	Usted pide prestado cosas y hace favores a sus vecinos
I would be willing to work together with others on something to improve my neighborhood	You would be willing to work with others on something to improve your community	Usted estaría dispuesto a colaborar junto con otros en algo para mejorar la comunidad
I plan to remain a resident of this neighborhood for a number of years	You plan to remain a resident of this village for a number of years	Usted planea quedarse en esta comunidad por algunos años más
I like to think of myself as similar to the people who live in this neighborhood	You like to think of yourself as similar to the people who live in your village	Usted cree que comparte gustos y opiniones similares a la gente que vive esta comunidad
[2]I rarely have neighbors over to my house to visit		NA
[1]A feeling of fellowship runs deep between me and other people in this neighborhood		NA
I regularly stop and talk with people in my neighborhood	You regularly stop and talk with people in your village	Cuando camina por el pueblo, con frecuencia usted se para y habla con gente de la comunidad
[2]Living in this neighborhood gives me a sense of community		NA

Dependence on water resources. Dependence on natural resources can be measured in a variety of ways. In *place attachment* studies, place dependence is often measured primarily as an emotional dependence rather than a functional dependence. Operationalized questionnaires contain items such as "I would not substitute any other area for the farming activities I do in…" (Raymond et al., 2010, p. 427).

However, there are examples of more functionally based place dependence questionnaires. One example of this functional measurement of dependence is demonstrated by Coulibaly-Lingani et al. (2011), who link forest dependency in terms of economic livelihoods in Burkina Faso. Additionally, Lise (2000) measured reliance on forest products in India in terms of economic and survival-based need.

Because the word "dependence" is broad, and because it is important to understand the complexity within DEPEND, I included both functional and emotional components within this questionnaire. From the functional perspective, respondents were asked about their reliance on the local water sources (e.g., rivers, streams) for income, food, and health. Emotional dependence was captured using two Likert statements. The first statement asked how important it is for the respondent to live near the water resources; the second statement asked whether living near water contributes to their happiness (Table 8).

Table 8: Operationalization of dependence on water resources.

Dependence on water resource statements	Spanish translation
Income for your family relies on water sources	Los ingresos de su familia depende de las fuentes de agua
Food for your family relies on water sources	La comida de su familia depende de las fuentes de agua
Water sources are important for the health of your family	El recurso agua es importante para la salud de su familia
For you, it is important to live near the water	Para usted es importante vivir cerca de la fuente de agua
Living near water is a part of your happiness	El vivir cerca del agua es parte de su felicidad

Locus of authority. The LOC variable investigated at which level respondents believe power should be held when making management decisions for water resources. As discussed in Chapter Two of this document, this concept is an important dimension of local participation in natural resources management decisions (Coulibaly-Lingani et al., 2011; Dyer et al., 2014; Zanetell & Knuth, 2004). Within this study, three Likert scale statements measured respondents' preferred LOC: (1) family, (2) community, and (3) government (Table 9).

Table 9: Operationalization of locus of authority.

Locus of authority statements	Spanish translation
You feel it is your family's responsibility to manage water resources	Siente que la gestión o el manejo del agua es responsabilidad de su familia
You feel it is your community's responsibility to manage water resources	Siente que la comunidad debe estar a cargo de la gestión o manejo de los recursos hídricos
You feel the government should be responsible for manage water resources	Siente que el gobierno debe estar a cargo de la gestión o manejo de los recursos hídricos

Level of concern regarding water resources. The level of concern for water resources was operationalized using three Likert statements (Table 10). These three statements were modified from Zanetell and Knuth's (2004) WTP in CBM of Venezuelan fisheries. Additionally, another three items within their study related directly to the state of, and concern for fisheries. Because of the shift in focus from fisheries to freshwater quantity and quality between Zanetell and Knuth's (2004) study and this one, I did not include any fishery-based questions.

Table 10: Operationalization of level of concern regarding water resources.

Level of concern regarding water resources	Spanish translation
Water is being appropriately managed in your community	Las fuentes de agua en su comunidad son manejadas adecuadamente. Por ejemplo, hay acceso para todas las personas, se respetan las regulaciones, se protege contra la contaminación
You believe it is necessary to increase the protection of water resources	Cree que es necesario incrementar la protección de los recursos como el agua
You feel that water quality is sufficient for your community	Siente que el nivel de calidad del agua se suficiente para su comunidad

Previous participation in other initiatives or programs. This variable was measured via a single question, which asked whether the respondent had previously participated in a pre-identified list of programs. CATIE supplied us with possible campaigns and programs that respondents may have worked with previously. This list included: (1) the TC; (2) CATIE; (3) Forest and Water, administered through an NGO entitled the German Technical Group (Spanish acronym GTZ); (4) Forests and Watersheds, administered through GTZ; (5) CATIE's Mesoamerican Agro-Environmental Program (Spanish acronym MAP); and (6) Regional Farmers Association for Ch'orti Copan Region (Spanish acronym ASORECH). Respondents indicated which programs they had participated in previously, if any, using a binary "yes/no" scale.

Socio-economic factors. Socio-economic information relevant to WTP (i.e., GENDER, EDUCATION, and WEALTH) was gathered via a short series of questions in the first section of the survey instrument. In addition to these variables, information regarding occupations, ethnicity, and household characteristics, such as the number of people living within the household, were collected. Wealth was estimated using a table of assets that were checked if the respondents reported owning various items. This method was selected because yearly income is often difficult to measure and discuss in a developing world context. The list of assets included high-wealth indicators (e.g., cars, motorcycles, internet), moderate-level wealth indicators (e.g., TV, electricity, cell phone), and low-level wealth indicators (e.g., chickens, machetes, scythes). Furthermore, information regarding land titles, farm characteristics, and crop types were collected in order to understand farm use, subsistence and commercial crops, and trends in these over time.

Pilot testing. Pereceman and Curran (2006) discussed the importance of collaboration with capable host country researchers who can act as official liaisons at the social, governmental, and community level. In accordance with this principle, representatives from the Tropical Agricultural Research and Higher Education Institute (Spanish acronym CATIE) acted as liaisons for UI researchers within the designated communities to ensure consent from village leaders and residents. In total, six different enumerators from CATIE worked with us, and one additional Costa Rican researcher acted as an enumerator.

Prior to fieldwork, questions were reviewed by members of CATIE to confirm that the cultural expectations and ways of interpreting questions were congruent with this study's objectives. A half day training and pilot study conducted in Guatemala prior to the full survey ensured that the questions were appropriate and properly translated and specific to the region of study. This period also answered any questions the enumerators had, which allowed them to perform the surveys smoothly during data collection.

This pilot testing session was conducted primarily by a UI researcher and enumerator who speaks fluent English and Spanish. Some minor changes to the survey instrument were made during the pilot testing session. These were primarily small issues related to the phrasing of statements, and were corrected prior to data collection.

Sampling. As mentioned previously, six representatives from CATIE acted as liaisons and enumerators for this study. Although six different members from CATIE participated in data collection, only three or four were out in the field each day. Household surveys were used to collect quantitative and qualitative data from the head

of household. In developing countries, this is typically a male (Angelsen, Overgaard-Larsen, Friis-Lund, Smith-Hall, & Wunder, 2011). Gaining both female and male perspectives, however, allows for a more complete picture of village diversity because men and women typically have gender specific tasks related to water and farming activities. Thus, enumerators surveyed male head of households when they were present, but if they were not present, they surveyed females.

The surveys were conducted in three pairs of two people, with one additional enumerator who performed surveys alone. Each group contained a fluent Spanish speaker working for CATIE, who conducted the surveys verbally with the respondents, and recorded the responses on a written copy of the instrument. Surveys were performed verbally because of the varied literacy rates in the population of interest. The second member of the paired groups completed the coversheets, ensured that no questions were overlooked or skipped, took global positioning system (GPS) points, and photos. International Review Board (IRB) protocols were followed, and prior to any data collection, verbal consent was obtained from each study respondent. Participants were free to stop the interview at any point.

Sampling design is one of the most important aspects of well-designed research (Pereceman & Curran 2006). This is because a well-designed study, which implements an acceptable level of randomization within respondents, is more generalizable. This study implemented systematic random sampling, beginning with participants in programs in each community. CATIE selected six communities for this study, five of which were sampled. These communities were selected because of the presence of NGO programs such as “Escuela de Campo,” “Bosques y Cuencas,” “Bosques y Agua,” or

ASORECH programs, which provide small capacity building programs and technologies to communities (e.g., cement wash bins).

Prior to execution of this study, CATIE visited each community and met with the local leaders of these programs to gain permission for the research to take place. Once permission was obtained, the community leaders selected the first four to five interviewees from among the community members who were participants in one of the afore mentioned programs. These selected individuals served as the starting elements for this study's systematic random sampling design, and typically were well respected in the communities.

Systematic random sampling, a form of probability sampling, was employed to ensure minimal sampling error. Systematic random sampling is useful for fieldwork where readily available sample frames are not available (Angelsen et al., 2011; Scheaffer, Mendenhall, Lyman-Ott, & Gerow, 2012) and is a useful sampling mechanism that is typically more cost effective and frequently provides more information about a population than a simple random sample (Scheaffer et al., 2012). In systematic random sampling, researchers randomly select a starting element. Within this study, the community leader selected several households in each community. From that starting point, researchers sequentially select every "*k*th" household, where "*k*" is a pre-selected number chosen intentionally by the researchers. Within the context of this study, research teams selected every third household. If there was no potential respondent present at the third household the next sequential household was selected instead. This mechanism of taking the next subsequent household was utilized because four of the five communities had small populations ($n \leq 300$); this number signifies the number of

people, not the number of households.

Nonresponse or refusal of people to participate in the survey can lead to the underrepresentation of various population sub-groups (Pereceman & Curran, 2006). Partnering with CATIE allowed us to minimize the surprise communities may experience when being asked to participate in surveys. Most people within each community were aware of our presence, and only two people refused to participate in the survey. Because of this, non-response bias was not a concern within this study. Because of these steps taken prior to our arrival my research team was able to enter each community and promptly begin surveying.

Measures of validity. Validity is maintained when an instrument measures what it is designed to measure (Fields, 2009). Several methodological steps were taken to ensure validity was maximized throughout the course of this study. First, this survey instrument was, in part, based on previous studies. The selection of previous scales, which have demonstrated construct validity among the variables, afforded this study with an internal degree of validity (Cronbach & Meehl, 1955). Examples of this have already been discussed in regard to the WTP theoretical model.

Second, internal validity of this study was also controlled through the study design discussed in this document, as well as through an intentionally constructed survey instrument that was tested prior to data collection. By implementing systematic random sampling of farmers in select communities the sample group maintained randomness and, therefore, internal validity. Additionally, this sampling technique minimized error from selection bias.

Third, this research is generalizable to the broader scope of rural Trifinio farmers

residing in the northern portion of the region because of the similar economic livelihood strategies (i.e., agriculture) and available resources (i.e., tropical forests, water) (Franklin, Olivera, et al., 2005). These features indicate a degree of external validity.

However, because no communities were sampled in El Salvador, this study is not generalizable to the complete scope of this region. Additionally, there is likely some bias within the community selection process because CATIE chose communities that may be more 'active' in program participation, which may indicate that these communities will have a higher WTP than on average.

Finally, due to the nature of this field-based research, the ecological validity of this study was maintained. Ecological validity is typically compromised in controlled research settings such as a lab (Brewer, 2000). Despite the importance of maintaining validity within this study, it is important for an instrument to also be reliable. As Fields (2009) wrote "to be valid the instrument must first be reliable" (p. 12).

Measures of reliability. Reliability is maintained when an instrument can be interpreted the same throughout the research study (Fields, 2009). The primary method in which reliability was ensured was through statistical tests (i.e., Cronbach's alpha). Test-rest reliability was not incorporated into this study design because it was impractical to interview the same subjects twice within the short window of time.

4.2 Data Analysis

This section briefly describes the various statistical techniques implemented within this study. After data collection was completed, data entry and cleaning followed. Each survey was entered manually into a Microsoft Excel data sheet. NVivo was implemented to thematically analyze the qualitative items (QSR International, 2012).

Frequency diagrams and tables were used to check for errors in IBM's SPSS 22 for the quantitative data (IBM Corp., 2013). Based on the frequency calculations with the data, I concluded that these data qualify as non-parametric because of the non-normal distribution. Non-parametric data are often analyzed in a similar manner to parametric data, with slight adjustments to the mathematical equations to account for non-normal distributions (e.g., Spearman's correlation coefficient).

Descriptive statistics. Descriptive statistics were run in order to describe this sample (Howell, 2013). Means, ranges, and standard deviations were calculated regarding: (1) the WTP variables, (2) socio-economic information, and (3) farm characteristics. Frequency histograms and bar charts were created in order to visualize trends in these data, and, thus, effectively describe this sample.

Likert scale treatment. Arguably, Likert scales could be analyzed in numerous ways. Some studies argue that Likert scales should only be analyzed as categorical data because of their stepwise nature (e.g., one-to-two, two-to-three, etc.). However, many other studies analyze Likert scales as continuous variables (e.g., Fischer, Kline, Ager, Charnley, & Olsen, 2014; Hall & Slothower, 2009).

For example, a study involving cognitive factors related to behavioral intention to implement defensible space for wildfire protection applied a seven point Likert scale, which was treated as a continuous variable in analysis (Hall & Slothower, 2009). In another study involving perceptions related to wildfire, a five point Likert scale regarding the public's level of concern about future wildfire potential were also treated as continuous variables (Fischer et al., 2014). Within this study, Likert scales were treated as continuous variables because most of the variables were averaged scale

items; thus, creating a more continuous structure.

Factor Analysis. Exploratory factor analysis (EFA) is a statistical technique used to identify groups or clusters of variables and reduce large data sets into more manageable variables for further analysis (Field, 2009; Lise, 2000). This technique was implemented in the context of this study to identify additional factors in the WTP theoretical model, and to determine the factors within the general WEALTH variable. In the literature, the best practices in implementing EFA as an analytical tool are debated.

First, books published in the 1980s and early 1990s stated that 100 is the minimum sample size for successful EFA (Comrey & Lee, 1992; Kline, 1986). However, more recent papers successfully conduct EFA with 40 or more subjects (Pollnac, Poggie, & Cabral, 1998; Tilt, Kearney, & Bradley, 2007). In a widely cited paper, MacCallum et al., (1999) demonstrated that generalized rules are "not valid or useful" when determining an appropriate sample size for factor analysis (p. 96). Instead, researchers should focus on other indicators such as communalities, which they suggest should be greater than .60 (MacCallum et al., 1999). Field (2009) echoes this criterion for evaluation, but instead suggests that communalities should all be greater than .50. Communalities denote the amount of common variance in each variable (Field, 2009). Generally, the higher the communality for each item, the more common variance is present in the dataset, which indicates that the revealed factors in the analysis are robust.

Second, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) was utilized to assess the appropriateness of each question in exploring constructs within the WTP model. The KMO represents the ratio of the squared correlations between variables to the squared partial correlation between variables within EFA (Field, 2009).

The KMO assesses how appropriate the selected variables are for use within EFA. The closer the value is to zero, the less appropriate it is; the closer to one the value is, the more appropriate.

Third, the appropriate level to "extract" factors differs widely in the literature (Field, 2009; Gaskin & Happell, 2014; Lise, 2000). The most common rule is to extract factors that have eigenvalues greater than one (Field, 2009; Gaskin & Happell, 2014; Lise, 2000). Additionally, researchers often consult factor loading coefficients to determine how well individual items load on various factors. Often, .45 is an adequate coefficient for the inputted items to load on new factors (Gaskin & Happell, 2014), while other authors state that .72 or above is preferred (Fields, 2009). Generally, the higher individual items load on a single factor (i.e., closer to one), the more robust the factor. For this study, a value of .50 was selected as an exclusion criterion because coefficient loading of .50 or more is recognized as "dominating in a factor" (Lise, 2000, p. 385). This standard, in conjunction with eigenvalues greater than one, were the primary mechanisms utilized to assess the strength of new factors.

Finally, there are two types of possible rotations within EFA, orthogonal and oblique. Orthogonal rotations are the most commonly used method, and should be used when researchers suspect that all of the factors are independent (Field, 2009). Oblique rotations are recommended when researchers believe there is a theoretical reason to believe the variables may be related, which Field (2009) argues should be the case in most psychological and social science research settings. For this study, *direct oblimin* rotation, a form of oblique rotation, was selected for EFA because the theoretical background of this research suggests that these variables may correlate with one

another.

Cronbach's alpha. Cronbach's alpha is a widely utilized test in social science research. Its purpose is to determine the internal consistency reliability of questions within a scale (Cronbach & Meehl, 1955; Fields, 2009). This study utilized many existing scales to construct the operationalized constructs of WTP, which indicates that Cronbach's alpha should reveal high internal consistency reliability within the chosen scales. However, it is necessary to test the internal consistency reliability within each new application of scales. This technique was the primary way that reliability was managed within this study design and analysis.

Kruskal-Wallis Tests. Kruskal-Wallis statistical tests resemble analysis of variance (ANOVA) tests, except that Kruskal-Wallis is recommended for ANOVA calculations in the event of non-parametric data (Field, 2009). Kruskal-Wallis tests were utilized to determine whether there were any statistically significant differences across communities. Bonferroni post-hoc tests were utilized to discover where differences were occurring when comparing the five sample sites (Field, 2009; Howell, 2013).

Correlations. In order to determine the relationship between individual variables, and to avoid multicollinearity in regression models, bivariate correlations were conducted. Correlational matrices were calculated to show any possible covariance between variables. As per the recommendation in Fields (2009), any correlation between independent variables with a high correlation (i.e., values near .8) were considered too high to include both predictors in the model.

Spearman's correlation coefficients were calculated to determine the relationships between variables. Spearman's test is similar to Pearson's, which is widely

used in correlational analyses (Fields, 2009). However, Spearman's test ranks the values in the data before applying Pearson's mathematical formula to the ranked data (Fields, 2009), which is more appropriate for non-parametric data.

Multiple Regression. Multiple regression statistical models are utilized when one dependent variable, in this case WTP, is theorized to have several factors (i.e., independent variables), which predict scores of the dependent variable (Howell, 2013; Tabachnick & Fidell, 2001). In multiple regression, each predictor variable has a unique coefficient, and these factors, plus a residual error term, predict values in the dependent variable (Fields, 2009). There are many different types of multiple regression; for this study, normal multiple regression was used.

Multicollinearity is an issue to contend with when working with multiple regression models. Multicollinearity occurs when there is a strong relationship between two or more of the predictor variables in a multiple regression model (Fields, 2009). This is an issue to be aware of because if two predictors have a high collinearity, it becomes nearly impossible to determine the unique contribution of one of the variables to the overall model. Scanning a correlational matrix, as mentioned above in the correlation segment, can mitigate this potential multicollinearity problem.

Furthermore, the variance inflation factor (VIF) has been utilized to detect strong relationships between predictor variables (Field, 2009). Myers (1990) suggests that summative VIF values, of all predictive variables, higher than ten indicates multicollinearity. However, Vaske (2008) discusses an alternative evaluation criteria regarding VIF. Specifically, he recommends that individual VIF should be below four to avoid multicollinearity. These standards form the basis for evaluating multicollinearity

in this study; each perspective for evaluating multicollinearity is addressed in the subsequent multiple regression section (5.7).

Independent dummy variables are often incorporated into multiple regression models in order to account for differences across groups that were not otherwise measured. For this reason, they are also known as stand in variables. To calculate dummy variables, one group is selected to compare the remaining groups against (Field, 2009). In this study, dummy variables were implemented first at the country level, then at the community level. These dummies control for differences between countries or communities that were not measured within the survey. For the community level dummy variable, Sesesmil, a Honduran community, was selected as the baseline to compare each of the other communities because it is the community that differs the most among the sampled communities; thus, it serves as an interesting baseline for comparison.

Content Analysis for Qualitative Data. The two qualitative questions analyzed for this study were analyzed using content analysis. The first question provided more detail to the concerns respondents have regarding their water resources. This question supports the quantitative analysis regarding changes and concerns in local water resources. The second question focuses on current management structures because, according to van Koppen et al. (2007), in the past, water management reform has not put enough emphasis on existing management structures in rural communities. A common technique in content analysis is the identification of themes from qualitative data.

Thematic analysis is a common technique that is used to identify themes within

qualitative data. Ryan and Bernard (2003) discussed the varied ways in which a *theme* can be described, measured, and analyzed. For the purposes of this study, a *theme* is defined as the "conceptual linking of expressions" (Ryan & Bernard, 2003, p. 88). However, there are a multitude of techniques where expressions can be linked to constructs. Within the many disciplines that use thematic coding in data analysis, there are often multiple strategies to link expressions and words conceptually in order to determine the underlying phenomenon. The identification of themes from raw data often occurs through content analysis, which has three primary forms: (1) conventional, (2) directed, and (3) summative (Berg & Lune, 2012). For this study, both directive and summative content analyses were conducted.

Directed content analysis utilizes analytical codes and categories that originate in existing theories. For this study, these included: (1) water quality, (2) water quantity, and (3) deforestation. Additional themes were identified through summative content analysis, which counts the number of references and repetitions to themes that were not identified a priori. Furthermore, linguistic connectors were utilized as a part of summative content analysis. Linguistic connectors are words or phrases that either infer casual relationships (e.g., since, because), or infer conditional relationships (e.g., if, then, etc.).

The qualitative questions asked in this study elicited concise responses, running only a line or two long. Because of this fact, the two qualitative questions were analyzed first by counting the number of references to themes, which is also known as repetition (Ryan & Bernard, 2003). This was accomplished by using NVivo software, which helps manage and make sense of qualitative data (QSR International, n.d.).

Prior to data analysis, responses were translated from Spanish to English. This was conducted by a high quality translator, and double-checked by a Spanish-speaking researcher. Understandably, this translation process required precision; and, at times, perfect translations were unavailable.

Ryan and Bernard (2003) stated that "the first exploratory step in the data analysis, investigators are most concerned with identifying as wide a range of themes as possible" (p. 95). Thus, the initial analysis worked to identify as many themes as possible. The second step of the analysis consisted of understanding the relationships among themes, and how prevalent the themes were within the responses. Finally, the most prominent themes were revisited in the context of the quantitative analysis in order to conduct a more complete investigation of the themes.

CHAPTER FIVE: Results

This chapter presents the results of the statistical analyses described above. The average length of this survey was 60 minutes, but ranged from 45-90 minutes. The order of my results is: (1) descriptive statistics of households and farming plots, (2) exploratory factor analysis (EFA), (3) Cronbach's Alpha, (4) descriptive statistics on WTP variables, (5) Kruskal-Wallis tests, (6) Spearman correlations, (7) multiple regression models, and (8) content analysis of qualitative data. Changes to the WTP theoretical model were made in accordance with the data collected; these changes are discussed in this chapter. This chapter focuses on the final regression models, presented at the end of this section. Exploratory analyses and alternative regression models are briefly discussed in this chapter but outputs are presented in appendices. A confidence interval of 90% ($p \leq .10$) was chosen to evaluate the results of this study.

5.1 Descriptive Statistics

Household characteristics. A majority of the respondents were males between 30-45 years of age with little to no formal education, who owned or worked primarily in the agricultural sector (Table 11). According to Ramos (2008), education levels in urban areas in Trifinio have decreased from 62% having a high school or higher education in 2001 to 41% in 2006. This sample reflects a lower percentage, with only 6% completing high school and 79% who did not complete primary school. However, this result may more accurately reflect the sampling of rural communities, since rural populations tend to have lower levels of education than urban areas (Elias & Taylor, 2008; Franklin, Tither, et al., 2005).

Of the 62 respondents, 30% reported being a part of the indigenous population

group, Maya-Chortí. The majority of these were located in one village in Honduras, Nueva Estanzuela. The Maya-Chortí live primarily along the border of Guatemala and Honduras, and are recognized as the largest indigenous group in the region (Franklin, Olivera, et al., 2005).

Table 11: Summary of household characteristics.

Characteristics	**Entire Sample** frequency (%)	**Individual Country** frequency (%)	
		Guatemala	Honduras
# of People per HH			
<5	20 (34%)	8 (14%)	12 (21%)
5-10	37 (64%)	21 (36%)	16 (28%)
11+	1 (2%)	0	1 (2%)
Age			
18-25	3 (5%)	0	3 (5%)
26-35	18 (29%)	6 (10%)	12 (19%)
36-45	16 (26%)	8 (13%)	8 (13%)
46-55	11 (18%)	8 (13%)	3 (5%)
56-65	13 (21%)	7 (11%)	6 (10%)
66+	1 (2%)	0	1 (2%)
Gender			
Male	38 (61%)	14 (23%)	24 (38%)
Female	24 (39%)	15 (24%)	9 (15%)
Sources of Income			
Farm only	30 (48%)	9 (15%)	21 (33%)
Farm+ Laborer	7 (11%)	3 (5%)	4 (6%)
Farm+ Business worker	6 (10%)	4 (6%)	2 (3%)
Housewife	18 (29%)	11 (18%)	7 (11%)
Student	1 (2%)	1 (2%)	0
Education Level			
None/Incomplete Primary	49 (79%)	22 (35%)	27 (44%)
Complete Primary	10 (16%)	8 (13%)	2 (3%)
Complete Secondary	1 (1%)	0	1 (2%)
Incomplete University	3 (5%)	0	3 (5%)
Ethnicity (8 missing answers)			
Chor'ti	19 (31%)	3 (5%)	16 (26%)
Not Chor'ti	35 (57%)	21 (34%)	14 (23%)

The majority (69%) of this sample reported farm related activities as their primary source of income. Most women (75%) reported that their primary livelihood activity was "ama de casa," or "housewife." This is representative of the distribution of livelihoods in Trifinio described in other research (Elias & Taylor, 2008; Franklin,

Olivera, et al., 2005). Interestingly, only 21% of respondents were aware that the communities they live within are designated as the Trifinio Region, which means that almost 80% of this sample was unaware of this designation.

Within this sample, 83% reported that they had a cell phone, 56% of respondents owned a TV, and 84% had electricity in their homes. These items appear to indicate a moderate level of wealth among most of the respondents. The wealthiest village was Sesesmil, located in Honduras; 50% of the respondents from Sesesmil had vehicles and/or motorcycles, a result that was not present in the other communities we visited. Additionally, 70% of residents in Sesesmil reported owning horses and 20% reported having Internet within their houses. See Figure 9 for typical housing arrangements between Sesesmil, the wealthiest community, and Nueva Estanzuela, the poorest community. Village level descriptive statistics are in Appendix B.

A. **B.**

Figure 9: Houses in Sesesmil (A) and in Nueva Estanzuela (B).

Farm characteristics. Trifinio's three most important agricultural products are coffee, corn and beans (Table 12). Typically, the poorer households grow beans and corn for subsistence, while the wealthier households focus on coffee. Coffee takes approximately three years to begin producing, and can only be harvested once a year,

making it difficult for poorer families to cultivate coffee for commercial purposes. These data are congruent with previous findings (e.g., Elias & Taylor, 2008; Franklin, Olivera, et al., 2005). Respondents in Sesesmil, being the wealthiest overall, reported that coffee made up 81% of their commercial crops.

Within this sample, 53% of the respondents reported having one farming parcel, while 24% reported having two farms. For this reason, only information regarding the two primary farms was collected and analyzed. Interestingly, only 14% reported not having a land title of any type. Thirty-four percent reported having an individual or family land title, while 52% stated that their communities had either an "Escitura Publica" or a "Titulo Communitario," which are communal land titles. Honduras had the most individual land titles (n=19), 16 of them in Sesesmil. The land within the second Honduran community surveyed, Nueva Estanzuela, held a community title and only three private plots. The three communities in Guatemala had a mixture of public land and privately owned land.

The 62 respondents reported having a total of 102 farm parcels. In general, the average plot size for the primary parcel was 0.89 hectares in Guatemala and 7.13 hectares in Honduras; the average parcel size for the second parcel was 0.56 hectares in Guatemala and 4.86 hectares in Honduras. Again, the community of Sesesmil had the largest farming parcels.

The four primary commercial crops planted include plantains (28.6%), coffee (17.6%), corn (22.7%), and beans (22.7%). Other less common commercial crops reported include mango, mombin, vegetables, and bananas (each less than 2%). The five primary subsistence crops planted include plantains (5.6%), coffee (7.4%), corn

(39.5%), beans (38.9%), and bananas (3.7%). Other less common subsistence crops reported include mango, mombin, and other fruits (each less than 1%). Most of the respondents reported multiple crops per farm parcel; thus, the overall count of crops planted exceeds the sample size and the total farm count (n=102).

Table 12: Summary of farm characteristics. The 62 respondents in the sample reported a cumulative 102 farm parcels. Many of these parcels also had multiple crop types present. Hence, the reported numbers of subsistence crops and commercial crops will generally exceed the sample size. Thus, the counts reported are the number of farming parcels that have each system or crop.

Farm Characteristics	**Entire Sample** *(n=102 farms)*	**Individual Country**	
		Guatemala *(n=43 farms)*	Honduras *(n=59 farms)*
Land Title Type (for any farm)			
None	9	7	2
Individual	21	2	19
Public	20	11	9
Community	14	1	13
# of Farm Parcels			
1-2	47	23	24
3-4	11	4	7
5	2	0	2
Subsistence Crops			
Beans	63	31	32
Corn	64	30	34
Coffee	12	2	10
Plantains	9	2	7
Commercial Crops			
Beans	27	11	16
Corn	27	10	17
Coffee	21	3	18
Plantains	34	22	12
Average Size of Primary Parcel	4.08 hectares	0.89 hectares	7.13 hectares
Average Size of Secondary Parcel	3.11 hectares	0.56 hectares	4.85 hectares

Perceptions of water quantity and quality. Nearly three quarters of this sample (73%) reported a change in water quantity from their primary water source (Figure 10). Deforestation was the primary reported cause of decreases in water quantity (34%). An increase in the number of people accessing the primary water source was the second most cited reason for water quantity decreases (24%). Additionally,

11% of the respondents reported that environmental factors such as fire, hurricanes, less rain, and short winters were responsible for decreases in water quantity, while 8% of respondents believed that human factors such as lack of protection, security, and maintenance were responsible. In contrast, 11% of respondents reported improvements in the amount of available water, which was primarily due to the installation of pumps within the homes and increased protection of both water and forest systems.

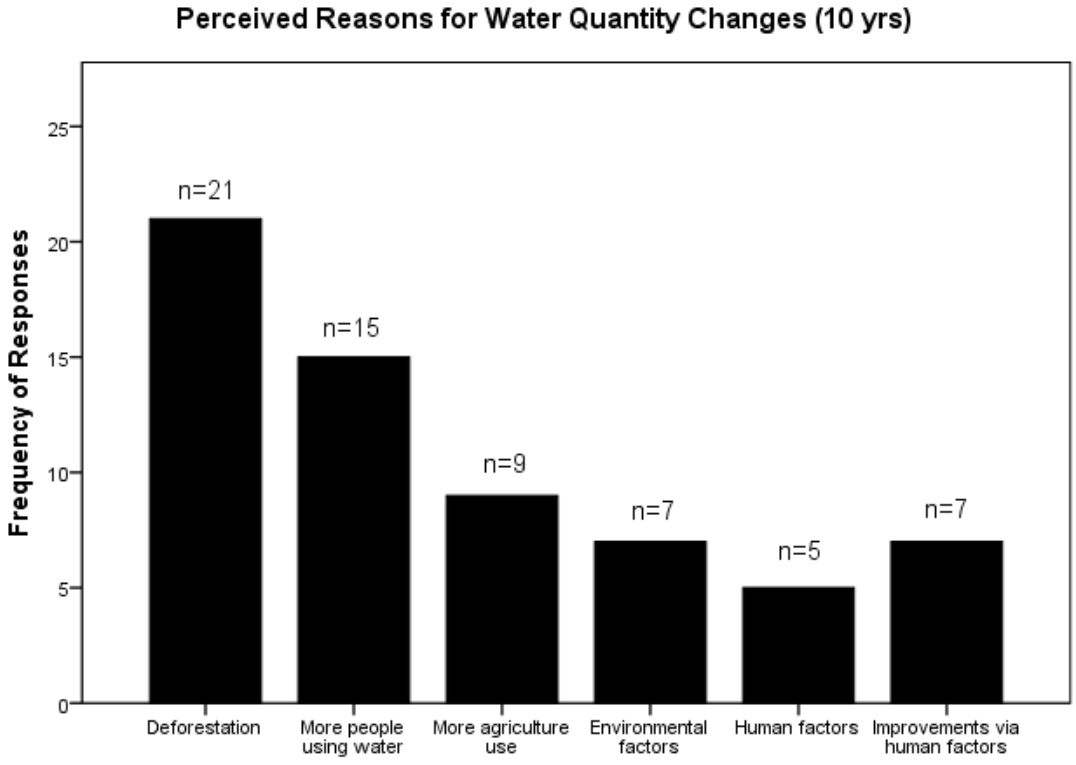

Figure 10: Perceived reasons for water quantity change in the last ten years. When consulting this figure it is important to note that many respondents reported multiple sources of water, and may have reported multiple causes for the changes witnessed.

In contrast to water quantity, only 23% of respondents reported a decrease in the quality of their primary water sources in the last ten years (Figure 11). Thirteen percent of respondents reported that their water quality had declined due to human factors such

as contamination and wastes into the water sources. Additionally, more agricultural use (10%), more people using water (8%), deforestation (6%), and farm animals (3%) were perceived to be responsible for water quality degradation. However, 10% of respondents reported an increase in the quality of their primary water source; this was principally due to the installation of new piping systems.

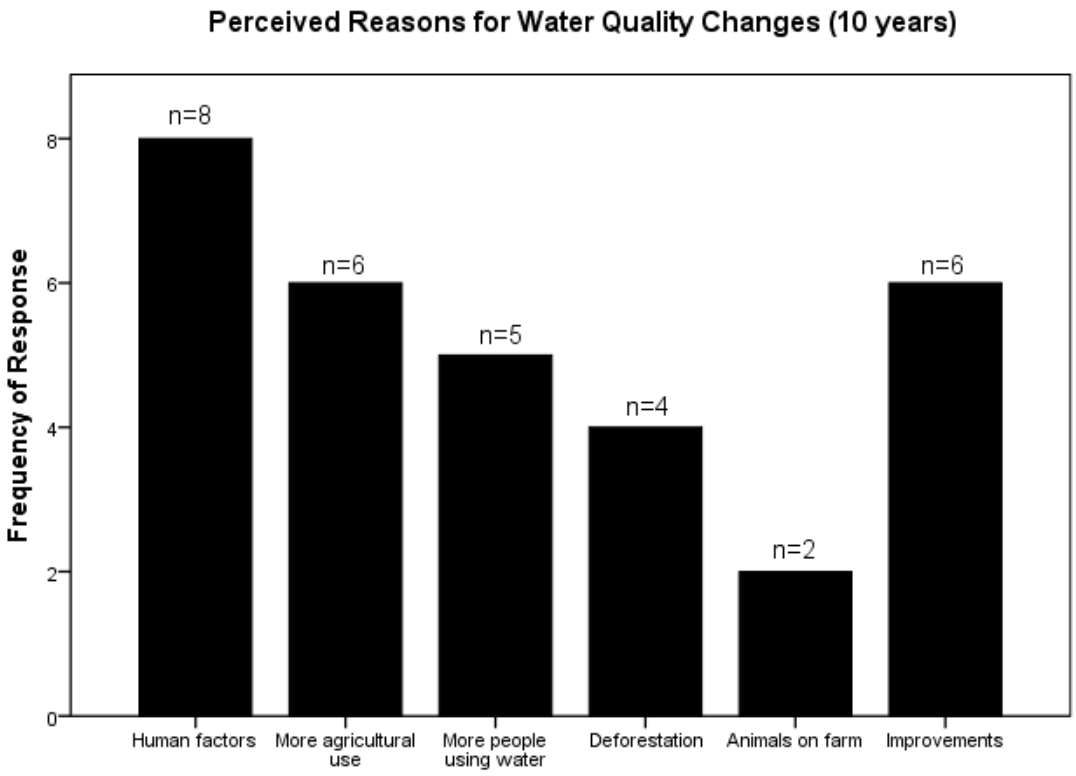

Figure 11: Perceived reasons for changes in water quality in the last ten years. When consulting this figure it is important to note that many respondents reported multiple sources of water, and may have reported multiple causes for the changes witnessed.

5.2 Exploratory Factor Analysis

The techniques for EFA described in Chapter Four were utilized in order to determine wealth indicators from a series of binary-coded items within the survey. Such items focused on the ownership of specific possessions (e.g., cell phones, or TV). Additionally, EFA was conducted on the SOC scale because previous studies indicate that

SOC is related to social capital (Buckner, 1988; Zanetell & Knuth, 2004), which is often discussed in terms of multiple constructs (Lewicka, 2011; Pronyk et al., 2008; Rahman, Hickey, & Sarker, 2012). This section discusses the revealed factors in WEALTH and SOC and the constraints implemented to test for the robustness of these new factors.

A factor loading threshold of .50, in conjunction with eigenvalues greater than one, were utilized to determine the appropriateness level at which to extract factors into new variables. All extracted factors in WEALTH (Table 13) and in SOC load at .60 or above, except for one SOC question, which loads at .54 (Table 14). Thus, WEALTH and SOC items loaded strongly on the revealed factors, indicating that these new variables are robust. Additionally, all of the individual eigenvalues for the new WEALTH and SOC factors were greater than one.

Table 13: The pattern matrix of EFA on WEALTH, revealing three components. Eigenvalues are reported in parentheses under each WEALTH factor.

Wealth Indicator	Component		
	WEALTH1 (3.824)	**WEALTH2** (1.737)	**WEALTH3** (1.465)
Vehicle	**.888**		
Motorcycle	**.757**		
Horses	**.732**		
Chainsaw	**.671**		
Internet	**.636**		
Electricity		**.835**	
Cellphone		**.784**	
TV		**.724**	
Latrine			**-.767**
Septic			**.754**

EFA of WEALTH items revealed three separate wealth indicators (Table 13). When those questions were analyzed with EFA, the KMO statistic revealed a .57 value (χ^2= 266.09; df= 91; $p \leq .000$), which is acceptable, though not ideal (Fields, 2009; Kaiser, 1974). Additionally, the communality extraction revealed that all variables were suitable

for EFA because all values were greater than .50 (Fields, 2009). The pattern component matrix reveals that WEALTH1 loads the high status symbols (e.g., car or internet), while WEALTH2 appears to be the tier-two wealth assets, which includes items that most households have (e.g., cellphone). WEALTH3 has two items, latrine and septic, which appear to be hygiene-based possessions. Radio and bike possessions were the only items to load on two separate factors, and, therefore, were excluded. Additionally pigs and oven possessions did not reach the .50 loading threshold, and were also excluded based on this criterion.

EFA of SOC revealed three, well-structured variables within the SOC scale. The KMO statistic revealed a value of .769 (χ^2= 404.671; df= 78; $p \leq .000$), which is considered a "good" score (Fields, 2009; Kaiser, 1974). Additionally, the communalities extraction revealed that all variables were suitable for EFA because all values were greater than .50 (Fields, 2009). The pattern component matrix revealed three distinct constructs within the overall SOC variable.

Table 14: A pattern matrix depicting the three unique components in SOC. Eigenvalues are reported in parentheses under each SOC factor.

SOC Scale Questions	Component		
	SOC1 (5.144)	**SOC2** (1.776)	**SOC3** (1.504)
You feel like you belong in the community	**.861**		
You like living in the community	**.787**		
You would be willing to work cooperatively within community	**.769**		
You plan on remaining a resident of this village	**.741**		
Relationships within the community are important to you	**.642**		
You can rely on your neighbors in an emergency		**.879**	
You feel loyal to your community		**.785**	
You agree with your community on what is important		**.771**	
You believe you are similar to the people in your community		**.653**	
You spend time visiting your neighbors			**.832**
You borrow things from your neighbors			**.742**
You ask for advice from your neighbors			**.666**
Your enjoy talking with your neighbors			**.544**

Each new component has an easily recognized theme. The first component is primarily related to individual feelings regarding his/her perspective on living with his/her community; this component appears to be a sense of personal belonging within the community and will be referred to as SOC1. The second component is primarily comprised of inter-personal emotions related to community members as a group and the overall climate of social relationships. This second SOC variable is designated as SOC2. The third component contains neighbor specific relationships; these questions all focus on inter-personal relationships with the people who live close by, and is designated SOC3. Both the second and third components are linked to questions involving trust among community members and neighbors.

5.3 Cronbach's Alpha

After EFA, the internal consistency reliability of the variables within the WTP theoretical model were calculated using Cronbach's alpha (Cronbach, 1955). WTP, DEPEND, SOC, WEALTH1, and WEALTH2 all had acceptable internal consistency reliability ($\alpha \geq .6$) (Table 15). However, CONCERN had low internal consistency reliability ($\alpha = .36$), and, thus, was excluded from multiple regression analyses, even though it was originally included in the WTP theoretical model. Instead, I investigate whether any of the individual three Likert statements that originally operationalized CONCERN provided explanatory power to regression models (Section 5.7). These include: (1) water is being appropriately managed (i.e., MANAGED WELL), (2) quantity of water in a community is sufficient (i.e., QUANT SUFF), and (3) belief that it is necessary to increase water protection (i.e., PROTECT WATER). Additionally, WEALTH3 had a low internal consistency reliability ($\alpha = -.764$), and, thus, was also excluded from

further analysis.

Similarly, each of the SOC variables had high internal consistency reliability (α >.75). It is because of these high Cronbach values for the individual SOC variables that I investigated them in separate multiple regression models after the WTP theoretical model was tested (see Section 5.7: Exploring Sense of Community).

Table 15: Initial and ultimate Cronbach alpha scores.

Scale	Initial Cronbach Value	After EFA Cronbach Value
WTP	.79	-
CONCERN	*.36*	-
DEPEND	.69	-
SOC	.85	-
SOC1	-	.86
SOC2	-	.79
SOC3	-	.75
WEALTH	.73	-
WEALTH1	-	.790
WEALTH2	-	.744
WEALTH3	-	*-.764*

5.4 Descriptive Statistics on WTP Variables

The mean WTP for this study was 4.03 (Table 16). Approximately 60% of respondents were WTP in future CBWRM initiatives (i.e., Likert score ≥4), 32% of the respondents felt mildly willing or neutral (i.e., Likert score 3-3.9), while 8% were not WTP (i.e., Likert score <3). The mean values of the regression model independent variables are as follows: SOC ($\bar{x}$= 4.23), SOC1 ($\bar{x}$= 4.56), SOC2 ($\bar{x}$= 3.98), SOC3 ($\bar{x}$= 4.09), DEPEND ($\bar{x}$= 4.19), WEALTH1 ($\bar{x}$= .15), WEALTH2 ($\bar{x}$= .76), GENDER ($\bar{x}$= .61), EDUCATION ($\bar{x}$= 1.15), LOC1 (i.e., family) ($\bar{x}$= 4.31), LOC2 (i.e., community) ($\bar{x}$= 4.52), and LOC3 (i.e., government) ($\bar{x}$= 3.39). PARTICIPATION was measured in the survey but excluded from analysis because enumerators consistently asked, "have you *heard* of any of these programs" instead of "have you *participated* in any of these programs.

Table 16: Descriptive statistics of study variables. [1]Original model predictors excluded from final model; [2]final model predictors; [3]investigated in regression models, but not included in final model

Variable	Abbreviation	Operationalization	Mean (SD)
Willingness to participate (dependent variable)	WTP	9 statements ranked via 5-point Likert Scale ranged from: 5-very willing to 1- definitely not willing	4.02 (.65)
Sense of community	[2]SOC	13 statements ranked via 5-point Likert Scale ranged from: 5-completely agree to 1-strongly disagree	4.23 (.51)
Sense of personal belonging	[3]SOC1	5 statements ranked via 5-point Likert Scale	4.56 (.48)
Interpersonal-neighbors	[3]SOC2	4 statements ranked via 5-point Likert Scale	3.98 (.78)
Interpersonal-community	[3]SOC3	4 statements ranked via 5-point Likert Scale	4.09 (.71)
Dependence on water resources	[2]DEPEND	5 statements ranked via 5-point Likert Scale ranged from: 5-completely agree to 1-strongly disagree	4.18 (.55)
Wealth indicators	[2]WEALTH1	1-Has item 0-Does not have item	.15 (.26)
	[1]WEALTH2		.76 (.26)
	[1]WEALTH3		.54 (.29)
Gender	[1]GENDER	1- Male 0- Female	.61 (.49)
Level of education	[1]EDUCATION	0-No Education; 1-Some primary; 2-complete primary; 3-some secondary; 4-complete secondary; 5-some college	1.15 (1.15)
Locus of authority (3 levels of management preference)	[1]LOC1	Family responsibility to manage water: 5-point Likert Scale	4.31 (.71)
	[1]LOC2	Community responsibility to manage water: 5-point Likert Scale	4.52 (.59)
	[1]LOC3	Government responsibility to manage water: 5-point Likert Scale	3.39 (1.29)
Level of concern about water resources	[1]CONCERN	3 statements ranked via 5-point Likert Scale	3.63 (.76)
Water is being appropriately managed	[2]MANAGED WELL	1 statements ranked via 5-point Likert Scale	3.26 (1.33)
Quantity of water in a community is sufficient	[3]QUANT SUFFICIENT	1 statements ranked via 5-point Likert Scale	3.29 (1.31)
Belief that it is necessary to increase water protection	[3]PROTECT WATER	1 statements ranked via 5-point Likert Scale	4.34 (.67)
Previous participation in other programs	[1]PARTICIPATION	1-Yes 0-No	.84 (.45)

5.5 Kruskal-Wallis Analyses.

Kruskal-Wallis tests were conducted to determine any community level differences in WTP variables. Results show that respondent WTP (p= .006), SOC (*p*= .088), SOC3 (p= .054), WEALTH1 (p= .000), WEALTH2 (p= .014), LOC2 (p= .084), CONCERN (p= .027), MANAGED WELL (p= .046), and QUANT SUFF (p= .035) differ at a statistically detectable level (Table 17). Bonferonni post-hoc tests were conducted in order to determine the driving interaction behind the significant differences in these variables. Consult Table 17 for summaries of these differences.

Table 17: Results of Kruskal-Wallis tests to determine difference in WTP variables between communities. * p ≤ .10, **p ≤ .05, ***p ≤ .01

Variable	Between Communities Significance	Differences
WTP	.006**	Sesesmil differs from La Libertad and Nueva Estanzuela
SOC	.088*	La Majada differs from Nueva Estanzuela
SOC1	.845	-
SOC2	.379	-
SOC3	.054*	La Majada differs from La Libertad, Sesesmil, and Nueva Estanzuela
DEPEND	.446	-
WEALTH1	.000***	Sesesmil differs from all other communities
WEALTH2	.014**	Nueva Estanzuela differs from all other communities
EDUCATION	.005***	
LOC1	.400	-
LOC2	.084*	Veguitas differs from all other communities
LOC3	.764	-
CONCERN	.027**	Sesesmil differs from Nueva Estanzuela
MANAGED WELL	.046**	Sesesmil differs from Nueva Estanzuela
QUANT SUFFICIENT	.035**	Sesesmil differs from Veguitas and La Majada
PROTECT WATER	.839	-
PARTICIPATION	.640	-

5.6 Spearman Correlations

Bivariate correlation matrices revealed no correlation between variables high enough to indicate problematic levels of covariance (i.e., values near .80) (Field, 2009), except when comparing SOC to its three separated components (Appendix C). However,

the individual SOC were placed into the multiple regression models one at a time and, thus, such covariance did not impact the overall regression models. Based on this parameter, there were no factors excluded from the multiple regression models.

5.7 Multiple Regression

Initial Analysis. Several multiple regression models were conducted with WTP as the dependent variable to iteratively explore the goodness of fit of the theoretical model. As a reminder, the variables I considered in regression based on independent variables from the original theoretical model and variables revealed in other analyses discussed previously included: (1) SOC, (2) DEPEND, (3) GENDER, (4) EDUCATION, (5) WEALTH (two levels), (6) LOC (three levels) (7) MANAGED WELL, (8) QUANT SUFF, and (9) PROTECT WATER. Recall, PARTICIPATION was excluded due to measurement error and CONCERN was dropped due to low internal consistency. Since there are multiple versions of LOC and WEALTH, I ran separate regressions using these different versions, and entered MANAGED WELL, QUANT SUFF, and PROTECT WATER individually into each model, resulting in 18 regressions. Collectively I refer to this first exploratory set of regressions as Model 1; for results from each version of Model 1 consult Appendix D. All 18 versions of Model 1 explain similar amounts of variance in WTP (R^2=.25 to.32), and all models are statistically significant ($p \leq .05$).

In a second set of exploratory models I added community level dummy variables (i.e., CD1, CD2, CD3, and CD4) to control for community level differences; these are collectively referred to as Model 2 and are presented in Appendix E. All 18 variations of Model 2 explain similar amounts of variance in WTP (R^2= .49 to .57), and all models are statistically significant ($p \leq .05$). Thus, inclusion of the community dummy variables in

Model 2 explains more of the variation in WTP than when these are not included (i.e., Model 1).

Under all 36 regression models from Models 1 and 2, LOC (all 3 versions), WEALTH2, GENDER, EDUCATION, QUANT SUFF, and PROTECT WATER were not statistically significant factors ($p \geq .10$) in predicting WTP (consult Appendices D and E). These variables are not included in the final round of regression analysis. The third set of models, which consists of three separate regressions, represents the most robust results and explains the most variation in WTP (Table 18).

Table 18: Summaries of Model 3 multiple regressions on willingness to participate. Standard errors for each predictor are in parentheses. * p ≤ .10, **p ≤ .05, ***p ≤ .01

Predictors:	**Model 3.1**	**Model 3.2**	**Model 3.3**
	R^2= .553*** (.471)	R^2= .468*** (.509)	R^2= .306*** (.566)
	VIF total: 15.448	VIF total: 9.35	VIF total: 4.886
SOC	.455 ***(.144)	.570*** (.147)	.533*** (.159)
DEPEND	.002 (.125)	-.098 (.129)	.010 (.148)
MANAGED WELL	-.207* (.051)	-.213* (.055)	-.277** (.058)
WEALTH1	.473** (.371)	-	.005 (.305)
CD1 (Veguitas)	.250* (.248)	.013 (.218)	-
CD2 (La Libertad)	.610*** (.246)	.384* (.219)	-
CD3 (La Majada)	.579*** (.224)	.303** (.190)	-
CD4 (Nueva Estanzuela)	.538*** (.242)	.246* (.203)	-

Model 3.1 contains four of the constructs from the original WTP theoretical model (i.e., SOC, DEPEND, WEALTH1, and MANAGED WELL) and community dummy variables. This model has the most explained variance (R^2= .553, $p \leq .01$), but also the highest VIF (15.448). Field (2009) suggests that summative VIF values greater than ten indicate a level of multicollinearity; however, according to Vaske (2008), issues with multicollinearity are not a concern until individual predictors have VIF values greater than four. In all variations of Model 3, there are no individual VIF values greater than four, which, according to Vaske (2008) indicates that there is no issue of

multicollinearity present. However, all three versions of Model 3 are presented because of the interesting relationship between WEALTH1 and the community level dummy variables.

When comparing Model 3.1 to Model 3.3, a change in the statistical significance for WEALTH1 was observed. Model 3.2 excludes WEALTH1; while most coefficients remain similar, there is a notable difference in the magnitude of the community dummy variables as compared to Model 3.1. Model 3.3 excludes the community dummy variables. In this model, WEALTH1 is not statistically significant as a predictor variable ($p \geq .10$). This change in significance between the community dummy variables and WEALTH1 in Models 3.2 and 3.3 is an example of omitted variable bias. Omitted variable bias is created when a regression model compensates for an absent factor by over or underestimating the effect of one of the other factors (Field, 2009). For a more complete discussion of omitted variable bias, consult Section 6.5.

Additionally, while Model 3.1 had the highest VIF of three final models, Model 3.2 ($R^2 = .468$, $p \leq .01$) and Model 3.3 ($R^2 = .306$, $p \leq .01$) provide additional confidence in the statistical interpretation for many of the factors expected to affect WTP. These variations of Model 3 provide insight into the role of community heterogeneity and wealth in explaining WTP that are discussed in Chapter Six. Furthermore, PARTICIPATION, EDUCATION, and GENDER were added individually and analyzed under all three models to ensure that the overall explained variance did not change; it did not. Results from these analyses confirm that PARTICIPATION, EDUCATION, and GENDER do not contribute to explaining variance in WTP at a statistically significant level within this sample, and do not interact with other predictors, which further

supports the robustness of other Model 3 predictors.

Final Regression Model. Based on the theory for WTP and statistical tests, Model 3.1 offers the most power for explaining variance in WTP (R^2= .553, p≤ .01). Considering only Model 3.1, SOC was the most robust predictor in explaining WTP (β=.455; p≤ .01). Additionally, MANAGED WELL (β= -.207; p≤ .10), WEALTH1 (β= .473; p≤ .05), and the community dummy variables were significant predictors in this model. However, the WTP predictor DEPEND was not a significant predictor in any model variation (β= .002, p≥ .05), but was included in this final model because I believe it was not operationalized correctly. The implications of these results are discussed in Chapter Six.

Exploring Sense of Community. In addition to including overall SOC as an explanatory variable, I also considered the unique contributions of the three variables of SOC discovered during EFA (Section 5.4). All variations of Model 3 were re-analyzed placing each individual SOC variable into the regression separately in place of SOC to determine their overall strength in predicting WTP. Models with "A" in the label use SOC1 (see Appendix F); models with "B" in the label use SOC2 (see Appendix G); and models with "C" in the label use SOC3 (see Appendix H).

Both SOC2 (i.e., inter-personal connections with neighbors) and SOC3 (i.e., inter-personal connections with community) are statistically significant predictors (p ≤ .02) under all nine combinations of the model variations. However, SOC1 (i.e., sense of personal belonging) is not statistically significant under the final model (i.e., Model 3.1) parameters (β= .14, p≥ .05). Thus, according to these analyses SOC1 is the least important of the three SOC variables. The implications of this finding are discussed

further in Section 6.1.

5.8 Themes of Qualitative Responses

Perceptions of Water Resources. The most ubiquitous finding regarding perceptions of water resources centered around water availability, both in present day and in the future (Figure 12). Most of the respondents (52%) mentioned water scarcity as their primary concern regarding water resources. Using linguistic connectors, data analysis revealed that many of the respondents who discussed water quantity also linked the phenomenon to continued increases in population and/or deforestation. For example, one respondent reported he was concerned for the current state of water resources stating that "*the water source is not enough for the future population, and also the water sources being deforested so the community faces drought*" (ID 59).

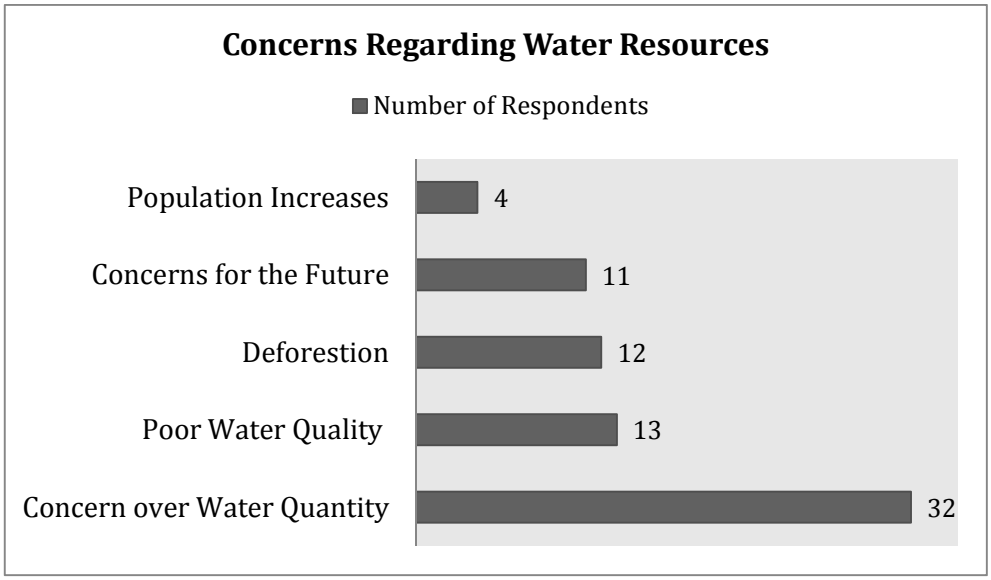

Figure 12: Common themes for concerns regarding water resources revealed in content analysis.

Additionally, water quality was discussed as an additional concern for water resources (21%). Most of the respondents who reported concerns regarding water quality linked it to health concerns. Often, in this context, water is referred to as

"contaminated." For example, one respondent stated "*I worry about water quality because children get sick when they drink contaminated water*" (ID 54). Another respondent reported, "*the contaminated water is the reason we get sick so often*" (ID 58). Most respondents do not link the cause of the contamination to any source. The three respondents who did link contamination to a source reported that mining, agriculture, and "wastes" affected water quality. One woman, from Nueva Estanzuela reported that as a village, "*we do not have options to get better water quality. We do not know what to do*" (ID 36). This community was the poorest of the five, and obtained their water from a small spring 20 minutes away. Implications of these analyses are discussed further in Section 6.6

Current Water Management. All of the communities reported having some form of a water management committee run by local community figures, and, at times the municipality (Figure 9). However, within the communities, there were several respondents who did not know, or did not mention, the water committees, and instead responded that they got water from a private well, or a stream that was unmanaged. Furthermore, many respondents (29%) mentioned some form of technological interventions that help to provide water to the community. Most of these references were regarding piping systems.

Additionally, multiple respondents (16%) reported some level of mismanagement, or corruption on these boards. This trend was not linked to one community, but was a finding within all five communities. Several respondents stated that the distribution of access to water is unfair despite having a water committee locally. One respondent reported "*there is a neighboring community that took over the*

water project (aqueduct) and do not share the water anymore, even though it was a joint project" (ID 11). Additionally, another respondent stated, "*water resources are not well managed because there is not provision for all community members*" (ID 53). Implications of these findings are discussed further in Chapter Six.

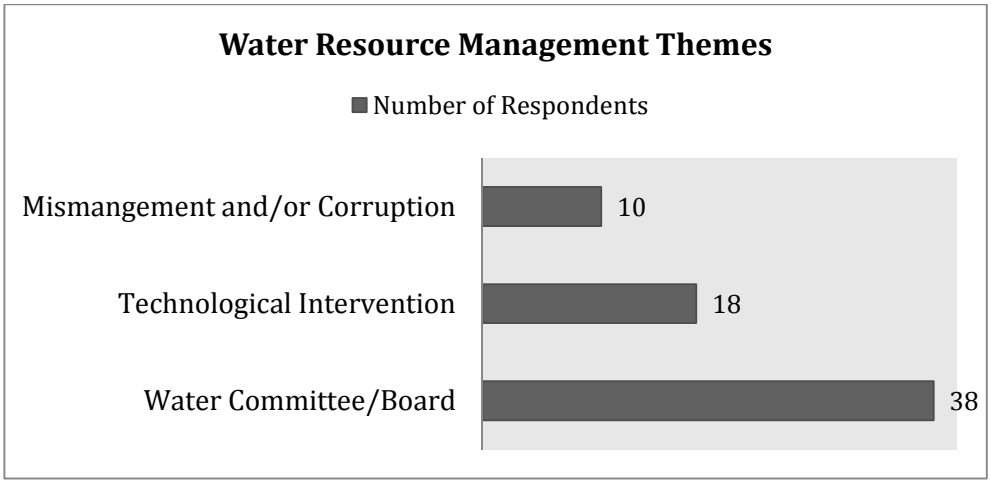

Figure 13: Common themes in water resource management within each community

CHAPTER SIX: Discussion & Conclusions

This chapter interprets the multiple regressions results of Model 3.1 with a separate subsection dedicated to each variable. The section on SOC also discusses the implications of the three individual SOC variables. Next, the important components of the qualitative analyses are interpreted in the context of quantitative findings. Finally, policy implications for the Trifinio Region, study limitations, and conclusions are discussed.

6.1 Sense of Community

Findings from this study indicate that SOC is the most important predictor of WTP in CBWRM (β =.455, $p\leq$ .01). Specifically, factors related to an individual's relationships with their neighbors and community members are the most important determinants of rural farmers' WTP. When SOC was analyzed as three separate variables (see Appendices F, G, & H), SOC1 (i.e., *sense of personal belonging*) explained the lowest amount of variance in WTP. This suggests that it is less important for people in a community to feel a sense of personal belonging, and more important for them to feel connected to their neighbors (SOC2) and the greater community (SOC3). Kruskal-Wallis tests showed that La Majada has a statistically significant lower SOC3 when compared to La Libertad, Sesesmil, and Nueva Estanzuela. This indicates that residents in La Majada do not feel as loyal to or trust their broader community as much as their neighbors.

These SOC findings align with what Ostrom (2010) defined as "core relationships," which are central to successful execution of collective action management at the community level. First, a person's *reputation* within the group influences the level of *trust* others have regarding the individual's willingness to follow

established regulations regarding resources. Trust builds *reciprocity*, and both trust and reciprocity impact the *level of cooperation* experienced in a group setting. Finally, the level of cooperation ultimately affects the *net benefits* achieved by the group. In addition, several structural constructs directly affect the core relationships and include information about past actors, personal/group linkages, number of participants, heterogeneity between participants, and face-to-face communication of participants (Ostrom, 2010).

Numerous studies confirm that when inequity, corruption, or generally weak social connections exist among participants the likelihood of CBM success is greatly diminished. Results from Dyer et al. (2014) support that communities that lacked trust and consensus led to a reduction in successful participation outcomes in CBM forestry management in Southern Africa. Ravnborg's (2008) Nicaraguan study corroborates that inequity of forest resource access arose from a lack of fair monitoring due to corrupt management, while Baland and Platteau's (1996) meta-analysis on collective action also support that past experiences of cooperation within a community are more likely to lead to managing CPRs successfully.

Qualitative responses from this study also support these conclusions, as several of the respondents indicated inequitable access to water resources or corrupt management systems (16%). Arguably, these references to corruption, or mismanagement of water resources impact SOC, which affects core relationships between reputation, trust, and level of cooperation. This linkage is well-summarized by one respondent who said, "*there is nothing I can do to protect it* [water]. *However, the community as a whole could*" (ID 12).

Despite the common findings that social connections and trust are important in successful participation programs, Zanetell and Knuth (2004) affirmed that "this field of study would also benefit from further knowledge about how to foment community cohesion and commitment, particularly where conflict and tensions exist" (p. 805). This recommendation is echoed by (Pronyk et al., 2008), who studied whether social capital could be generated in rural South Africa in the context of group-based microfinance loans with participatory gender and HIV training for women. Throughout the two-year period that groups worked together, social capital between the members of the various groups was enhanced (i.e., *bonding social capital*), as well as connection to other community members and villages (i.e., *bridging social capital*). These results indicate that "social capital can be intentionally generated in relatively short programmatic time frames" (Pronyk et al., 2008, p. 1567). Moreover, Evans (1997) indicated that social capital may be enhanced via institutional partnerships and by working at multiple levels simultaneously in a nested institutional structure. This is discussed further in Section 6.7, where policy recommendations to Trifinio are made.

6.2 Dependence on Water Resources

Place dependence is often cited as an important component of participatory management (Coulibaly-Lingani et al., 2011; Lise, 2000; Zanetell & Knuth, 2004). However, it was not a significant factor in predicting WTP within this study (β= .002, $p \geq$ .05). I believe that this is related to the way in which DEPEND was operationalized or how residents of Trifinio perceive their connection to water resources.

Coulibaly-Lingani et al. (2011) and Lise (2000) both utilized economic factors, such as involvement in fuel cutting activities and total use of forest goods, to

operationalize dependence on forest resources in Burkina Faso and India respectively, and found that dependence on forest resources are statistically significant in WTP. In this study, DEPEND was operationalized as five Likert scale statements broken into "place dependence" (i.e., food, income, health) and "emotional dependence" (e.g., happiness). Conceivably, considering the economic components regarding water resources could enhance the measure of DEPEND in future studies. This economic aspect should be developed further in the context of water resources in future studies.

Additionally, Zanetell and Knuth (2004) included statements in their *dependence on fisheries* variable that directly relate to consumption of fish in their study in Venezuela. Within their study, both livelihoods and primary source of food were directly linked to fishing activities, which is a tangible and easily comprehensible connection. Feasibly, a further investigation into the food inputs to DEPEND would enhance the operational aspects of this variable for future use in investigating dependence on water resources. For example, determining what rainfall patterns are needed to produce various subsistence crops such as corns and beans, and how rainfall may have changed overtime may enhance future measures of dependence on water resources.

Qualitative results from this study also support the idea that observable phenomenon, such as decreases in the amount of available water, are more easily recognized than non-observable phenomenon (e.g., water quality and dependence on water resources). Because a majority of crops depend on rainwater instead of irrigation in the region, this study's measures of DEPEND likely did not capture the direct link between *water sources* (e.g., river or well) and food/income asked about in the survey. This may have influenced the perception of dependence in the case of water resources.

Finally, the qualitative segment of this study revealed that 93% of the respondents reported that they are concerned about the state of their water sources. Statements like “water is life” (ID 45) were common in qualitative responses, which confirm that people within the region are deeply connected and are aware of their reliance on their water resources. This further supports the case that this study’s measure of DEPEND did not capture respondents’ genuine dependence on water resources. Or, this may indicate that because residents are so dependent on water resources there in no measurable variation in the level of such dependence, which would also lead to low levels of predictive power for WTP. Thus, future research is needed to determine how to effectively operationalize dependence on water resources as a new dimension in investigating place dependence, or to confirm that it is not an important driver of WTP in the Trifinio Region because all people are so reliant on water resources.

6.3 Perceptions of Water Resource Management

Results from this study indicate that the community perceptions regarding how well their water resources are being managed (i.e., MANAGED WELL) is an important factor in WTP in managing water resources at the community level (β= -.207, p = .056). Respondents are more WTP in CBWRM when they believe their water resources are not being managed well.

However, I believe that this construct may be performing as I hypothesized CONCERN would act within the WTP theoretical model. Based on Zanetell and Knuth's (2004) research, *level of concern* negatively impacted overall WTP in fishery management in Venezuela. Results from their study indicated that a defeatist attitude

acted negatively on WTP, which caused people to be less WTP if their concerns for the fishery were high. Results from my study demonstrate the opposite relationship, that people were more WTP if they thought water resources are being managed poorly and suggest that further exploration into the relationship between perceptions of a given natural resource, and its management, should be investigated in future participatory management studies.

In addition, perceptions of current natural resource management practices are not commonly measured within participatory literature. Instead, many studies measure perceived successes/failures of programmatic interventions after they have occurred (e.g., Dyer et al., 2014). This trend in CBM stems from evaluating how well a given intervention worked. As research into drivers of WTP expands, it is likely that considering local perceptions of current management will increase. As more information regarding management perspectives is gleaned, it is possible that a threshold will emerge for when high-levels of concern about a resource will begin to detract from WTP.

6.4 Heterogeneity in Wealth

Results from this study demonstrate that WEALTH1 is important in predicting WTP in CBWRM (β= .473, $p \leq .05$). WEALTH1, which included only high-value assets (i.e., motorcycle, vehicle, chainsaw, horses, Internet), had a positive relationship with WTP, which demonstrates that the more of these high value items are owned, the more willing communities are to participate in CBWRM. This result is contradictory to the bulk of participatory literature, which often marks higher levels of wealth with lower levels of participation. However, aside from Sesesmil respondents, only three other respondents reported owning any of the WEALTH1 assets, making an in depth analysis of this

relationship impossible within this sample.

Numerous studies cite the importance wealth and/or income play in participatory management, primarily as a source of heterogeneity among participants (e.g., Agrawal, 2002; Dungumaro & Madulu, 2003; Ostrom, 1990). Within the context of this study, Kruskal-Wallis and Bonferonni post-hoc tests revealed that WEALTH1 values differ between Sesesmil, the wealthiest community in this study, and the other four communities at a statistically detectable level ($p \leq .01$). Additionally, Sesesmil has the highest reported levels of education (Appendix B), and Spearman correlations between WEALTH1 and EDUCATION reveal that there is statistically detectable relationship within this sample ($r = .356$; $p \leq .01$). This relationship indicates that wealth and education levels rise together, but a casual relationship cannot be inferred with these data. In addition, although EDUCATION was not a significant factor in WTP regression models in this study, it may be that my sample was not large enough to capture the effect EDUCATION has on WTP. This notion is supported by findings in Model 2.2 (in Appendix E), where EDUCATION is almost statistically significant ($p = .102$).

As discussed previously, heterogeneity within communities is often a source of failed CBM institutions because differences among participants impacts trust, reciprocity, and overall net-benefits received through collectively managing resources (see Section 6.1) (Ostrom, 1990). Results from this study's qualitative analysis support that community level heterogeneity influences respondent perception regarding how water resources are managed locally. For example, one respondent in Sesesmil stated, "*some wealthy people take advantage of it* [access to water resources] *and do not comply with the norms for rational water use*" (ID 5). Statements like this contrast the

quantitative results that suggest the more high-value assets a person has, the more WTP he/she is. This relationship is interesting because it demonstrates that perceptions of wealthier individuals by poorer residents may, in fact, be more of an issue than wealthier individual's desire to be involved in participatory management programs. However, it is important to consider that people in wealthy communities, such as Sesesmil, may report high levels of WTP, but may, in fact, be exaggerating.

Because wealth is often cited as a source of heterogeneity, and because the results from this study indicate people who have more high-value assets are more WTP, future research should try to incorporate additional measures of wealth. Some possible methods would be (1) collecting measures that can serve as a proxy for yearly income such as the amount of crops grown and sold in markets, (2) estimating remittance payments from relatives in the US or other locations, and (3) through additional measures of assets (e.g., number of farming plots). I believe that by including additional measures of wealth in future WTP models, further research can determine wealth typologies or thresholds that may be addressed and included *a priori* in future participatory programs. By incorporating these additional measures into future studies, *how* wealth levels impact poorer communities' WTP can be investigated.

6.5 Community Level Dummy Variables

Community level dummy variables were statistically significant in predicting WTP in CBWRM. When comparing Model 3.1, which includes the community dummies, to Model 3.3, which does not, the explained variance drops from 55% to 30%. This change in magnitude illustrates that the survey used in this research did not encompass all dimensions of WTP in CBWRM, and, specifically, something at the community level

was missed.

Some of this community level difference is related to differences in wealth or other economic characteristics. This is evident when WEALTH1 is compared in Model 3.1 and 3.3. In Model 3.1, WEALTH1 (β= .473, $p\leq$ .05) has a statistically significant positive relationship in predicting WTP, while in Model 3.3 WEALTH1 is not significant (β= -.005, $p\geq$ .05). As stated previously, this is an example of omitted variable bias; and some characteristic that varies at the community level, not at the country, household, or individual level, was omitted. I hypothesize that this missed economic-based characteristic may be related to remittance payments from relatives working abroad. These types of payments were mentioned by numerous respondents in Sesesmil as an additional source of income, which financed larger farm plots, bigger or multiple houses, and provided opportunities to grow coffee.

6.6 Content Analysis of Concerns Regarding Water Resources

One of the emergent themes from qualitative analysis identified water quantity as a more pressing issue than water quality to respondents. Furthermore, it was far more likely for respondents to link a cause to water quantity issues, such as deforestation and population increases. These results suggest that rural communities are more concerned and aware of water scarcity issues than those of water quality.

According to reports on water quality in the Trifinio Region, the major sources of contamination is from agricultural fertilizers, cattle, and sediment from erosion (Ministerio Federal de Cooperación Económica y Desarrollo, 2011; Spillman et al., 2000). Additionally, changes in the timing and available water are impacting residents within the Trifinio Region (Clemente & Hernandez, 2010; Nelson & Chomitz, 2006; Spillman et

al., 2000). There is ample evidence to support that deforestation is one of the drivers in these changes (Clemente & Hernandez, 2010; Nelson & Chomitz, 2006). These changes are not only scientifically reportable, but are also being recounted anecdotally by local residents who notice these trends over time.

Respondents who identified water availability as a primary concern also tended to include a personal observation of such trends. These observations were often reported as decreases in the amount of rainfall or changes from year to year in the rivers, wells, and springs. Yet, when water quality was listed as a concern, the descriptions were often more vague, such as indicating various forms of "waste" as the culprits. The focus of water quality concerns were linked to health issues. This may suggest that because water quantity decreases are easily visualized they are more observable. For this same reason, causes of water quality are not well understood; yet, the results of contamination are clear. This may be an indication that framing the causes of decreasing water quality could be enhanced within development programs and initiatives.

6.7 Policy Significance and Lessons

The Trifinio Region is a unique transboundary watershed that is currently restructuring their top-down governmental management approach to an integrated management model, which includes strengthening local governance institutions specific to water resource management. Green and Daoust (2012) conducted an integrated management study in Trifinio specific to communities located near the Montecristo Trinational Protected Area, a national park, located at the center of the region. Specifically, they recommend that programs that aim to partner with and act through

local communities need to target *early and sustained active local participation at an even stronger level*, in order to positively affect decentralization success. Although this is a commonly stated need in participatory management literature, mechanisms to accomplish this early and sustained involvement often lack initial community contact to assess what factors influence the required level of sustained participation.

To address this, Zanetell and Knuth (2004) suggest conducting feasibility assessments, which include assessing how willing communities are to participate in sustained CBM practices, and to discover the salient components that lead to high levels of WTP. Thus, it was the objective of this study to assess which factors are the most important in determining WTP in CBWRM. As discussed above, the results from this study reveal that SOC, and specifically inter-personal relationships among community members, is the most important component to address when designing and executing CBM models.

Green and Daoust (2012) reported that there has been solid progress in cultivating opportunities to build and strengthen regionalism across the three countries. However, results from this study indicate that further effort and education is needed in order to enhance SOC between (1) individuals within communities, (2) individual communities and one another (within countries, and among countries), (3) between communities and local branches of government at the municipality level, and (4) between municipalities and Trinational governance institutions (e.g., the TC). These steps are needed not only because SOC is the most robust predictor of WTP in CBWRM, but also because a large majority of respondents (~80%) were unaware that their communities were located in the Trifinio Region.

Specifically, I would recommend that this restructuring of water governance include strengthening of intermediate-levels of government (i.e., at the municipality level) to administer and monitor local CBWRM practices because it is difficult for high-levels of government to provide the necessary support to all local-level management institutions. Instead, efforts to enhance municipality-level water management can ultimately influence how successful CBWRM institutions are in the long-term because they can (1) provide the necessary support in monitoring water resource utilization, and (2) ensure equitable establishment, or re-structuring of CBWRM institutions to include all relevant stakeholders in the decision-making processes related to water resources. Both of these principles are recognized as important components in successful CBM regimes (e.g., Dyer et al., 2014; Hayes, 2006; Ostrom, 1990). Moreover, if municipalities concentrate on small-scale initiatives intentionally designed to enhance SOC between residents and between communities and municipalities, strengthening trust may mitigate issues of heterogeneity.

Respondents in this study also indicated that the various municipalities were already working with CBWRM groups at varying capacities. However, equitable access and reliability of water resources is still a prevalent concern among respondents. Three respondents, from three different communities, voiced specific concerns about municipality involvement. "*The municipality helped with the installation* [of water pipes/pumps]*, but there are problems with distribution because not everybody gets water*" (ID 1); "*it would be better if the government buys those lands* [where freshwater springs are located] *to effectively protect them, given that neither the municipalities nor the central government are doing it*" (ID 10); and "*we do not want to hand the service*

[tasks of the water committee] *over to the municipality because they will collect taxes and we do not have money*" (ID 17). Therefore, based on these results, it is prudent to enhance SOC between local CBWRM institutions and municipalities.

This notion of enhancing intermediary levels of government is supported by Berkes (2007), who stated that "community-based conservation as a panacea, like government-based conservation as a panacea, ignores the necessity of managing commons at multiple levels, with vertical and horizontal interplay among institutions" (p. 15188). Thus, it is logical to suggest that small-scale initiatives that have an intention to generate social bonds, while addressing other natural resource related phenomenon, should be considered in the Trifinio Region.

In addition, it is important to consider the implications of wealth heterogeneity in and among communities. My regression models and qualitative results indicate that engaging stakeholders in participatory management may be difficult if high levels of wealth heterogeneity are present. For example, two respondents, both located in Sesesmil preferred privatization of water access. "*I have to protect my springs. It is other's business to do as they see fit*" (ID 23); "*we think that everyone should have their own water pipe; we have our own*" (ID 35). Such preferences for individual management occurred more within Sesesmil than in any other community in this study. Yet higher levels WEALTH1 contributed to higher WTP scores than respondents with low WEALTH1 levels in Sesesmil, which may indicate that there is a degree of exaggeration among wealthier individual's WTP in CBWRM. Although these results cannot be casually linked to wealth, it is a source of concern, and should be addressed when developing shared management models.

Furthermore, results from this study suggest that people are more WTP when they believe their water resources are not being managed well. Qualitative results also indicate that people are most concerned about the amount of available water both now and in the future. Green and Daoust (2012) suggested that for transboundary integrated management projects, "it can be useful to pursue more focused objectives that have narrower scope and are designed to build on successes" (p. 5). Therefore, future programmatic interventions should concentrate on a series of small-scale programs with a specific focus on water scarcity and its causes, and secondarily, on educating Trifinio residents on region-level problems related to water quality (e.g., fecal contamination, agricultural wastes, and sediment loading from deforestation).

Concentrating programmatic effort on a topic of concern (i.e., water scarcity) and interest may facilitate restructuring community-run water committees to be more equitable. Addressing highly sensitive issues like water scarcity may serve as a focal point to inspire community involvement. In turn, this may (1) enhance resident education regarding their primary interest and concerns, (2) pave the way for larger scale integrated management efforts, and (3) build trust among residents and their municipality institution. To disseminate these findings and policy recommendations, an executive summary in Spanish was shared with partners at CATIE and the TC.

6.8 Limitations of this Study

There are a few notable aspects of this study design to mention when interpreting these results. First, owing to the failure to properly ask respondents about their previous participation in programs or initiatives, this variable was excluded from regression models. The exclusion of this variable may have impacted the overall

regression models, and had it been included, it may have led to a higher explanatory power of WTP. It could have also led to additional policy suggestions if past participation was positively related to WTP.

Second, this small sample size and the fact that no villages in El Salvador were sampled affects the ability to generalize these results to the broader context of the region and to places outside the study area. For Trifinio, the generalizability is constrained by the exclusion of El Salvador; of the three countries it is the most urbanized, and also the most affected by activities that degrade water quality and impact water quantity (López, 2004). Additionally, as mentioned in Chapter Four, the villages chosen by CATIE for this study were already participating in some type of rural development program; thus, they may represent an above average WTP for the region. In conjunction with this, I recognize that the presence of three researchers from the United States may have also influenced respondents' reported level of WTP. These elements impact this study's external validity; however, the villages sampled in this study have similar characteristics to other studies conducted in Trifinio, for example, livelihood strategies (e.g., primarily subsistence farming on corn and beans) (Elias & Taylor, 2008; Franklin, Olivera, et al., 2005), and systematic random sampling was utilized which affords a suitable level of randomization within communities.

Despite these limitations, internal validity in this study was maintained through (1) construct validity of pre-designed scales (e.g., SOC) and (2) through the systematic random sampling design. Additionally, internal consistency reliability of the survey instrument was tested and maintained using Cronbach's alpha. Therefore, this study maintained acceptable levels of internal validity and reliability. Future studies should

expand the scope of sampled villages to enhance external validity and generalizability.

6.9 Conclusions

CBM approaches continue to be promoted as the amount of global natural resources diminishes. Providing communities with the ability to collectively manage local natural resources *should*, theoretically, increase the likelihood those resources will be utilized in a sustainable manner and the needs of rural populations are met (Blaikie, 2006; Heathcote, 2009). However, in practice, studies often find that simply creating CBM institutions does not lead to equitable access or sustainable uses of a given resource (e.g., Araral, 2009; Kamoto et al., 2013; Ravnborg, 2008). Instead, addressing the underlying factors that motivate participation in such programs should be viewed as fundamental in developing effective and fair CBM practices (Zanetell & Knuth, 2004).

This study's primary objective was to investigate the underlying factors that motivate WTP in CBWRM in the Trifinio region. Results from this research contribute to the empirical literature on the factors that drive participation within CBM institutions. In the Trifinio region, I found that social connections, perceptions of water resource management, and wealth influence WTP in CBWRM. These findings advance the sociological theory of WTP in a new dimension, water resources, and a new geographic area, the Trifinio Region. Findings from this study confirm many of the theoretical findings of past studies, but also uncover some different and contradictory results on why rural farmers are WTP in CBWRM.

Program recommendations to Trifinio policy-makers focuses on enhancing social connections at the community and municipality levels through small-scale programs that focus on water scarcity issues first, and on educating residents on the sources of

water quality second. Once established, these small-scale initiatives can build from the bottom-up into an integrated management model that uses the municipality-level government to convey the needs of CBWRM to the transnational governance level. These results indicate that enhancing social connections in local communities and nesting CBM programmatic design into municipal level governance may enhance continued efforts to establish CBMs within integrated management models in Trifinio.

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Appendices

Appendix A- Survey Instrument

ID base de datos: _____

Instrucciones para la persona que aplica la encuesta

- *Leer todo lo que está en la encuesta cada vez que se realiza una entrevista. El texto está en formato de letra "normal" e "itálico". Lea a la persona a entrevistar todo, excepto lo que está en itálico de aquí en adelante.*
- *La muestra para cada región se creó seleccionando aleatoriamente miembros de la comunidad.*
- *Las personas a entrevistar deben ser las que toman las decisiones sobre el manejo de la propiedad (finca/parcela). No podrán ser familiares, trabajadores, ni residentes del hogar o terreno/finca. Si la(s) persona(s) que toman las decisiones no están presentes, no haga la entrevista. Pregunte, cuándo sería posible hablar con alguna persona que toma las decisiones. Si no es posible entrevistar a quien toma las decisiones durante el tiempo de la agenda de trabajo, agradézcale a la persona con quien conversó y despídase.*
- *Nunca entrevistar a personas menores de edad. En la medida de lo posible, se debe evitar la presencia de personas ajenas a la familia a la hora de hacer la entrevista.*
- *Cada persona entrevistada tendrá un número de identificación único. Llenar ID base de datos.*
- *Asegúrese de recoger todo el material usado en la encuesta al final de la entrevista.*
- *Asegurarse de tomar el punto GPS donde se realiza la entrevista.*
- *Anote la hora de inicio y fin de la entrevista.*

Presentación

Buenos días/tardes/noches.

Mi nombre es _____ vengo de parte de la Universidad de Idaho en EE.UU. Esta encuesta es parte de un estudio sobre las actividades productivas de las fincas y las percepciones sobre los recursos naturales en la región conocida como Trifinio. Están colaborando con nosotros el CATIE y la Comisión Trifinio. Las preguntas se relacionan con diversos temas de la vida diaria y sobre las características de las fincas. Cabe aclarar que no somos representantes del gobierno y que esta entrevista es confidencial y voluntaria. La entrevista va a durar aproximadamente 60 minutos. Recuerde que toda la información que vamos a recopilar será tratada de forma confidencial y es únicamente para fines de investigación.

(Si la persona tiene preguntas generales, puede responder. Si piden más aclaración, diga: "si me lo permite, hablaremos sobre esos temas más adelante y le puedo aclarar en ese momento su duda." Si preguntan cómo fue seleccionado diga: "usted fue seleccionado al azar, por cosa de suerte).

¿Puedo empezar la entrevista?	Si _____ No _____ *(marca con una X)*
¿Puedo tomar los photos?	Si _____ No _____
¿Puedo recordar la entrevista?	Si _____ No _____
¿Puedo marque la locación? (GPS)	Si _____ No _____

(*Marca con una X*)	Yo	Mi pareja	Mi pareja y yo	Mi hermanos(as) y yo	Otra
¿Quién o quienes toman las decisiones sobre qué se hace en la finca?					_____
¿Quién o quienes toman las decisiones sobre el uso de los bosques de la finca?					
¿Quién o quienes toman las decisiones sobre el uso del agua de la finca?					

- *Es importante obtener la información de las personas que toman las decisiones, de ambos mujeres y hombres, especialmente de aspectos y responsabilidades que cada uno tiene de la casa o de la finca. Es válido que la persona entrevistada pida ayuda a otros que estén presente en el lugar de la entrevista. En el caso que la personas(s) entrevistada(s) <u>no es</u> la(s) persona(s) que toma decisiones, preguntar si quien(es) toma las decisiones está cerca, y si está disponible para la entrevista. Realice la entrevista con esta(s) otra(s) persona(s). Si no es posible realizar la entrevista en el momento con la persona adecuada, de las gracias y finalice la entrevista.*
- *Es válido que la persona entrevistada consulte o complemente la información con otro miembro del hogar que tenga información.*
- *Si nota que la persona no maneja la información requerida, haga una pausa, de las gracias y finalice la entrevista. Haga la anotación en el formulario.*

PARTE I: CARACTERÍSTICAS DEL HOGAR (HOUSEHOLD FEATURES)

Ahora quisiera que UD me cuente sobre los miembros de su hogar, de acuerdo a las preguntas que le voy hacer. Voy a comenzar con las características de la persona que toma la mayor parte de las decisiones sobre la finca.

	1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**
	Dígame por favor el nombre (sin apellidos) de las personas que viven en su hogar empezando por Ud. *(Please tell me the name (no last names) of the people living in your home starting with you)*	¿Cuántos años cumplidos tiene? *(Por cada individuo)* *(How old are you? For each individual)*	¿Es hombre o mujer? *(Por cada individuo)* *(Are they male or female? For each individual)*	¿Cuál es la relación de parentesco con la persona que responde la entrevista? *(What is the relationship to the person answering the interview?)*	¿A qué se dedica?, es decir, cuál es su fuente de ingreso principal. *(Por cada individuo)* *(What do you do? i.e., which is your main source of income? For each individual)*	Respecto a la educación, ¿cuál es el último Grado aprobado? (*Regarding education, what is the last grade completed?)*	¿Usted pertenece a algún grupo indígena? (*Do you belong to an indigenous group? Which indigenous group does your family belong to?)*
	1. Persona que está respondiendo 2. Individuo 2	Años completos por individuo *(0 para menores de 1 año)*	1. Hombre 2. Mujer	1. Persona que toma decisiones 2. Cónyuge 3. Hijo(a)/Hijastro (a) 4. Yerno/Nuera 5. Nieto(a)/sobrino (a) 6. Hermano(a) 7. Padre/Madre biológico 8. Padrastro/Madrastra 9. Suegro(a) 10. Otro familiar	1. Menor de edad 2. Finca propia 3. Finca propia y trabaja <u>ocasionalmente</u> fuera de la finca como…: 3.1. Jornalero 3.2. Comercio 3.3. Profesional 3.4. Asalariado 4. Trabaja siempre fuera de la finca como… 5. Ama de Casa 6. Estudiante	0. Ninguno 1. Primaria incompleta 2. Primaria completa 3. Secundaria incompleta 4. Secundaria completa 5. Universitaria incompleta 6. Universitaria completa (Bach.) 7. Maestría, Doctorado	0. No sabe 1. SI (*¿Cuál?*) 1.2. Chortí 1.3. Ladinos 1.4. Mixto 2. NO (*pase a la 9*)
1							
2							

8. ¿Cuántos terrenos administra o son propiedad de alguien en su hogar (casas, fincas, lotes)? _____
(How many plots of land do you/or someone in your household own (homes, farms, lots)?)

Ahora me podría hablar sobre la(s) finca(s) o parcela(s) que manejan los miembros de su hogar. No tome en cuenta el(los) lote(s) con casa(s) que <u>no son parte</u> de una finca. Empecemos por la finca que usted considera es la principal, es decir, la finca a la que el hogar le dedica la mayor cantidad de tiempo.
(***<u>El orden en que se registran aquí las fincas debe ser el mismo para el resto de la entrevista)</u>.***

	9. Fincas	**10.**	**11.**	**12.**	**13.**	**14.**	**15.**	**16.**
Finca *(Hasta finca 2)*	¿Cuál es el tamaño del terreno? *(What is the size of the land?)*	¿Es Ud. o algún miembro del hogar dueño del finca/parcela? *(Are you or a member of the family that owns this farm/plot?)*	¿Cuánto tiempo dura en llegar caminando desde aquí donde estamos hasta la finca? *(How long does it take you to walk from where we are to the farm?)*	*Solo si es dueño del finca (Only for land owners)* ¿La finca tiene título de propiedad emitido por una entidad de gobierno?	¿Hace cuantos años usa, administra o posee el terreno? *(How many years have you used or administered this land?)*	¿Paga impuestos sobre la propiedad ? *(Do you pay taxes on the land?)*	¿Cuántas personas de su familia trabajan en la finca <u>X</u>? Puede ser familia que no vive en el hogar. *(How many members of the family work on the farm?)*	¿Cuántas personas que no son de la familia trabajan en la finca fijos? *(How many people outside the family work on the farm permanently?)*
	1. Hectáreas 2. Manzanas 3. Tareas 4. Otro: ____	1. SI 1.1. Se la alquila a alguien 1.2. Se la presta a alguien 2. NO 3. Usted paga alquiler 4. Es prestada	En minutos _____	1. SI 2. NO 3. Otro_____ NA = no aplica	Años	1. SI 2. NO	Escriba la cantidad *(Write the quantity)*	Escriba la cantidad *(Write the quantity)*
1								
2								

17. Hablemos ahora de las actividades que tiene en su finca(s).

(*De ser necesario, puede leer las opciones de respuesta. Llenar datos de la(s) finca(s) en el mismo orden que* ***en 9****)*

Usos	**18.1.**	**18.2.**	**18.3.**	**18.4.**	**18.5.**	**18.6.**	**18.7.**
Finca	¿Tiene potrero o pasto? *(Livestock)*	¿Tiene plantación, acuacultura, o monocultivo comercial? *(Commercial plantation, aquaculture, or monoculture)*	¿Tiene plantación, acuacultura, o monocultivo para autoconsumo? *(Plantation, aquaculture, monoculture for self-consumption, Which one?)*	¿Tiene bosque? *(Forest)*	¿Tiene cultivos mezclados con árboles? Esto se conocen como sistemas agroforestales *(Agroforestry system)*	¿Tiene áreas con regeneración natural, tacotal, charral? *(Natural regeneration, fallow lands)*	¿Tiene agua propia de la finca? *(Water)*
	1. SI 1.1. Pastizales para ganado 1.2. Pastizales para cabras 1.3. Pastizales para caballos 1.4. Otro:___ 2. NO	1. Café 2. Plátano 3. Banano 4. Maíz 5. Frijoles 6. Otros _____	1. Café 2. Plátano 3. Banano 4. Maíz 5. Frijoles 6. Otros _____	1. SI 1.1. Bosque Secundario 1.2. Bosque Primario 1.3. Plantación forestal 1.4. Reforestación 1.5. Otro _____ 2. NO	1. SI 2. NO	1. SI 1. NO	1. SI 1.1. Río/quebrada 1.2. Naciente 1.3. Pozo 1.4. Humedal 1.5. Otra___ 2. NO
1							
2							

Solo para finca 1 y la 2 si tiene más de una finca. Repetir a la persona entrevistada una por una la modalidad de uso de suelo para el caso que aplica

18. ¿Dónde hay ahora tiene _____, qué había ahí hace 10 años? *(El espacio en blanco se refiere a la modalidad de uso de suelo que aplica).*

	19.1.	**19.2.**	**19.3.**	**19.4.**	**19.5.**	**19.6.**	**19.7.**
Finca	Potrero o pasto	Plantación, acuacultura, o monocultivo comercial	Plantación, acuacultura, o monocultivo para autoconsumo	Bosque	Sistemas Agroforestales	Regeneración natural, tacotal, charral	Presencia de agua
1							
2							

Hablemos un poco del futuro de su finca.

20. ¿Ha pensado en qué le gustaría hacer con su finca más adelante? Es decir, ¿Qué piensa hacer en los próximos 3 a 5 años con su terreno? *(Let's talk about the future of your farm. Have you given some thought to what you like to do with your estate later? What will you do in the next 5 years with this land?)*

_____

_____

_____

Gracias por sus respuestas. Hasta ahora va muy bien con sus aportes. (*Thank you for your answers. You are doing very well to this point in the interview*)

PARTE II: SECCIÓN SOBRE BOSQUES (SECTION ON FORESTS)

Vamos a conversar sobre temas generales que tienen que ver con el bosque. *(Let's talk about forests in general.)*

21. En términos generales, ¿qué beneficios obtiene usted o su familia del bosque? *(No sugerir las repuesta) Marque con X (Broadly speaking, what benefits do the forests provide to you and your family)?*

0. Nada/Ninguno	
1. Agua	
2. Madera, postes	
3. Leña	
4. Plantas	
5. Ingreso (turismo, ventas de productos del bosque, incentivos)	
6. Belleza del paisaje	
7. Biodiversidad	
8. Frescura, oxígeno	
9. Otros (lista)	

22. Por favor comente en más detalle los productos que usted consigue en el bosque. *Can you tell me more detail about the products do you collect from the forest?*	**22.1.**	**22.2.**	**22.3.**
Si se mencionan productos, pregunte sobre ellos, y si hay alguna otra cosa que ellos colecten del bosque. *(If they list products above ask about them, and ask if there is anything else they collect from the forest)*	¿Normalmente, de dónde obtiene estos productos? *(Where do you collect them from)* 1. Los bosques de mi finca 2. Bosques en la comunidad 3. Otra fuente _____	Normalmente, ¿Cuántas veces al mes va a colectar ese producto al bosque? *(Normally, How many times <u>per month</u> do you go to the forest to collect this item?)*	¿Cuánto tiempo le tomaría ir desde aquí hasta el bosque más cercano? *(How long does it take you from where we are to walk to this forest?)*
1. Madera, postes			Minutos _____
2. Leña			
3. Plantas			
4. Fauna/cacería			
5. Otros que se colecten del bosque _____			

23. Si tiene animales como ganado en la finca ¿Los animales pasan algún tiempo en el bosque? *Marque con X*
(If you have livestock, do the animals spend time in the forest?

0. □ No tiene ganado *(doesn't have livestock)*	1. □ Si	2. □ No

Para cada tipo de bosque que usa o visita, por favor, responda las siguientes preguntas.
For each forest that you use or visit, please answer the questions that follow.

	24.	**25.**	**26.**	**27.**
Pregunte específicamente para cada tipo de bosque, si no lo tiene, marque NA ***Ask specifically for each type; If they do not have this type of forest, enter NA.***	¿En los últimos 10 años, ha habido cambios en los bosques de la zona donde vive? *(Si la respuesta es NO, pase a la **pregunta 28)*** *(In the last 10 years, have there been changes in the forests where you live?* *(If the answer is NO, go to question 28)*	¿Cuáles cambios de importancia ha notado en el bosque? *(No sugerir las respuetas, escriba todas las que se mencionen)* *(What major changes have you noticed in the forest?* *(Do their answers, write all that are mentioned)*	¿Por qué cree que ha habido cambios en las áreas de bosque? *(No sugiera las respuestas, marque la opción que más se aproxima a la respuesta dada, o escriba la respuesta Otros)* *(Why do you think there have been changes in the forest?)*	¿Cuán severos han sido estos cambios en su comunidad? *(Lee las respuestas)* *(How severe have these changes been to your community?)*
	1. SI *2.* NO	1. Pérdiad de bosque 2. Perdida de la calidad del bosque o degradación 3. Más plantaciones de bosque 4. Más fuegos 5. Otros (especifique)	1. Más gente usa el bosque 2. Más área para agricultura 3. Más área para pastos 4. Otros (especifique)	0. No sabe 1. No mucho 2. Más o menos 3. Muy severos
1. Bosque de su finca ***Forest on their farm***				
2. Bosque comunal ***Community forest***				
3. Otra: (por ejemplo bosque público) ***For example: public forest)***				

28. ¿Qué piensa hacer con el bosque de su finca(s) en los próximos 3 a 5 años? *(What will you do with the forest on your farm(s) in the next 3-5 years?)*

_____

_____

_____

_____

29. ¿Tiene alguna preocupación por el estado futuro y cantidad de bosques de esta comunidad? Explique. *(Si la persona no tiene alguna preocupacion por el estado futuro y cantidad de bosques, pase a la* ***pregunta 30.1****)*
*(Are you concerned about the future amount/quantity of forest or quality of forest for this community? Explain how and why? If the person isn't concerned about the future of the forests, proceed to question 30.1****.)***

_____

_____

_____

_____

Relación con el bosque

Hablemos sobre el bosque y usted. Le voy a leer una lista corta de frases y quisiera que usted me diga si está: 1 muy en desacuerdo; 2 en desacuerdo; 3 neutral; 4 acuerdo; 5 totalmente de acuerdo, con lo que le leo. *(Lea cada frase despacio, de ser necesario relea la frase, también puede releer la escala de los valores del 1 al 5. Escriba en el espacio el número correspondiente).*

(Let's talk about forest and you. I'll read a short list of phrases and I would like you to tell me if you: 1 strongly disagree; 2 disagree; 3 neutral; 4 I agree; 5 totally agree, with what I read you.)

	1 muy en desacuerdo	**2 en desacuerdo**	**3 sin opinión**	**4 de acuerdo**	**5 totalmente de acuerdo**
30.1.Los ingresos de su familia dependen del bosque *(Income for your family relies on the forest)*					
30.2. La alimentación de su familia depende del bosque *(Food for your family relies on the forest)*					
30.3. Para usted es importante vivir cerca del bosque *(For you is important to live near forest)*					
30.4. El vivir cerca del bosque es parte de su felicidad *(Living near forest is a part of your happiness)*					
30.5. Los bosques en su comunidad son manejados adecuadamente. Por ejemplo, hay acceso para todas las personas, se respetan las regulaciones, se protege contra la deforestación *(Forests are being appropriately managed in your community)*					
30.6. Siente que la gestión o el manejo del bosque es responsabilidad de su familia *(You feel it is your family's responsibility to manage the forest)*					
30.7. Siente que la comunidad debe estar a cargo de la gestión o manejo de los bosques *(You feel the community should be in charge of managing the forest)*					
30.8. Siente que el gobierno debe estar a cargo de la gestión o manejo de los bosques *(You feel the government should be in charge of managing the forest)*					
30.9. Cree que es necesario incrementar la protección del bosque *(You believe it is necessary to increase the protection of the forest)*					
30.10. Siente que la cantidad de bosque que hay es suficiente para su comunidad *(You feel that the quantity of forest there is sufficient for your community)*					

PARTE III: AGUA (WATER)

Ahora quisiera que Ud. me hable sobre las fuentes de agua en su comunidad, de acuerdo a las preguntas que le voy hacer.
(Now I would like you to tell me about water sources in the community, according to the questions I'm going to ask you.)

31. Fuentes	**32.**	**33.**	**34.**		**35.**	**36.**	**37.**
¿De dónde obtiene el agua? *(Haga las siguientes preguntas para cada fuente)* *(Where do you get water? (For each source, ask the next 6 questions))*	¿Qué usos le da al agua, según la fuente? *(Puede que haya múltiples usos por fuente)* *(What is water from that source used for? (Can list multiple uses for each source))*	¿Cuánto tarda en llegar desde su casa hasta la fuente de agua que usted usa? *(How long does it take to travel from your home to where you get the water?)*	Según la época ¿Hay agua suficiente para su hogar y su comunidad? Por favor, piense según la época: lluviosa, seca, o todo el año. *(According to the season, is there enough water for you and your community during all time of the year?)*		¿Han ocurrido cambios en la cantidad de agua en los últimos 10 años? *(Si la respuesta es <u>NO</u>, pase a la **pregunta 43**)* *(Has there been changes in the amount of available water in last 10 years?)* *(If the answer is <u>No</u>, go to question 43)*	¿Por qué cree que la disponibilidad de agua ha cambiado? *(No de las respuestas, marque la opción que más se aproxima a la respuesta dada, o escriba la respuesta Otros)* *(Why do you think the availability of water has changed?)*	¿Cuán severos han sido estos cambios en su comunidad? *(Lee las respuestas de 1 a 4)* *(How severe has these changes been to your community?)*
	1. Agricultura (cultivos) 2. Animales de la finca (Ganado, cerdos, gallinas, etc.) 3. Otro	Minutos	0. No sabe 1. Si 2. No		1. Si 2. No	1. Más gente usa agua. 2. Más uso en agricultura 3. Más uso para animales en las fincas 4. Otros (especifique)	1. No sabe 2. No mucho 3. Más o menos 4. Muy severos
			Época lluviosa *(Rainy season)*	Época verano *(Dry season)*			
1. Naciente							
2. Río							
3. Quebrada							
4. Pozo público							
5. Pozo privado							
6. Sistema municipal							
7. Otros							

Continuamos con el tema de agua pero enfocado en la calidad del agua. Para cada una de las diferentes fuentes de agua discutidas en la pregunta interior, queremos saber lo siguiente:

38. Calidad del agua	**39.**	**40.**		**41.**	**42.**	**43.**
Fuentes según 36	¿Considera que el agua que utiliza es de buena calidad? Es decir es transparente, sin olor, sin basura, sin tierra, etc. *(Do you think the water you use is of good quality? It is transparent, odorless, with no garbage, etc.)*	¿La calidad del agua cambia en diferentes épocas del año? *(Does the quality of water change at different times of the year?)*		¿Han ocurrido cambios en los últimos 10 años? *(Si la respuesta es <u>NO</u>, pase a la **pregunta 49**)* *(Has there been changes in the 10 years?)* *If the answer is No, go to question 49)*	¿Por qué cree que la calidad de agua ha cambiado? *(No de las respuestas, marque la opción que más se aproxima a la respuesta dada, o escriba la respuesta Otros)* *(Why do you think the quality of water has changed?)*	¿Cuán severos han sido estos cambios en su comunidad? *(Lee las respuestas de 1 a 4)* *(How severe are these impacts for your community?)*
1. Naciente 2. Río 3. Quebrada 4. Pozo público 5. Pozo privado 6. Sistema municipal o de organización local **7.** Otros (especificar)	0. No sabe 1. Si 2. No	0. No sabe 1. Si 2. No		1. Si 2. No Describa el cambio brevemente: _____ _____	1. Más gente usa agua. 2. Más uso en agricultura 3. Más uso para animales en las fincas 4. Otros (especifique):	1. No sabe 2. No mucho 3. Más o menos 4. Muy severos
		Época lluviosa *(Rainy season)*	Época verano *(Dry season)*			

44. ¿Tiene alguna preocupación por el futuro de los recursos hídricos de esta comunidad en cuanto a calidad o cantidad? ¿Por qué y cómo? *(Si la persona no tiene alguna preocupacion por el estado futuro de los recursos hídricos, pase a la* ***pregunta 45.1****)*

_____

_____

_____

_____

Relación con el agua

Hablemos sobre el agua y usted. Otra vez, le voy a leer una lista corta de frases y quisiera que usted me diga si está: 1 muy en desacuerdo; 2 en desacuerdo; 3 sin opinión; 4 de acuerdo; 5 totalmente de acuerdo, con lo que le leo. *(Lea cada frase despacio, de ser necesario relea la frase, también puede releer la escala de los valores del 1 al 5. Escriba en el espacio el número correspondiente).*

	1 muy en desacuerdo	**2 en desacuerdo**	**3 sin opinión**	**4 de acuerdo**	**5 totalmente de acuerdo**
45.1 Los ingresos de su familia dependen de las fuentes de agua *(Income for your family relies on water sources)*					
45.2 La alimentación de su familia depende de las fuentes de agua *(Food for your family relies on water sources)*					
45.3 El recurso agua es importante para la salud de su familia *(Water sources are important for the health of your family)*					
45.4 Para usted es importante vivir cerca de la fuente de agua *(For you, it is important to live near the water)*					
45.5 El vivir cerca del agua es parte de su felicidad *(Living near water a part of your happiness)*					
45.6 El uso que se le dé al bosque impactan las fuentes de agua. *(Forest uses impact water resources)*					
45.7 Las fuentes de agua en su comunidad son manejadas adecuadamente. Por ejemplo, hay acceso para todas las personas, se respetan las regulaciones, se protege contra la contaminación *(Water is being appropriately managed in your community)*					
45.8 Siente que la gestión o el manejo del agua es responsabilidad de su familia *(You feel it is your family's responsibility to manage water resources)*					
45.9 Siente que la comunidad debe estar a cargo de la gestión o manejo de los recursos hídricos *(You feel the community should be in charge of managing water resources)*					
45.10 Siente que el gobierno debe estar a cargo de la gestión o manejo de los recursos hídricos *(You feel the government should be in charge of managing water resources)*					
45.11 Cree que es necesario incrementar la protección de los recursos como el agua *(You believe it is necessary to increase the protection of water resources)*					
45.12 Siente que el nivel de calidad del agua se suficiente para su comunidad *(You feel that the level of water quality is sufficient for your community)*					

46. ¿Cómo maneja su comunidad los recursos hídricos actualmente?
(How does your community currently manage water resources?)

_____

_____

_____

Supongamos que hay un programa de capacitación para diseñar un plan de gestión de los recursos hídricos con el objetivo de mejorar la cantidad y calidad del agua. El programa imaginario (hipotético) podría ser facilitado por organizaciones externas (por ejemplo, una organización local, o el gobierno), pero sería responsabilidad de la comunidad hacerse cargo del plan para implementar los cambios y de supervisar que los cambios se hacen según el plan. Para cada pregunta a continuación, por favor indique su interés en participar en estas actividades en una escala de 1 = nada dispuesto, 2 = probablemente no dispuestos 3 = neutral, 4 = probablemente dispuestos, 5 = muy dispuesto.
(Suppose there was a program to empower your community to design a plan for managing water resources aimed at improving water quantity and quality. The hypothetical program might be facilitated by outside organizations (e.g., NGOs, Government), but it would be the community's responsibility to take charge of the plan, to implement changes, and to monitor and enforce these changes. For each question below, please indicate your interest in participating in these activities on a scale of 1=not at all willing, 2=probably not willing 3=neutral, 4=probably willing, 5=very willing.)

	1 nada dispuesto	**2 probablemente no dispuestos**	**3 sin opinión**	**4 probablemente dispuestos**	**5 muy dispuesto**
47.1 Asistir a reuniones comunales relacionadas con la gestión del agua *(Attend meetings related to managing water resources in my community)*					
47.2 Tomar un papel de liderazgo para la gestión del agua en la comunidad *(Take a leadership role in managing water resources in my community)*					
47.3 Trabajar junto con otras personas de mi comunidad en el manejo de recursos hídricos *(Work with other people in my community to manage water resources)*					
47.4 Trabajar con personas de otras comunidades (cercanas) en el manejo de recursos hídricos *(Work with people in other communities upstream (near me) to manage water resources)*					
47.5 Cambiar las prácticas en mi hogar y la finca(s) relacionadas al uso del agua que ayuden a mejorar este recurso *(Change practices related to how my household and farm uses water that would lead to improvements in water resources)*					
47.6 Cambiar el sitio de donde obtiene el agua para el hogar *(Change where I collect water for my household)*					

Disposición

Ahora usando la misma escala, por favor indique qué tan dispuestas cree Ud. que otras personas en su comunidad estarían a participar en estas actividades.

(Now, please indicate how willing you think others in your community would be to participate in these activities (use same scale))

	1 nada dispuesto	**2 probablemente no dispuestos**	**3 sin opinión**	**4 probablemente dispuestos**	**5 muy dispuesto**
48.1 Colaborar en la gestión y manejo del agua *(Work collaboratively to manage water resources)*					
48.2 Cambiar las prácticas en el hogar y la finca(s) relacionadas al uso del agua que ayuden a mejorar este recurso *(Change their household and farm practices that would lead to improvements in water resources)*					

Nuevamente gracias por su participación en esta encuesta. Tiene alguna pregunta hasta este punto. (*Once again, thank you for your participation in this interview. Do you have any question to this point?*

PARTE IV: SENTIDO DE COMUNIDAD ENTRE MIEMBROS DEL PUEBLO (SENSE OF COMMUNITY AMONG VILLAGE MEMBERS)

Ahora queremos saber cómo se siente usted con su comunidad. (Escala: 1 muy en desacuerdo; 2 en desacuerdo; 3 sin opinión; 4 de acuerdo; 5 totalmente de acuerdo)

	1 muy en desacuerdo	**2 en desacuerdo**	**3 sin opinión**	**4 de acuerdo**	**5 totalmente de acuerdo**
49.1 En general, le gusta vivir en esta comunidad *(Overall, you like living in this village)*					
49.2 Se siente que pertenece a esta comunidad *(You feel like you belong to this village)*					
49.3 Usted visita la casa de sus vecinos *(You visit with your neighbors in their homes)*					
49.4 La amistad y las relaciones con la gente significa mucho para usted *(Friendships you have with other people in your village mean a lot to you)*					
49.5 Si usted necesita consejo sobre algo, podría pedirlo a alguien de su caserío *(If you needed advice about something you could go to someone in your village)*					
49.6 Cree que está a de acuerdo con la mayoría de gente de su comunidad sobre lo que es importante en la vida *(You think you agree with most people in your village about what is important in life)*					
49.7 Usted cree que sus vecinos le ayudarían en una emergencia *(You believe your neighbors would help you in an emergency)*					
49.8 Usted siente lealtad con la gente en su comunidad *(You feel loyal to the people in your village)*					
49.9 Usted pide prestado cosas y hace favores a sus vecinos *(You borrow things and exchange favors with your neighbors)*					
49.10 Usted estaría dispuesto a colaborar junto con otros en algo para mejorar la comunidad *(You are willing to work together with others on something to improve your village)*					
49.11 Usted planea quedarse en esta comunidad por algunos años más *(You plan to remain a resident of this village for a number of years)*					
49.12 Usted cree que comparte gustos y opiniones similares a la gente que vive esta comunidad *(You like to think of yourself as similar to the people who live in your village)*					
49.13 Cuando camina por el pueblo, con frecuencia usted se para y habla con gente de la comunidad *(You regularly stop and talk with people in your village)*					

PARTE V: SECCIÓN SOBRE FORMAS DE PAGO O COMPENSACIÓN (SECTION ON FORMS OF PAYMENTS OR COMPENSATION)

50. Quisiera que me diga si alguna vez usted ha oído hablar de algún programa que ofrezca formas de compensación, pagos o incentivos para
(I would like you to tell me if you have ever heard of any form of compensation, payment or incentives to:)

Términos relacionados a incentivos	**SI: 1; NO:2**
50.1 Proteger el bosque *(Protect the forest)*	
50.2 Proteger una naciente o recurso agua *(Protect water resources)*	
50.3 Reforestar *(Reforest)*	
50.4 Sistemas agroforestales *(Agroforestry systems)*	
50.5 Servicios ecosistémicos o servicios ambientales (PES o PSA) *(Ecosystem services or environmental services (PES or PSA))*	

(Si NO conoce sobre ningún tipo de Compensación, pagos o incentivos ***pasar a 71****)*
(If he/she DOES NOT know about any type of Compensation, payment or incentives go to ***71****)*

51. ¿Cómo supo usted de estos pagos? *(Marcar todas las opciones que apliquen)* *(How you knew of these payments? (Check all that apply)*	**Marque con X** ***(Mark with X)***
51.1 Medios de comunicación (Periódico, Radio, Televisión o Noticias) *(Media)*	
51.2 Organización local, cuál? _____ *(Local organization, which one?)*	
51.3 Comisión Trifinio *(Trifinio Commission)*	
51.4 CATIE *(CATIE)*	
51.5 Regente/Ingeniero forestal *(Forestry engineer or regent)*	
51.6 Vecino *(Neighbor)*	
51.7 Amigo o conocido *(Friend, acquaintance)*	
51.8 Miembro de la familia *(Family member)*	
51.9 Otros. ¿Cuál?_____ *(Other, which one?)*	
51.10 No sebe, no se acuerda *(Does not know or remember)*	

52. ¿Ha solicitado estos pagos?

0. □ NS/NR *(don't know)*	1. □ Si ¿Cuántas veces? _____ *(Yes. How many times?)*	2. □ No

53. Supongamos que hay un programa o proyecto que dá un tipo de compensación pago para el majeo o protección de recursos como bosque o agua. Para cada pregunta a continuación, por favor indique su interés en participar en estas actividades en una escala de 1 = nada dispuesto, 2 = probablemente no dispuesto 3 = sin opinión, 4 = probablemente dispuesto, 5 = muy dispuesto.

(Suppose there was a program or project that gives some kind of compensation or payment for management or protection of resources like forest or water. For each option indicate whether the incentive would motivate you to participate in this type of program.)

Razones *(Reasons)*	1 nada dispuesto	2 probablemente no dispuestos	3 sin opinión	4 probablemente dispuestos	5 muy dispuesto
53.1 El dinero en sí mismo *(Money in itself)*					
53.2 Para conservar/proteger (le gusta el bosque) *(To preserve/protect (like the forest)*					
53.3 Tengo interés en que otros se den cuenta sobre mi apoyo a la conservación (*My interest for others to know about my support to conservation*)					
53.4 Mejora el paisaje *(Improves the landscape)*					
53.5 Seguridad derechos y tenencia de la tierra *(Land rights and tenure security)*					
53.6 Tener algún tipo de asistencia técnica o capacitación en relación a su finca. ¿Qué tipo?_____					

54. Indique la que considera es la principal razon para su interes en particpiar en estas actividades: _____

PARTE VI: SECCIÓN SOBRE ORGANIZACIONES LOCALES Y REGIONALES (PARA TODOS) (SECTION ON LOCAL AND REGIONAL ORGANIZATIONS)

Ahora hablemos sobre organizaciones locales y regionales. ¿Alguna vez usted ha trabajado con alguna de las siguientes entidades?
(Now let's talk about local and regional organizations. Have you ever worked with or participated with any of the following organizations?)

55. Organización *(Organization)*	**SI: 1; NO: 2**
1. La Comisión Trifinio	
2. El CATIE	
3. Programa Agua y Bosques	
4. Programa Agua y Cuencas	
5. Programa MAP	
6. ASORECH	
7. Mancomunidad ¿Cuál? _____	

1. □ Si	2. □ No

56. ¿Usted sabe si su finca(s) está(n) ubicada(s) en la zona de Trifinio?

PARTE VII: SECCIÓN FINAL SOBRE TEMAS GENERALES (PARA TODOS) (FINAL SECTION ON GENERAL ISSUES (FOR ALL))

57. ¿De qué material fue construida su casa (donde Ud. vive actualmente)? *(block o ladrillo, zócalo, madera, prefabricado, zinc, otro)*
(What material is your house made of (that is, the house where you currently live)? (block or brick, zócalo, wood, pre-fab, zinc, other).

Section of the house	**Material *(Material)***
Techo *(roof)*	
Paredes (walls)	
Piso *(floor)*	

58. ¿Usted tiene otras casas?
(Do you own other houses?)

1. □ Si ¿Cuántas? _____	2. □ No

59. De la siguiente lista que le voy a mencionar, ¿qué cosas tiene en su hogar? *(Marque con X)*
(From the list of things I am going to mention, what things do you have in your household? Mark with X)

	SI: 1; NO: 2		**SI: 1; NO: 2**		**SI: 1; NO: 2**
Electricidad		Fogón (para leña)		Bicicleta	
Teléfono fijo		Televisión		Tractor	
Celular		Equipo de radio/música		Motosierra	
Internet		Machete		Motoguadaña	
Fosa séptica		Pala, pico, o macana		Gallinas	
Letrina		Vehículo (carro)		Cerdos	
Cocina (estue naturs pfa)		Motocicleta		Caballo	

Hemos llegado al final de la entrevista. Quisiera agradecerle de parte del equipo investigador de la Universidad de Idaho, por todo su tiempo y por la información que nos comparte en esta encuesta.

¿Tiene alguno pregunta o comentario de lo que hemos conversado?
(Si es una pregunta relevante para la encuesta anótela. Si hay preguntas que no puede responder, simplemente diga que se lo hará saber al equipo que está haciendo el estudio, explique que se verá la forma de aclarar la pregunta).

Asegúrese de recoger todo el material usado en la encuesta y despída

Appendix B- Descriptive statistics at the community level.

Table 19: Descriptive statistics at the community level. Veguitas, La Libertad, and La Majada are located in Guatemala; Nueva Estanzuela and Sesesmil are located in Honduras. Mean (standard deviation).

	Veguitas n=8 mean (SD)	**La Libertad** n=8 mean (SD)	**La Majada** n=13 mean (SD)	**Nueva Estanzuela** n=12 mean (SD)	**Sesesmil** n=21 mean (SD)
Gender	.50 (.53)	.88 (.35)	.23 (.44)	.67 (.49)	.76 (.43)
Age	45.38 (12.25)	48.00 (9.89)	45.23 (9.99)	38.50 (9.76)	42.67 (15.65)
Education Level	.75 (.88)	.50 (.54)	1.38 (.65)	.50 (.52)	1.76 (1.54)
WTP	3.79 (.30)	4.54 (.36)	4.00 (.72)	4.35 (.65)	3.74 (.64)
SOC	4.22 (.44)	4.39 (.33)	3.91 (.53)	4.40 (.43)	4.30 (.54)
SOC1	4.52 (.45)	4.625 (.44)	4.46 (.52)	4.60 (.43)	4.59 (.54)
SOC2	3.84 (1.21)	4.00 (.48)	3.65 (.88)	4.19 (.65)	4.09 (.67)
SOC3	4.15 (.55)	4.50 (.32)	3.48 (.99)	4.38 (.38)	4.14 (.61)
DEPEND	4.10 (.50)	4.5 (.53)	4.14 (.58)	4.26 (.39)	4.08 (.63)
MANAGED WELL	2.88 (1.24)	3.5 (1.31)	4.14 (.58)	2.42 (1.17)	3.81 (1.29)
WEALTH1	.025 (.071)	.025 (.071)	.00 (.00)	.017 (.058)	.44 (.30)
WEALTH2	.87 (.24)	.875 (.173)	.77 (.28)	.389 (.489)	.89 (.22)
Size of primary farm parcel	1.12 (.79)	1.05 (.77)	.54 (.39)	.72 (.38)	10.51 (11.6)
Size of secondary farm parcel	.39 (.20)	.85 (.65)	.36 (.35)	.35 (.11)	7.33 (8.87)

Appendix C- Spearman Correlation Coefficient Matrix

Table 20: Spearman Correlation Coefficient Matrix. No indications of covariance at high enough levels to be problematic, except when parceling sense of community (SOC) into its three separate components * p ≤ .10, **p ≤ .05, ***p ≤ .01

	WTP	SOC	DEPEND	MANAGED WELL	WEALTH1	SOC1	SOC2	SOC3
WTP	1	.415**	.151	-.150	.066	.311*	.361**	.427**
SOC	.415**	1	.348**	.231	.200	.699**	.893**	.803**
DEPEND	.151	.348**	1	.218	.139	.371**	.190	.370*
MANAGED WELL	-.150	.231	.218	1	.284*	.272*	.158	.115
WEALTH1	.066	.200	.139	.284*	1	.272*	.158	.049
SOC1	.311*	.699**	.371**	.272**	.217	1	.473**	.523**
SOC2	.361**	.893**	.190	.158	.127	.473**	1	.596**
SOC3	.427**	.803**	.370**	.115	.049	.523**	.596**	1

Appendix D- Exploratory multiple regression model combinations, excluding community dummy variables.

LOC (family, community, government) and WEALTH1 and WEALTH2 were analyzed in all possible combinations to explore which predictors in the WTP theoretical model are most robust. Based on these models, and models in Appendix E, GENDER, EDUCATION, and LOC are excluded because they are not statistically significant under any model combination.

Model 1.1 Variations

A: WTP=SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC1+PROTECT WATER

B: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC1+QUANT SUFF

C: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC1+MANAGED WELL

Model 1.2 Variations

A: WTP=SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC1+PROTECT WATER

B: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC1+QUANT SUFF

C: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC1+MANAGED WELL

Model 1.3 Variations

A: WTP=SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC2+PROTECT WATER

B: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC2+QUANT SUFF

C: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC2+MANAGED WELL

Model 1.4 Variations

A: WTP=SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC2+PROTECT WATER

B: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC2+QUANT SUFF

C: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC2+MANAGED WELL

Model 1.5 Variations

A: WTP=SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC3+PROTECT WATER

B: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC3+QUANT SUFF

C: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC3+MANAGED WELL

Model 1.6 Variations

A: WTP=SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC3+PROTECT WATER

B: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC3+QUANT SUFF

C: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC3+MANAGED WELL

Appendix D: Model 1.1A

WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC1+PROTECT WATER

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.512[a]	.263	.167	.59905

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.899	7	.986	2.747	.016[b]
	Residual	19.378	54	.359		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.143	.803		1.423	.160	-.467	2.754		
SOC	.687	.192	.530	3.575	.001	.302	1.072	.620	1.612
DEPEND	-.166	.218	-.140	-.761	.450	-.602	.271	.405	2.470
GENDER	-.128	.185	-.096	-.692	.492	-.499	.243	.712	1.405
EDUCATION	.015	.085	.026	.173	.863	-.155	.185	.610	1.641
WEALTH1	-.254	.364	-.102	-.698	.488	-.983	.476	.635	1.576
LOC1	.076	.155	.083	.490	.626	-.235	.386	.480	2.082
PROTECT WATER	.102	.124	.105	.818	.417	-.148	.351	.831	1.204

a. Dependent Variable: Willingness_to_Participate

Appendix D: Model 1.1B

WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC1+QUANT SUFF

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.529[a]	.280	.187	.59193

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.358	7	1.051	3.000	.010[b]
	Residual	18.920	54	.350		
	Total	26.278	61			

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	1.316	.767		1.716	.092	-.222	2.854		
	SOC	.712	.186	.550	3.833	.000	.340	1.085	.647	1.545
	DEPEND	-.069	.219	-.058	-.315	.754	-.509	.370	.390	2.563
	GENDER	.001	.206	.001	.006	.995	-.412	.415	.560	1.787
	EDUCATION	.033	.084	.059	.395	.695	-.135	.202	.606	1.649
	WEALTH1	-.132	.366	-.053	-.362	.719	-.865	.601	.613	1.630
	LOC1	.069	.153	.075	.452	.653	-.238	.376	.480	2.084
	QUANT SUFF	-.102	.072	-.203	-1.412	.164	-.246	.043	.646	1.548

a. Dependent Variable: Willingness_to_Participate

Appendix D: Model 1.1C

WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC1+MANAGED WELL

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.569[a]	.324	.236	.57356

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.514	7	1.216	3.697	.002[b]
	Residual	17.764	54	.329		
	Total	26.278	61			

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.339	.743		1.801	.077	-.151	2.830		
SOC	.737	.180	.569	4.089	.000	.376	1.098	.646	1.547
DEPEND	-.096	.207	-.081	-.465	.644	-.512	.319	.409	2.444
GENDER	-.115	.177	-.086	-.647	.520	-.470	.241	.711	1.406
EDUCATION	.023	.081	.041	.285	.777	-.139	.186	.613	1.630
WEALTH1	-.070	.354	-.028	-.199	.843	-.780	.640	.614	1.629
LOC1	.111	.148	.121	.747	.458	-.187	.409	.479	2.089
MANAGED WELL	-.139	.059	-.282	-2.374	.021	-.257	-.022	.888	1.126

a. Dependent Variable: Willingness_to_Participate

Appendix D: Model 1.2A

WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC1+PROTECT WATER

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.506[a]	.256	.160	.60169

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.728	7	.961	2.655	.020[b]
	Residual	19.550	54	.362		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.142	.823		1.387	.171	-.509	2.793		
SOC	.672	.192	.519	3.503	.001	.287	1.057	.627	1.594
DEPEND	-.144	.217	-.122	-.667	.508	-.579	.290	.413	2.422
GENDER	-.156	.182	-.116	-.854	.397	-.521	.210	.741	1.350
EDUCATION	-.016	.076	-.027	-.204	.839	-.169	.137	.761	1.315
WEALTH2	.022	.227	.012	.098	.922	-.433	.478	.946	1.057
LOC1	.075	.156	.082	.483	.631	-.237	.387	.480	2.083
PROTECT WATER	.096	.125	.098	.766	.447	-.155	.346	.834	1.199

a. Dependent Variable: Willingness_to_Participate

Appendix D: Model 1.2B

WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC1+QUANT SUFF WATER

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.527[a]	.278	.185	.59264

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.312	7	1.045	2.974	.010[b]
	Residual	18.966	54	.351		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.318	.786		1.676	.100	-.259	2.895		
SOC	.703	.185	.543	3.810	.000	.333	1.073	.658	1.520
DEPEND	-.056	.216	-.047	-.257	.798	-.489	.378	.402	2.489
GENDER	-.005	.207	-.004	-.026	.980	-.419	.409	.560	1.787
EDUCATION	.019	.077	.034	.249	.804	-.135	.173	.729	1.372
WEALTH2	.001	.224	.001	.005	.996	-.448	.451	.941	1.062
LOC1	.068	.153	.074	.445	.658	-.239	.375	.480	2.084
QUANT SUFF	-.107	.071	-.213	-1.505	.138	-.249	.035	.668	1.497

a. Dependent Variable: Willingness_to_Participate

Appendix D: Model 1.2C

WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC1+MANAGED WELL

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.569[a]	.324	.236	.57369

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.506	7	1.215	3.692	.002[b]
	Residual	17.772	54	.329		
	Total	26.278	61			

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.321	.761		1.735	.088	-.206	2.847		
SOC	.733	.179	.566	4.097	.000	.374	1.092	.655	1.527
DEPEND	-.090	.205	-.076	-.440	.662	-.502	.321	.418	2.392
GENDER	-.123	.174	-.092	-.703	.485	-.472	.227	.736	1.359
EDUCATION	.013	.073	.024	.184	.855	-.132	.159	.761	1.314
WEALTH2	.027	.216	.014	.125	.901	-.407	.461	.947	1.056
LOC1	.111	.149	.121	.745	.460	-.187	.408	.478	2.091
MANAGED WELL	-.141	.057	-.286	-2.459	.017	-.257	-.026	.923	1.083

a. Dependent Variable: Willingness_to_Participate

Appendix D: Model 1.3A

WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC2+PROTECT WATER

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.511[a]	.261	.165	.59972

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.856	7	.979	2.723	.017[b]
	Residual	19.422	54	.360		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.098	.820		1.339	.186	-.546	2.742		
SOC	.669	.199	.517	3.367	.001	.271	1.068	.581	1.722
DEPEND	-.112	.170	-.094	-.657	.514	-.453	.229	.665	1.504
GENDER	-.125	.186	-.093	-.671	.505	-.498	.248	.707	1.415
EDUCATION	.019	.084	.033	.223	.824	-.150	.188	.619	1.615
WEALTH1	-.287	.377	-.116	-.761	.450	-1.042	.469	.592	1.688
LOC2	.058	.169	.053	.344	.732	-.281	.397	.586	1.705
PROTECT WATER	.092	.130	.094	.703	.485	-.170	.353	.759	1.318

a. Dependent Variable: Willingness_to_Participate

Appendix D: Model 1.3B

WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC2+QUANT SUFF WATER

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.534[a]	.285	.192	.58992

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.486	7	1.069	3.073	.008[b]
	Residual	18.792	54	.348		
	Total	26.278	61			

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.168	.794		1.472	.147	-.423	2.759		
SOC	.668	.195	.516	3.431	.001	.278	1.058	.586	1.705
DEPEND	-.043	.170	-.036	-.252	.802	-.383	.298	.646	1.549
GENDER	.023	.208	.017	.112	.911	-.393	.439	.549	1.821
EDUCATION	.035	.083	.061	.417	.678	-.132	.201	.617	1.621
WEALTH1	-.199	.376	-.080	-.529	.599	-.951	.554	.577	1.732
LOC2	.121	.160	.109	.758	.452	-.199	.441	.636	1.573
QUANT SUFF	-.110	.072	-.219	-1.523	.133	-.254	.035	.640	1.562

a. Dependent Variable: Willingness_to_Participate

Appendix D: Model 1.3C

WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC2+MANAGED WELL

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.565[a]	.319	.230	.57581

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.374	7	1.196	3.608	.003[b]
	Residual	17.904	54	.332		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.285	.775		1.658	.103	-.269	2.839		
SOC	.716	.190	.553	3.768	.000	.335	1.097	.585	1.709
DEPEND	-.015	.166	-.012	-.089	.930	-.348	.318	.643	1.556
GENDER	-.113	.179	-.084	-.632	.530	-.471	.245	.706	1.416
EDUCATION	.029	.081	.051	.361	.720	-.133	.191	.622	1.609
WEALTH1	-.111	.370	-.045	-.299	.766	-.853	.632	.565	1.769
LOC2	.057	.156	.051	.363	.718	-.256	.369	.637	1.571
MANAGED WELL	-.133	.059	-.270	-2.261	.028	-.252	-.015	.884	1.131

a. Dependent Variable: Willingness_to_Participate

Appendix D: Model 1.4A

WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC2+PROTECT WATER

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.503[a]	.253	.156	.60285

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.653	7	.950	2.615	.021[b]
	Residual	19.625	54	.363		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.126	.840		1.341	.186	-.558	2.810		
SOC	.663	.200	.512	3.321	.002	.263	1.064	.581	1.721
DEPEND	-.080	.166	-.068	-.485	.629	-.413	.252	.707	1.414
GENDER	-.157	.183	-.118	-.860	.394	-.523	.209	.741	1.350
EDUCATION	-.013	.077	-.022	-.162	.872	-.167	.142	.746	1.340
WEALTH2	.026	.228	.014	.115	.909	-.430	.482	.946	1.057
LOC2	.026	.164	.023	.156	.877	-.304	.355	.628	1.593
PROTECT WATER	.093	.131	.095	.705	.484	-.170	.355	.758	1.319

a. Dependent Variable: Willingness_to_Participate

Appendix D: Model 1.4B

WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC2+QUANT SUFF

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.530[a]	.281	.188	.59144

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.389	7	1.056	3.018	.009[b]
	Residual	18.889	54	.350		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.196	.812		1.473	.146	-.431	2.823		
SOC	.662	.195	.512	3.397	.001	.272	1.053	.587	1.704
DEPEND	-.018	.164	-.015	-.111	.912	-.347	.310	.697	1.435
GENDER	.010	.207	.008	.049	.961	-.406	.426	.553	1.809
EDUCATION	.015	.077	.027	.196	.845	-.139	.170	.721	1.387
WEALTH2	.005	.224	.003	.021	.983	-.444	.453	.942	1.062
LOC2	.101	.155	.091	.647	.520	-.211	.412	.675	1.481
QUANT SUFF	-.116	.071	-.231	-1.619	.111	-.259	.028	.654	1.530

a. Dependent Variable: Willingness_to_Participate

Appendix D: Model 1.4C

WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC2+MANAGED WELL

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.564[a]	.318	.229	.57617

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.352	7	1.193	3.594	.003[b]
	Residual	17.926	54	.332		
	Total	26.278	61			

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.280	.791		1.619	.111	-.305	2.866		
SOC	.716	.190	.553	3.762	.000	.334	1.097	.585	1.710
DEPEND	-.001	.159	-.001	-.008	.994	-.321	.318	.699	1.431
GENDER	-.125	.175	-.094	-.716	.477	-.477	.226	.736	1.359
EDUCATION	.016	.074	.028	.216	.830	-.133	.165	.734	1.362
WEALTH2	.033	.217	.017	.150	.881	-.403	.468	.947	1.056
LOC2	.044	.150	.040	.294	.770	-.256	.344	.691	1.447
MANAGED WELL	-.137	.058	-.278	-2.380	.021	-.253	-.022	.927	1.079

a. Dependent Variable: Willingness_to_Participate

Appendix D: Model 1.5A

WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC3+PROTECT WATER

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.512[a]	.263	.167	.59901

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.902	7	.986	2.748	.016[b]
	Residual	19.376	54	.359		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.070	.820		1.305	.197	-.574	2.715		
SOC	.700	.194	.541	3.609	.001	.311	1.089	.608	1.644
DEPEND	-.121	.171	-.102	-.707	.483	-.463	.222	.659	1.517
GENDER	-.133	.185	-.100	-.721	.474	-.505	.238	.711	1.406
EDUCATION	.018	.084	.031	.209	.835	-.151	.187	.618	1.617
WEALTH1	-.259	.364	-.104	-.711	.480	-.988	.471	.634	1.577
LOC3	.031	.062	.061	.497	.621	-.094	.156	.898	1.114
PROTECT WATER	.113	.125	.117	.903	.370	-.138	.365	.819	1.222

a. Dependent Variable: Willingness_to_Participate

Appendix D: Model 1.5B

WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC3+ QUANT SUFF

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.527[a]	.278	.185	.59270

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.308	7	1.044	2.972	.010[b]
	Residual	18.970	54	.351		
	Total	26.278	61			

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.296	.780		1.662	.102	-.267	2.860		
SOC	.721	.189	.557	3.817	.000	.342	1.100	.628	1.592
DEPEND	-.015	.170	-.013	-.087	.931	-.355	.325	.653	1.532
GENDER	-.002	.207	-.002	-.012	.991	-.418	.413	.556	1.798
EDUCATION	.037	.083	.066	.448	.656	-.130	.205	.617	1.620
WEALTH1	-.133	.366	-.054	-.363	.718	-.867	.601	.613	1.632
LOC3	.015	.061	.030	.249	.804	-.108	.139	.905	1.105
QUANT SUFF	-.102	.072	-.203	-1.410	.164	-.247	.043	.643	1.556

a. Dependent Variable: Willingness_to_Participate

Appendix D: Model 1.5C

WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC3+ MANAGED WELL

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.563[a]	.317	.229	.57647

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.333	7	1.190	3.582	.003[b]
	Residual	17.945	54	.332		
	Total	26.278	61			

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.349	.759		1.777	.081	-.173	2.871		
SOC	.740	.184	.572	4.032	.000	.372	1.108	.629	1.590
DEPEND	.003	.163	.002	.015	.988	-.324	.329	.671	1.491
GENDER	-.120	.178	-.089	-.671	.505	-.477	.238	.711	1.407
EDUCATION	.031	.081	.055	.384	.702	-.131	.193	.623	1.604
WEALTH1	-.074	.356	-.030	-.209	.835	-.789	.640	.613	1.633
LOC3	.005	.060	.011	.091	.928	-.115	.126	.897	1.115
MANAGED WELL	-.135	.059	-.273	-2.278	.027	-.254	-.016	.878	1.138

a. Dependent Variable: Willingness_to_Participate

Appendix D: Model 1.6A

WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC3+ PROTECT WATER

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.506[a]	.256	.160	.60165

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.730	7	.961	2.656	.020[b]
	Residual	19.547	54	.362		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.058	.845		1.253	.216	-.635	2.751		
SOC	.686	.194	.530	3.537	.001	.297	1.074	.614	1.628
DEPEND	-.100	.169	-.084	-.591	.557	-.438	.239	.681	1.469
GENDER	-.162	.182	-.121	-.889	.378	-.528	.204	.740	1.352
EDUCATION	-.014	.076	-.025	-.189	.850	-.167	.138	.767	1.303
WEALTH2	.038	.229	.020	.166	.869	-.420	.496	.934	1.070
LOC3	.031	.063	.061	.489	.627	-.096	.157	.887	1.128
PROTECT WATER	.107	.126	.110	.849	.400	-.145	.358	.823	1.215

a. Dependent Variable: Willingness_to_Participate

Appendix D: Model 1.6B

WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC3+ QUANT SUFF WATER

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.526[a]	.276	.183	.59342

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.262	7	1.037	2.946	.011[b]
	Residual	19.016	54	.352		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.292	.803		1.609	.113	-.318	2.903		
SOC	.712	.188	.550	3.793	.000	.336	1.088	.638	1.568
DEPEND	-.002	.166	-.002	-.012	.990	-.335	.331	.681	1.468
GENDER	-.010	.208	-.007	-.046	.963	-.426	.407	.555	1.802
EDUCATION	.023	.076	.040	.295	.769	-.131	.176	.738	1.354
WEALTH2	.010	.226	.005	.045	.964	-.443	.464	.927	1.078
LOC3	.015	.062	.029	.239	.812	-.109	.139	.892	1.121
QUANT SUFF	-.107	.071	-.213	-1.500	.139	-.249	.036	.663	1.507

a. Dependent Variable: Willingness_to_Participate

Appendix D: Model 1.6C

WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC3+ MANAGED WELL

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.563[a]	.317	.228	.57657

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.326	7	1.189	3.578	.003[b]
	Residual	17.952	54	.332		
	Total	26.278	61			

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.324	.781		1.697	.096	-.241	2.890		
SOC	.737	.182	.569	4.040	.000	.371	1.103	.637	1.571
DEPEND	.008	.159	.007	.052	.959	-.312	.328	.699	1.430
GENDER	-.128	.175	-.096	-.731	.468	-.480	.224	.734	1.362
EDUCATION	.020	.073	.036	.279	.781	-.126	.166	.767	1.304
WEALTH2	.034	.219	.018	.155	.878	-.405	.473	.934	1.070
LOC3	.006	.060	.012	.099	.921	-.115	.127	.887	1.128
MANAGED WELL	-.137	.058	-.278	-2.363	.022	-.254	-.021	.914	1.094

a. Dependent Variable: Willingness_to_Participate

Appendix E- Exploratory multiple regression model combinations, including community dummy variables.

LOC (family, community, government) and WEALTH1 and WEALTH2 were analyzed in all possible combinations to explore which predictors in the WTP theoretical model are most robust. These models, in conjunction with the models presented in Appendix D, GENDER, EDUCATION, and LOC are excluded because they are not statistically significant under any combination.

Model 2.1 Variations

A: WTP=SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC1+PROTECT WATER + COMMUNITY DUMMIES

B: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC1+QUANT SUFF + COMMUNITY DUMMIES

C: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC1+MANAGED WELL + COMMUNITY DUMMIES

Model 2.2 Variations

A: WTP=SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC1+PROTECT WATER + COMMUNITY DUMMIES

B: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC1+QUANT SUFF + COMMUNITY DUMMIES

C: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC1+MANAGED WELL + COMMUNITY DUMMIES

Model 2.3 Variations

A: WTP=SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC2+PROTECT WATER + COMMUNITY DUMMIES

B: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC2+QUANT SUFF + COMMUNITY DUMMIES

C: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC2+MANAGED WELL+ COMMUNITY DUMMIES

Model 2.4 Variations

A: WTP=SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC2+PROTECT WATER + COMMUNITY DUMMIES

B: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC2+QUANT SUFF + COMMUNITY DUMMIES

C: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC2+MANAGED WELL + COMMUNITY DUMMIES

Model 2.5 Variations

A: WTP=SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC3+PROTECT WATER + COMMUNITY DUMMIES

B: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC3+QUANT SUFF + COMMUNITY DUMMIES

C: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC3+MANAGED WELL + COMMUNITY DUMMIES

Model 2.6 Variations

A: WTP=SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC3+PROTECT WATER + COMMUNITY DUMMIES

B: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC3+QUANT SUFF + COMMUNITY DUMMIES

C: WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC3+MANAGED WELL + COMMUNITY DUMMIES

Appendix E: Model 2.1 A WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC1+PROTECT WATER + COMMUNITY DUMMIES

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.736[a]	.541	.440	.49108

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.220	11	1.293	5.361	.000[b]
	Residual	12.058	50	.241		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	.957	.690		1.388	.171	-.428	2.342		
SOC	.511	.168	.395	3.040	.004	.173	.849	.545	1.836
DEPEND	.099	.192	.083	.515	.609	-.286	.484	.351	2.846
GENDER	-.034	.163	-.025	-.208	.836	-.360	.293	.620	1.612
EDUCATION	.069	.073	.122	.942	.351	-.078	.217	.548	1.826
CD1 (Veguitas)	.589	.265	.303	2.224	.031	.057	1.122	.493	2.029
CD2 (La Libertad)	1.321	.262	.680	5.033	.000	.794	1.848	.502	1.991
CD3 (La Majada)	.975	.263	.610	3.703	.001	.446	1.504	.339	2.953
CD4 (Nueva Estanzuela)	1.107	.258	.672	4.299	.000	.590	1.624	.376	2.661
WEALTH1	1.106	.425	.446	2.601	.012	.252	1.960	.312	3.205
LOC1	-.143	.135	-.155	-1.056	.296	-.414	.129	.424	2.359
PROTECT WATER	.048	.104	.050	.464	.645	-.161	.258	.794	1.260

Appendix E: Model 2.1 B WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC1+QUANT SUFF + COMMUNITY DUMMIES

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.737[a]	.543	.442	.49010

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.268	11	1.297	5.400	.000[b]
	Residual	12.010	50	.240		
	Total	26.278	61			

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.033	.674		1.533	.132	-.320	2.386		
SOC	.531	.166	.410	3.192	.002	.197	.864	.554	1.804
DEPEND	.137	.190	.116	.722	.474	-.245	.520	.355	2.820
GENDER	.017	.179	.013	.097	.923	-.342	.377	.510	1.962
EDUCATION	.074	.073	.131	1.017	.314	-.072	.221	.552	1.812
CD1 (Veguitas)	.561	.271	.289	2.074	.043	.018	1.105	.471	2.124
CD2 (La Libertad)	1.287	.268	.663	4.798	.000	.748	1.826	.479	2.088
CD3 (La Majada)	.972	.262	.608	3.712	.001	.446	1.498	.341	2.933
CD4 (Nueva Estanzuela)	1.090	.260	.661	4.194	.000	.568	1.612	.368	2.720
WEALTH1	1.135	.419	.458	2.708	.009	.293	1.977	.320	3.125
LOC1	-.144	.135	-.157	-1.071	.289	-.415	.126	.424	2.360
QUANT SUFF	-.040	.062	-.080	-.645	.522	-.165	.085	.595	1.679

Appendix E: Model 2.1 C WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC1+ MANAGED WELL+ COMMUNITY DUMMIES

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.752[a]	.566	.471	.47749

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.878	11	1.353	5.932	.000[b]
	Residual	11.400	50	.228		
	Total	26.278	61			

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.054	.656		1.605	.115	-.265	2.372		
SOC	.576	.164	.445	3.506	.001	.246	.906	.538	1.857
DEPEND	.114	.183	.096	.626	.534	-.253	.481	.365	2.736
GENDER	-.038	.158	-.028	-.239	.812	-.355	.280	.621	1.611
EDUCATION	.061	.071	.108	.855	.396	-.082	.204	.548	1.824
CD1 (Veguitas)	.506	.262	.261	1.932	.059	-.020	1.032	.477	2.097
CD2 (La Libertad)	1.256	.258	.647	4.869	.000	.738	1.775	.491	2.035
CD3 (La Majada)	.935	.255	.585	3.665	.001	.423	1.448	.341	2.936
CD4 (Nueva Estanzuela)	.963	.264	.584	3.651	.001	.433	1.493	.339	2.952
WEALTH1	1.122	.408	.452	2.746	.008	.301	1.942	.320	3.126
LOC1	-.110	.133	-.120	-.830	.410	-.376	.156	.416	2.405
MANAGED WELL	-.093	.053	-.188	-1.764	.084	-.199	.013	.760	1.316

a. Dependent Variable: Willingness_to_Participate

Appendix E: Model 2.2A WTP=SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC1+PROTECT WATER+ COMMUNITY DUMMIES

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.706[a]	.498	.388	.51356

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.091	11	1.190	4.512	.000[b]
	Residual	13.187	50	.264		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	.953	.733		1.301	.199	-.518	2.425		
SOC	.594	.172	.459	3.457	.001	.249	.940	.569	1.757
DEPEND	-.034	.191	-.029	-.181	.857	-.417	.348	.389	2.573
GENDER	-.049	.170	-.037	-.291	.772	-.391	.292	.622	1.609
EDUCATION	.115	.074	.203	1.546	.128	-.034	.264	.585	1.711
CD1 (Veguitas)	.209	.231	.108	.903	.371	-.256	.674	.706	1.416
CD2 (La Libertad)	.965	.235	.497	4.109	.000	.493	1.436	.687	1.456
CD3 (La Majada)	.573	.211	.358	2.713	.009	.149	.997	.576	1.737
CD4 (Nueva Estanzuela)	.864	.244	.524	3.535	.001	.373	1.354	.457	2.190
WEALTH2	.317	.230	.168	1.380	.174	-.145	.779	.673	1.486
LOC1	-.095	.139	-.103	-.680	.499	-.375	.185	.436	2.296
PROTECT WATER	.075	.108	.077	.691	.493	-.143	.293	.804	1.243

Appendix E: Model 2.2B WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC1+QUANT SUFF+ COMMUNITY DUMMIES

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.704[a]	.495	.384	.51522

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.005	11	1.182	4.454	.000[b]
	Residual	13.273	50	.265		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.072	.722		1.486	.144	-.377	2.521		
SOC	.622	.170	.480	3.658	.001	.280	.964	.585	1.708
DEPEND	-3.097E-5	.191	.000	.000	1.000	-.384	.384	.388	2.574
GENDER	-.015	.188	-.011	-.081	.936	-.393	.363	.510	1.959
EDUCATION	.123	.074	.217	1.668	.102	-.025	.272	.595	1.681
CD1 (Veguitas)	.187	.242	.096	.774	.442	-.298	.672	.653	1.531
CD2 (La Libertad)	.931	.243	.480	3.833	.000	.443	1.419	.645	1.550
CD3 (La Majada)	.569	.215	.356	2.650	.011	.138	1.000	.560	1.785
CD4 (Nueva Estanzuela)	.856	.256	.519	3.342	.002	.341	1.370	.419	2.389
WEALTH2	.319	.233	.170	1.371	.176	-.148	.786	.661	1.513
LOC1	-.093	.140	-.101	-.665	.509	-.374	.188	.436	2.295
QUANT SUFF	-.026	.066	-.052	-.391	.697	-.159	.107	.578	1.731

Appendix E: Model 2.2C WTP= SOC+DEPEND+GENDER+EDUCATION +WEALTH2+LOC1+MANAGED WELL+ COMMUNITY DUMMIES

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.716[a]	.513	.406	.50599

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.477	11	1.225	4.785	.000[b]
	Residual	12.801	50	.256		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.135	.709		1.599	.116	-.290	2.560		
SOC	.665	.170	.514	3.913	.000	.324	1.006	.565	1.769
DEPEND	-.019	.185	-.016	-.102	.919	-.391	.353	.399	2.503
GENDER	-.054	.167	-.040	-.323	.748	-.390	.282	.621	1.610
EDUCATION	.112	.073	.198	1.543	.129	-.034	.259	.591	1.693
CD1 (Veguitas)	.134	.235	.069	.571	.571	-.338	.605	.667	1.500
CD2 (La Libertad)	.900	.234	.463	3.842	.000	.429	1.370	.670	1.493
CD3 (La Majada)	.529	.211	.331	2.506	.016	.105	.953	.559	1.788
CD4 (Nueva Estanzuela)	.710	.269	.431	2.637	.011	.169	1.251	.365	2.741
WEALTH2	.258	.231	.137	1.115	.270	-.207	.723	.644	1.553
LOC1	-.060	.139	-.065	-.428	.670	-.339	.220	.423	2.361
MANAGED WELL	-.081	.057	-.165	-1.414	.164	-.197	.034	.719	1.391

Appendix E: Model 2.3A WTP= SOC+DEPEND+GENDER+EDUCATION +WEALTH1+LOC2+PROTECT WATER+ COMMUNITY DUMMIES

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.740[a]	.547	.447	.48797

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.372	11	1.307	5.487	.000[b]
	Residual	11.906	50	.238		
	Total	26.278	61			

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.173	.701		1.673	.101	-.235	2.582		
SOC	.583	.175	.451	3.343	.002	.233	.934	.499	2.006
DEPEND	.017	.145	.014	.117	.907	-.275	.309	.604	1.656
GENDER	-.060	.162	-.045	-.369	.714	-.385	.266	.617	1.620
EDUCATION	.061	.072	.107	.838	.406	-.085	.206	.556	1.798
CD1 (Veguitas)	.485	.269	.250	1.805	.077	-.055	1.026	.473	2.116
CD2 (La Libertad)	1.312	.258	.676	5.095	.000	.795	1.829	.515	1.940
CD3 (La Majada)	.967	.256	.605	3.777	.000	.453	1.481	.353	2.829
CD4 (Nueva Estanzuela)	1.101	.252	.668	4.363	.000	.594	1.608	.386	2.589
WEALTH1	1.195	.435	.482	2.745	.008	.320	2.069	.294	3.400
LOC2	-.210	.158	-.190	-1.330	.190	-.528	.107	.443	2.258
PROTECT WATER	.091	.109	.094	.837	.407	-.127	.309	.724	1.381

Appendix E: Model 2.3B WTP= SOC+DEPEND+GENDER+EDUCATION +WEALTH1+LOC2+QUANT SUFF+ COMMUNITY DUMMIES

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.737[a]	.543	.442	.49025

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.260	11	1.296	5.394	.000[b]
	Residual	12.017	50	.240		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.245	.699		1.782	.081	-.158	2.649		
SOC	.593	.175	.458	3.387	.001	.241	.945	.500	2.002
DEPEND	.048	.146	.040	.327	.745	-.245	.341	.605	1.654
GENDER	-.015	.180	-.011	-.084	.933	-.377	.347	.503	1.986
EDUCATION	.067	.072	.118	.926	.359	-.078	.213	.560	1.786
CD1 (Veguitas)	.495	.273	.255	1.815	.076	-.053	1.043	.464	2.157
CD2 (La Libertad)	1.278	.267	.658	4.790	.000	.742	1.814	.484	2.065
CD3 (La Majada)	.964	.260	.603	3.706	.001	.442	1.486	.346	2.891
CD4 (Nueva Estanzuela)	1.093	.261	.664	4.190	.000	.569	1.618	.365	2.742
WEALTH1	1.203	.437	.485	2.751	.008	.325	2.081	.294	3.400
LOC2	-.162	.153	-.146	-1.056	.296	-.469	.146	.477	2.096
QUANT SUFF	-.030	.063	-.060	-.478	.635	-.156	.096	.586	1.707

a. Dependent Variable: Willingness_to_Participate

Appendix E: Model 2.3C WTP= SOC+DEPEND+GENDER+EDUCATION +WEALTH1+LOC2+MANAGED WELL+ COMMUNITY DUMMIES

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.759[a]	.576	.483	.47202

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.138	11	1.376	6.177	.000[b]
	Residual	11.140	50	.223		
	Total	26.278	61			

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.317	.673		1.955	.056	-.036	2.669		
SOC	.662	.172	.511	3.845	.000	.316	1.007	.480	2.084
DEPEND	.081	.140	.068	.574	.569	-.201	.362	.606	1.651
GENDER	-.060	.156	-.045	-.382	.704	-.374	.255	.619	1.616
EDUCATION	.056	.070	.099	.803	.426	-.084	.197	.558	1.793
CD1 (Veguitas)	.410	.262	.211	1.562	.124	-.117	.937	.465	2.152
CD2 (La Libertad)	1.254	.251	.646	5.006	.000	.751	1.758	.509	1.963
CD3 (La Majada)	.953	.247	.596	3.853	.000	.456	1.450	.354	2.821
CD4 (Nueva Estanzuela)	.966	.255	.586	3.789	.000	.454	1.477	.355	2.821
WEALTH1	1.250	.421	.504	2.970	.005	.405	2.094	.295	3.394
LOC2	-.201	.147	-.182	-1.368	.177	-.496	.094	.481	2.081
MANAGED WELL	-.106	.052	-.215	-2.045	.046	-.210	-.002	.767	1.303

Appendix E: Model 2.4A WTP=SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC2+PROTECT WATER+ COMMUNITY DUMMIES

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.705[a]	.497	.386	.51431

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.052	11	1.187	4.486	.000[b]
	Residual	13.226	50	.265		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.059	.752		1.409	.165	-.451	2.570		
SOC	.628	.183	.485	3.431	.001	.260	.996	.504	1.986
DEPEND	-.104	.144	-.088	-.721	.474	-.394	.186	.678	1.476
GENDER	-.063	.171	-.047	-.368	.714	-.406	.280	.617	1.621
EDUCATION	.110	.074	.194	1.494	.141	-.038	.258	.598	1.672
CD1 (Veguitas)	.153	.255	.079	.602	.550	-.359	.665	.584	1.711
CD2 (La Libertad)	.942	.233	.485	4.041	.000	.474	1.410	.699	1.432
CD3 (La Majada)	.542	.206	.339	2.639	.011	.130	.955	.609	1.641
CD4 (Nueva Estanzuela)	.835	.240	.507	3.473	.001	.352	1.317	.473	2.113
WEALTH2	.306	.229	.163	1.338	.187	-.153	.766	.680	1.471
LOC2	-.089	.159	-.081	-.563	.576	-.409	.230	.488	2.051
PROTECT WATER	.094	.115	.097	.821	.416	-.136	.325	.721	1.387

Appendix E: Model 2.4B WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC2+QUANT SUFF+ COMMUNITY DUMMIES

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.701[a]	.491	.379	.51714

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.906	11	1.173	4.387	.000[b]
	Residual	13.371	50	.267		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.135	.752		1.510	.137	-.375	2.644		
SOC	.638	.184	.493	3.472	.001	.269	1.007	.505	1.981
DEPEND	-.076	.146	-.065	-.524	.602	-.370	.217	.672	1.488
GENDER	-.026	.190	-.020	-.138	.891	-.409	.356	.502	1.992
EDUCATION	.117	.074	.206	1.587	.119	-.031	.265	.604	1.655
CD1 (Veguitas)	.167	.259	.086	.646	.521	-.353	.687	.573	1.745
CD2 (La Libertad)	.911	.242	.469	3.767	.000	.425	1.397	.656	1.525
CD3 (La Majada)	.540	.210	.338	2.569	.013	.118	.962	.589	1.698
CD4 (Nueva Estanzuela)	.832	.254	.505	3.273	.002	.321	1.342	.428	2.336
WEALTH2	.308	.233	.164	1.318	.193	-.161	.777	.661	1.512
LOC2	-.040	.153	-.036	-.263	.794	-.347	.267	.534	1.872
QUANT SUFF	-.023	.067	-.047	-.347	.730	-.158	.111	.567	1.764

Appendix E: Model 2.4C WTP= SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC2+MANAGED WELL+ COMMUNITY DUMMIES

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.716[a]	.513	.406	.50598

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.477	11	1.225	4.786	.000[b]
	Residual	12.801	50	.256		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.234	.738		1.671	.101	-.249	2.717		
SOC	.697	.184	.538	3.786	.000	.327	1.067	.482	2.074
DEPEND	-.055	.142	-.046	-.388	.699	-.340	.230	.681	1.468
GENDER	-.063	.168	-.047	-.376	.708	-.400	.274	.618	1.618
EDUCATION	.111	.072	.195	1.533	.132	-.034	.255	.603	1.658
CD1 (Veguitas)	.089	.256	.046	.347	.730	-.425	.602	.562	1.779
CD2 (La Libertad)	.880	.232	.453	3.800	.000	.415	1.345	.685	1.460
CD3 (La Majada)	.509	.204	.318	2.498	.016	.100	.919	.600	1.667
CD4 (Nueva Estanzuela)	.685	.261	.415	2.623	.012	.160	1.209	.388	2.575
WEALTH2	.250	.229	.133	1.092	.280	-.210	.711	.656	1.524
LOC2	-.064	.148	-.058	-.431	.669	-.362	.234	.541	1.847
MANAGED WELL	-.087	.057	-.177	-1.535	.131	-.201	.027	.736	1.359

Appendix E: Model 2.5A WTP=SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC3+PROTECT WATER+ COMMUNITY DUMMIES

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.730[a]	.533	.431	.49528

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.013	11	1.274	5.193	.000[b]
	Residual	12.265	50	.245		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	.927	.702		1.321	.193	-.483	2.336		
SOC	.526	.171	.407	3.083	.003	.183	.869	.537	1.863
DEPEND	-.065	.150	-.055	-.436	.664	-.367	.236	.583	1.715
GENDER	-.051	.165	-.038	-.310	.758	-.382	.280	.613	1.631
EDUCATION	.059	.074	.103	.797	.429	-.089	.206	.556	1.799
CD1 (Veguitas)	.550	.268	.283	2.055	.045	.012	1.088	.491	2.036
CD2 (La Libertad)	1.265	.259	.651	4.892	.000	.746	1.785	.526	1.900
CD3 (La Majada)	.867	.259	.542	3.348	.002	.347	1.386	.356	2.805
CD4 (Nueva Estanzuela)	1.032	.253	.626	4.079	.000	.524	1.540	.396	2.525
WEALTH1	.990	.423	.399	2.338	.023	.139	1.840	.320	3.123
LOC3	.027	.053	.053	.501	.618	-.080	.134	.841	1.189
PROTECT WATER	.057	.107	.059	.536	.594	-.157	.272	.770	1.298

Appendix E: Model 2.5B WTP=SOC+DEPEND+GENDER+EDUCATION +WEALTH1+LOC3+QUANT SUFF+ COMMUNITY DUMMIES

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.731[a]	.534	.431	.49507

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.023	11	1.275	5.201	.000[b]
	Residual	12.255	50	.245		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.024	.684		1.498	.140	-.349	2.398		
SOC	.544	.170	.420	3.205	.002	.203	.884	.544	1.840
DEPEND	-.021	.147	-.017	-.140	.889	-.315	.274	.609	1.641
GENDER	-.001	.182	-.001	-.008	.994	-.368	.365	.500	1.998
EDUCATION	.064	.073	.113	.875	.386	-.083	.211	.561	1.784
CD1 (Veguitas)	.532	.273	.274	1.949	.057	-.016	1.080	.472	2.117
CD2 (La Libertad)	1.234	.266	.635	4.644	.000	.700	1.767	.498	2.007
CD3 (La Majada)	.875	.256	.547	3.417	.001	.361	1.389	.364	2.747
CD4 (Nueva Estanzuela)	1.023	.255	.621	4.007	.000	.510	1.536	.388	2.575
WEALTH1	1.030	.416	.415	2.473	.017	.193	1.866	.331	3.022
LOC3	.019	.053	.037	.354	.725	-.087	.125	.857	1.166
QUANT SUFF	-.036	.063	-.072	-.574	.568	-.163	.090	.589	1.697

a. Dependent Variable: Willingness_to_Participate

Appendix E: Model 2.5C WTP=SOC+DEPEND+GENDER+EDUCATION+WEALTH1+LOC3+MANAGED WELL+ COMMUNITY DUMMIES

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.749[a]	.560	.464	.48066

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.726	11	1.339	5.795	.000[b]
	Residual	11.552	50	.231		
	Total	26.278	61			

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.058	.664		1.593	.117	-.276	2.392		
SOC	.586	.166	.453	3.522	.001	.252	.921	.532	1.880
DEPEND	.002	.140	.002	.016	.987	-.280	.284	.628	1.593
GENDER	-.047	.160	-.035	-.292	.772	-.368	.274	.615	1.627
EDUCATION	.053	.071	.093	.745	.460	-.090	.196	.558	1.791
CD1 (Veguitas)	.478	.262	.246	1.824	.074	-.048	1.005	.482	2.075
CD2 (La Libertad)	1.209	.253	.622	4.777	.000	.701	1.717	.518	1.931
CD3 (La Majada)	.863	.247	.540	3.490	.001	.366	1.360	.368	2.719
CD4 (Nueva Estanzuela)	.903	.255	.548	3.537	.001	.390	1.416	.366	2.729
WEALTH1	1.046	.404	.422	2.587	.013	.234	1.858	.331	3.023
LOC3	.008	.052	.016	.153	.879	-.096	.111	.848	1.179
MANAGED WELL	-.098	.053	-.198	-1.842	.071	-.205	.009	.758	1.319

a. Dependent Variable: Willingness_to_Participate

Appendix E: Model 2.6A WTP=SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC3+PROTECT WATER+ COMMUNITY DUMMIES

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.709[a]	.502	.393	.51156

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.193	11	1.199	4.583	.000[b]
	Residual	13.085	50	.262		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	.850	.740		1.148	.256	-.637	2.337		
SOC	.608	.172	.470	3.536	.001	.263	.954	.564	1.773
DEPEND	-.165	.148	-.140	-1.117	.269	-.463	.132	.638	1.567
GENDER	-.070	.170	-.053	-.413	.681	-.412	.271	.616	1.624
EDUCATION	.101	.073	.178	1.384	.172	-.046	.248	.601	1.663
CD1 (Veguitas)	.203	.231	.105	.880	.383	-.260	.667	.705	1.418
CD2 (La Libertad)	.966	.233	.497	4.144	.000	.498	1.434	.691	1.447
CD3 (La Majada)	.511	.206	.320	2.476	.017	.097	.926	.597	1.674
CD4 (Nueva Estanzuela)	.842	.239	.511	3.521	.001	.362	1.323	.472	2.117
WEALTH2	.323	.229	.172	1.411	.165	-.137	.782	.674	1.484
LOC3	.051	.055	.101	.927	.358	-.059	.161	.843	1.186
PROTECT WATER	.087	.109	.090	.802	.426	-.132	.307	.789	1.268

Appendix E: Model 2.6B WTP=SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC3+QUANT SUFF+ COMMUNITY DUMMIES

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.705[a]	.496	.386	.51442

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.046	11	1.186	4.482	.000[b]
	Residual	13.231	50	.265		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	.996	.729		1.367	.178	-.467	2.460		
SOC	.635	.171	.491	3.717	.001	.292	.978	.578	1.730
DEPEND	-.122	.148	-.103	-.827	.412	-.420	.175	.646	1.547
GENDER	-.041	.190	-.031	-.217	.829	-.422	.340	.500	1.999
EDUCATION	.111	.073	.196	1.529	.133	-.035	.257	.614	1.628
CD1 (Veguitas)	.190	.241	.098	.789	.434	-.294	.674	.653	1.530
CD2 (La Libertad)	.935	.243	.481	3.853	.000	.447	1.422	.645	1.549
CD3 (La Majada)	.518	.210	.324	2.473	.017	.097	.939	.586	1.706
CD4 (Nueva Estanzuela)	.845	.253	.513	3.344	.002	.338	1.353	.428	2.336
WEALTH2	.328	.233	.174	1.405	.166	-.141	.796	.655	1.526
LOC3	.043	.055	.084	.774	.443	-.068	.154	.845	1.183
QUANT SUFF	-.019	.067	-.038	-.285	.777	-.153	.115	.568	1.761

Appendix E: Model 2.6C WTP=SOC+DEPEND+GENDER+EDUCATION+WEALTH2+LOC3+MANAGED WELL+ COMMUNITY DUMMIES

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.717[a]	.514	.407	.50527

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.513	11	1.228	4.812	.000[b]
	Residual	12.765	50	.255		
	Total	26.278	61			

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	1.080	.717		1.506	.138	-.360	2.521		
SOC	.675	.170	.521	3.962	.000	.333	1.017	.561	1.781
DEPEND	-.099	.143	-.083	-.691	.493	-.386	.188	.669	1.494
GENDER	-.066	.168	-.050	-.396	.694	-.403	.271	.617	1.622
EDUCATION	.105	.071	.184	1.466	.149	-.039	.248	.614	1.629
CD1 (Veguitas)	.133	.234	.068	.566	.574	-.338	.603	.667	1.499
CD2 (La Libertad)	.900	.233	.464	3.868	.000	.433	1.368	.676	1.479
CD3 (La Majada)	.493	.204	.308	2.410	.020	.082	.903	.594	1.683
CD4 (Nueva Estanzuela)	.703	.263	.426	2.670	.010	.174	1.231	.381	2.625
WEALTH2	.265	.232	.141	1.143	.258	-.200	.730	.642	1.558
LOC3	.031	.055	.062	.572	.570	-.079	.141	.832	1.201
MANAGED WELL	-.080	.057	-.161	-1.383	.173	-.195	.036	.716	1.397

a. Dependent Variable: Willingness_to_Participate

Appendix F- Summary of multiple regression Models 3.1, 3.2, 3.3 "A" variations

Table 21: Summary of multiple regression models 3.1, 3.2, 3.3 "A" variations using SOC1 in place of the complete sense of community variable. * p ≤ .10, **p ≤ .05, ***p ≤ .01

Predictors:	**Model 3.1A**	**Model 3.2A**	**Model 3.3A**
	R^2= .426*** (.533)	R^2= .305*** (.581)	R^2= .145 (.627)
	VIF total: 15.886	VIF total: 9.069	VIF total: 4.926
SOC1	.140 (.168)	.313* (.166)	.293* (.188)
DEPEND	.097 (.143)	-.036 (.147)	.101 (.164)
MANAGED WELL	-.155 (.058)	-.169* (.063)	-.269** (.064)
WEALTH1	.589* (.438)	-	.060 (.341)
CD1 (Veguitas)	.297* (.287)	.000 (.249)	-
CD2 (La Libertad)	.675*** (.280)	.400* (.250)	-
CD3 (La Majada)	.533* (.261)	.164 (.209)	-
CD4 (Nueva Estanzuela)	.655*** (.276)	.300* (.231)	-

Appendix G- Summary of multiple regression Models 3.1, 3.2, 3.3 "B" variations

Table 22: Summary of multiple regression models 3.1, 3.2, 3.3 "B" variations using SOC2 in place of the complete sense of community variable. * p ≤ .10, **p ≤ .05, ***p ≤ .01

Predictors:	Model 3.1B	Model 3.2B	Model 3.3B
	R^2= .527*** (.484)	R^2=.385*** (.547)	R^2=.266*** (.597)
	VIF total: 14.505	VIF total: 9.007	VIF total:
SOC2	.364*** (.085)	.429*** (.095)	.401*** (.102)
DEPEND	.090 (.123)	-.006 (.135)	.130 (.148)
MANAGED WELL	-.184 (.052)	-.175 (.059)	-.273** (.061)
WEALTH1	.588*** (.365)	-	.074 (.314)
CD1 (Veguitas)	.323** (.252)	.031 (.234)	-
CD2 (La Libertad)	.692*** (.248)	.417*** (.236)	-
CD3 (La Majada)	.596*** (.231)	.226* (.200)	-
CD4 (Nueva Estanzuela)	.627*** (.242)	.276** (.218)	-

Appendix H- Summary of multiple regression Models 3.1, 3.2, 3.3 "C" variations

Table 23: Summary of multiple regression models 3.1, 3.2, 3.3 "C" variations using SOC3 in place of the complete sense of community variable. * p ≤ .10, **p ≤ .05, ***p ≤ .01

Predictors:	Model 3.1C	Model 3.2C	Model 3.3C
	R^2= .533***(.481)	R^2= .402*** (.539)	R^2=.251** (.587)
	VIF total: 15.153	VIF total: 9.531	VIF total: 4.686
SOC3	.424***(.105)	.508***(.116)	.446***(.113)
DEPEND	.036 (.126)	-.068 (.136)	.054 (.152)
MANAGED WELL	-.165 (.052)	-.154 (.058)	-.238* (.060)
WEALTH1	.568*** (.365)	-	.062 (.309)
CD1 (Veguitas)	.276**(.252)	-.014 (.231)	-
CD2 (La Libertad)	.610***(.252)	.330**(.234)	-
CD3 (La Majada)	.666*** (.233)	.327** (.208)	-
CD4 (Nueva Estanzuela)	.592***(.243)	.246* (.216)	-