

**Integrating the Community Perspective: An
exploration of Prospect Theory as a tool to derive
benefits in Negotiated Agreements**

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Honours Bachelor of Arts, University of Toronto, 2015

Project Submitted in Partial Fulfillment of the
Requirements for the Degree of
Master of Resource Management

in the
Simon Fraser University
Faculty of Resource and Environmental Management

Project No. 739

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Fall 2019

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Ethics Statement

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Abstract

This paper provides an overview of negotiated agreements as strategies for community engagement in conjunction with insights from the field of behavioral economics, specifically Prospect Theory. Prospect Theory posits that losses are valued more than gains from a reference state and result in large valuation disparities in experimental studies. This study estimates valuation disparities within compensating and equivalent variation measures of WTP and WTA in a structured field experiment. A case study undertaken in Loreto, Baja California Sur, explores interactions between tourism development and impacts to household water security. The study finds moderate valuation disparities ranging from 1.09 to 1.15 that were statistically significant when maximum likelihood estimation was used. The paper then discusses whether applied Prospect Theory can function as a tool to derive benefits within negotiated agreement frameworks. The research concludes that participating communities may benefit from being able to retain a greater share of development benefits at local scales.

Keywords: contingent valuation; willingness to pay; willingness to accept; impact benefit agreements; water security

Acknowledgement

I would like to acknowledge and thank the residents, academics and community representatives of Loreto who lent their time and insights during the conduct of this research. Specifically, I would like to thank EcoAlianza and the Autonomous University of Baja California Sur for providing much appreciated support and facilities in the development and execution of the fieldwork.

I would like to thank my supervisor, Dr. Duncan Knowler, for his mentorship and input throughout all aspects of this project, but particularly during key moments as the research evolved in the field. I appreciate the time he dedicated to the project, both on campus as well as during the critical field stage. I would also like to thank Dr. Victor Hernandez and Dr. Salvador Garcia Martinez for their time and guidance. The advice, support and insights received throughout were invaluable and it was a pleasure working with them.

As well I would like to thank the rest of my professors and REM faculty with whom I have worked to develop this research project over the last couple of years.

I would like to thank my family for their unfailing support and for planning many excellent trips during this endeavor. I would especially like to thank Jake for your encouragement and ears.

Finally, thanks to MITACS for providing funding for the research.

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List of Acronyms

WTA	Willingness to accept
WTP	Willingness to pay
BCS	Baja California Sur
NA	Negotiated Agreement
CV	Compensating Variation
EV	Equivalent Variation
NOAA	National Oceanic and Atmospheric Administration
EPA	Environmental Protection Agency
PT	Prospect Theory
IPC	Integrally Planned Centre
FNTFDT	Federal National Trust Fund for the Development of Tourism
LBNP	Loreto Bay National Park
LELUP	Loreto Ecological Land Use Plan
LUDP	Loreto Urban Development Plan
OOMSAPA	<i>Organismo Operador del SAPA de Loreto</i>
NISG	National Institute of Statistics and Geography
NGO	Non-governmental Organization
PPM	Provision Point Mechanisms
CPC	Circular Payment Card
PC	Payment Card
ML	Maximum Likelihood
OLS	Ordinary Least Squares
PE	Point Estimate

Chapter 1.

Introduction

1.1. Problem Statement

Natural resources have always held a key role in economic and social development. Resources that can be extracted or marketed may convey a development advantage for regions by acting as natural capital that effectively 'bankroll' economic growth. However, such development may also result in an imbalance if the benefits of development accrue at national scales while project externalities remain at local scales and affect surrounding populations; Humphreys (2002) refers to this pattern as a duality in development. If overlooked, perceived imbalances in this pattern of resource development can create tensions between proponents of development projects and the communities that are affected by them.

Local communities will likely prioritize economic growth that aligns with the sustainable management of the local resources on which their region depends (Bruckner, 2015; Humphreys, 2002; Söderholm & Svahn, 2015). However, the lack of financial benefits able to promote social welfare, economic diversification, and sustainable development in regions where dualities in development are present is well documented (Bornstein & Leetmaa, 2015; Toledo, Garrido, & Barrera-Bassols, 2015). Particularly in developing countries, economic growth is often characterized by foregone considerations of those factors that constitute sustainable economic growth, such as environmental integrity and resident quality of life (Bornstein & Leetmaa, 2015; Cerda & Vásquez, 2005).

Some impacts associated with development represent a form of market failure. In theory, economic markets work to determine the quantity of a good or service that will maximize social welfare based on price. However, this optimal allocation of resources can be undermined if externalities are present.

Externalities refer to positive or negative impacts which are not accounted for in the price of production, leading to a sub-optimal quantity supplied of the good or

service in question. Typically, it is negative externalities, such as impacts on the environment and society, that will manifest and result in greater development activity than is optimal for a region.

Often, externalities will involve a lack of consideration for local resource constraints or involve other forms of direct impacts on the social and environmental fabric of a community. In response, financial benefits may be sought as compensation strategies to redistribute project-generated wealth back to local communities. Such benefits re-align the beneficial outcomes of a development with its associated risks (Gibson & O'Faircheallaigh, 2015; Humphreys, 2002). In the interest of conflict mitigation, it is recommended that compensation strategies incorporate the perspective of project-affected communities through transparent and inclusive community engagement (Bornstein & Leetmaa, 2015). Approaches to community engagement, such as corporate initiatives and public regulations, are commonly applied. However, they are also criticized for not meeting transparency and inclusivity criteria (Bornstein & Leetmaa, 2015; O'Faircheallaigh, 2017).

In response, negotiated agreements have been introduced as alternative community engagement strategies that act as benefit-sharing mechanisms to catalyze regional development. Indeed, the negotiated agreement space was first applied as a process to transfer compensation in cases where land reclamation was required by projects. Today, negotiated agreements play a broader role to ensure that local communities retain equitable shares of development benefits by acting as financial vehicles for the transfer of compensation (O'Faircheallaigh, 2013). Negotiated agreements provide a legal recourse for local actors to address social, economic, and environmental concerns and the space has also evolved as a driver of community participation in decision making. The advantage they confer for addressing perceived imbalances in the regional and national distribution of impacts and benefits associated with development has led to a rapid increase in their application.

Economic valuation serves as a powerful tool to measure both impacts and benefits from the perspective of affected populations. Economic valuations seek to estimate values associated with changes in welfare, whether positive or

negative, that are a result of policy choices. In the field of environmental economics and policy, valuations notably often address negative changes in welfare that are related to loss of environmental health and quality (Knetsch, 2007, 2016). In such contexts, Prospect Theory offers insights from the field of behavioral economics based on an understanding of human behaviour that argues losses are valued more greatly than gains (Thaler, 1980). This suggests that individuals may require greater compensation for a feeling of loss, or damages incurred, than they are willing to give up for a comparable gain (Kahneman, Knetsch, & Thaler, 1991).

A valuation disparity is said to exist where measures of willingness-to-pay (WTP) for gains or willingness-to-accept (WTA) losses differ (Thaler, 1980). The existence of a valuation disparity implies that the measure of welfare applied in economic valuation matters. Furthermore, this suggests a need to consider subjective feelings of loss that reflect how communities may value resources, particularly those over which they perceive ownership. As a result, applications of Prospect Theory have been increasingly recommended in the conduct of economic valuation to inform decision-making where loss is concerned (Knetsch, 2016; Whittington, Adamowicz, & Lloyd-Smith, 2017).

1.2. Case Study

In Loreto, a municipality of Baja California Sur (BCS), Mexico, tourism is the primary economic activity in the region (Gamez, 2007). Tourism activity supports local economic development by bringing in foreign currency and is expected to generate the greatest regional growth in coming years (ibid). However, tourism is also associated with a host of local externalities that can manifest if the generated growth exceeds the region's environmental carrying capacity (Gamez & Angeles, 2011; Villegas, 2007).

In Loreto specifically, Steinitz et al., (2005), Gamez (2007), and McEvoy (2014) express concerns that state pursued tourism developments will increase the total demand for freshwater and pose a threat to the region's water security. Many urban areas in BCS face imbalances in the demand and supply for safe and reliable water, with demand often surpassing supply capacity (Mcevoy, 2014;

McEvoy & Jamie, 2015). Therefore, Loreto's water security will be determined by the total volume of potable water that is available to meet the demand of both resident and tourist populations.

As a community, Loreto is considered civically active (Paez et al. 2010) and plans for regional growth will have to consider stakeholder preferences of the impacts and benefits associated with future developments. For instance, Loreto citizen groups have launched a civil society campaign in response to the foreseen development pressures of BCS's tourism objectives. *#loretoideal* is a grassroots campaign that outlines a plan to address the concerns of the community regarding Loreto's long-term sustainability. Specifically, the sustainable management of Loreto's freshwater and marine resources (*#loretoideal*, 2018).

1.3. Research Purpose

Using Loreto, BCS, as a case study, I conducted an economic valuation study to elicit values of changes in welfare, or well-being, using applied Prospect Theory. Prospect Theory posits there is no single value associated with a change in the supply of goods and services. Instead, gains or losses are valued asymmetrically. Therefore, my primary research objective is to explore the existence of a possible disparity in residents' valuation of changes to the reliability of their household municipal piped water service. To explain possible drivers of estimated values I elicit socio-demographic information and numerically assess resident's perceptions of tourism-related impacts as well as attitudes toward the resource.

A secondary research objective is to discuss negotiated agreements as hypothetical vehicles for compensation. Specifically, compensation that is based on economic valuations that apply Prospect Theory and can be considered behaviourally-accurate models. Without being prescriptive, I discuss process synergies for deriving compensation within the negotiated agreement process based on the available guidance. I also discuss potential benefits and explore resident's preferences for the conduct of negotiated agreements.

With this interdisciplinary study, I make three contributions to the literature. First, I contribute to the literature on Prospect Theory by providing empirical

evidence of the valuation disparity elicited in a field application. No previous research has applied a structured field experiment in a developing country, particularly in the context of the tourism impacts on household water security. Second, I contribute to the negotiated agreement literature by introducing a method to derive equitable benefits for participating communities. No other studies have applied insights from behavioural economics in the context of negotiated agreements. Finally, I provide empirical information in a form that may be used in future policy analysis by estimating changes in welfare of a marginal one-day change to the reliability of the household water service. By linking tourism development to the reliability of household water supply I quantify the associated costs and benefits to individuals and households and explore socially desirable outcomes for Loreto.

1.4. Research Questions

My primary research question is: how do residents of Loreto value changes to their household water security that result from tourism development? In this context, are there statistically significant differences between measures of welfare for an identical change in the reliability of household water provision? In addition, how do individual characteristics affect reported estimates? As the negotiated agreement space continues to evolve practitioners may derive insights from behavioral economics to assess environmental damages. Therefore, I ask whether there are any synergies between the applied Prospect Theory approach and the negotiated agreement process. If so, what are implications of merging the two approaches?

1.5. Organization of the Study

The paper is laid out as follows: Section 2 will describe the literature on negotiated agreements, the role of compensation and Prospect Theory. Section 3 will provide background on tourism and the determinants of water security in Loreto. Section 4 will describe the chosen methodology, including limitations and statistical analyses. Section 5 will present the results of the study and Section 6 will discuss findings of the economic valuation study, policy implications, and

recommendations specific to Loreto. Section 7 will conclude and suggest future areas of research.

Chapter 2.

Literature Review

2.1. Negotiated Agreements

Negotiated agreements can be characterized in a number of different ways. Broadly, negotiated agreements are contracts that exist between community organizations and project developers, in which the developer agrees to modify aspects of a project and/or provide benefits to the community in return for support (Sheikh, 2008). However, they can also be thought of as grassroots approaches to ensure the equitable sharing of development benefits at local scales. To achieve this, negotiated agreements rely on enforceable outcomes, community participation and collective bargaining strategies that represent local interests (Le Meur, Horowitz, & Mennesson, 2013).

Negotiated agreements may be pursued when project proponents require conflict-free revenue streams and proposed developments may incite conflict, for example if property rights are contested (Hira & Busumtwi - Sam, 2018). This characteristic is particularly important in mining development where negotiated agreements are most commonly sought out (ibid). Nevertheless, the flexibility and documented advantages of this strategy have led to their prolific application across various community-development contexts in both developed and developing countries. For instance, negotiated agreements have been sought out in urban and rural projects related to energy infrastructure, urban development, and resource development (O'Faircheallaigh, 2013).

In testament to their wide applicability, negotiated agreements are referred to in various forms, including: community development, impact benefit, shared responsibility, partnership, community, and empowerment agreements (Bruckner, 2015; Keenan, Kemp, & Ramsay, 2016; O'Faircheallaigh, 2015). For simplicity, this paper applies the term negotiated agreements to represent the broad range of partnerships that are embodied, similar to the approach taken by the World Bank in a field study of best practises (Sarkar, Gow-Smith, Morakinyo, Frau, & Kuniholm, 2010).

Salkin & Lavine (2008) and Wolf-Powers (2010) define negotiated agreements as documented bargains that result in a set of material commitments in return for support from the residents of a development area. Thus, this definition emphasizes the benefits of participation to each negotiating party; developers benefit from obtaining a social licence to operate while communities benefit from access to a recourse through which to address their development concerns.

O'Faircheallaigh (2015) further conceptualizes negotiated agreements as contractual agreements between project developers and communities. Through provisions for the long-term local investment of funds, negotiated agreements work to minimize negative environmental and social impacts that may result. Thus, this definition emphasizes the key role that negotiated agreements play as mechanisms for the transfer of monetary benefits (Esteves, 2008; Rowan & Streather, 2011). Sarkar et al., (2012) similarly observe that financial provisions are included in final agreements to mitigate projects impacts by stipulating investments in replacement or substitute resources.

The specific environmental, social or similar impact to be addressed by each negotiated agreement will depend on the regional context and type of development under consideration. Within this context, negotiating parties stipulate agreement provisions for preferred financial mechanisms, as well as the nature and style of compensation that will take place (Gilmour & Mellett, 2013). In the past, agreements have addressed concerns related to the transportation, electricity, and resource management components of a project. Provisions for non-monetary compensation, such as installing sanitation facilities and improving the supply of drinking water, have also been included in final agreement provisions based on the priorities of the community (Sarkar et al., 2010).

Gilmour and Mellet (2013) offer a unique insight by outlining a set of provisions commonly included in final agreements. For instance, agreement provisions typically address the representation and election of community representatives, nature and style of ongoing consultations, degree of agreement confidentiality, degree of regulatory support, preferences for financial mechanisms, as well as the environmental, socio-economic and cultural impacts to be addressed (ibid). As an example of the continuous evolution and flexibility of

a negotiated agreement strategy, Knotsch, Siebenmorgan and Bradshaw (2010) observe how 'well-being' provisions have recently gained traction to incorporate indicators of communities' health and subjective well-being.

Two key recommendations were identified in the literature to ensure the long-term success of a negotiated agreement. First, optimal community engagement is recommended to take place well in advance of a project's launch. Second, participants should secure access to the necessary human, financial and information resources prior to negotiation (Bruckner, 2015; Teschner, 2013). 'Human resources' refer to the necessary leadership and management capacity that is available to oversee a negotiation process. This includes willing community representatives, as well as a mix of government representatives, financial advisors and local NGO's that may provide support, as appropriate (Hira and Busumtwi-Sam, 2018). Harris (2015) further outlines the importance of having a coalition of community stakeholders organized around collective interests, and a supportive local government that will encourage cooperation from private sector stakeholders.

'Financial resources' refer to the funds required to operate a multi-year negotiation process, establish community committees and ensure their ability to enforce compliance. For example, to manage funds according to the terms of the agreement, community trustees and transparency committees are recommended (Siebenmorgan, 2009). As well, Hira and Busumtwi-sam (2018) further recommend ongoing monitoring and evaluation of final agreements. Additional governance structures will similarly require adequate human and financial resources to support them.

Finally, 'information resources' refer to the availability of baseline socio-economic and cultural data. Negotiated agreement practitioners should gather information of pre-project conditions as well as future projections for the purposes of comparison. This allows negotiating parties to make informed decisions and signal the benefits of cooperation to private sector stakeholders and project proponents. For example, documenting previous experiences or known outcomes of similar developments can serve to emphasize the advantages of cooperation to the developer and increase their willingness to negotiate (Rowan & Streather,

2011). Experience may be direct, through previous participation in environmental and social impact assessments or indirect, through the sharing of stories or second-hand information of similar occurrences (ibid). Establishing a clear picture of community priorities and concerns based on data is further recommended in Gibson and O’Faircheallaigh’s (2015) Community-Benefit Agreement toolkit.

2.1.1. Benefits and Challenges

The benefits of negotiated agreements cited in the literature are far-reaching. Following a comprehensive study of their application in mining development, where they are most common, De Barbieri (2016) concludes that negotiated agreements deliver positive outcomes relative to pre-agreement conditions. Brucker (2015) and Fidler (2010) attribute improved outcomes to the increased enforceability for communities that results from relying on contractual provisions that can be legislatively enforced. By contrast, public regulation and corporate social responsibility approaches to community engagement typically exist only between companies and the state. Both approaches are critiqued as ineffective due to their unenforceable, voluntary and bureaucratic natures (O’Faircheallaigh, 2015).

Keenan et al., (2016) and Been (2010) cite as a key benefit the dyadic channels of communication that develop between companies and host communities. In some instances, such models of communication have taken precedence over traditional government-developer models (Keenan et al., 2016). Project developers are simultaneously prioritizing positive community relations to mitigate conflict and ameliorate potential impacts. Therefore, engagement with communities is strengthened and leads to greater overall participation in decision-making, particularly where there is a perceived lack of local government capacity (Hira & Busumtwi - Sam, 2018). This increased consideration has consequently led to the recognition of project-affected communities as significant civil actors (Hira & Busumtwi - Sam, 2018).

As a result, negotiated agreements have experienced an explosion in their application (Dupuy, 2014; O’Faircheallaigh, 2015). However, this growth is not without its challenges due to a resulting lack of available frameworks to guide their

rapid application (Gilmour & Mellett, 2013; Keenan et al., 2016; O’Faircheallaigh, 2013). One reason for this is that final agreements are often protected by strict confidentiality clauses and are only shared with negotiating parties. The private nature of final products poses an institutional barrier to both knowledge-transfer and capacity building in new undertakings (Bruckner, 2015; Gilmour & Mellett, 2013; Keenan et al., 2016). In addition, final agreements will vary greatly across applications since they reflect the unique context and priorities of negotiating participants (Sarkar et al., 2010). Therefore, the importance of location-specific factors poses an additional barrier to capacity building across contexts.

An additional challenge relates to the process of defining the project-affected community whose interests should be represented. Given the lack of negotiating frameworks that are available, Nwapi (2017) notes that practices vary considerably and may lack attention to the issue of minority group representation. Similarly, defining the role of local government is often unclear as negotiated agreements have evolved as complementary instruments to existing community engagement strategies. That is, agreements function alongside but separate from public regulations that may be in place (O’Faircheallaigh, 2017). Defining any potential overlap in responsibility with these existing public regulations, such as social and environmental impact assessments, is challenging and likewise requires due consideration.

A final challenge in the conduct of negotiated agreements pertains to the role of bargaining power throughout proceedings (O’Faircheallaigh, 2013). On one hand, engaging in negotiated agreements has been documented to increase the overall levels of bargaining power that are available to communities (ibid). However, bargaining power is also a necessary pre-condition, since final agreement outcomes can depend on communities’ pre-existing levels of bargaining power (Been, 2010; O’Faircheallaigh, 2013). Interested parties are therefore cautioned before moving forward from a ‘sub-par’ bargaining position that could effectively reduce their avenues for legal recourse if they wish to oppose the development at a later date (O’Faircheallaigh, 2013). To that end, Fidler (2010) further recommends taking actions to positively influence a particular bargaining position to the fullest extent prior to engaging in negotiations. Specific tactics include forming community coalitions (Parks & Warren, 2009) and utilizing

the media to create high profile cases to improve “negotiating leverage” (Peterson St-Laurent & Le Billon, 2015).

2.1.2. Compensation as Mitigation

Compensation may take a variety of forms within negotiated agreements. The literature offers insights into the type of monetary and non-monetary benefits that are commonly included in the financial provisions of final agreements. For instance, Gilmour and Mellet (2013) identify lump sum payments, periodic fixed cash payments, and revenue sharing schemes as the most commonly applied strategies. Rowan and Streather (2011) further document benefits such as lowered property taxes and preferential utility fees for water, road and electricity services. Thus, financial provisions may be broadly geared toward environmental or social project components or narrowly focused on targets that reflect the long-term development goals of the community.

The literature also offers insights of recent trends in the scale of monetary benefits associated with negotiated agreements. For instance, an increase in the scale of monetary benefits received by communities has recently been documented. Likely, this is a result of a shift towards royalty-type payments that vary with the overall impact or success of developments and yield revenue streams to finance local investments as opposed to traditional one-time payments (Cernea, 2008; Guesnet & Frank, 2014).

Less information is available with regards to the methodologies used to determine financial provisions. Likely, this is due to the confidential nature of final agreements. Nevertheless, Been (2010) cites the economic valuation of lands and resources as a challenge for establishing financial provisions. The author expands on the controversial nature of valuing the loss of amenities such as parklands, trees, and parking spaces perceived to be lost to development (ibid). In addition, the methods that are available to value such amenities¹ may be perceived as unable to capture the range of socio-economic, cultural, and environmental burdens that aggregate in the long-term (Kanbur, 2003). This challenge is

¹ For example, the application of market values, replacement costs, or beneficial estimates of losses (Lindsay, 2012).

exacerbated where risk, non-physical loss, or alternative values (such as the intrinsic value of non-substitutable items) are perceived incompatible with economic analysis (Martinez-Alier, 2001).

Guesnet and Zeil (2014) advocate integrating the perspective and values of affected populations into conversations around benefit distribution. Doing so enables a transition towards compensatory strategies that seek meaningful impacts as opposed to those applied as operational remedies (ibid). To that end, Dinda (2016) also advocates for an approach that acknowledges the variety of preferences and attitudes towards risk across participating communities. Particularly relevant is a movement beyond traditional impact-valuation studies in favor of alternative forms of potential losses (Martinez-Alier, 2001). For instance, Lindsay (2012) extends similar considerations to include the risks borne by project-affected communities.

While financial considerations may be perceived as outcomes of the overall negotiation, Lindsay (2012), as well as Guesnet and Frank (2014) recommend approaching this task as a separate process embedded within the broader agreement process. For instance, by establishing baseline information specific to financial preferences, consulting with a financial advisor, and engaging local NGO's to propose social investments in line with local development goals (Knotsch et al., 2010; Rowan & Streather, 2011; Siebenmorgen, 2009). As a result, this undertaking can be expected to mirror the benefits and challenges of the broader process. This includes tailoring compensation to the resources and contextual priorities of the project-affected community and defining the inclusion, distribution, and level of benefits that is appropriate.

2.2. Economic Measures of Welfare

A monetary valuation of impacts is often required to capture changes in welfare, such as those likely to result with the introduction of new policies or programs. Four measures exist within an Expected Utility Framework to capture changes in welfare based on Hicksian Theory, a subset of the conventional theory of

individual choice.² The measures are defined as compensating variation (CV) and equivalent variation (EV) framings of an individuals' willingness to accept (WTA) and willingness to pay (WTP) for changes. This yields the following four measures of economic welfare: WTP_{CV} , WTA_{CV} , WTA_{EV} , WTP_{EV} (Hanemann, 1984).

Framings of compensating and equivalent variation differ across a temporal dimension relative to the proposed change, project, or policy (Whittington et al., 2017). CV specifically captures a necessary change in income, i.e., through individual's maximum willingness to pay or minimum willingness to accept, that will leave them as well off as they were prior to the proposed change (Knetsch, Riyanto, & Zong, 2012). EV, on the other hand, expresses a necessary sum of money that will leave an individual similarly indifferent after a change has taken place, i.e. after an initial shift to their original level of utility (Ibid).³

In either a CV or EV framework, WTP is a measure of welfare applied in decision contexts that involve gains. Therefore WTP refers to a maximum amount of money that would be willingly given up for a positive outcome while allowing an individual to retain their current levels of utility (Kahneman et al., 1991; Zong & Knetsch, 2013). WTA is a measure of welfare applied in the context of loss. Therefore, WTA represents a minimum amount of compensation that would be willingly received to accept a negative outcome while similarly retaining original levels of utility.⁴ Strictly speaking, each of the four measures of welfare has a strategic and theoretical application that depends on the broader decision context (Table 1).

Table 1. The four economic measures of welfare and their respective decision contexts

	WTP	WTA
Compensating Variation	WTP_{CV} – Apply when obtaining a gain prior to a change	WTA_{CV} – Apply when incurring a loss prior to a change
Equivalent Variation	WTP_{EV} – Apply when foregoing a reduction in a new gain	WTA_{EV} – Apply when foregoing a gain following a recent loss

² Hicksian Theory states that “individuals have preferences over all non-negative bundles of goods that may be represented by a utility function and are independent of initial resource endowments” (p.481) (Bateman, Munro, Rhodes, Starmer, & Sugden, 1997).

³ Utility may also be thought of as well-being (Booth et al., 2016).

⁴ Kahneman et al., (1991) cite environmental degradation and loss of social cohesion as examples of negative externalities to which WTA is uniquely suited.

Within a neoclassical economics framework, the choice of measure used in economic valuation is prescribed by the Theory of Rational Behavior as the dominant theory of human behavior. Under this economic paradigm, WTP and WTA measures are assumed equal due to insignificant substitution and income effects acting on individual choice. Thus, conventional wisdom dictates that values elicited with either measure are expected to be so similar that it does not matter which is chosen (Willig, 1976).

An assumption of equality is reinforced in the existing guidance for conducting economic valuation studies. For example, the National Oceanic and Atmospheric Administration (NOAA) Panel released a report in 1993 on contingent valuation that defined the research agenda and continues to influence the design and conduct of environmental valuation studies (Arrow et al., 1993; Johnston et al., 2017). The report recommended WTP estimation based on frequently cited challenges of estimating WTA. These include practical challenges, such as difficulty in framing incentive-compatible questions, high rates of scenario rejection, unrealistically large stated values, and strategic responses (ibid). The U.S. Environmental Protection Agency (EPA) also recommends the use of WTP because it is often easier to measure and estimate than WTA (Environmental Protection Agency, 2000).

Implicit in the conventional wisdom of equating WTP and WTA measures is an assumption that individuals make choices irrespective of the broader decision context in which changes in welfare were brought about (Borges, 1992; Whitehead & Blomquist, 2006). Whittington et al. (2017) provide additional insight as to why WTA measures are largely disregarded. The authors argue it is due in part to *“practitioner[s] wish to avoid politically unpopular or unwanted approaches to cost-benefit analysis if, for example, the state has no intention of paying compensation and does not support presenting the possibility”* (p.320).

Together, theoretical assumptions based on the Theory of Rational Behavior and a perceived ease of WTP application over WTA have led to a skew in valuation studies. This skew favors the almost exclusive application of WTP measures of welfare (Zong and Knetsch, 2013). Even so, a growing body of

literature proposes an alternative understanding of human decision making that questions and challenges the basis of this assumption.

2.2.1. Behavioural Economics and Prospect Theory

Insights from the field of behavioral economics offer an alternative understanding of the drivers of individual and collective decision making to those prescribed by neoclassical economics. The field encompasses a body of literature that explores how human information-processing diverges from normally prescribed rationality. For example, the Theory of Rational Behavior is based on the concept that choice is driven by a rational welfare-maximization strategy based on absolute changes in wealth or wellbeing (Hanemann, 1984; Knetsch et al., 2012; Thaler, 1980).

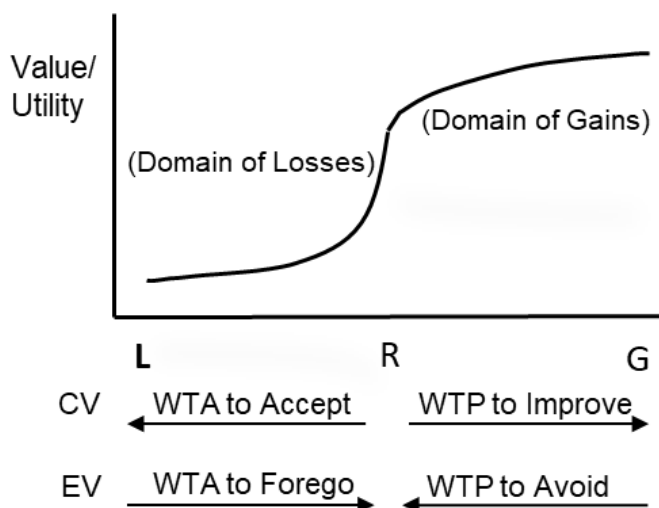
Prospect Theory suggests an alternative understanding of the drivers of choice from the field of behavioral economics. This field of study interprets the outcomes of choice through a host of biases and cognitive limitations that drive decision-making. Of these cognitive biases, loss aversion has arisen as one of the most prominent (Ericson & Fuster, 2014). Loss aversion occurs when an individual perceives changes in welfare or well-being relative to a fixed reference state. Furthermore, changes from reference state are valued asymmetrically and negative changes are weighed more heavily than positive ones (Kahneman & Tversky, 1979). This is why individuals exhibiting loss aversion attach a greater value to loss than they do to commensurate gains (Thaler, 1980).

The reference state reflects the initial set of endowments from which changes are *de facto* measured against and plays a key role in driving loss aversion. The reference state can simply be thought of as the state which is considered normal, or the status quo (Samuelson & Zeckhauser, 1988; Sprenger et al., 2015). From this reference state, value-based decisions under Prospect Theory are effectively the product of relative, rather than absolute, changes in welfare (Kahneman & Tversky, 1979).

The figure below illustrates the relationship between changes in individual utility (or welfare) and the direction of change from a fixed reference state (Figure 1). The S-shaped value function is asymmetric around the reference state due to

the property of loss aversion (Zong & Knetsch, 2013). That is, the function is steeper in the domain of losses since losses are weighed more heavily than gains from the neutral reference point.

Figure 1. Illustration of Domains and Reference Point



In the conduct of an economic valuation, individuals may be asked to state values of WTA or WTP compensating variation to accept a loss (a move from R to L) or obtain a gain (a move from R to G), prior to it taking place. However, if a shift to the original reference state has already occurred, whether positive or negative, the valuation will be best suited with a measure of equivalent variation.

In the case of equivalent variation, a positive change in the domain of losses does not refer to gains, but to a reduction of a previous loss relative to the pre-policy reference state (a move from L to R). This change should be framed in terms of WTA to forego a return to the superior state of well-being. Similarly, a negative change in the domain of gains does not refer to direct losses but to a reduction in a previous gain (a move from G to R). In turn, this change is best captured with a WTP measure of avoiding a return to the inferior state of well-being.

Recent guidance provided by Johnston et al. (2017) for the conduct of economic valuations recognizes that the broader decision context should determine which measure is most appropriate from a conceptual perspective. An understanding of the relevant rights scheme is also required due to a common

characterization that loss is best captured by a WTA measure if individuals have property, or ownership, rights to a particular good or service (Freeman, Herriges, & Kling, 2014; Whittington et al., 2017). If not, a WTP decision context is most appropriate. Kim, Kling & Zhao (2015) similarly advocate for economic valuations that are informed by both theoretical and conceptual considerations, such as the applicable reference condition and relevant property rights structure.

Knetsch (2007) expands on this consideration by observing that legal entitlements are not the sole drivers of ownership. Rather, community norms and feelings towards certain entitlements may equally reflect how rights, and therefore reference conditions, are perceived (Kahneman et al., 1991; Knetsch, 2007). Reb and Connelly (2007) likewise find that subjective feelings of ownership induced by possession need not be driven by factual ownership. Bischoff (2008) suggests that the non-excludable nature of public goods leads individuals to view them as part of their individual endowments. Consequently, rights to public environmental goods such as the right to a clean environment can further be assumed to belong to the public (Harper, 2000).

To determine which economic welfare elicitation format is most appropriate Kahneman and Tversky (1979) recommend coding impacts as either gains or losses relative to an applicable reference state and the timing of the induced change. Whittington et al., (2017) echo this practical guidance in light of the general confusion that remains around what contexts warrant a WTA valuation, as well as policy challenges that result when the reliability of WTA responses is called into question.

2.2.2. The Valuation Disparity

Prospect Theory was developed as a response to consistent contradictions in experimental studies between observed patterns of behavior and the outcomes predicted by the Rational Theory of Behavior (Allais, 1953; Tversky & Kahneman, 1991). Specifically, contradictions existed between what study participants were willing to pay to obtain a good versus what they were willing to accept for the loss

of the same good, despite their assumed equivalence (Thaler, 1980).⁵ Now referred to as a valuation disparity, this finding has been explored across a wide range of studies following Thaler's (1980) seminal paper on Prospect Theory.

Additional contexts in which the valuation disparity has been observed are wide and varied.⁶ In one of the first field studies, Hammack and Brown (1974) reported that waterfowl hunters were willing to spend (WTP) \$247 to be able to continue hunting but required an average compensation (WTA) of \$1044 to give up their hunting rights. Generally, valuation disparities are found to be more pronounced where a market is lacking, as is the case with public or abstract goods involving the environment as opposed to public health and safety, leisure, and travel counterparts (Knetsch, 2016; Nataf & Wallsten, 2013).

As the number of studies exploring valuation disparities has risen, so has the number of meta-studies exploring whether valuation methodologies are driving observed outcomes. Horowitz and McConnel (2002) provided the first such meta-analysis across 45 studies. The authors ruled out experimental artefacts as drivers of observed valuation disparities given its prevalence across various subjects and design elements.⁷ Shortly after, Sayman and Onculer (2005) conducted a second meta-analysis of 39 studies and ruled out strategic misrepresentation as a respondent strategy driving the disparity.⁸

Most recently, Tuncel and Hammit (2014) expanded the scope of Horowitz and McConnel's (2002) meta-analytical framework to include 76 studies on the

⁵ The Valuation Disparity is also referred to as the Reference or Endowment effect, a related concept subject to strict property definitions, which similarly posits that an endowment of current assets will be valued higher than those not yet owned (Kahneman & Tversky, 1979).

⁶ The following is a non-exhaustive list of contexts in which a valuation disparity has been explored: flamingo conservation efforts (Navrud & Mungatana, 1994), the exchange of desirable candidates' contact information in dating markets (Nataf & Wallsten, 2013), housing decisions in Chinese property markets (Bao & Gong, 2016), and changes in risk of bicycle theft at the University of Beijing (Zong & Knetsch, 2013).

⁷ Horowitz and McConnel (2002) looked at the following design elements: increments and decrements, real and random real studies, elicitation technique, incentive compatibility, and subjects (students vs. local public).

⁸ Sayman and Onculer (2005) examined study design characteristics related to stating the price, iterative bidding, within versus between subject designs, and out of pocket payments.

valuation disparity.⁹ While the authors did not reach a consensus on why a large valuation disparity persists, they conclude that weak experimental methodologies, such as the use of open-ended elicitation formats, were not driving results. The authors also find that this line of inquiry remains focused on ordinary goods with substitutes, student samples, real hypothetical payoffs, and measures of compensating variation from different reference points. As well, they find that open-ended elicitation formats and out-of-pocket payment mechanisms remain the most commonly applied methodologies. With regards to the size of valuation disparities, a wide range is reported depending on the type of good and experimental conditions.¹⁰ Tuncel & Hammitt (2014) nevertheless find the disparity has generally decreased following Horowitz and McConnell's (2002) meta-analysis due in part to evolving methodologies.

Still, Sprenger et al. (2015) refer to the valuation disparity as a behavioral anomaly. Indeed, various alternative drivers of the valuation disparity other than loss aversion have been proposed.¹¹ Nevertheless, Ericson and Fuster (2014) and Kim et al. (2015) find that loss aversion retains the greatest explanatory power. Plott and Zeiler (2005) also conclude that while experimental design can influence the size of the valuation disparity, its persistence is best explained by a behavioral propensity to value losses more than gains.

2.2.3. Water Supply Valuation Studies

Valuation studies that focus on household water service typically value changes in welfare that result from changes in the quality, quantity, or reliability of the service. As well, it is often assumed that institutional arrangements give property rights for a certain level of household water service to the water authority . As a result, it is

⁹ Tuncel and Hammit (2014) explored the effect of choice of payment vehicle, within- versus between-subject designs, framing, experience, and availability of close substitutes.

¹⁰ Sayman and Onculer (2005) report a mean WTA/WTP ratio of 7.1 and a median ratio of 2.9. Horowitz and McConnell (2002) found ratios between 3:2 and 3:1 for private goods, such as mugs and hockey tickets, but much higher values for publicly provided goods.

¹¹ For example, the cost of information (Kolstad & Guzman, 1999), ownership (Morewedge, Shu, Gilbert, & Wilson, 2009), attachment and possession (Kogut & Kogut, 2011), factors of evolutionary significance (Apicella, Azevedo, Christakis, & Fowler, 2014), "self-congruence" (Thomas, Yeh, & Jewell, 2015), and emotions (Jefferson & Taplin, 2011).

implied that clients ought to pay for any improvements in service quality.¹² An alternative perspective is that consumers hold property rights to a certain level of service quality and ought to be compensated for any degradation in quality. The focus of this literature review is not specific to studies that value attributes of household water service. Nevertheless, a brief overview can provide helpful insights into current practises around the conduct of Prospect-Theory driven valuation.

Howe and Smith (1994) observed that client damages from shortages to household water service had seldom been studied and effectively provide an initial application of Prospect Theory in this context. The authors ask open-ended WTP and WTA questions for various changes to the reliability of the household water supply in three cities in Colorado, U.S. They find that average estimates depend on past experience with the reliability of the water service experienced by each city.¹³ Using changes to household water bills as the payment vehicle, the authors examine reliability, quality, and cost features to understand the consequences of water shortages to households and to inform water utilities' management plans for addressing hydrological risk.

Howe and Smith (1994) effectively question the efficiency of providing a service that is completely reliable. In a similar vein, Griffin and Mjelde (2000) and Macdonald et al., (2010) question the delivery of uninterrupted service when water development costs are high. Griffin et al., (2000) estimated the value of current and future water supply shortages by eliciting WTP and WTA to avoid or accept days of disrupted service. The authors find valuation disparities for future service shortfalls are consistently higher than current shortfalls.

¹² See: Hensher et al's. (2006) estimation of household WTP to avoid drought water restrictions in Australia; Groothuis et al's. (2015) estimation of WTP for water conservation measures in North Carolina; Price et al's. (2018) estimation of household WTP to reduce the likelihood of flood events and water service disruptions in Canada; Appiah et al's. (2018) estimation of WTP for reliability in drinking water supply in Alberta; and Azahara Mesa-Jurado et al's. (2012) estimation of farmer's WTP for guaranteed irrigation water supply.

¹³ For example, aggregate WTP to increase service reliability was insufficient to cover the costs in both cities where the service is historically perceived as low. In cities where residents enjoy a water service that is highly reliable, aggregate WTA for a reduction reliability would be covered by the cost-savings of limited service.

McDonald et al. (2010), obtain implicit prices for attributes associated with changes in the reliability of household water service, including the duration and frequency of shortages as well as strategies for communicating them. The authors' objective was to determine whether it could be economically efficient to compensate consumers for allowing a decline of service standards. A choice model was used to elicit values of WTP, as well as values of WTA, on the basis that customers hold property rights to particular levels of service. However, the authors were unable to compare estimates due to the changes necessary to differentiate each scenario; WTP contributions were described as increases in household water bills whereas WTA contributions were described as one-time payments. Respondents were found to value a larger range of attributes under the WTA approach.

Shackley and Dixon (2000) offer an alternative insight by focusing on quality attributes of household water service. The authors estimate public preferences for imbuing drinking water with a fluoride treatment using a payment card approach. Consideration was given to residents that opposed the treatment on the basis that policy losers must be allowed to express a value for the magnitude of their perceived loss. WTP for those in favor of the proposal was \$12.63 (n=40). For those opposed to the proposal, mean WTA compensating variation was \$76.00 (n=5) while WTP equivalent variation to prevent the proposal was \$29.38 (n = 8). That is, for those against the policy, estimated WTA values were 2.6 times greater. The authors ultimately recommend the use of WTP to prevent questions over their WTA counterparts based on relative ease of survey respondents of answering the WTP question.

Also with regards to water quality, Brox et al., (2003) obtain WTP and WTA values for improvements and declines in the water quality of the Grand River watershed in Ontario. The authors introduce a statistical method to address item non-response in payment card valuation surveys.¹⁴ The authors estimate mean

¹⁴ Item non-response refers to the case where a survey questionnaire is returned, but the respondent does not answer one or more key questions or are considered invalid for reasons other than protest responses (Brox, Kumar, & Stollery, 2003). The proposed estimation technique inputs missing categorical values by distributing missing responses over the entire WTP range conditional on the respondent's other observed characteristics.

values of WTP and WTA per month of \$4.56 and \$9.42 per household, respectively. Finally, Booth et al., (2016) conduct laboratory experiments to test for the existence of the endowment effect to improve the quality of drinking water. Estimated WTA was 62 to 125 cents higher than WTP on average indicating the presence of a significant and positive valuation disparity ratio of 2.72 to 10.77.¹⁵

This review indicates a clear preference for WTP studies which may be due to a research focus on policies and projects that are perceived as *gains* (Appiah, Adamowicz, Lloyd-Smith, & Dupont, 2018). Nevertheless, a number of studies do extend property rights of access to a clean, safe, and reliable supply of water to residents. Loss is discussed in the context of service shortages and decreases in water quality, however a cohesive methodological approach to estimate values associated with negative impacts to this service is lacking. For example, reference conditions are not always used in developing valuation scenarios. When they are, applied reference states are either hypothetical (Griffin and Mjelde, 2000) or function as experimental design elements within broader experiments (Booth et al, 2016).

Consequently, estimated values are often not appropriate for carrying out structured comparisons that would provide empirical evidence of valuation disparities in this context. For example, estimates may lack comparability across decision contexts due to differences in elicitation formats, sample sizes, protest responses, and even choice of payment periods (Del Saz-Salazar, Hernández-Sancho, & Sala-Garrido, 2009; Macdonald, Morrison, & Barnes, 2010; Shackley & Dixon, 2000). Notably, valuation disparities of reliability in household water supply have not been explored in developing countries, to the best of my knowledge. Of the studies conducted in developing countries, I note Vasquez et al., (2009) elicited household WTP responses for safe and reliable drinking water in a mid-sized urban area of *Hidalgo del Parral*, Mexico. Likewise, Vasquez, Franceschi and Hecken (2011) elicited household WTP for improved household water service in *Matiguas*, Nicaragua.

¹⁵ significant at the 1 percent level using both the Wilcoxon signed-rank test and the Welch's paired t-test

Chapter 3.

Background

3.1. Study Area Description

Loreto is a burgeoning oasis town that resides on the east coast of BCS (Appendix A). The municipality is nestled between the *Sierra de la Giganta* mountain range and the Gulf of California, also known as the Sea of Cortez (Paez et al., 2010). Loreto is an arid, desert like region with a hot dry climate. Freshwater for the municipality is extracted from the San Juan Bautista Londo aquifer located 30km north of Loreto (ibid). Total freshwater use is divided between agricultural (40%) and urban domestic uses (60%)(ibid).

Residents of Loreto enjoy a high quality of life and exhibit strong internal cohesion based on shared cultural and social values (Carrilio & Ganster, 2007). Residents feel satisfied with Loreto as a community, specifically its safety, and they report a positive view of the future (Steinitz et al., 2005). In a survey of self-reported well-being indicators, Carrilio and Ganster (2007) found that a majority of residents reported 'excellent' or 'good' measures of satisfaction across a variety of environmental factors including air quality, beach water quality, noise, endangered species, habitat quality, and availability of parks.

Loreto is the second fastest growing municipality in BCS, after Los Cabos (Campos, 2017). The municipal economy is based on agricultural, ranching, fishing and tourism activities, as well as activities related to the management of Loreto's marine protected area (*Loreto Información estratégica*, 2017). However, tourism is the primary economic activity in Loreto and is the main driver of municipal growth.

The Loreto Bay National Park (LBNP) is a main feature of the municipality (Figure 2). The LBNP was established as a result of community efforts to conserve marine life and ecosystems unique to the region (Stamieszkin, Wielgus, & Gerber, 2009). Specifically, it was a result of co-operations among community groups, academia and tourists wishing to protect declining fish populations (ibid).

Today, the park protects diverse ecological resources of biogeographical significance, including marine life, islands, estuaries, and mangroves. In turn, the marine protected area is subject to specific regulations that prohibit overfishing, poaching, and pollution of the marine waters to ensure the sustainable development of the region. Indeed, the LBNP supports a number of tourism activities, such as snorkeling, scuba diving, sport fishing and marine wildlife viewing that generate economic activity for Loreto (ibid).

Figure 2. Map of Loreto Bay National Park

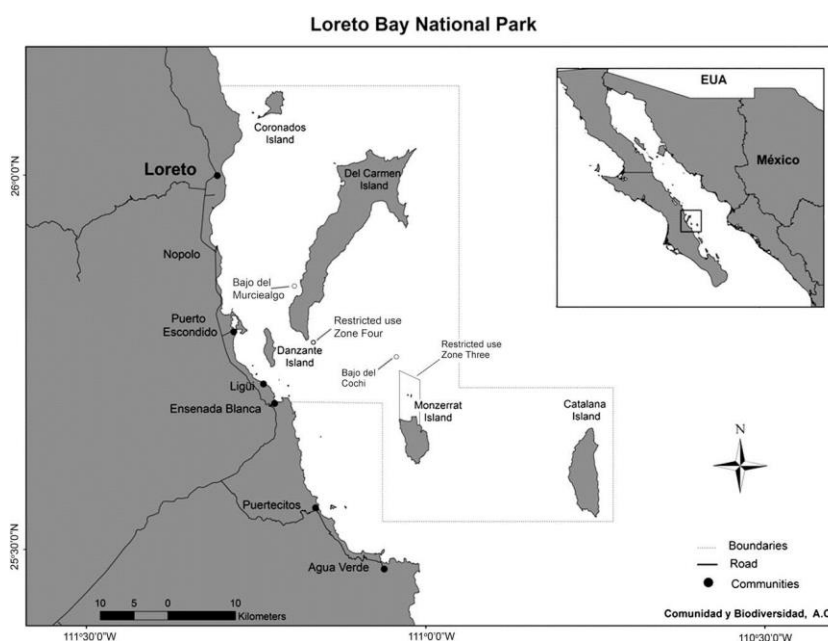


Figure 2. Map of Loreto, indicating the Loreto Bay National Park boundaries and the towns and islands included inside or adjacent to the park (Stamieszkin et al., 2009)

In addition to designated areas for marine tourism, the municipality boasts an international airport, a 5 diamond golf resort, numerous hotels, and various marinas with sufficient dock space for recreational craft and main cruise lines (Stamieszkin et al., 2009).

3.2. Tourism in Loreto

Tourism in Mexico is driven at the federal level by a policy agenda focused on producing coastal destinations to foster a national tourism economy (Anderson, 2017). To achieve this objective, investments in the 1970s were directed at key

designated regions known as Integrally Planned Centers (IPCs). IPCs were developed in lightly populated areas characterized by fragile eco-systems. Planning models that included basic infrastructure, such as potable water, sewage, electricity and paved roads, were provided to each IPC by Mexico's Federal National Trust Fund for the Development of Tourism (FNTFDT) to catalyze regional growth through tourism activity (Garcia-Villa, 1992). In BCS, Loreto and Los Cabos were both developed as IPCs due to the regions' biogeographical significance and rich cultural history (Gamez, 2007). The remaining three destinations include popular sites such as Cancun, Huatulco, and Ixtapa (Gamez, 2007). FNTFDT is the federal body responsible for managing and marketing each destination (ibid).

In their book on the history and economic performance of Loreto, Carrillio and Ganster (2007) observe that Loreto's projections for future growth are largely attributed to federal policy objectives. In particular, the authors refer to the federally-mandated push for increased tourism investment and improved real-estate market performance that is ongoing in Loreto. At the municipal level, Loreto's tourism policy is governed by an Ecological Land-Use Plan (ELUP). The land use plan designates land for agricultural, extractive, fishing and tourism activities. It also sets boundaries for the maintenance of property, environmental services, and conservation of ecosystems and biodiversity. Notably, the ELUP was developed through community group efforts to zone the municipality according to principles of sustainability and was led by EcoALianza, an active NGO in Loreto (Steinitz et al., 2005).

Future growth in Loreto is expected to result from a combination of traditional and alternative models of tourism. Markedly, traditional, or large-scale, tourism has been developed in Loreto and BCS for decades. On the other hand, alternative, or small-scale, tourism projects are under development in Loreto as academics and policy-makers seek strategies to foster industry competitiveness (Gamez, 2007; Gamez & Angeles, 2011). Both tourism models differ greatly and will have a different footprint on the landscape of Loreto. For example, alternative tourism activities aim to foster visitor interaction with the culture and environmental amenities of a region. In Loreto, alternative tourism activities are varied and may include traditional cheese making, weaving, olive oil production

and leather tanning workshops, as well as visits to sites of cultural significance and the LBNP (Gamez, 2007). Activities under this model require a high degree of local knowledge, organization, and place-based capacity building and have a low environmental footprint (ibid).

In comparison, traditional tourism is associated with limited visitor interactions of a region's natural and social surroundings. The objective of this model is to provide tourists with experiences for relaxation (Gamez, 2007). For this reason, success for this model is often equated with hotel occupancy (ibid). In turn, traditional developments require less place-based capacity building and a greater degree of initial investment in infrastructure (Bringas Rabajo & Ojeda Revah, 2000). Funds under this model are also typically sourced externally since proposals are put forth by transnational developers (Gamez, 2007). As a result, ownership for such developments is often external (ibid).

Traditional models of tourism are associated with a host of social, economic and environmental problems. The externalities associated with rapid tourism expansion and resulting population growth include unplanned urbanization and the incidence of squatter settlements (Gamez, 2007), a loss of the benefits associated with growth (Anderson, 2017), a loss of shared culture and 'sense of community' (Steinitz et al., 2005), and environmental damages as a result of pollution and depleted freshwater sources (Villegas, 2007). Patterns of environmental damage have been observed in every IPC managed by FNTFDT. For example, Los Cabos residents of working neighborhoods receive municipal piped water periodically (Mcevoy, 2014). This is referred to as a *tandea* service and may arrive every 3 to 15 days (Gamez, 2007). Villegas (2007) further reflects there is every reason to believe the same pattern will be repeated in Loreto.

Loreto's most recent experience with large-scale tourism development was that of the *Villages of Loreto Bay* project in 2003. This development consisted of an ambitious project to build 6000 homes in the nearby region of Nopolo. The project was overseen by the Trust for Sustainable Development (TSD) who marketed the project as a sustainable initiative; commitments included creating more potable water than was used, producing more renewable energy than was

consumed, and improving the ecosystem of which it was part (TSD, n.d.).¹⁶ However, the project declared bankruptcy in 2007 before construction was finished. Gamez (2007) examined contributors to growth in Loreto during this period and writes that a degree of uncertainty had always been associated with the project due to a lack of clear communication of its planned dates for completion. Notably, Loreto grew dramatically during this period and the municipality now faces key challenges providing infrastructure and services to unplanned settlements outside the planned core of Loreto (ibid).

Nevertheless, Loreto's natural beauty and rich natural history is poised to benefit from further tourism growth with the help of effective marketing strategies (Gamez, 2007). To boost the tourism industry following the 2008 recession, Loreto was recently rebranded as a *Pueblo Mágico*, or Magical Town, in line with a federal marketing campaign to increase activity in the sector (*Loreto Información estratégica*, 2017). However, moving forward Gamez (2007) observes a preference of civil society to shift towards low-impact, alternative tourism activities. Indeed, Steinitz et al. (2005) conducted a survey that found residents are opposed the development style of Los Cabos, Loreto's sister IPC in BCS. Stamieszkin et al. (2009) similarly observe that residents have expressed caution with regards to Loreto's chosen development path.

3.3. Water Security in Loreto

Water security typically refers to the presence of a quantity and quality of water necessary to meet human and eco-system needs (Cook & Bakker, 2012) but may also be expanded to emphasize risk¹⁷ and social dimensions.¹⁸ Hydrological

¹⁶ The project also established an independent charitable foundation dedicated to "serving the economic and social needs of the historic town of Loreto as it absorbed the impact of this development" and one percent of the sale of each home was contributed to the fund. According to the TDS website, donations were distributed to enhance hospital services, fund a sea turtle conference, eco-tourism program, basketball courts, and patrol boats for the enforcement officers in charge of the Loreto Marine National Park. Funds were also meant to support a host of local and national NGO's in the area (TSD, n.d.).

¹⁷ For instance, Grey and Sadoff (2007) portray water security as guarding an acceptable level of water-related risks to people, environment and economy.

¹⁸ Additionally, Oswald Spring (2014) defines water security as the "complex interrelations between people, human activities, energy, ecosystem services, natural requirements for

studies conducted for Loreto express concerns that rapid municipal growth will negatively impact the municipalities long-term water security (Paez et al., 2010). Specifically, the concern is that the available freshwater supply from the San Juan Londo aquifer may not be able to meet municipal and tourism demands, given the projected growth of the population (Paez et al., 2010; Villegas, 2007).

McEvoy (2014) conducted an analysis of technological solutions for BCS's water security concerns. In particular, the author differentiates between a 'broad' and 'narrow' conceptualization of water security that helps understand the differential scales across which water security plays a role. For instance, 'broad' water security refers to the overall deficit or surplus of water resources available to meet the human and ecosystem needs of a population (ibid). However, 'narrow' water security embodies factors that determine the deficit or surplus of water available to individuals and households, such as specific strategies employed in the home (ibid). Furthermore, broad water security emphasizes the role of governance and investments in solutions that can support total demand for the resource. In comparison, a narrow perspective emphasizes the role of infrastructure over institutions; infrastructure plays a role in achieving equity at the household level depending on how the resource is distributed throughout the community (Cook & Bakker, 2012).

3.3.1. Broad Water Security in Loreto

In addition to managing IPC's, FNTFDT is responsible for operating and maintaining the San Juan Londo aqueduct that supplies water to Loreto (Villegas, 2007). The San Juan Londo aquifer is Loreto's only source of groundwater and is replenished through runoff penetration from the nearby *Sierra de la Giganta* mountain range (Paez et al., 2010; Steinitz et al., 2005). However, regional hydrological studies predict that over-extraction and saline intrusion have depleted the resource due to the aquifer's uncertain rate of recharge (Steinitz et al., 2005).¹⁹ Under these constraints, Paez et al., (2010) emphasizes that the

maintaining biodiversity, climate change, and new demands related to hygienic living conditions, the alleviation of poverty and socio-economic aspirations" (page 3).

¹⁹ This has occurred in the past due to over-extraction from household water wells (no longer accessible) in the city of Loreto (Villegas, 2007)

sustainable management of the region's freshwater source will depend on strategies to either augment the aquifer with artificial means or limit rates of extraction. For example, by shifting land-use planning approaches away from water intensive developments that may further disturb the natural water cycle (ibid).

In Loreto, and more generally BCS, the discourse around broad water security is focused on the application of desalination technologies to address expected deficits in the supply of freshwater (Mcevoy, 2014). Desalination refers to the process of removing dissolved solids or salts from brackish water or seawater to produce potable water and is an active strategy throughout BCS (Mcevoy, 2014; McEvoy & Jamie, 2015). However, the pursuit of desalination strategies has been characterized as a top-down process that is instigated by national governments in response to political pressures rather than a strategy for inclusive development planning. In this regard, McEvoy (2014) documents low levels of civic engagement in regions of BCS where desalination has been pursued, specifically when eliciting community input prior to adoption of the technology. In one case, civic society actors note it was clear decisions had been taken, even when community members had been invited to a public opinion forum to discuss the decision (ibid).

3.3.2. Narrow Water Security in Loreto

Narrow water security in Loreto is achieved through a combination of strategies. Culturally, consumptive needs are met through a combination of store-bought resources and household deliveries (Campos, 2017). Non-consumptive needs are met through the municipal supply of piped water. However, households invest in water storage containers to meet their non-consumptive needs when the water service is interrupted. A number of water storage techniques ensure there is a constant supply of water in the home and may include *tinacos* (large barrel like containers commonly installed on rooftops) and containers of various sizes. Indeed, Campos (2017) found that only 9% of Loreto residents do not rely on water storage strategies in the home. As a result, resident's perceptions of the municipal water service is driven by pressure and reliability characteristics over

quality; municipal piped water is rated high across color, odor and taste categories (ibid).

Loreto's municipal piped water service is managed by the Organismo Operador del SAPA de Loreto (OOMSAPA). OOMSAPA is the designated utility responsible for administering the resource throughout the municipality (Appendix B), which is divided into various land use designations, including the urban center, ranchos and traditional *ejidal* land (Stamieszkin et al., 2009).²⁰ There are 5,975 households with connections to the municipal piped water supply and service is administered by neighborhood depending on the availability of connection to the infrastructure of potable water. For instance, about 250 households are served through a *pipa*, or water-delivery, service where there are no connections to the municipal piped water service.

Within the urban center the neighborhoods of Zaragoza, Miramar, and INVI receive notably different service. Zaragoza belongs to an *ejidal* community set apart due to their cultural norms and historic relationship with the municipality. Households in this neighborhood have large properties, consume high volumes of freshwater and are known to renege on monthly water payments. Adjacent to the urban center, the neighborhood of Miramar is an example of the rapidly expanding shanty settlements driven by the period of economic growth surrounding the *Villages of Loreto Bay* project. Residents of Miramar loose water pressure for 4 hours every day in which INVI receives a *tandea* water service. Miramar residents are not subject to the monthly water bill payment schedule set by OOMSAPA and are instead charged a monthly contribution of MXN \$50 pesos per month.

Similar to many Mexican utilities, OOMSAPA faces a number of institutional, political, and cultural barriers to maintaining service (Mcevoy, 2014; Vásquez et al., 2009). Barriers are in large part due to the combination of aging infrastructure and high municipal debt of the utility (Carino et al., 2006). The funds required to improve the service are often lacking due to the highly political nature

²⁰ Following agrarian land reforms in the early 1900's *ejidal* land refers to communal land used for agriculture in which members of the ejido make land tenure decisions communally (Pickering et al., 2015). As a result of this land tenure system, *ejidal* communities receive government boons that other residents do not

of adjusting water fees and the high rates of unpaid water bills by service users. Campos (2017) found that only a small proportion (10%) of Loreto residents consider freshwater to be a scarce resource and may explain a refusal to pay for water utilities if the resource is perceived to be inexhaustible and mismanaged (Campos, 2017). The perceived unreliability of the service leads to a further refusal to pay utility fees and therefore fewer funds to invest in service improvements (Campos, 2017; Ortiz Rendon, 2011).

Within the broader institutional and social context, McEvoy (2014) suggests alternative approaches to improve Loreto's water management be considered prior to adopting desalination technologies. These include improving groundwater monitoring, implementing water conservation measures, or integrating water and land use planning strategies. Suggested improvements in the literature further include supply-side infrastructure investments (such as pipe upgrades) and demand-side investments to reduce the rate of aquifer extraction. These may include installing water-efficient fixtures in homes (Paez et al., 2010), and upgrading non-functional household water meters (Campos 2017).²¹ Otherwise, governing utilities run the risk that determinants of narrow water security, such as inefficiencies in the overarching water delivery system, will not be addressed and may lead to inequalities in service delivery at the community level.

Paez et al., (2010) recommend establishing a community based decision-making body as a means to influence water-management decisions in the social, environmental and economic interests of the community. The recommendation was based on strong levels of observed civic interest and political participation in Loreto (ibid). For this reason, it is not surprising that a civic campaign by the name of #loretoldeal was recently launched by EcoAlianza, a prominent NGO in the Loreto community. The objective of the campaign is to engage civil society actors

²¹ Campos (2017) found that 91% of survey respondents did not know their monthly consumption of water despite reporting a meter installed (75%) and perceiving it to be working just fine (79%). The author concludes that Loreto residents can essentially be thought of paying a fixed water quote in that they are not adjusting their water consumption behavior according to the incentive scheme of the meter.

in discussions around future decision for the sustainable development of Loreto (#loretoideal, 2018).

Chapter 4.

Methodology

This chapter outlines the methodology I used in my research. First, I identify the contingent valuation approach and household survey design, including sample considerations and limitations of the survey. Second, I describe the four contingent valuation scenarios and utility functions associated with each. Finally, I elaborate on the statistical analysis and scale of analysis applied.

4.1. Contingent Valuation Method

I applied a stated preference contingent valuation approach to directly elicit measures of economic welfare by using responses to survey questions, as is commonly done in the literature (Champ, Boyle, & Brown, 2003; Hanemann, 1984; Johnston et al., 2017). Contingent valuation is the primary economic tool used to estimate non-market values and is applied in developed and developing countries. This approach creates hypothetical markets for participants in which they can make decisions (Alberini & Cooper, 2000). Values can then be aggregated to the level of those with policy standing and integrated within broader policy contexts (Alberini & Cooper, 2000; Heberlein & Bishop, 1986; Whitehead & Blomquist, 2006).

Contingent valuation methods are well-suited to contexts that involve either pure or quasi-public goods for which no market currently exists, such as the reliability of household water service. Contingent valuation methods have also been broadly applied to value changes to the provision of household water service as discussed in Chapter 2 (Griffin & Mjelde, 2000; Howe & Smith, 1994).

4.2. Survey Design

To understand how residents of Loreto value the reliability of their household water service I conducted a household survey that applies four measures of welfare in a between-subject experimental design (Appendix C). The survey was

revised on a rolling basis and received significant input from participants of pilot and pre-test surveys. Input was also provided by key stakeholders with knowledge of Loreto's tourism development and water security landscape. I translated the survey into Spanish on a rolling basis using insights from the pre-test stage to ensure the questionnaire captured nuances of local speech.

4.2.1. Sampling Considerations

The target population was all residents of Loreto that rely on freshwater supplied from the San Juan Londo aquifer. Therefore, I defined my target population as the municipality of Loreto. The population of Loreto is composed of 18,912 residents (*Loreto Información estratégica*, 2017). However, there are 5,975 households with connections to the municipal piped water supply (*ibid*). Based on Dillman's (2007) sample size calculation and the total number of houses dependent on the municipal water service, I required a sample of 350 respondents. To reach my target population I obtained maps from Mexico's National Institute of Statistics and Geography (NISG) depicting the study area (Appendix B). I employed a random sampling technique to identify my study sample using NISG maps of Loreto *manzanas*, or neighbourhoods, since no central database exists from which to source either home occupants or individual properties.²² I assigned a number to each manzana and randomized this list in excel.²³

My approach therefore consisted of visiting a structured random sample of manzanas. I kept count of the number of households that I was unable to reach after three separate visits to the home. As this was often the case, I applied a modified convenience replacement technique to survey the desired number of residents indiscriminately by replacing the households that were unavailable (Bernard, 2002). In my case, this involved simply moving on to the next manzana in my random sample.

²² Researchers wishing to survey residents of an urban area are frequently forced to employ strategies such as simply covering every house, or every other house, in a certain district (Alberini & Cooper, 2000).

²³ Manzanas in the neighborhoods of Zaragoza and Miramar were excluded due to the unique relationships with the water service, as discussed in Chapter 3.

Finally, I applied screening criteria to increase the incentive compatibility of survey respondents with specific contingent valuation scenario components (Appendix D). I applied screening criteria to ensure survey participants were of legal age, permanent residents of the home being surveyed, and up to date on their monthly water bills.

4.2.2. The Questionnaire

I administered pilot and final surveys with the aid of students from the Autonomous University of Baja California Sur. Students were identified through a youth volunteer network that is coordinated by EcoAlianza, a local NGO.²⁴ Prior to engaging in fieldwork, I held a 2-hour training session during which I ensured student's familiarity with the content, subject matter, and methodology of the surveys. I asked students to repeatedly practice administering the survey and provided feedback on tone, pace and demeanor to ensure volunteers gained an acceptable level of comfort with the surveying technique. Each survey took approximately 20-40 minutes to complete.

I placed potentially biasing questions, such as income, after the contingent valuation scenario to encourage eliciting unbiased estimates. The household survey was therefore presented as follows:

- Demographic information (Section A)
- Water use and management in the home (Section B)
- Contingent valuation scenarios (Section C)
- Networks of information (Section D)
- Attitudes related to tourism and the environment (Section E)
- Household livelihood information (Section F)

In Section A, I collected socio-demographic information to obtain a description of sample respondents. Questions related to gender, age, and education are considered good "warm-up" questions and have been found to increase respondent's level of comfort with the exercise (Alberini & Cooper, 2000). In Section B, I asked respondents about their perceptions of the reliability of their municipal piped water supply. I also inquired about normal water use in the home

²⁴ EcoAlianza also provided flyers, students and a work-space for training sessions.

to understand household consumption patterns, including water management and conservation strategies.

In Section C, I presented the respondent with one of four versions of the survey in a between-subject design. Thus, I collect data across four sub groups that elicit both CV and EV measures of WTP and WTA. With this approach I avoid biasing respondents by presenting them with more than one valuation question at a time (Sayman & Öncüler, 2005). As well, I am able to recreate a real-world decision context in which only one policy would be considered at a time (Booth, Guilfoos, & Uchida, 2016).

In Section D, I explored respondents' access to information and degree of community participation. I used a Likert scale to gauge respondents' perceived access to information regarding tourism developments. I also asked participants about their degree of trust towards members and outsiders of the Loreto community, as well as their participation voting in the previous municipal election.

In Section E, I again applied Likert scales to capture preferences for various tourism developments, general attitudes towards the environment, and perceived impacts to the economy, culture, environment, and water resources in Loreto. In this section I also provide an introductory paragraph on negotiated agreements, followed by questions about respondents' knowledge, and expectations of agreement outcomes, as well as management preferences. Section F concludes with information on respondent's livelihood, including employment, income, and payments on the household water bill.

4.2.3. Limitations of the Household Survey

A survey that is administered face-to-face allows the surveyor to explain questions and probe for complete answers if misunderstandings arise (Bernard, 2002). Since question ordering in a contingent valuation study is strategic, an interviewer is able to ensure respondents cannot anticipate valuation questions (ibid). Nevertheless, interviewer bias may be introduced if the interviewer's appearance and demeanor, or the physical conditions of survey administration, influence the

participant (Neuman, 2006). In turn, this may lead to false or omitted information (ibid).

Measurement error may likewise occur if questions or answers are misunderstood, or if incorrect information is recorded (Champ et al., 2003). Protest responses to specific questions, particularly the valuation question, can introduce non-response error and possible selection bias (Champ et al., 2003; Whitehead, 2006). Finally, non-coverage error may occur if the need to exclude certain neighbourhoods from the sample frame leads to a loss of correspondence with the population of interest (ibid).

4.3. Contingent Valuation Scenarios

I designed four hypothetical scenarios that describe enhancements and restrictions to the supply of municipal piped water. Each scenario is based on a common set of assumptions that I manipulate to develop unique scenarios, as follows. The supply of municipal piped water varies with the ability of the proponent of a tourism project to privately source their own freshwater with the use of desalination technology. To frame a scenario as a *gain*, I state that surplus potable water from the desalination plant will be shared with residents of Loreto. Thus, the reliability of water service at the household level can be expected to improve.

To frame a scenario as a *loss*, I refer to Loreto Bay National Park regulations that may pose a barrier to desalination plants proposed in Loreto. As a marine protected area, the park prohibits pollution of surrounding coastal waters that might result from the deluge of the desalination process. Therefore, I state that the desalination plant proposed is not feasible and potable water for the proposed tourism project will be sourced from the San Juan Londo aquifer. As this is the only source of potable freshwater available to the municipality, the reliability of water service at the household level can be expected to decline.

Valuation scenarios also involved past and future tourism developments, depending on the CV or EV context being applied. To develop CV scenarios, I simply framed each change as taking place in the future. However, EV scenarios

require a recent shift of the reference state and thus, additional manipulation of the scenarios. To describe a previous gain, I state that OOMSAPA had recently invested in Loreto's water infrastructure to address leaks and the reliability of water service in homes had improved as a result. To describe a previous loss, I state that an existing tourism development had obtained access to potable water from the San Juan Londo aquifer. As a result, the reliability of water service in homes had recently declined.

Scenarios were formulated to assess what residents of Loreto felt an increase or a decrease in the reliability of their municipal household water supply was worth to them. At the household level, changes in service reliability manifested as days of interrupted service, per month, for an average household. Therefore, to ensure comparability across sub-samples, each scenario valued a marginal one-day change in the number of monthly water service interruptions from an identical reference state of 2 days per month, on average.

I asked residents to state their marginal WTP for a one-day decrease in service disruptions as contributions to the monthly water bill.²⁵ In the case of loss, residents stated their marginal WTA for a one-day increase in service disruptions as rebates applied to the monthly water bill. Each scenario linked the change in disruptions to expenditures in a desalination plant proposal. Therefore, to gain a surplus of potable water residents chose whether or not to contribute to a shared cost-arrangement for a desalination plant with the tourism developer. However, where LBNP regulations prohibited the plan to build a desalination plant, the developer compensated residents for the increase in interruptions to their household water service through a fund.

All scenarios began with an identical introductory paragraph:

“Tourism development generates income for the residents of Loreto. As tourism is the principal economic activity in Loreto, the municipality was designated a *Pueblo Magico* in 2012 to encourage further growth in tourism activity. At the same time, an increase in tourism development will increase

²⁵ Use of the water bills as payment vehicles may increase the number of overall protest responses and lead to non-response bias (Carson & Mitchell, 1993). However, this payment vehicle is preferred to taxes which present increasingly contentious alternatives (Whitehead & Blomquist, 2006). Griffin & Mjelde (2000) note that previous real-world experience paying monthly water reinforce their suitability in CV scenarios.

Loreto’s demand for water. Recall that the demand for water in Loreto is expected to increase with the municipalities’ population growth alone.”

Each hypothetical scenario depicted one change to respondent’s household municipal piped water (Table 2). The first two applied compensating variation measures of welfare and a reference state of the present as the basis for comparison. The final two applied equivalent variation measures of welfare and the induced status quo, following a recent shift to respondent’s original reference state.

Table 2: Framings applied across the four contingent valuation scenarios

Version	Change	Framing	Question
WTP_{CV}	<i>Positive</i>	Gain	Q1. To obtain this improvement, what is the maximum amount you would be willing to pay, as an increase in your monthly water bill, for the proposed project to increase the municipal piped water availability to a typical home for an additional day each month?
WTA_{CV}	<i>Negative</i>	Loss	Q2. To accept this reduction, what is the minimum you would be willing to accept, as a discount in your monthly water bill, if the proposed project decreases the municipal water availability to a typical home, by one additional day, each month?
WTA_{EV}	<i>Negative</i>	Prevent Loss	Q3. To forego this improvement, what is the minimum you would be willing to accept, as a discount in your monthly water bill, given that the project will be unable to return your municipal piped water supply to its previous levels and a typical home will continue to have one less day of water supply per month?
WTP_{EV}	<i>Positive</i>	Forgo Gain	Q4. To avoid a reduction in the service, what is the maximum amount you would be willing to pay, as an increase in your monthly water bill, for this project to maintain water service availability at the current level so that a typical home will continue to have an additional day of water supply per month on average?

Unrealistic scenarios will not be viewed as consequential and can affect final reported values. Therefore, as recommended by Johnston et al. (2017) I applied insights from the pilot and pre-test stages to encourage scenario realism,

credibility and consequentiality such that respondents would perceive a non-zero probability that their responses could influence the outcomes of each scenario.

For example, water security is a fairly serious concern in Loreto and pilot testing revealed that respondents were familiar with the nature of the disruption, the role of desalination techniques in the region, and the need to protect the LBNP on which much of Loreto's tourism activities are based. As well, reliability is a key attribute of urban water supply along with quality and cost and is particularly relevant where pressure, duration, and frequency characteristics are most important to residents (Campos, 2017).

I applied provision point mechanisms (PPM) in each scenario to encourage incentive compatibility with scenario components and curtail the incidence of high value outliers. Incentive compatibility refers to the incentive structure that supports the revelation of real values and reduces the incidence of free-riding. Similar approaches are popularly applied to elicit WTP, and Bush et al. (2013) recently introduced a PPM mechanism to support the revelation of real values in a WTA context. PPM's typically specify a minimum required to advance a proposal such that aggregate WTP must exceed this minimum to be realized. In the case of WTA, a maximum amount of compensation is specified instead, such that aggregate values in excess will fail to advance the proposal.

Finally, I employed 'cheap talk' scripts that force a careful consideration of real-world behaviour by asking participants to recall income constraints. For instance, in the case of WTP, I ask respondents to "*recall [that] this amount will then not be available for other household needs.*" Ryan and Watson (2009) and Lindhjem & Navrud (2011) were successful in reducing hypothetical bias in contingent valuation surveys using cheap talk scripts.

4.3.1. Utility Functions

The base good valued in each scenario is the provision of municipal piped water to households in Loreto. Suppose that households obtain utility from their supply of municipal piped water (W) and income (Y). As Loreto residents purchase store-bought water to meet the household consumption needs, (W) refers to the utility

and convenience of all remaining household activities. For example, observing personal hygiene routines and doing laundry. The superscript (2) refers to the reference state, (1) refers to a positive change, and (3) refers to a negative change. Household utility is then represented by:

$$U^2 = V(W^2, Y^2) = v(W^2) + m(Y^2) \quad (1)$$

Hicksian measures of WTA and WTP leave an individual as well off with the proposed policy or project as they were prior to. Since no respondents are expected to report a zero use of the resource, changes in welfare under each scenario are represented as:

CV to pay for an improved water service:

$$v(W^2) + m(Y^2) = v(W^1) + m(Y^2 - WTP_{CV}) \quad (2)$$

CV to accept a diminished water service:

$$v(W^2) + m(Y^2) = v(W^3) + m(Y^2 + WTA_{CV}) \quad (3)$$

EV to accept an unrealized improvement to the water service:

$$v(W^1) + m(Y^2) = v(W^2) + m(Y^1 + WTA_{EV}) \quad (4)$$

EV to pay to avoid deterioration to the water service:

$$v(W^3) + m(Y^2) = v(W^2) + m(Y^3 - WTP_{EV}) \quad (5)$$

4.3.2. Welfare Elicitation Format

I applied a circular payment card (CPC) as the value elicitation mechanism (Appendix E). Payment cards pose a lower cognitive burden for participants than alternative elicitation mechanisms by modeling everyday consumer behaviour that participants would be familiar with, i.e., selecting the best fitting price from a range of options (Drichoutis, Lusk, & Pappa, 2016). They also retain a greater statistical efficiency that makes them appropriate for small-sample studies (Covey, Loomes, & Bateman, 2007; Whitehead, 2006).

Payment cards (PCs) provide participants with an ordered set of bids in an ascending linear list from which respondents choose the value that most closely

reflects their maximum WTP or minimum WTA (Cameron & Huppert, 1989). A CPC, on the other hand, randomizes the initial bid that each respondent is exposed to by presenting bids in a wheel format that discourages anchoring, range, and centering biases associated with the linear PC approach (Johnston et al., 2017).²⁶

I designed a seven bid CPC containing the following amounts in \$MXN pesos/month: <\$10, \$15, \$30, \$65, \$110, \$165, and >\$230²⁷ with an additional option to state open-ended values on either side of this range. I asked respondents to circle the highest (or lowest) amount that they would be willing to pay (or accept) from this range. When developing the bid amounts I considered both range and spacing design elements that would encourage efficient and unbiased estimates (Johnston et al., 2017). For example, the final bids discourage possible prominence bias identified in the pilot data set (Smith, 2006).²⁸ Following Covey et al., (2007), the highest and lowest bids reflect responses from the pilot survey. The remaining bids place pilot study means and medians for each sub sample at similar points on the card. Bids are also increasingly spaced apart to accommodate positively skewed data (Champ et al., 2003).²⁹

4.4. Statistical Analyses

I analyzed survey data using descriptive statistics to understand respondent's behaviour, knowledge of tourism development, and attitudes. As well, I employ both comparative and regression analyses to understand stated WTP and WTA values of changes to resident's household municipal water service under various scenario assumptions.

²⁶ Covey et al. (2007) and Smith (2006) found CPC formats are less prone to anchoring bias.

²⁷ Optimal design should include includes 5-8 bids (Alberini & Cooper, 2000).

²⁸ Prominence bias occurs when respondents are likely to state values of greater salience, typically 1,2,5,10...N x 10^x (Covey et al., 2007). For example, a value of MXN \$50 pesos/month.

²⁹ I accept some information for estimation purposes may be lost as the coarseness of each interval increases (Rowe, Schulze, & Breffle, 1996).

4.4.1. Comparative Analysis

Comparative tests of non-normally distributed PC data are common in the literature (Chanel, Makhoulfi, & Abu-Zaineh, 2017; Zong & Knetsch, 2013). Given the positively skewed nature of the data, I applied non-parametric Mann-Whitney *U*-tests of differences in the means of each sub sample. I tested three null hypotheses: first, that there would be no difference in WTP and WTA values of compensating variation.

$$\textit{Hypothesis 1: } H_0: WTP_{CV} = WTA_{CV} \quad H_A: WTA_{CV} > WTP_{CV} \quad (6)$$

Second, that there would be no difference in WTP and WTA values of equivalent variation.

$$\textit{Hypothesis 2: } H_0: WTP_{EV} = WTA_{EV} \quad H_A: WTA_{EV} > WTP_{EV} \quad (7)$$

Finally, I pooled data across WTP and WTA values and tested for the hypothesis that there would be no difference in pooled WTA and WTP responses.³⁰

$$\textit{Hypothesis 3: } H_0: WTP_P = WTA_P \quad H_A: WTA_P > WTP_P \quad (8)$$

Given the valuation disparities that have been observed for a number of market and non-market goods, I expect that the null hypotheses will be rejected, and average WTA will exceed average WTP (Booth et al., 2016; Tunçel & Hammitt, 2014).

To estimate the means from ordinal interval payment card data, I apply two approaches based on a review of the literature.³¹ Following Bowker and McDonald (1993) and Gyrd-Hansen (2014) I first estimate means for each sub sample using direct point estimates from the PC which have been log-transformed to best suit

³⁰ Pooling may be applied to analyze several different populations when the mean of each population may be different but the variance of each population is assumed to be the same (Cameron, Poe, Ethier, & Schulze, 2002).

³¹ Interval data is censored, meaning the value of true WTP or WTA is assumed to lie in a bracket bound by the chosen PC bid and a neighboring amount. Commonly this censored interval comprises the next highest - or next lowest in the case of WTA - dollar amount on the PC (Cameron and Huppert, 1989).

the skewed nature of the data.³² This represents a conservative technique that yields a lower bound of both mean and median WTP and WTA values, and should be appealing to researchers, policy makers and analysts as the technique avoids value overestimation (Gyrd-Hansen, Jensen, & Kjaer, 2014).³³

I also apply maximum likelihood (ML) estimation techniques as suggested by Cameron and Huppert (1989). ML estimation involves calculating means based on predicted values from interval regression models that use a conditional means equation (Appendix F). As per convention, I estimate the means for each sub sample in an interval regression model that is restricted to a constant term [See: Shackley and Dixon (2000); Moon et al. (2007); Del Saz-Salazar et al. (2009); and Lindhjem & Navrud (2011)]. In the next section, I discuss the interval regression models I applied to first estimate average values and then to check the internal validity of the initial results obtained from ML procedures with respect to explanatory variables.³⁴

I identified protest responses by analyzing the answers to an open-ended follow-up question for all stated values of zero (Mahieu, Riera, & Giergiczny, 2012).³⁵ I recorded “true zero” responses as “\$1” to avoid undefined log transformations of the data and removed protest bids from the final sample (ibid). Finally, I applied χ^2 - tests of differences in the demographic characteristics of each sub sample. I conducted all comparative analyses using IBM SPSS Statistics Data Editor.

³² WTP data is typically skewed to the right due to the number of high estimates reported. Since the data do not follow a normal distribution a log-normal transformation is best suited (Lindhjem & Navrud, 2011).

³³ If true values lie in the interval between the chosen value and next highest option, the use of the point estimate provides a lower bound on a maximum WTP value, and an upper bound for a value of minimum WTA.

³⁴ Cameron and Huppert (1989) observe this practice is due to differing goals between analyses, where one simply aims to estimate mean values of stated preference experiments, while the other aims to estimate the functional relationships between the values and respondent characteristics.

³⁵ Protest responses refer to stated values of zero due to moral objections to certain scenario components.

4.4.2. Interval Data Models

I apply an interval data regression model based on the assumption that PC responses depend on a latent (or unobserved) variable that is reported in interval categories (Greene, 2000). Let (y^*) represent the true value of WTP or WTA that is observed in intervals given by the payment card. Further, let a dependent variable (y) indicate respondents' discrete choice of a PC bid, such that (y^*) lies within a completely censored interval (Cameron & Huppert, 1989; Donaldson, Jones, Mapp, & Olson, 1998). Formally, the model is:

$$y^* = \beta x + \varepsilon, \varepsilon|x \sim \text{Normal}[0, \sigma^2] \quad (\text{unobserved latent variable})$$

$$y = j \text{ if } a_{j-1} \leq y^* < a_j \quad (\text{observed choice of PC bid})$$

Where: $j = 1, \dots, J, A_0 = -\infty, A_j = +\infty$

Y^* =	the respondent's true WTP or WTA value that is unobserved
β =	A vector of parameters reflecting the relationship between the stated value and variables in x
x =	A vector of independent variables that may influence the stated value
ε =	An independently and identically distributed error term with mean 0 and variance σ^2 .
Y =	The respondents selected payment card bid
J =	Total number of bid values presented in the payment card
A =	Upper and lower payment card limits, with the first and last being open ended

I ran interval data models on each sub group, pooled samples of EV and CV framings, and the full sample against a number of explanatory variables for a total of 7 regressions. Since the dependent variable (y) is coded according to the PC data scheme, the variable represents true monetary values, and model coefficients can be interpreted as the marginal effects on the latent WTP or WTA value (y^*) similarly to an OLS model (Yang, Hu, Mupandawana, & Liu, 2012). I used the likelihood ratio index as a measure of model significance and interpreted the sign and value of the parameter coefficients to understand how an independent variable influenced the dependent variable. I carried out all analyses using the GROUPEDDATA command on LIMDEP 11 for Windows.

4.4.3. Regression Variables

I chose the most promising explanatory variables based on preliminary OLS analyses, using log-transformed PC point data as is common practice with random utility choice models. OLS results for each sub sample, EV and CV pooled samples, and the full sample can be found in Appendix G.

The final variable mix is represented in the following bid curve:

$$U = \beta_0 + \text{SOCIODEMOGRAPHIC}X_i\beta + \text{INFORM}X_i\beta + \text{IMPACT}X_i\beta + \text{IMPORT}X_i\beta \quad (9)$$

I identified the final mix of explanatory variables using insights from the literature discussed in Chapter 2 (Table 3).³⁶ The vector of demographic variables controls for a respondent's gender, age, status as the head of the household, income, household size, and employment status (if employed by the tourism industry). INFORM, IMPACT and IMPORT, on the other hand, are dummy variables.

INFORM is a coefficient that controls for a respondent's self-rated degree of knowledge about potential impacts of future tourism developments. The effect of previous information has been previously explored by Del-Saz Salazar (2009), who found a positive and significant influence on WTA of respondent's contextual knowledge. As well, MacDonald et al., (2010) observed the provision of additional communication influenced whether the community would support a reduction in the quality of service in a WTA decision context.

IMPACT measures the effect of respondent's perceptions of impacts to Loreto's water resource from tourism activity. The variable equals 1 if this perception is "very bad" or "bad", 0 if otherwise. This variable acts as a proxy attitudinal measure based on Salvaggio et al.'s (2014) argument that targeted environmental concerns are better predictors of support for water policies than

³⁶ Variables related to water use in the home, such as whether the respondents conserved water in the home, perceived their water service to sufficiently meet their daily household needs and whether the water service is better or worse compared to the past were excluded from the final variable mix during the OLS regression stage due to a lack of explanatory power.

general environmental value orientations or even knowledge of environmental problems.

IMPORT measures the importance that respondents attribute to Loreto's tourism growth relative to other economic activities of the region, such as ranching and agriculture. This variable acts as a proxy for possible interests in encouraging future tourism activity in Loreto. Therefore, IMPORT controls for the fact that tourism is the primary economic engine of the region and is favoured by residents.

Finally, I included a WTA dummy variable that equals 1 if the response refers to a WTA frame and 0 otherwise to further explore the valuation disparity in the full interval regressions. This dummy variable is applied in each pooled sub group.

Table 3: Variable Definitions Used in Interval Regression

#	Name	Question	Coding
Independent			
	GROUPED		1 = 10*; 2 = 15*; 3 = 30*; 4 = 65*; 5 = 10*; 6 = 165*; 7 = 230*
Dependent			
1	WTA	Dummy Variable	WTA = 1; WTP = 0
2	FEMALE	What is your gender?	Female = 1; Male = 0
3	AGE	What is your age?	Cont.
4	HEAD	Are you the head of this household?	Head of Household = 1; Not = 0
5	INC_50	How much income did you earn from the above employment activities in the last 12 months?	>51 pesos/month = 1; Otherwise = 0
6	HHSIZE	How many people reside in your household at least 6 months of the year?	Cont.
7	TOURISM	What were the main sources of income for you and members of your household in the last 12 months (that is, since last June)?	Tourism = 1; Otherwise = 0
8	INFORM	Do you feel informed about potential impacts that tourism development in Loreto could have?	Very/Somewhat = 1; Not at all/Unsure = 0
9	IMPACT	How would tourism affect Loreto's water resources (such as underground aquifers)?	Very Bad/Bad = 1; Very good/Good/Unsure = 0
10	IMPORT	How important is it for you that tourism be developed compared to ranching and agriculture, which are also key economic activities of the region?	Much /Somewhat more = 1; Not as/Unsure = 0

*pesos per month. These variables were then log-transformed prior to regression analysis.

4.5. Scale of Analysis

My research focuses on an economic estimation of values at the community level. As such, I treat sample averages as community-level attributes indicating preferences for increases or decreases to household water reliability. To arrive at community level estimates, I first multiply both raw data and predicted sample averages by the population of Loreto to obtain a measure of total economic welfare generated or lost, depending on the scenario. This scale of analysis captures political jurisdiction by extending the analysis to the total number of individuals living in and covered by the water catchment area (Bateman, Day, Georgiou, & Lake, 2006).

Next, I derive aggregate values that reflect considerations of economic jurisdiction by limiting the analysis to the number of houses with connections to the water supply system (Del Saz-Salazar, 2009). Following Howe and Smith (1994), I also multiply sample averages by the total number of detached dwellings in Loreto. In both cases, I assumed that respondents and non-respondents are equal as proposed by Whitehead and Blomquist (2006). While the former strategy is important from a policy perspective to provide information about the social cost or benefit to the project-affected community, the latter is arguably most important to utilities managers concerned with providing service to a certain number of clients.

Chapter 5.

Results

During data collection, I obtained a non-response rate of 33%. This refers to households in my structured random sample that I did not receive a response from because no one was home. Following survey protocol, unresponsive households were revisited on three separate occasions. After three tries, I simply moved on to the next manzana in the random sample based on the modified convenience replacement technique. Ultimately, I was able to contact 275 households where a member of the household was available. Of these households, 5% declined to participate and an additional 5% were later excluded based on screening criteria.

Of the remaining 248 responses, I eliminated a further 21 as protest responses and analyzed the remaining 227. To differentiate between true zero and protest responses, I examined the open-ended answers to the question about why a stated value of "0" was given and removed respondents that morally objected to a component of the contingent valuation scenario. Thus, the protest response rate for the final sample (n=248) was 9% . Protest responses were comparable across each sub sample, with the exception of a slight increase in the WTP_{CV} scenario (Table 4). Open-ended explanations given for each protest response can be found in Appendix H.

Table 4: Protest response rates across the four measures of welfare

Sub Sample	N	True Zeros	Protest Responses	Protest Response Rate
WTP_{CV}	57	2	7	12%
WTA_{CV}	54	2	5	9%
WTA_{EV}	59	1	4	7%
WTP_{EV}	57	1	5	9%

5.1 Demographic Characteristics

With regards to the demographic characteristics of the survey sample, 61% identified as being female and 72% identified as the head of their household. The

median age was 43 and respondents ranged from 18 to 86 years old since residents younger than 18 were unable to participate but no age ceiling was imposed on the sample (Table 5). The mean household is composed of 3.65 residents and ranged from 1 to 9 individuals throughout the sample. Of these, 1.62 residents on average were non-working dependents, such as children, elderly or the infirm. As well, most respondents indicated being married (43%) or in a common-law union (17%), while 28% reported being single. In terms of education, 34% of respondents obtained a university education, 28% obtained a high school education and 3% each report receiving graduate education or no education at all.

Table 5: Sociodemographic characteristics of survey sample

	Units	Mean	SD	Median	Min	Max
Gender	0 = Male 1 = Female	0.62	0.49	1	0	1
Age	Continuous	44.36	15.79	43	18	86
Head of Household	0 = Not 1 = Head of household	.718	0.45	1	0	1
Household Size	Continuous	3.65	1.52	4	1	9
Marital Status	Categories 1-5 ¹	2.81	1.75	3	1	5
Education	Categories 1-6 ²	3.83	1.18	4	1	6
Employment	Categories 0-9 ³	4.77	2.70	5	0	9
Income	Categories 1-6 ⁴	3.28	2.12	3	1	6

¹Marital Status: 1 = married, 2 = divorced, 3 = widowed, 4 = common law, 5 = single
²Education Categories 1= none, 2 = elementary, 3 = secondary, 4 = high school, 5 = university, 6 = graduate
³Livelihood categories: 1 = Agri & Ranch, 2 = Fish & Aqua, 3 = Manufacturing, 4 = Const & Trans, 5 = Commerce, 6 = Tourism, 7 = Government, 8 = Other, 9 = Retired, 0 = None
⁴Income Categories: 1 = Less than 10,000 pesos/year, 2 = 10,001-20,000 pesos/year, 3 = 20,001-30,000 pesos/year, 4 = 30,001-40,000 pesos/year, 5 = 40,00-50,000 pesos/year, 6 = 50,001 + pesos/year.

Roughly a quarter of the sample was directly employed in government (25%), commerce (23%) or tourism (20%), as expected. Remaining employment activities are listed in order of frequency in Appendix I. Roughly half of respondents (52%) earned an income greater than \$20,000 pesos/month. Moreover, reported annual earnings peaked at both the lowest (<\$10,000 pesos/year) and highest (>\$50,000 pesos/year) income categories, with 35% and 30% of responses falling in these ranges, respectively. Although unexpected, the high proportion of low-income earners is potentially attributable to the proportion of respondents that were unemployed. That is, 48% of respondents that earn

<\$10,000 pesos/year were unemployed. Frequency distributions of reported sample incomes can be found in Appendix J.

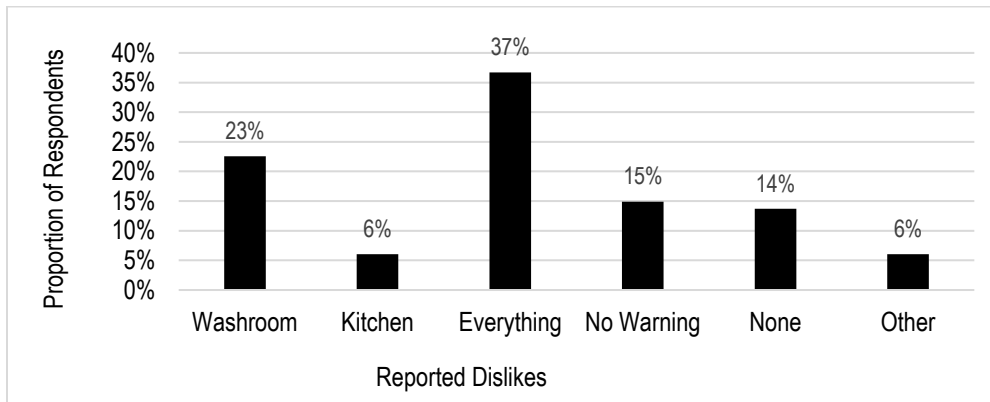
Appendix K provides demographic statistics for the final sample (n = 227). The demographic characteristics across the four sub groups were comparable. This is based on χ^2 tests of differences in sub sample characteristics that failed to reject a null hypothesis of no difference. Appendix L contains the results of the χ^2 tests across the four sub groups and the pooled CV and EV samples, including associated p-values. Appendix L also includes the results of ANOVA analyses across the same pooling structures for continuous demographic variables, as well as associated p-values and F-statistics.

5.1. Household Water Use

The average household in the sample contains 1.37 washrooms and experiences 2 days of interruptions in the water service, per month. When interruptions take place, 38% of respondents receive notice in advance through a mobile loudspeaker service. I also asked respondents to state what they dislike most when interruptions to the water service occur to capture sources of household inconvenience. Each open-ended answer was qualitatively analyzed and grouped into one of 5 most frequent responses, as well as an 'other' category (Figure 3).

Interruptions to the household water service are felt differently across households. 'Everything' (37%) is the most frequently reported answer and refers to the total halt of household activities and chores when the municipal piped water service is unavailable. Across the sample, washroom-related activities posed a greater inconvenience (23%) than those related to the kitchen (6%). As well, 15% of respondents report a dislike that no warning is given ahead of time, while a comparative proportion (14%) did not report any dislike in particular.

Figure 3: Greatest open-ended dislikes reported by residents when their household municipal piped water service is interrupted



Most respondents consider the water service to have worsened (42%) or remained the same (45%) compared to 5 years ago. However, when asked if the current service is sufficiently meeting their daily household needs, 69% gave a positive response. This is perhaps due to the fact that 35% of households report the use of at least two strategies for water storage in preparation of service interruptions. The three most commonly cited supplementary strategies to manage non-consumptive water needs include *tinacos* (rooftop barrels) (80%), *dispositivos* (ground level containers of various dimensions) (40%), and in a minority of cases, store-bought water (3%). In addition, water is commonly ‘always’ (74%) conserved in the home, with some respondents “sometimes’ (25%) engaging in water conservation behavior at home.

The maximum reported monthly water bill was \$500 pesos/month while the average was MXN \$151.34 pesos/month. This is because the fixed monthly water bill of MXN \$113 pesos/month set by OOMSAPA applies to 79% of the households in the sample. Thus, 21% of the sample was subject to a metered bill payment structure. Ideally, homes that report a household water meter should pay monthly fees according to the metered bill structure. However, of the homes that report a municipal water meter on premises (67%), only 17% were functional (Table 6). Conversely, most homes where a municipal water meter has been installed in the past are no longer functional (49%) and therefore pay the monthly fixed water fee. This may be due to challenges on behalf of OOMSAPA to provide maintenance for existing meters.

As well, of households that lack a household water meter (32%), 3% actually report paying according to a metered structure. Possibly, this may be a result of having spoken with an uninformed member of the household, such as young adults or seniors not in charge of bill payments. More likely, the findings speak to a general lack of information on behalf of residents about their own household water consumption.

Table 6. Cross tabulation of proportion of homes that report the presence of a municipal piped water meter and those that pay for metered service

		Monthly Municipal Water Bill Structure		Total
		Fixed	Metered	
Water Meter Reported	Yes	123 (49%)	44 (17%)	167 (67%)
	No	73 (29%)	8 (3%)	81 (32%)
Total		196 (79%)	52 (20%)	248

*Percent values refer to percent of the total households surveyed.

5.2. Networks of Information

Respondents were largely divided when asked to rate how easy it is for them to find information about future tourism developments proposed for Loreto. Most respondents stated that it is somewhat easy to obtain access to relevant information. However, an equal proportion of respondents also stated that it was either 'very easy' or 'not at all easy' to find this information (26% and 25% of the sample respectively). A similar pattern repeats with respect to how informed residents feel about potential impacts of future tourism development on Loreto. Again, the highest proportion of respondents (46%) feel 'somewhat' informed about future impacts while 21% and 29% reported feeling 'very informed' or 'not at all informed', respectively. In both cases, almost half of the sample feels somewhat confident that they have or can obtain this information, if needed. However, certain members of the community are more knowledgeable about this subject, including where to go for further information, than others.

I also asked residents whether they would be willing to attend an information session about Loreto's future tourism development. In this case, the preference indicated by the sample is strongly in favor of attendance; 63% of respondents were 'very willing' and 22% of respondents were 'somewhat willing' to attend. Only a minority were not interested at all (10%).

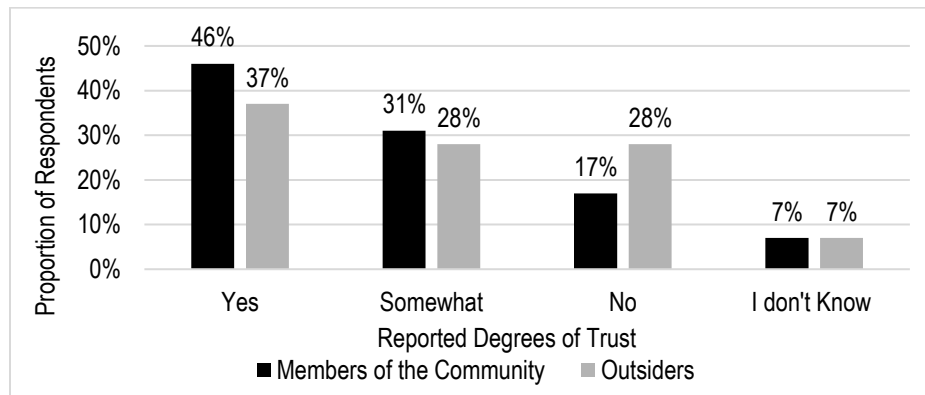
5.3. Community Cohesion

Community cohesion was gauged directly via respondent's degree of involvement (voluntary and political) in community activities, as well as indirectly through their reported degree of trust towards members and outsiders of the community. Political participation within the sample was greater than reported participation in community activities; about three quarters of the sample (76%) voted in the previous municipal election. Political participation in Loreto is high, particularly since the question did not apply to 10% of the sample that had either just moved to Loreto or recently reached voting age.

On the other hand, only 23% of respondents reported volunteering with or belonging to a community group. As well, when asked how often they participate in community events, a minority (12%) reported 'always participating' while 34% of respondents stated that they 'do not participate' in community events at all; most (54%) respondents sometimes participate in community events.

Based on reported levels of trust, community cohesion among members of the community is high; 46% of respondents felt that they could trust members of the community (Figure 4). A lower proportion of respondents felt similarly about outsiders to the community, but not by a large margin (37%). In addition, respondents rarely felt they were not able to trust members of the community (17%) but did feel they could not trust outsiders of the community by a slightly larger margin (28%).

Figure 4: Reported degrees of trust for members of the community and outsiders



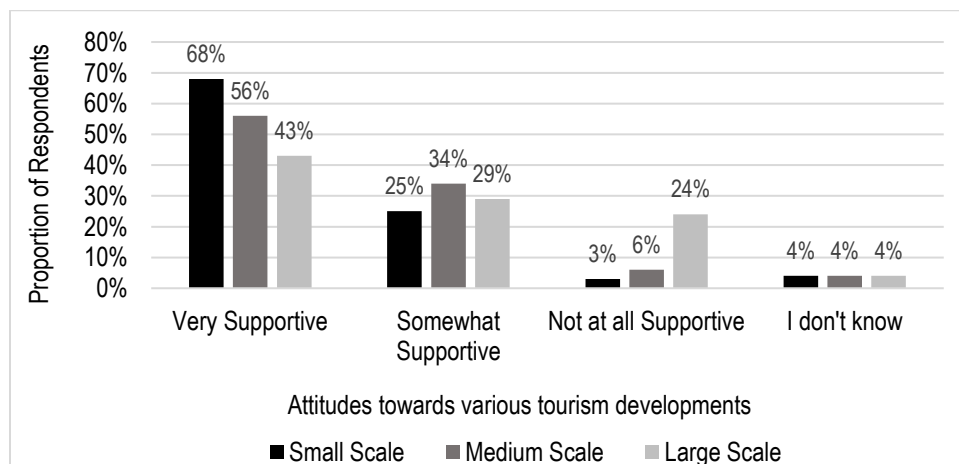
5.4. Attitudes and Perceptions

Tourism

Given the importance of tourism activities in Loreto, respondents were asked to state their preferences for small, medium, and large-scale projects. Each scale was described as follows: small-scale tourism refers to alternative tourism projects, medium-scale tourism refers to small hotels and tourism residences common within the city of Loreto, and large-scale tourism refers to the traditional development model. Residents indicated strong support for both small and medium scale developments (Figure 5). That is, there is less ambiguity in responses as only 3% and 6% of respondents, respectively, are opposed to small and medium scale developments. In comparison, 24% of respondents stated not being at all supportive of large-scale developments.

Small-scale developments (68%) were the most supported developments based on the proportion of respondents that stated being 'very supportive'. Small-scale tourism was followed by medium (56%) and large-scale developments (43%). Notably, almost half the respondents in the sample are nevertheless 'very supportive' of large-scale tourism. Finally, when asked to rate the importance of tourism relative to other economic activities in the region, such as ranching and agriculture, more than half of the sample (58%) indicated tourism is a much more important economic activity.

Figure 5: Support for Small, Medium, and Large Scale Tourism Development



I ranked resident’s preferences for the three models of tourism development based on their reported support (Table 7). Again, small-scale developments are most supported (mean = 1.439) compared to the alternatives.

Table 7: Ranked Preferences for Small, Medium, and Large-Scale Tourism Development

	Rank (based on mean)	Mean	Median	SD
Small-scale (Alternative)	1	1.439	1.000	0.761
Medium-scale	2	1.576	1.00	0.770
Large-scale (Traditional)	3	1.895	2.00	.916
Data coded as follows: 1 = “very supportive”; 2 = “somewhat supportive”; 3 = “not at all supportive”; 4 = “unsure”.³⁷				

I also elicited opinions about the severity of potential tourism impacts including impacts to the local economy, culture, environment, and water resources (Table 8). In order of increasing severity, impacts were perceived as negative in relation to the culture (mean = 2.16), environment (mean = 2.51), and water resources (mean = 2.78) of Loreto. Perceptions of impacts on Loreto’s economy were the most positive (mean = 1.30).

Table 8: Ranked Perceptions of the Severity of Impacts from Tourism Development

Impact Sphere	Rank (based on mean)	Mean	Median	SD
Water	1	2.76	3.00	1.13
Environment	2	2.51	2.00	1.16
Culture	3	2.16	2.00	1.14
Economy	4	1.30	1.00	0.72
Data coded as follows: 1 = “very good”; 2 = “somewhat good”; 3 = “somewhat bad”; 4 = “very bad”; 5 = “Unsure”.³⁸ Greater means indicate increasingly negative perceptions of impacts and are ranked higher.				

³⁷ Respondents that reported being ‘unsure’ were excluded from this analysis due to the coding scheme. Their inclusion would have skewed reported means towards higher values.

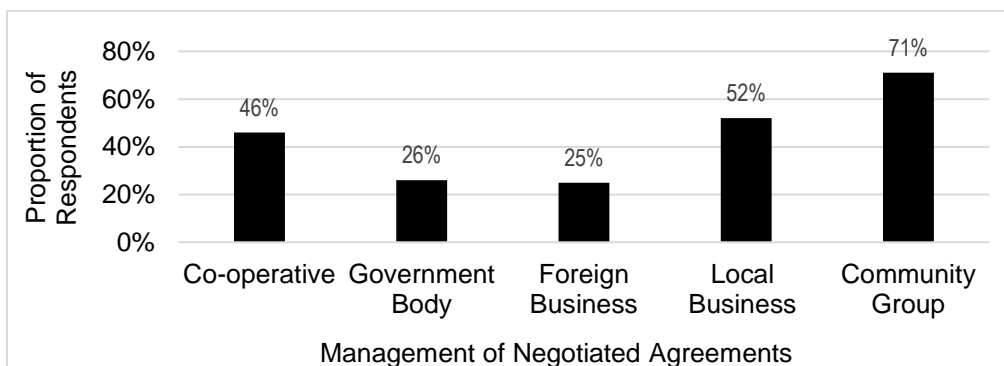
³⁸ Respondents that reported being “unsure” were excluded from this analysis. See above.

Negotiated Agreements

I introduced the concept of negotiated agreements in the survey and asked respondents to indicate any prior experience with a similar strategy to community engagement. I had a prior expectation that there would be some pre-existing knowledge due to the relatively recent experience with the *Villages of Loreto Bay* project and associated community fund. However, more than three quarters of the sample (77%) indicated having no prior knowledge of negotiated agreements. At the very least, this indicates a lack of effective communication with residents on behalf of project managers.

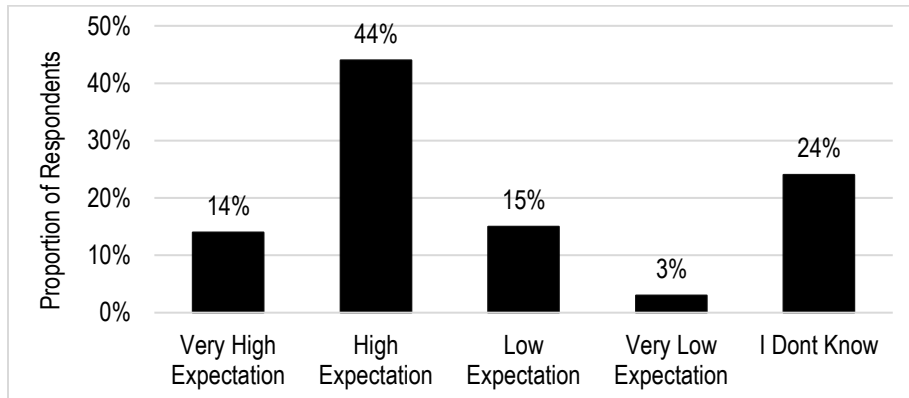
I also asked respondents to identify their preferences for management of negotiated agreements in Loreto (Figure 6). Following a majority rule where more than 50% of respondents had identified this group as best suited to a management role, 'community groups' (71%) were followed by 'private business from Loreto' (52%). 'Government' (26%) and 'private foreign business' (25%) were also each selected by approximately one quarter of the sample. The pattern in responses indicates a clear preference for management roles to remain in the hands of community representatives.

Figure 6. Reported preferences for management of negotiated agreements in Loreto



Finally, I asked respondents about their expectation that negotiated agreements pursued in Loreto would result in a fair share of benefits for the community. On the whole, 44% of respondents have 'high' expectations that a fair share of benefits would result, and a further 14% reported 'very high' expectations (Figure 7). Negative expectations were reported much less frequently; 15% of respondents reported 'low' expectations and only 3% answered 'very low'.

Figure 7. Reported Expectations of Outcomes from Negotiated Agreements



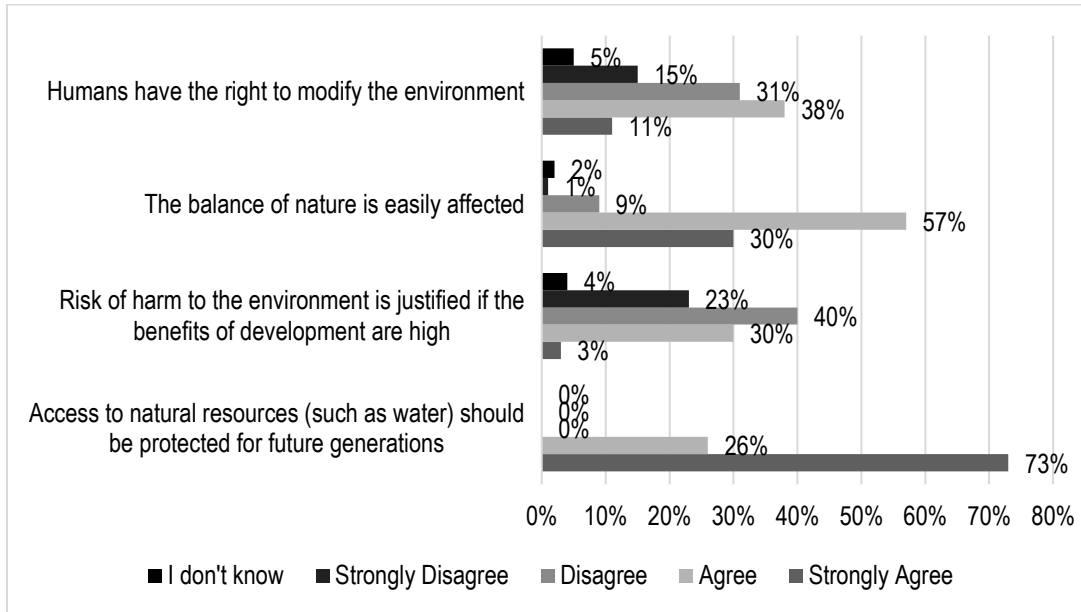
Open-ended responses exploring the reasons driving reported expectations were qualitatively analyzed and grouped into the five most popular categories, as well as an ‘other’ category. Appendix M presents a cross-tabulation of reported expectations and the open-ended reasons given. Respondents stating ‘high’ and ‘very high’ expectations likely based their responses on optimism about future outcomes, those who were ‘unsure’ lacked information, and those with low expectations cited negative past experiences.

Environment

I asked respondents to indicate their agreement with four general statements about the environment (Figure 8). Each of the four statements addressed a different attitude related to conservation, risk, biocentric and anthropocentric views. Notably, respondents either agreed or strongly agreed the most across environmental attitudes related to conservation and biocentric views. Of these two, the most unified statement refers to protecting access to natural resources for future generations, possibly due to collective experiences establishing the Loreto Bay National Park to achieve similar goals.

The sample is more divided across environmental attitudes related to risk and anthropocentric views. This indicates that within the sample, there are polarized views about whether humans have the right to modify the environment and whether risk of harm to the environment is justified when the benefits of development are high.

Figure 8: Reported agreements across statements of environmental attitudes related to conservation, risk, biocentric and anthropocentric views

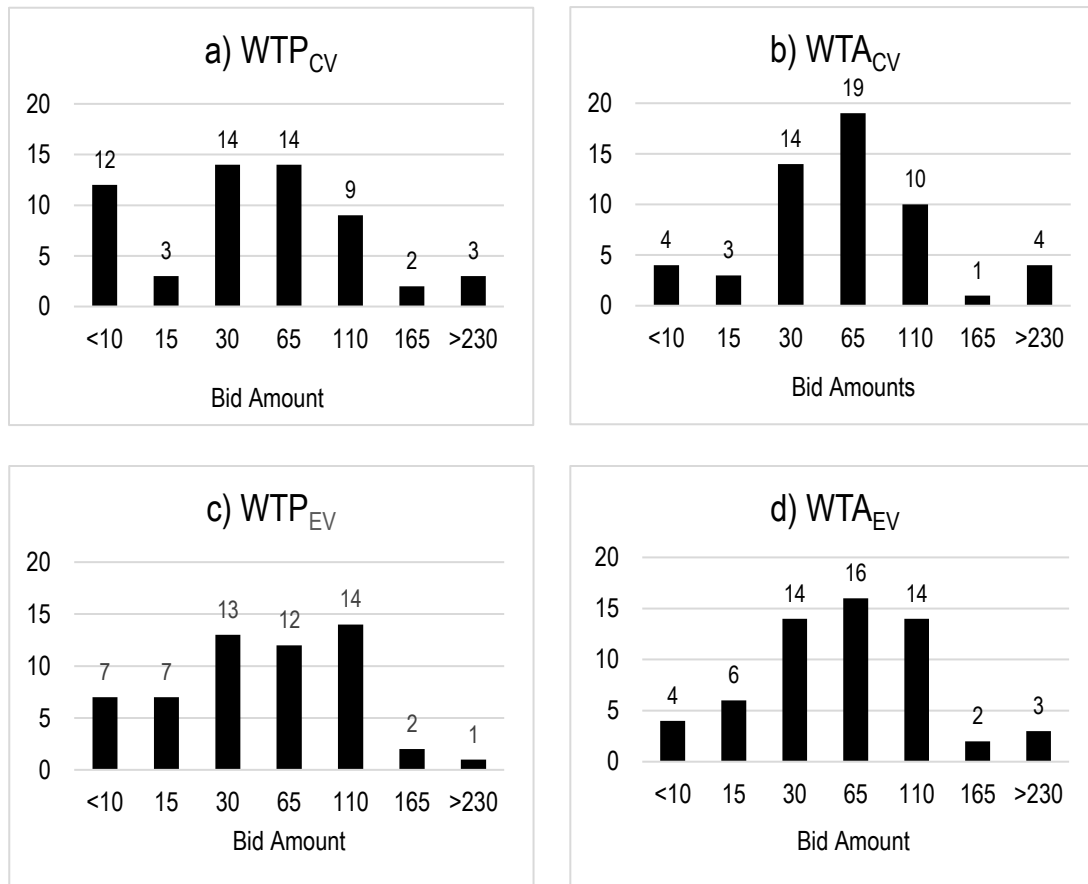


5.5. Valuation Responses

I presented respondents with a circular payment card and asked them to state their WTP and WTA values for each contingent valuation scenario. The frequency distributions of payment card data were then plotted for each sub sample. WTP responses, particularly WTP_{EV} , have higher concentration densities at low ends of the payment card, specifically the <\$10 and \$15 pesos/month intervals, compared to their WTA counterparts (Figure 9).

As well, $WTA_{(EV \text{ and } CV)}$ data approximate normal distributions with response densities highest for the \$65 pesos/month, or middle, bid on the payment card. No significant outliers were detected. Respondents chose the highest payment card bids of \$165 and >\$230 pesos/month with a similar frequency across all four sub groups ($n=5$), with the exception of WTP_{EV} in which they were chosen with less frequency ($n=3$).

Figure 9. Frequency distribution of valuation responses for each sub group



Mean data for each sub sample was calculated in \$MXN pesos per month using the point estimates identified in each payment card (Table 9) and maximum likelihood estimation techniques (Table 10). For measures of compensating variation, mean WTP for a one-day reduction in municipal piped water service interruptions was MXN \$62.09 and MXN\$ 49.82 pesos per month, based on point estimates and predicted values, respectively. For a one-day increase in service interruptions mean WTA was MXN \$71.56 and MXN \$54.80 pesos per month (based on point estimates and predicted values, respectively).

For measures of equivalent variation, respondents indicated a similar mean WTA of MXN \$72.51 and MXN \$54.84 pesos per month to accept foregoing a one-day improvement to the reliability of their household water service (based on point estimates and predicted values, respectively). Mean WTP to avoid foregoing a one-day reduction in the same was MXN \$62.54 and MXN \$48.34 pesos per month. Likewise based on point estimates and predicted values.

Table 9. Summary Statistics of Point Estimate WTP and WTA values

	<i>Point Estimates</i>				
	Mean	Median	SD	Min	Max
WTP_{CV}	62.09	30	61.6	0	300
WTA_{CV}	71.56	65	59.47	0	250
WTA_{EV}	72.51	65	64.08	0	370
WTP_{EV}	62.54	65	53.83	0	300

Table 10. Summary Statistics of Maximum Likelihood Estimates of WTP and WTA values

	<i>Maximum Likelihood Estimates</i>				
	Mean	Median	β	σ	LL*
WTP_{CV}	49.82	27.38	3.31***	1.094***	-103.0
WTA_{CV}	54.80	38.09	3.64***	0.853***	-94.3
WTA_{EV}	54.84	37.33	3.62***	0.877***	-105.1
WTP_{EV}	48.34	30.87	3.43***	0.947***	-101.3

*LL = log likelihood

With regards to how certain respondents felt about their final chosen bid amount, 71% stated being 'definitely sure' of their final stated estimates, while the remaining (29%) stated being 'probably sure'. When asked to reflect on the honesty of fellow participants responses to the contingent valuation question, answers were evenly divided; about half the sample (52%) felt that other participants would provide an honest answer and the other half (48%) did not.

In addition, to address my study hypotheses I ran non-parametric Mann-Whitney U tests of differences in means across each sub sample, as well as across CV and EV pooled sub samples (Table 11). Despite a valuation disparity evidenced by the difference in the raw means, tests of differences in sample means were only statistically significant in the case of ML estimates. Pooled sample averages are significantly different at the 1% level for the CV (p-value = 0.009***), EV (p-value = 0.008***), and full sample (p-value = 0.000***).

Table 11. Mann-Whitney U-tests of differences between sub samples

<i>Pooled Samples</i>	<i>N</i>	<i>P-Value</i>	
		<i>Point Est.</i>	<i>MLE</i>
Compensating Variation: WTP versus WTA	111	0.17	0.009***
Equivalent Variation: WTP versus WTA	116	0.37	0.008***
<i>Full Sample</i>			
WTA versus WTP	227	0.11	0.000***

*** / ** / * ==> Significance at 1% (0.01), 5% (0.05), 10% (0.10) level.

Mann-Whitney U tests conducted using point estimate data did not indicate any significant differences between WTP and WTA means across any of the pooled samples. Originally, this statistical approach to estimate means was chosen as a conservative measure based on the literature. However, the means estimated using maximum likelihood techniques are actually lower in terms of absolute values. ML estimated means also yielded lower valuation disparities between WTP and WTA sub samples in both CV and EV contexts. In addition to the statistical efficiency provided by ML techniques, it seems this approach yields increasingly conservative estimates. For this reason, I use ML generated means to estimate annual values of changes in economic welfare across the four measures of welfare. These can be found in Appendix N.

5.6. Regression Results

Finally, I introduced explanatory variables to identify determinants of WTP and WTA using step-wise regression models that I obtained by removing variables step-by-step, starting from the full models (Table 12). The dependent variables of the interval regression are the log-transformed thresholds given by the PC bid scheme. The likelihood ratio index of the WTP_{CV} model is 0.87 and the index for the WTA_{CV} model is 0.95. For WTP_{CV} , as age (estimated coefficient = -0.02**) and household size increase (estimated coefficient = -0.20*) respondents are less willing to pay for service improvements. However, if respondents assign a greater relative importance to tourism activities the effect on WTP is strong and positive (estimated coefficient = 1.77**). The results of the CV models reveal that fewer variables are significant in contexts of loss. In the WTA_{CV} sub sample identifying

as the head of the household meant respondents were willing to accept less for a one-day service improvement (estimated coefficient = -0.64**).

Interval regression models for EV sub sample exhibited a similar pattern as WTA_{EV} regressions offer less explanatory power than WTP_{EV} counterparts. Once again, only one variable was identified as a significant driver of WTA. If the respondent gives a higher importance to tourism development than alternative economic activities, they are WTA_{EV} less compensation in household rebates (estimated coefficient = -0.73*). The likelihood ratio index of the WTP_{EV} model is 0.84 and 0.95 for the WTA_{EV} model, comparable to the CV scenarios.

The sign and significance of variables vary across decision contexts. While I expected the effect of income to remain positive, I did not have other prior expectations about the sign and significance of key variables in the EV context, due to their lack of previous application. Regardless, I had a notion that respondents who would stand to gain the most from maintaining the improvement to their household water service would be willing to pay more. The model revealed that average WTP_{EV} increases if the respondent identifies as the head of the household (estimated coefficient = 0.91***) and is employed in the tourism industry (estimated coefficient = 0.79***). Heads of households may have adjusted their household water management strategies as a result of the recently experienced improvement and may be unwilling to readjust. As well, employees of the tourism industry may be more willing to contribute if the social desirability of future employment was driving their responses.

As expected, WTP_{EV} also increases if the respondent earns more than MXN \$51,000 pesos per month (estimated coefficient = 0.52*) and the effect of age is strong and negative (estimated coefficient = -0.03***). WTP_{EV} also decreases with negative perceptions of impacts to Loreto's water resource (estimated coefficient = -0.53**). This result is not surprising given that respondents may easily perceive that the proposed desalination plant may not be sufficient to offset what they perceive to be a markedly negative impact to Loreto's freshwater resource from the tourism development. If this is the case, they be unconvinced and unwilling to contribute as much as residents who do not perceive this impact to be as negative.

Pooled CV models ($n = 112$) had a log likelihood ratio of 0.94. Results show that identifying as the head of the household retains a negative but strong effect (estimated coefficient = -0.51^{**}) while the importance given to tourism activity retains a positive effect (estimated coefficient = 0.58^{**}). Significant drivers of average values in the pooled EV sample ($n = 115$) were age (estimated coefficient = -0.01^{***}), income (estimated coefficient = 0.33^*) and tourism employment (estimated coefficient = 0.42^*). The pooled EV model has a log likelihood ratio index of 0.94, comparable to the CV sample. The full model ($n = 227$) had a log likelihood ratio index of 0.97 and found age (estimated coefficient = -0.01^{**}) and income (estimated coefficient = 0.28^{**}) to be significant drivers. Both age and income are considered base variables against which the theoretical validity of models can be verified, and their observed signs are in line with the literature and expectations. Due to the disproportionate burden that interruptions to the water service can have on population groups, a dummy variable was included for gender. However, it was not significant in the regression models.

Finally, the WTA dummy variable I introduced to further investigate the presence of a valuation disparity was positive across each pooled sample. This indicates that all other variables held constant, a decision context involving loss increases average reported values. However, the dummy variable was significant only in the CV (estimated coefficient = 0.32^*) and fully pooled samples (estimated coefficient = 0.26^{**}).

Table 12. Interval Regression Results

Interval Data Regressions							
	WTP _{CV}	WTA _{CV}	WTA _{EV}	WTP _{EV}	EV	CV	Full
WTA DUMMY	-	-	-	-	0.18 (0.16)	0.32* (0.18)	0.26** (0.12)
FEMALE	-0.12 (0.28)	0.17 (0.25)	-0.31 (0.23)	0.04 (0.22)	-0.09 (0.17)	0.16 (0.19)	-0.01 (0.13)
AGE	-0.02** (0.01)	0.01 (0.01)	-0.01 (0.01)	-0.03*** (0.01)	-0.01*** (0.01)	-0.00 0.00	-0.01** (0.00)
HEAD	-0.53 (0.36)	-0.64** (0.27)	-0.31 (0.31)	0.91*** (0.26)	0.25 (0.21)	-0.51** (0.22)	0.19 (0.15)
INCOME	0.48 (0.31)	-0.06 (0.26)	-0.07 (0.26)	0.52** (0.23)	0.33* (0.18)	0.13 (0.21)	0.28** (0.14)
HHSIZE	-0.20* (0.11)	0.05 (0.08)	-0.07 (0.09)	0.08 (0.06)	0.00 (0.06)	-0.03 0.06	-0.01 (0.05)
TOURISM	-0.46 (0.31)	0.44 (0.32)	0.31 (0.30)	0.79*** (0.29)	0.42* (0.22)	0.08 (0.23)	0.17 (0.15)
INFORM	-0.27 (0.35)	0.28 (0.24)	0.08 (0.27)	-0.06 (0.22)	-0.03 (0.18)	0.23 (0.21)	0.08 (0.13)
IMPACT_W	-0.19 (0.26)	-0.26 (0.24)	0.03 (0.22)	-0.53** (0.22)	-0.02 (0.17)	-0.27 (0.18)	-0.12 (0.12)
IMPORT_S	1.77*** (0.51)	0.08 (0.32)	-0.73* (0.38)	0.31 (0.30)	-0.25 (0.25)	0.58** 0.27	0.15 (0.19)
σ	0.88*** (0.09)	0.79*** (0.08)	0.80*** (0.08)	0.69*** (0.07)	0.83*** (0.06)	0.89*** (0.07)	0.89*** (0.47)
Constant	4.21*** (0.91)	3.20*** (0.69)	5.44*** (0.67)	3.40*** (0.51)	4.20*** (0.46)	3.28** (0.58)	3.84*** (0.36)
N	57	55	59	56	115	112	227
df	11	11	11	11	12	12	12
Log Likelihood	-90.51	-90.33	-100.14	-85.72	-196.45	-189.94	-395.84
Null Log-Likelihood	-103.07	-94.34	-105.16	-101.37	-207.21	-200.02	-407.50
Likelihood Ratio Index	0.8781	0.9574	0.9522	0.8456	0.9480	0.9496	0.9713

***/ **/ * ==> Significance at 1%, 5%, 10% level.
 Censoring Thresholds for the 8 cells: 1 = $(-\infty, 2.30)$, 2 = $(2.30, 2.71)$, 3 = $(2.71, 3.40)$, 4 = $(3.40, 4.17)$,
 5 = $(4.17, 4.70)$, 6 = $(4.70, 5.11)$, 7 = $(5.11, 5.44)$, 8 = $(5.44, +\infty)$

Chapter 6.

Discussion

In this chapter I discuss the findings of each scenario, including relevant assumptions and the results of the comparative analyses. As well, I address broad policy implications for the conduct of contingent valuation studies that involve loss and discuss recommendations that are specific to Loreto. Finally, I conclude with limitations of the study. Below, I report estimates of total economic welfare that I derived using two statistical methods, following the example of Griffin and Mjelde (2000); maximum likelihood (ML) estimation is proposed by Cameron and Huppert (1989) as the most efficient analysis of payment card data (compared to a mid-point approach) and raw data estimation using point estimates is also included as a conservative approach.³⁹

6.1. Contingent Valuation Scenarios

I designed four hypothetical scenarios to compare changes in welfare that may result from potential impacts to the security of water in Loreto, which are experienced as changes to the reliability of household's municipal water supply. Together, the hypothetical scenarios explore whether residents of Loreto feel the same about positive and negative changes to their household water service, as a neoclassical economic approach to valuation would assume. Notably, I assigned respondents in scenarios depicting a negative change the acting property right to their municipal piped water service on the basis that access to this resource is an inalienable human right. Although such an approach has not been applied in Loreto before, I further note that municipal utilities are known to issue rebates and therefore the primary reason for rejecting a WTA scenario involving loss is weak (Macdonald et al., 2010).

³⁹ This practice allows for a degree of flexibility required for the analysis of payment card data since the assumptions regarding respondent's true WTP and WTA are often unclear (Ryan & Watson, 2009).

Scenarios of Compensating Variation

In both decision contexts of compensating variation (CV), an anonymous tourism developer provides an independent supply of potable freshwater to offset expected increases in service demand. Recall that CV scenarios apply a reference state that is based in the present. Therefore, I deliberately reinforced a reference state of interruptions to the municipal water service of 2 days per month, on average. The reference state was identified in the pilot study and further corroborated by the sample.

I described a tourism development that would provide surplus freshwater for Loreto to elicit the value of a positive change in the domain of gains. The WTP_{CV} value captures the gain of reducing the days of interrupted household water service. The surplus of freshwater is generated by a desalination plant that the developer proposes to cover the project's demand and will be distributed through Loreto's municipal piped water system. Residents were given the option to participate in a shared-cost arrangement with the developer to finance the desalination plant. Thus, I stipulated that the proposal would proceed if at least half of the participants were willing to make a financial contribution through their monthly household water bills.

To elicit the value of a negative change in the domain of losses, I used closely parallel wording to describe a tourism project whose development would result in a deficit of municipal freshwater. In this case, a WTA_{CV} value captures the loss associated with an increase in the number of days of interrupted household water service. To develop this scenario, I stated that the tourism development's additional demand for freshwater would be supplied by the municipal utility. I also stated that Loreto Bay National Park regulations prohibit desalination plants due to pollution concerns for the surrounding marine waters. Instead, the developer establishes a fund to compensate residents for reductions to the reliability of their water service. I stated that a rebate would be applied to the household water bill if the total sum of rebates did not exceed an unknown maximum that could be allocated to the fund.

Relative to the average water bill administered by OOMSAPA, respondents are WTP 55% (PE) and 44% (ML) of their monthly fees, and WTA

63% (PE) and 48% (ML). Notably, the use of point values of the payment card data results in higher estimated averages than their ML counterparts. Therefore, the ML estimation technique represents a more conservative approach. In both cases, my estimates are almost double compared to the literature, however a known limitation is that the studies I reviewed do not estimate marginal changes in the reliability of the service. For example, Griffin and Mjelde (2000) estimated that residents were WTP 22% and 25% (based on raw data and predicted means, respectively) of their monthly water bill for service improvements and were WTA 32% and 33.8% of the same for disruptions that last 2 weeks and occur every 10 to 15 years. In any case, residents of Loreto are both more willing to contribute and require greater compensation for the proposed change, perhaps because the scenario implies that changes will occur in the near-term.

Protest response rates are comparable across both sub groups which indicates that social desirability effects are not specifically biasing one measure over another (Shackley & Dixon, 2000). The protest response rate for the WTP_{CV} scenario was 12% (n = 7). Participants were mostly unwilling to accept increases to utility bills and also expressed doubt of the quality of desalinated water. Comparatively, the WTA_{CV} protest response rate was 9% (n = 5). In this case, participants lacked interest in the proposal, preferred to maintain an uninterrupted service, believed that water has no price, and were reluctant to relive interruptions associated with the development of *Loreto Bay*.

The results of the interval regression models reveal that WTP_{CV} decision contexts are driven by a greater number of explanatory variables than their WTA_{CV} counterparts. However, this is documented in the literature; Brox et al. (2003) and Griffin and Mjelde (2000) also report similar discrepancies. Interval regression models also indicate that average WTP_{CV} (n = 57) decreases with respondent's age and household size, significant at the 5% and 10% level, respectively. The effect of age on WTP_{CV} is observed in previous studies and is perhaps expected since the older you are the less likely you are to benefit from a project (Shackley and Dixon, 2000). The effect of household size implies that larger households are WTP less for service improvements, perhaps because they are more likely to have alternative strategies in place (Campos, 2017). As well, the income variable is not significant, but does show the expected positive sign that nevertheless

indicates respondents are willing to pay more for service improvements if they fall in higher income brackets.

As well, average WTP_{CV} increases if respondents assign a greater importance to tourism development over other economic activities of the region, significant at the 5% level. The strong and positive effect of IMPORT suggests a need to recognize the influence of economic engines on choice. Residents may be conflating service improvements with their preferred economic activity and reporting higher than expected WTP values as a result. This does not imply that residents are willing to purchase economic growth, but rather that they perceived the WTP_{CV} scenario as a “win-win” context that addresses both resource and regional development concerns. Brox et al, (2003) similarly find a positive relationship between WTP_{CV} and support for economic growth.

Comparatively, the WTA_{CV} interval regression model ($n = 55$) yielded only one explanatory variable of note. Respondents that identified as heads of their households were WTA_{CV} less on average, significant at the 10% level. Unfamiliarity with a WTA_{CV} decision-context may be a source of additional confusion for these individuals since water is better understood as a good that is paid for rather than as a good for which payments are received (Griffin & Mjelde, 2000). Presumably, heads of households manage household bills and may have stated lower values of WTA_{CV} since they have knowledge of the current payment structure. That is, they may not have expected to receive a rebate higher than their current bill and this value falls somewhere in the middle of the payment card.

The pooled WTA_{CV} and WTP_{CV} ($n = 112$) model reveals that identifying as the head of the household retains a negative but strong effect while the importance attached to future tourism economic activity retains a positive and similarly strong effect. Both are significant at the 5% level. Also, the WTA_{CV} dummy variable is positive and significant at the 10% level. This indicates that all other variables held constant, a decision context involving loss results in an increase in reported values.

Scenarios of Equivalent Variation

Recall that the remaining two scenarios assume that a change in the reliability of the household water service has recently taken place. Therefore, the original reference state of 2 days of interruptions per month, on average, has shifted to a new normal.⁴⁰ In this case, an equivalent variation measure of welfare captures the value of a shift from this status quo back to the original reference state.

I described a worsened status quo to elicit the value of a positive change in the domain of losses. That is, households now experience 3 days of service interruptions per month, on average, following a previously realized tourism development that draws their water from the municipal piped water supply. WTA_{EV} captures the value of foregoing a reduction in this loss (or of foregoing a reduction in the number of days of water service interruptions) with a sum that leaves the individual indifferent between the welfare level of the current normal and that of the preferred reference state. Similar to the WTA_{CV} scenario, I described a return to the reference state using a tourism proposal that would provide surplus freshwater water using a desalination plant. Again, the proposal is unable to advance due to LBNP restrictions that prevent polluting Loreto's marine waters. Therefore, the developer proposes a fund to compensate residents for the project's continuing impact on Loreto's water supply. The fund is subject to the same restrictions as in the CV scenario. Thus, total stated values cannot exceed an unknown amount that may be allocated to the fund.

Finally, to elicit the value of a negative change in the domain of gains I describe a new normal state that is superior. Households now experience 1 day of interruptions per month, on average, following repairs to Loreto's water infrastructure. However, respondents are told the average number of household water interruptions will return to the previous reference state of 2 days per month, with the development of a new tourism project. WTP_{EV} captures the value of avoiding an increase in days of interrupted service with a sum that leaves an individual indifferent between the welfare level of the reference state and paying to avoid an increase in the number of water service interruptions from the new

⁴⁰ The reference state does not necessarily have to be the status quo, but may refer to a current normal (Whittington et al., 2017).

normal. Similar to the WTP_{CV} scenario, the developer proposes to build a desalination plant that will provide a surplus of freshwater to Loreto and thus mitigate the increase in demand. Respondents were again asked to contribute to a shared-cost arrangement through an additional fee in their monthly household water bills.

Results indicate respondents are WTA_{EV} 64% (PE) and 49% (ML) of their fixed water bill to forego a gain to the reliability of their water supply and WTP_{EV} 55% (PE) and 43% (ML) of their monthly water bills to forego a reduction in the same. As well, protest response rates across EV scenarios are comparable with CV results; the protest rate of the WTP_{EV} scenario was 9% ($n = 5$) and the WTA_{EV} scenario was 7% ($n = 4$). Participants protested the WTA_{EV} scenario if they thought that tourists consume more or are more wasteful with the resource, perceived that monthly water bills are fair, or hoped the additional day of interrupted service would create a culture of consciousness around water use in Loreto. On the other hand, respondents protested the WTP_{EV} scenario if they preferred alternative water supply strategies to desalination plants or believed that it is the developer's responsibility to provide funding.

As in the case of compensating variation, interval regression models yield a greater number of explanatory variables in a WTP setting. In WTA_{EV} models ($n = 59$) respondents will accept less compensation if they support tourism development in the region over alternative economic activities, significant at the 10% level. As opposed to the WTP_{CV} , the sign and significance of IMPORT is negative and could possibly be due to the provision point mechanism I applied. Households may have felt an incentive to state lower values of WTA_{EV} to ensure that the rebate and tourism development would be carried out. No other variables in the model were significant.

On the other hand, WTP_{EV} ($n = 56$) increases if the respondent identifies as the head of the household and is employed in the tourism industry, both significant at the 1% level. This indicates that heads of households and individuals employed in the tourism industry are more willing to contribute to a desalination proposal that allows them to retain a gain in service reliability. WTP_{EV} also increases if the respondent earns more than MXN \$51,000 pesos per month

(significant at the 10% level), but decreases with age (significant at the 1% level), and negative perceptions of the severity of impact on Loreto's water resource (significant at the 5% level).

The high number of explanatory variables driving average WTP_{EV} seem to influence the interval regression models of the pooled EV sample ($n = 115$). After pooling EV responses, the interval regressions revealed that average WTP_{EV} increases with income and tourism employment, both significant at the 10% level, and decreases with age, significant at the 1% level. The models also included a WTA_{EV} dummy variable to capture the effect of a WTA scenario, which was positive but not significant.

When all sub groups are pooled ($n = 227$), the final regression model indicate that respondent's age has a weak, negative effect while income retains a strong and positive effect. Both coefficients are significant at the 5% level and provide a degree of confidence in final estimates since age and income are the most accepted drivers of average WTP and WTA. Furthermore, the WTA dummy variable on the fully pooled sample was both positive and significant at the 10% level. This indicates that across all scenarios that were presented, a decision-context that involved loss yields a positive and significant increase in reported values, all other variables held constant.

Assumptions driving Hypothetical Scenarios

I made a number of assumptions about the tourism development landscape to ensure that scenarios were plausible and contextually relevant for a field application of Prospect Theory. For instance, I assume that the tourism landscape in Loreto will remain unchanged, therefore the scenarios imply that the proposed scale of the tourism development will be large enough to impact Loreto's supply of freshwater. Indeed, although residents indicated the highest preference for small-scale developments on average (mean = 1.43), large-scale projects are being considered for the region and attitudes towards traditional tourism developments were nevertheless positive (mean = 1.89).

I further assume that desalination technologies will continue to provide supply-side solutions for regional water security concerns (McEvoy, 2014; McEvoy

2015). Moreover, I assume that concerns for regional water security will be primary determinants of success for future tourism development proposals. Although the potential impacts generated by tourism activity on local communities are broad, I note that respondents ranked the severity of impacts on water resources the highest (mean = 2.76), followed by environment (second ranked mean = 2.51), culture (third ranked mean = 2.17) and economy (fourth ranked mean = 1.30).

Finally, I assume that stated values are not driven by any underlying factors. Chi-squared tests of differences in the characteristics of each sub group indicated that socio-demographic factors are not driving estimated averages and further support this point. As well, the composition of my sample provides a degree of certainty that final values reflect the perspective of the household decision maker since 72% of the respondents identified as the head of their household. Also, although metered households were kept in the sample, it is unlikely that these respondents behaved differently. Resident's perceptions towards household water meters indicated a general lack of knowledge about total water consumption in the home (Campos, 2017). Therefore, residents are assumed not to change the quantity of the good being consumed based on the pricing scheme since they face the same incentive as the rest of the sample. Howe and Smith (1994) also assume that respondents would behave similarly under both payment structures.

6.2. Comparative Analysis

The average WTP and WTA values that I estimated using point estimate data revealed a valuation disparity of a magnitude and direction consistent with expectations. Mean WTA_{CV} exceeded mean WTP_{CV} by 15.2% while mean WTA_{EV} was greater than WTP_{EV} by a comparable 13.7%. The resulting valuation disparities addressing the first two study hypotheses are 1.15 (CV) and 1.16 (EV). However, Mann U-Whitney tests did not indicate that these differences in means were statistically significant in either the pooled CV or EV sub groups (p-values of 0.17 and 0.37, respectively). This was also true for the fully pooled sample that addresses hypothesis 3 (p-value = 0.11). Nevertheless, I observe that the p-value of the fully pooled sample was quite close to being significant at the 10% level.

To further address my study hypotheses, I repeated the analyses using ML predicted values. Following Cameron and Huppert's (1989) suggested approach, I find that WTA_{CV} was 9.9% greater than WTP_{CV} . This yields a valuation disparity of 1.09 in a CV decision context and is somewhat lower than the valuation disparity of the previous approach. On the other hand, WTA_{EV} was greater by 13.4% than WTP_{EV} and corresponds to a valuation disparity of 1.13. Compared with the point estimate approach, the relative increases in both CV and EV pooled sub samples are comparable, although more so in the context of equivalent variation. In either case, I observe that the statistical significance between point estimate and ML comparative analyses differs. Unlike the previous analysis, Mann U-Whitney tests using ML predicted values found sample averages to be significantly different at the 1% level in reference to hypotheses 1, 2 and 3.

The fact that comparative analyses yielded different results indicates that final valuation disparities are sensitive to model assumptions of payment card data. In any event, both the size and pervasiveness of estimated valuation disparities suggest there is a pattern between what residents of Loreto are WTP and WTA for marginal changes to the reliability of their water supply. This provides further evidence that valuations of gain and loss are systemically different as predicted by loss aversion.

Nevertheless, the size of the valuation disparity is surprising. This is particularly true since the reliability of municipal water service is a public or quasi-public good for which the greatest valuation disparities are documented among environmental non-ordinary private goods (Sayman & Öncüler, 2005; Tunçel & Hammitt, 2014). Alternatively, it may be the case that this particular quasi-public good may simply be associated with lower ratios. For instance, Griffin and Mjelde's (2000) ratios were 1.49 and 1.35, for point-estimates and predicted ML values, respectively. As well, Del Saz-Salazar (2009) similarly obtained a positive ratio of 1.7 for improving the quality of a river basin in Spain, which is nevertheless modest compared to the literature.⁴¹

⁴¹ Tunçel & Hammitt (2014) found a WTP/WTA geometric mean ratio of 6.23 for environmental goods.

Moderators of the Valuation Disparity

This section discusses the technical and contextual factors related to the experimental design and nature of the good that may be driving the observed modest valuation disparities. For instance, payment card elicitation formats tend to have smaller WTA-WTP ratios, therefore estimated means should be thought of as lower-bounds on existing valuation disparities (Horowitz and McConnell, 2002; Del Saz-Salazar, 2009; Drichoutis et al., 2016).

With regards to experimental design, Tuncel and Hammit (2014) find that experiments in which both WTP and WTA are measures of CV have significantly smaller disparities than experiments in which one or both of these capture a value of EV. Nevertheless, recall that valuations are likely to occur as pre-emptive (CV) or reactionary (EV) measures to a proposed policy, project or initiative. Therefore, comparisons within either temporal framing were chosen as the focus of comparative analyses due to their applicability within real-world policy landscapes.

With regards to contextual factors, valuation disparities may decrease if individuals have experience “transacting” the good being valued. For example, resident’s access to municipal water supply depends on monthly payments and, in some cases, market purchases of potable water. This is in direct contrast to true public goods for which similar experience would be low. Indeed, Kolstad and Guzman (1999) obtain lower valuation disparities if consumers have some degree of price awareness for market goods. Likewise, Tuncel and Hammit (2014) find that such market experience leads to a roughly two-fold reduction in valuation disparities.

Not only do residents of Loreto have experience transacting the good, they also have experience with the nature of the change. Specifically the 2 days of monthly service interruptions, on average, that households currently experience. In the context of household electricity supply Hartman et al., (1991) find that experience with the induced change lowers the compensation required for diminished reliability, all else equal. Griffin and Mjelde (2000) hypothesize that a lack of experience with the proposed change may support artificially high objections to unfamiliar events, which lead to greater valuation disparities.

However, as a result of experiences with an intermittent water supply, residents of Loreto are also more likely to have assembled a set of coping strategies. This may lead to moderate valuation disparities in the short- and long-run if residents are able to adjust their household water management practises with substitutes that can compensate for non-optimal quantities of the public good (Griffin & Mjelde, 2000; Horowitz & Mcconnell, 2002). Indeed, residents of Loreto rely on a strong culture of preparedness in the home. Campos (2017) found that 80% of homes in Loreto rely on *tinacos* and 35% of respondents in my sample rely on at least 2 alternative water storage strategies in the home. As well, almost three quarters (74%) of respondents 'always' conserve water in the home. This may explain why 69% of respondents feel the current water service sufficiently meets their daily needs, despite 52% reporting that they do not receive notifications prior to service interruptions.

In addition, Koetse and Brouwer (2016) find that valuation disparities increase with the magnitude of the proposed change. Furthermore, this effect is stronger for losses than for gains. Perhaps the choice to value a one-day change in reliability contributed to moderate ratios if residents perceived the change as manageable. However, a one-day change was chosen to be representative of the marginal value of the reliability of household water service. It was also chosen to ensure comparability across sub groups, since households are more likely to reject a loss scenario as the size of the induced loss increases (Howe & Smith, 1994). In truth, the impact on Loreto's municipal piped water supply from further development may be greater than a day.

Finally, the use of monthly water bills as the payment vehicle is a design choice that may have contributed to moderate valuation disparities. For example, Tversky and Kahneman (1991) find that respondents perceive existing water bills as part of an existing utilities account rather than as a separate out-of-pocket cost. This further decreases the size of valuation disparities. Also, water fees are set at the municipal and state level, therefore an element of uncertainty may be driven by perceptions of government corruption combined with the fact that data collection occurred during municipal and federal elections. If government leadership was perceived as lacking or in flux, the salience of a survey involving fees and rebates may have been affected. Vasquez et al., (2011) hypothesize that

if respondents perceive a scenario to have real policy consequences, they may report higher WTP values. Unfortunately, a similar hypothesis is not provided for WTA responses and the effect on the valuation disparity is unclear.

6.3. Policy Implications

The differential application of measures of welfare that are based on broader decision contexts is supported by the presence of moderate but positive and systemic differences in resident's valuations of changes to the reliability of their household water service. For this reason, the findings of my study are of interest to environmental managers and policy-makers in light of the sustained push-back that alternative measures of welfare experience within policy spheres (Brown & Gregory, 1999; Knetsch, 2016). This status quo results from a low willingness to discuss compensatory strategies in policy settings, as well as a perceived lack of evidence in favour of applied Prospect Theory; valuation disparities are elicited under experimental conditions and using non-standardized methods that prevent final value comparisons (Shackley & Dixon, 2000; Tunçel & Hammitt, 2014). I address these gaps by providing evidence of valuation disparities that exist in a real-world field application using a static reference state that is based on the most recently available guidance (Johnston et al., 2017; Whittington et al., 2017). Therefore, environmental managers and policy-makers may benefit from quantitative evidence of a valuation disparity to support future decision making.

A number of practical insights can be derived from my study findings for consideration within a policy setting. For instance, my study findings emphasize the importance of applying Prospect-Theory as a preparatory strategy. The significance of the valuation disparity in contexts of compensating variation is evidenced in the results of the Mann-Whitney U Tests conducted with ML data as well as the dummy variable applied to the pooled CV regression model; both were significant at the 1% and 10% level, respectively. This indicates that loss aversion plays a greater role prior to the realization of a policy or project. Environmental managers and policy makers should be aware that real (or perceived) property rights structures should not be ignored or contradicted with the incorrect use

WTP.⁴² Social costs are otherwise likely to be undervalued and lead to error when estimating economic welfare, particularly where compensating variation is concerned (Feo-Valero, Arencibia, & Román, 2016).

A second insight pertains to the ability to describe the drivers of decision-making for a particular population of interest. I discussed changes in the sign, magnitude and significance of explanatory variables across WTP and WTA decision contexts. These findings suggest that an application of WTP where WTA is better suited will not capture explanatory drivers of behavior that may otherwise be important to decision-makers. From a policy perspective, this may have an impact how the behavior of populations of interest are modelled.

Finally, my study findings underscore the importance of understanding social desirability effects associated with developments that are widely supported. My study differs from the literature that typically focuses WTA approaches on projects with clear opposition, such as the closing of hazardous rendering plants (Bowker & MacDonald, 1993). In contrast, tourism development in Loreto can be considered an economic engine for the region that favours the general interest. Where this is the case, Del Saz-Salazar (2016) argues that measures of WTP to accept a loss or avoid an outcome are inappropriate since residents cannot realistically be asked to avoid the activity. However, the moderate valuation disparities I obtained in this study suggest the application of either WTP or WTA may be subject to social desirability effects if this context provides incentives to increase stated values of WTP and decrease stated values of WTA, resulting in moderate valuation disparities. This is evidenced by the regression results on IMPORT and the low protest response rates of the study (Lindhjem & Navrud, 2011).⁴³ This is an issue of importance for policy makers since the role of industry in a region should not preclude a frank discussion about local damages that may result.

⁴² For example, it would be incorrect to value wilderness threatened by development activities using WTP to preserve the environment or to avoid the development if local communities perceive a *de facto* right to their wilderness (Lienhoop & Macmillan, 2007).

⁴³ Shackley and Dixon (2000) obtained protest responses of approximately 19-25% while Griffin and Mjelde (2000) also received protest responses of similar magnitudes (>25%).

Finally, my study findings are also of interest to economic valuation practitioners. In a study valuing wilderness in Iceland, Lienhoop and Macmillan (2007) note that WTA elicitation for environmental losses represents “*one of the most demanding contexts for contingent valuation*” (page. 290). Indeed, treatment of WTA data remains a challenge, as evidenced by the decreased explanatory power yielded by decision-contexts of WTA and uncertain role of social desirability effects acting on stated values. Furthermore, the differing outcomes of the comparative analyses based on ML and PE data highlight a need for transparency about the chosen methodological assumptions applied to payment card data. Given the broad applicability of applied Prospect Theory, it is recommended that pre-test and focus groups are used to provide insight into the broader decision context of any particular valuation. As is, there is a need for further research on the impact of strategies that encourage incentive compatibility, such as provision points and cheap talk scripts, which can moderate valuation disparities where economic engines are concerned.

6.3.1. Implications for Negotiated Agreements

As a mechanism for the transfer of monetary benefits, negotiated agreements provide compensation for local communities that would otherwise lack the recourse to express grievances related to impacts perceived as negative. Therefore, to address my secondary research objective I discuss the advantages of embedding Prospect Theory within the negotiated agreement process. In particular, the advantages of assessing financial implications after having examined externalities from the perspective of affected individuals to reflect known behavioural biases (Samuelson & Zeckhauser, 1988). Notably, this approach requires a move beyond the current focus on changes in economic welfare since negotiated agreements result in monetary compensation and therefore have financial implications. This will be of interest to the development policy community as well as negotiated agreement practitioners who may apply alternative methods to quantify externalities in the pursuit of goals related to social and environmental justice.

The scope of this discussion requires an acknowledgement of differences among potential stakeholders. It is quite possible that local stakeholders may

choose to exercise their role as *de facto* political actors a number of ways. For instance, by seeking an equitable distribution of the material benefits associated with a proposed development, as well as modifying or halting said proposal (Del Saz-Salazar, García-Rubio, González-Gómez, Picazo-Tadeo, & Es, 2016; Tetreault, 2016). The choice to pursue a negotiated agreement depends largely on the willingness of communities to contest the prevailing property rights schemes and receive compensation for perceived impacts (Hira & Busumtwi - Sam, 2018).

Process Synergies

The greatest opportunity to embed applied Prospect Theory within the broader negotiated agreement process occurs during the pre-assessment stage that practitioners recommend take place early on (Siebenmorgan, 2009). The objective of a pre-assessment exercise is to gather baseline information of communities' concerns, needs, and preferences relative to their unique development context. Moreover, local NGO's and financial advisors are engaged at this time (Fidler & Hitch, 2007; Gibson & O'faircheallaigh, 2015; Siebenmorgen, 2009). For this reason, the pre-assessment stage can serve to identify key variables necessary to conduct an economic valuation of applied Prospect Theory. For instance, negotiated agreement practitioners and local stakeholders can gather information on the relevant rights structures, potential impacts, and reference states from which to qualify impacts as gains or losses (Knetsch, 2016; Whittington et al., 2017). Engagement with community representatives at this stage may provide an additional benefit if calculations related to impacts and risk can be carried out in a transparent way (Guesnet & Frank, 2014).

In particular, the information gathered at the pre-assessment stage can support the development of an experimental design by yielding information on the technical and contextual factors to which valuation studies, particularly WTA valuations, are sensitive (Koetse & Brouwer, 2016). For instance, this study found a number of factors including the magnitude of expected changes and choice of payment vehicle were moderating final WTP and WTA values. Thus, the pre-assessment stage may provide information that is probable and politically feasible for that context. For example, the choice regarding the type of payment can be

representative of community preferences, such as the allocation of compensation as individual payments, household rebates, or pooled investments for community projects. In turn, this will contribute to the realism of contingent valuation scenarios and provide estimates that are uniquely suited to the local context.

Finally, the application of Prospect Theory aligns with the preparatory approach of a negotiated agreement. My study findings tentatively support the application of compensating variation measures of WTP or WTA, where valuation disparities are more pronounced than in contexts of equivalent variation. Similarly, negotiated agreements are accompanied by recommendations that community engagement take place as early as possible. That is, the sooner that communities engage in the negotiated process the more likely the strategy will achieve long-term success (Gibson & O'Faircheallaigh, 2015). Whittington et al., (2017) similarly recommend that pre-emptive approaches to valuing loss occur prior to any development taking place (Whittington et al., 2017).

Advantages of the approach

A behavioral approach to economic valuation aligns broad decision contexts with individuals' subjective perceptions of changes in their well-being, or utility to apply the appropriate measure. This approach offers a number of advantages to practitioners, communities and the broader policy community. Communities that integrate behavioural insights into negotiated agreement proceedings benefit from establishing a practice to avoid undervaluing potential damages associated with proposed developments. From the perspective of addressing the market failure discussed in Chapter 1, this approach may serve to more accurately reflect the size of the negative externality, or social cost, generated by proposed development activity. Indeed, where externalities are concerned, it is more likely that economic valuation biases may encourage environmentally harmful activities or discourage mitigating measures (Hira Busumtwi-San, 2018; Knetsch, 2010). Therefore, the proposed approach works to avoid the incidence of partial compensation that may occur in a neoclassical economics context that is reliant exclusively on WTP (Cerdeira & Vásquez, 2005; Knetsch, 2016).

An additional advantage may present itself during negotiation proceedings. The literature on negotiated agreements often points to a need to enhance the

bargaining power of participating communities where possible (Fidler, 2010; O'Faircheallaigh, 2013). Thus, it is feasible that conducting a structured quantitative analysis may play a role in strengthening communities' bargaining power at this critical juncture. As agreement provisions are determined, negotiating positions may be reinforced if supported by quantitative evidence of key concerns for the community and their possible outcomes from a behavioural perspective. If driven by the most current information, negotiating positions may also be more likely to remain focused on actions deemed necessary to the community, as opposed to promises of social developments (Tetreault, 2016). Together, greater levels of bargaining power could address issues of partial compensation and misallocation of resources where mitigating action is required. This may refer to the final amount of monetary compensation provided, but it may also refer to aspects of how funds are targeted to achieve the greatest benefit for participating communities.

A final advantage pertains to the capacity for a horizontal diffusion of this negotiated agreement approach (Le Meur et al., 2013). Locally negotiated agreements have been observed to influence the adoption of similar practises across jurisdictions, which may explain their popularity and rapid increase in applications. With a few exceptions, negotiated agreements remain largely grassroots policy channels driven by communities with the incentive and political will to undertake them. For this reason, negotiated agreements offer an alternative policy channel through which to integrate behavioural insights that is not subject to the documented political push-back (Knetch, 2016; Whittington et al., 2017). In this case, it is future interested parties that may benefit as the negotiated agreement space continues to evolve and adopt new practises.

Notably, my study findings indicate that estimated values are highly dependent on contextual variables across which loss aversion plays a significant role (Koetse and Brouwer, 2015). As a result, the cross-jurisdictional application of this approach is subject to the caveat that each application requires time and space-specific data collection. Nevertheless, within each application my study findings mitigate concerns that values of WTA are being strategically misrepresented and supports further cross-jurisdictional applications. Had profit maximization been a principal motivator of stated values, the results might have

indicated large valuation disparities in favor of household rebates. While this concern is understandable given the lack of income constraints in WTA elicitation the moderate valuation disparities found in this study indicate that incentives for the truthful revelation of values can be provided. For instance, I applied cheap talk scripts, provision point mechanisms, and even circular payment cards to address a host of biases associated with contingent valuation.

Equity Implications

Of course, a host of concerns surrounding the economic valuation of non-market goods are subject to debate.⁴⁴ I generally detract from these problems to focus on an important methodological consideration which will always arise when externalities, or more broadly *losses*, are the subject of economic analysis. It is important to note that behavioral and traditional valuations of non-market goods differ in their acknowledgement that individuals may hold property rights to a certain level or quality of a good or service. Alternative compensation paradigms similarly acknowledge that recipients of compensation are rights-holders whose rights are being restored, not policy beneficiaries (Guesnet & Frank, 2014). This perspective encourages equitable outcomes by shifting development discourses towards the protection of rights.

Rights may be local in scale and include perceived, or *de facto*, rights structures. However, they may also be global and include rights laid out in international treaties and conventions such as the Universal Declaration of Human Rights (*ibid*). Social justice implications stem from the increased likelihood of equitable outcomes if policy “losers” are acknowledged and their loss is accurately captured. Shackley and Dixon (2000) observe that attempts to estimate loss with the appropriate money-metric for this population are rare and that consideration is rarely given.

Arlen et al., (2002) specifically advocate for “later” governance structures, such as the collective bargaining agreements discussed in this chapter, that

⁴⁴ While monetary valuation can be considered controversial, I refer to Johnston et al., (2017) and Del Saz-Salazar, (2016) who emphasize the unquestionable need for valuation data to drive decision making and cost-benefit analysis which would otherwise lack information on environmental externalities and be seriously defective.

encourage a shift away from the current practice of automatically allocating rights to private entities. Within such a structured approach, negotiated agreements may further include provisions in the short term to address impacts that may be disproportionately affected by certain segments of the population, such as women, seniors, or low-income households. In the long-term, agreements may also stipulate provisions to address the rights of future generations who may experience ongoing project impacts. In this way, alternative compensation paradigms may also address social justice issues pertaining to inter-generational equity and the distribution of impacts (O'Faircheallaigh, 2015).

6.4. Recommendations

The pursuit of water-intensive activities within the context of Loreto's scarcity of freshwater makes the efficient management of this resource a priority. This is of interest to the community of Loreto, as it is their rights to a secure water supply that may be infringed upon (Grey and Sadoff, 2007). It is also of interest to Loreto's water service providers that may wish to apply policies and practices to sustainably manage the resource. I will first discuss recommendations for Loreto civil society groups, followed by municipal stakeholders. I assume that the valuation scenarios presented to respondent's reflect possible interactions with future tourism developments and have been appropriately coded and captured from the relevant reference state. Therefore, I apply compensating variation measures of WTA and WTP that reflect the prior context of Loreto where no change has yet taken place.

Civil society

In Loreto, and more broadly BCS, negotiated agreements represent one possible strategy that can be employed to address community concerns in light of the environmental, political and financial challenges of ensuring water security for the region (Villegas, 2007). However, the purpose of this discussion is not to be prescriptive but to introduce an alternative policy approach that may work to achieve equitable outcomes for the community (Le Meur et al., 2013).

My study estimated aggregate community values based on a conservative maximum likelihood estimation technique. When aggregated to the 18,912

residents of Loreto that depend on the San Juan Londo aquifer, I estimated total monthly social costs of MXN \$1,036,378 pesos associated with one additional day of interruptions to the household water service. Alternatively, the total social benefits associated with a one-day reduction in interruptions to the household water service is MXN \$942,196 pesos.

The information may be of interest to civil society groups whose mandate is to ensure the sustainable development of the region. Indeed, following a majority rule, respondents identified groups from civil society, such as community groups and local business, as best suited to manage a negotiated agreement for Loreto. Potentially, this is due to high reported intra-community levels of trust and desire to increase community participation. It may also be due to past experience since NGO's in Loreto have led a number of successful civil society campaigns, including establishing the Loreto Bay National Park and Loreto's Ecological Land-Use Plan. This findings supports recommendations in the literature that local NGO's be included in negotiated agreements in a supportive capacity.

Municipal Stakeholders

This information is clearly important to FNFTDS managers responsible for managing the San Juan London aqueduct as well as OOMSAPA managers charged with service delivery. For this reason, I repeated the aggregation analysis to account for the 5,975 households in Loreto that are connected to the water service. Residents are not WTP as much for reducing the frequency of service interruptions as they are WTA rebates for increases in service interruptions due to higher associated social costs. I obtain monthly estimates of MXN \$297,675 pesos that represent potential earnings for the utility to carry out a service improvement of reducing interruptions to the household water service by one day. On the other hand, I obtain estimates of \$327,430 pesos that represent required monthly compensation for customers, should they experience an additional day of interruptions.

Insights from the economic valuation of non-market benefits and costs may inform the design and implementation of water management policies, such as the choice to proceed with desalination technologies. For instance, this may refer to public investment criteria, and or pricing and equity policies to achieve cost

recovery for water system improvements (Griffin and Mjelde, 2000; Howe et al., 1994). Municipal stakeholders may also wish to mitigate any conflict associated with water management strategies since residential water use accounts for 60% of total demand (Campos, 2017; McEvoy & Jamie, 2015).

6.5. Limitations

My study has several limitations. One limitation pertains to extrapolating study findings to the population of Loreto, due to the small sample size. For instance, the size of each subsample (each less than $n = 60$) is quite small compared to other studies and may limit variability. Nevertheless, I accepted the trade-off of reduced statistical precision in favour of the versatility of estimating all four welfare measures. Pooled samples improve on this somewhat, although they remained shy of the suggested sample size based on Dillman (2007).

A related limitation stems from the composition of the sample. While my sample frame refers to the whole municipality, which relies on water from the San Juan Londo aquifer, I acknowledge extrapolation to this level may be further limited due to the exclusion of neighborhoods from Zaragoza and Miramar. Residents from both *colonias* were deemed to lack incentive compatibility in responding to the contingent valuation scenario, due to unique relationships with the municipality or water service provision. As a result, my study findings primarily reflect the perspectives of residents from Loreto's remaining downtown neighbourhoods.

Chapter 7.

Conclusion

In this study I tested the effect of reference dependence driven by loss aversion across resident valuations of changes to the reliability of their household water service. I conducted four separate contingent valuation experiments using a between-subject design with residents living in the case study area of Loreto, BCS. Loreto's tourism development landscape is driven at the federal level and may conflict with the municipality's goals of achieving broad and narrow water security. Therefore, I discuss applied Prospect Theory in the context of economic development engines that yield national benefits but are also associated with negative impacts at local scales.

I applied maximum likelihood and point estimate techniques to estimate theoretically-valid and contextually-relevant changes in welfare. Both explore the interrelation between money-metric and subjective measures of well-being across different policy decision contexts. Prior expectations were that residents facing identical reference states would reveal a disparity in their valuations of improvements or interruptions to the municipal water service. My study found asymmetrical valuations across WTA and WTP framings that were moderate compared to the literature. Valuation disparities were more pronounced when point estimate data was used but their difference was statistically significant when estimated using maximum likelihood techniques. My study findings support recommendations from the behavioral economics literature to move away from the application of WTP measures where a WTA approach is merited. WTP is oftentimes not a defensible or adequate predictor of economic behavior where loss is concerned (Knetsch, 1989).

I provide an initial discussion of the role that applied Prospect Theory could play if integrated in negotiated agreements, as well as social justice implications of the approach. Through their role as vehicles for the transfer of monetary benefits, negotiated agreements may be strengthened by embedding behavioral insights. In turn, insights from behavioral economics should derive

increasingly accurate measures of externalities incurred and thereby help retain a more equitable share of benefits at local scales. Both approaches are based on a recognition of local rights structures (Del Saz-Salazar & García-Menéndez, 2016; Gibson & O'faircheallaigh, 2015; Kanbur, 2003). Therefore, this preliminary discussion addresses gaps in how externalities may be conceptualized and quantified by public and private stakeholders.

7.1. Integrating the Community Perspective

For value-conscious growth to appropriately address social and environmental costs borne by individuals and communities the perspectives of said individuals need to be considered. In this study, the perspective of the community is defined as the implicit expectations and interests regarding long-term community development, including the equitable access to the material conditions for urban life and space for political voice (Bornstein & Leetmaa, 2015).

My study draws on components from the behavioral economics and negotiated agreement literature to integrate subjective perceptions of well-being within appropriate development forums (Siebenmorgan, 2009). For instance, negotiated agreements are a response to calls by practitioners for a policy, legal or institutional tool that can integrate community input into development discussions (Schafrik & Kazakidis, 2011). Meanwhile, welfare is the measure of subjective well-being and is intricately linked with an individual's perception of the changes imposed by policies (Zong & Knetsch, 2013). Therefore, the primary reason for conducting behaviorally-accurate valuations is to capture changes in welfare from the perspective of those affected by said policies.

7.2. Value of Research

This study sought mutually-beneficial policy avenues and provided an initial discussion integrating practical findings from the literature on negotiated agreements and Prospect-Theory (Fidler, 2010; Del Saz-Salazar, 2016). Although valuation disparities have been explored across a wide range of applications, a Prospect Theory framework has not been applied in a structured field experiment that covers all four measures of welfare, in a developing country. Therefore, this

study contributes to the growing body of literature on applied Prospect Theory that is currently underused.

The empirical findings from this experiment should provide a basis for the continuing evolution of applied Prospect Theory. Although this study focuses on the tensions between narrow household water security and tourism development using Loreto as a case study, the strategies discussed herein have wide applications. Certainly, economic valuations in decision contexts of gain and loss will be applicable in any number of contexts, particularly in real-world applications in environmental economics and policy (Zong and Knestch, 2013; Knetsch, 2016; Del Sas-Salazar, 2016).

The negotiating agreement field is also an evolving inter-disciplinary approach to community engagement that draws from anthropology, social sciences, economics, law, and policy (Bruckner, 2015). Findings from behavioral economics can enrich the pursuit of negotiated agreements by integrating considerations of appropriate reference states and rights structures when estimating the impacts and benefits associated with proposed developments. Esteves (2008) observes that innovations in the negotiated agreement space are welcome, albeit rare given the relative recentness of the strategy as a research domain. By asking respondents to directly state preferences, economic experiments represent powerful tools to estimate benefits and costs and may be of interest to communities, practitioners, and organizations working to advance the negotiated agreement agenda. Given the degree of activity in both fields, this paper offers a contribution that provides minimum, although valuable, guidance for the conduct of future research in this domain.

7.3. Future Research

A number of challenges specific to the application of WTA present valuable avenues for future research. Specifically, further research in the field on this subject should focus on exploring strategies to increase the saliency and realism of scenarios that involve compensation. This strategy is rarely carried out and represents a gap in the literature. For instance, the saliency of WTA valuations may be addressed through the use of provision point mechanisms,

circular payment cards, cheap talk scripts and additional strategies, such as presenting WTA values as negative values on a payment card. However, these strategies have been developed relatively recently and further research is required to corroborate their effect on reported WTA values, as well as reported valuation disparities.

As well, methodological assumptions guiding the manipulation of payment card data are not clear and would benefit from further exploration. Research in this field of inquiry would contribute to increasing the reliability of estimated means across WTP and WTA contexts. Possibly, the extent to which the explanatory drivers differ across decision-contexts involving fees and rebates has been understated and also suggests a need for further research.

Finally, a number of research questions related to the combined approach remain. Future studies may explore the benefits and challenges of integrating applied Prospect Theory at various stages of the negotiated agreement. In an operational sense, the role of public, private, and community interests will have to be factored in, as well as the feasibility of engaging with an economic valuation practitioner to carry out the exercise. Future studies may also assess the effect of applied Prospect Theory on communities negotiating, or bargaining, power. These considerations were beyond the scope of this paper but are necessary to understand the practicality of integrating both approaches.

References

- #loretoideal. (2018). #loretoideal. Retrieved July 23, 2019, from <https://www.loretoideal.org/>
- Alberini, A., & Cooper, J. (2000). *Applications of the contingent valuation method in developing countries: a survey*. Rome: Food and Agriculture Organization of the United Nations.
- Allais, M. (1953). Le Comportement de l'Homme Rationnel devant le Risque: Critique des Postulats et Axiomes de L'Ecole Americaine. *Econometrica*, 21(4), 503–546. Retrieved from <https://www-jstor-org.proxy.lib.sfu.ca/stable/pdf/1907921.pdf?refreqid=excelsior%3Af597fbfcaa8dd044cd78a3d29c952b77>
- Anderson, R. (2017). Roads, value, and dispossession in Baja California Sur, Mexico. *Economic Anthropology*, 4(1), 7–21. <https://doi.org/10.1002/sea2.12069>
- Apicella, B. C. L., Azevedo, E. M., Christakis, N. a, & Fowler, J. H. (2014). Evolutionary Origins of the Endowment Effect : Evidence from Hunter-Gatherers. *American Economic Review*, 104(6), 1793–1805. <https://doi.org/10.1257/aer.104.6.1793>
- Appiah, A., Adamowicz, W., Lloyd-Smith, P., & Dupont, D. (2018). Reliability of Drinking Water: Risk Perceptions and Economic Value. *Water Economics and Policy*, 1–27. <https://doi.org/10.1142/S2382624X18500200>
- Arlen, J., Spitzer, M., & Talley, E. (2002). Endowment Effects within Corporate Agency Relationships. *The Journal of Legal Studies*, 31(1), 1–37. <https://doi.org/10.1086/324659>
- Arrow, K., Solow, R., Portney, P. R., Leamer, E. E., Radner, R., & Schuman, H. (1993). *Report of the NOAA Panel on Contingent Valuation*. Retrieved from https://www.researchgate.net/profile/Edward_Leamer/publication/277297107_Kenneth_Arrow/links/572a241108ae2efbdfbc1959/Kenneth-Arrow.pdf
- Azahara Mesa-Jurado, M., Martin-Ortega, J., Ruto, E., & Berbel, J. (2012). The economic value of guaranteed water supply for irrigation under scarcity conditions. *Agricultural Water Management*, 113, 10–18. <https://doi.org/10.1016/j.agwat.2012.06.009>
- Bao, H. X. H., & Gong, C. M. (2016). Endowment Effect and Housing Decisions. *International Journal of Strategic Property Management*, 20(4), 341–353. <https://doi.org/10.3846/1648715X.2016.1192069>
- Bateman, I., Day, B. H., Georgiou, S., & Lake, I. (2006). The aggregation of

environmental benefit values: Welfare measures, distance decay and total WTP. *Ecological Economics*, 60(2), 450–460.
<https://doi.org/10.1016/j.ecolecon.2006.04.003>

Bateman, I., Munro, A., Rhodes, B., Starmer, C., & Sugden, R. (1997). *A Test of the Theory of Reference-Dependent Preferences*. *The Quarterly Journal of Economics* (Vol. 112). Retrieved from <https://www-jstor-org.proxy.lib.sfu.ca/stable/pdf/2951243.pdf?refreqid=excelsior%3Ab863df326cac2b2c8ed2995da0c0fefe>

Been, V. (2010). Community Benefits Agreements: A New Local Government Tool or Another Variation on the Exactions Theme? *The University of Chicago Law Review*, 77(1), 5–35. Retrieved from <http://www.jstor.org/stable/40663024>

Bernard, R. (2002). *Research methods in anthropology: qualitative and quantitative approaches* (3rd ed.). Lanham: AltaMira Press.

Bischoff, I. (2008). Endowment effect theory, prediction bias and publicly provided goods: an experimental study. *Environmental Resource Economics*, 39, 283–296. <https://doi.org/10.1007/s10640-007-9126-3>

Booth, P. L., Guilfoos, T., & Uchida, E. (2016). Endowment Effects and Drinking Water Quality. *Agricultural and Resource Economics Review*, 45(2), 338–366.

Borges, B. F. J. (1992). *Loss aversion and community standards of fairness: the role of costs in exchange negotiations*. Simon Fraser University. Retrieved from <http://summit.sfu.ca/item/5615>

Bornstein, L., & Leetmaa, K. (2015). Moving Beyond Indignation: Stakeholder Tactics, Legal Tools and Community Benefits in Large-Scale Redevelopment Projects. *Oñati Socio-Legal Series*, 5(1), 29–50.

Bowker, J., & MacDonald, H. (1993). An Economic Analysis of Localized Pollution: Rendering Emissions in a Residential Setting. *Canadian Journal of Agricultural Economics*, 41(1), 45–59.

Bringas Rabajo, N. L., & Ojeda Revah, L. (2000). El ecoturismo: ¿una nueva modalidad del turismo de masas? *Economía Sociedad y Territorio*, 2(7), 373–403. <https://doi.org/10.22136/est002000436>

Brown, T. C., & Gregory, R. (1999). Why the WTA-WTP disparity matters. *Ecological Economics*, 28, 323–335. Retrieved from https://ac-els-cdn-com.proxy.lib.sfu.ca/S0921800998000500/1-s2.0-S0921800998000500-main.pdf?_tid=fffb0c0d-fbc0-4464-8ff3-7bef892f1292&acdnat=1540951350_04596cb25bf3113045f9eb1b4730666c

Brox, J. A., Kumar, R. C., & Stollery, K. R. (2003). Estimating Willingness to Pay

for Improved Water Quality in the Presence of Item Nonresponse Bias. *American Journal of Agricultural Economics*, 85(2), 414–428. Retrieved from <https://www-jstor-org.proxy.lib.sfu.ca/stable/pdf/1245137.pdf?refreqid=excelsior%3Ad854473b0f610e44cbdf45386e5148c4>

- Bruckner, K. D. (2015). Community Development Agreements in Mining Projects. *Denver Journal of International Law and Policy*, 44, 413–427. <https://doi.org/10.3868/s050-004-015-0003-8>
- Bush, G., Hanley, N., Moro, M., & Rondeau, D. (2013). Measuring the Local Costs of Conservation: A Provision Point Mechanism for Eliciting Willingness to Accept Compensation. *Land Economics*, 89(3), 490–513. Retrieved from <https://muse.jhu.edu/article/508747>
- Cameron, T. A., & Huppert, D. D. (1989). OLS versus ML Estimation of Non-market Resource Values with Payment Card Interval Data1. *JOURNAL OF ENVIRONMENTAL ECONOMICS AND MANAGEMENT*, 17, 230–246. Retrieved from https://ac-els-cdn-com.proxy.lib.sfu.ca/0095069689900181/1-s2.0-0095069689900181-main.pdf?_tid=7629610b-4a68-42b7-af2c-1aab214f65c2&acdnat=1526165763_e8f77130ed6b52af4b42f4ee95bd4a65
- Cameron, T. A., Poe, G. L., Ethier, R. G., & Schulze, W. D. (2002). Alternative Non-market Value-Elicitation Methods: Are the Underlying Preferences the Same? *Journal of Environmental Economics and Management*, 44, 391–425. <https://doi.org/10.1006rjeem.2001.1210>
- Campos, J. O. (2017). *El Servicio de Agua Potable, Percepcion Ciudadana y Perspectivas de Manejo Sustentable en Loreto*, B.C.S. Universidad Autónoma de Baja California Sur. Retrieved from <http://biblio.uabcs.mx/tesis/te3688.pdf>
- Carino, M., Cordero, L., Monteforte, M., Cordero, S., Zarinan, J., & Rendon, C. (2006). *Baja California Sur's Community-Based Opportunities and Needs*. San Diego. Retrieved from https://icfdn.org/wp-content/uploads/2015/11/Baja_Needs_Assesment_2006.pdf
- Carrilio, T., & Ganster, P. (2007). The Quality of Life in Loreto: Challenges and Opportunities. In P. Ganster, O. Arizpe, & A. Ivanova (Eds.), *Lotero: The Future of the First Capital of the Californias* (pp. 283–302). San Diego: San Diego State University Press.
- Carson, R., & Mitchell, R. (1993). The value of clean water: the public's willingness to pay for boatable, fishable, and swimmable quality water. *Water Resources Research*, 29(7), 2445–2454. Retrieved from <http://www.econ.ucsd.edu/~rcarson/papers/CleanWater.pdf>
%5CnY:%5CLiteratur%5CSuWaRest%5CEconomic%5CEnvironmental valuation

- Cerda, A., & Vásquez, F. (2005). Differences Between Parametric and Non-Parametric Estimation of Welfare Measures: An Application to the Río Claro, Talca, Chile Diferencias entre Estimaciones Paramétricas y No-Paramétricas de Medidas de Bienestar: Una Aplicación al Caso del Río Claro, Ta. *Panorama Socioeconomico*, 31, 22–31.
- Cernea, M. M. (2008). Compensation and benefit sharing: Why resettlement policies and practices must be reformed. *Water Science and Engineering*, 1(1), 89–120. [https://doi.org/10.1016/S1674-2370\(15\)30021-1](https://doi.org/10.1016/S1674-2370(15)30021-1)
- Champ, P., Boyle, K., & Brown, T. (2003). *A primer on nonmarket valuation*. (P. Champ, K. Boyle, & T. Brown, Eds.) (3rd ed.). Boston: Kluwer Academic Publishers.
- Chanel, O., Makhloufi, K., & Abu-Zaineh, M. (2017). Can a Circular Payment Card Format Effectively Elicit Preferences? Evidence From a Survey on a Mandatory Health Insurance Scheme in Tunisia. *Applied Health Economics and Health Policy*, 15(3), 385–398. <https://doi.org/10.1007/s40258-016-0287-5>
- Cook, C., & Bakker, K. (2012). Water security: Debating an emerging paradigm. *Global Environmental Change*, 22, 94–102. <https://doi.org/10.1016/j.gloenvcha.2011.10.011>
- Covey, J., Loomes, G., & Bateman, I. J. (2007). Valuing Risk Reductions: Testing for Range Biases in Payment Card and Random Card Sorting Methods. *Journal of Environmental Planning and Management*, 50(4), 467–482. <https://doi.org/10.1080/09640560701401986>
- De Barbieri, E. (2016). Do Community Benefits Agreements Benefit Communities? *Cardozo Law Review*, 37(5), 1773–1826. Retrieved from <http://heinonline.org/HOL/Page?handle=hein.journals/cdozo37&id=1885&div=54&collection=journals>
- Del Saz-Salazar, S., & García-Menéndez, L. (2016). Port expansion and negative externalities: a willingness to accept approach Port expansion and negative externalities: a willingness to accept approach. *Maritime Policy & Management*, 43(1), 59–83. <https://doi.org/10.1080/03088839.2015.1032379>
- Del Saz-Salazar, S., García-Rubio, M. A., González-Gómez, F., Picazo-Tadeo, A. J., & Es, F. (2016). Managing Water Resources Under Conditions of Scarcity: On Consumers' Willingness to Pay for Improving Water Supply Infrastructure. *Water Resour Manage*, 30(5), 1723–1738. <https://doi.org/10.1007/s11269-016-1247-4>
- Del Saz-Salazar, S., Hernández-Sancho, F., & Sala-Garrido, R. (2009). The social benefits of restoring water quality in the context of the Water Framework Directive: A comparison of willingness to pay and willingness to accept. *Science of the Total Environment*, 407(16), 4574–4583.

<https://doi.org/10.1016/j.scitotenv.2009.05.010>

- Dillman, D. (2007). *Mail and internet surveys: The tailored design method* (2nd ed.). New York, New York: John Wiley & Sons.
- Dinda, S. (2016). Land Acquisition and Compensation Policy for Development Activity. *Journal of Land and Rural Studies*, 4(1), 111–118.
<https://doi.org/10.1177/2321024915616688>
- Donaldson, C., Jones, A. M., Mapp, T. J., & Olson, J. A. (1998). Limited dependent variables in willingness to pay studies: applications in health care. *Applied Economics*, 30(5), 667–677.
<https://doi.org/10.1080/000368498325651>
- Drichoutis, A., Lusk, J., & Pappa, V. (2016). Elicitation Formats and the WTA/WTP gap: A study of climate neutral foods. *Food Policy*, 61, 141–155.
- Dupuy, K. E. (2014). Community development requirements in mining laws. *The Extractive Industries and Society*, 1(2), 200–215.
<https://doi.org/10.1016/j.exis.2014.04.007>
- Environmental Protection Agency, U. S. (2000). *Guidelines for Preparing Economic Analysis*. Washington, DC.
- Ericson, K. M. M., & Fuster, A. (2014). The Endowment Effect. *Annual Review of Economics*, 6(1), 555–579. <https://doi.org/10.1146/annurev-economics-080213-041320>
- Esteves, A. M. (2008). Mining and social development: Refocusing community investment using multi-criteria decision analysis. *Resources Policy*, 33(1), 39–47. <https://doi.org/10.1016/j.resourpol.2008.01.002>
- Feo-Valero, M., Arencibia, A. I., & Román, C. (2016). Analyzing discrepancies between willingness to pay and willingness to accept for freight transport attributes. *Transportation Research Part E*, 89, 151–164.
<https://doi.org/10.1016/j.tre.2016.03.004>
- Fidler, C. (2010). Increasing the sustainability of a resource development: Aboriginal engagement and negotiated agreements. *Environment, Development and Sustainability*, 12(2), 233–244.
<https://doi.org/10.1007/s10668-009-9191-6>
- Fidler, C., & Hitch, M. (2007). Impact and Benefit Agreements: A Contentious Issue for Environmental and Aboriginal Justice. *Environments*, 35(2), 49–69. Retrieved from <https://search-proquest-com.proxy.lib.sfu.ca/docview/207688638/fulltextPDF/50C4F4162DC442FFPQ/1?accountid=13800>

- Freeman, A., Herriges, J., & Kling, C. (2014). *The measurement of environmental and resource values : Theory and methods* (3rd ed.). Washington, DC.
- Gamez. (2007). Traditional and Alternative Tourism in Loreto. In P. Ganster, O. Arizpe, & A. Ivanova (Eds.), *Lotero: The Future of the First Capital of the Californias* (pp. 201–220). San Diego: San Diego State University Press.
- Gamez, A., & Angeles, M. (2011). Borders within. Tourism growth, migration and regional polarization in Baja California Sur (Mexico). *Journal of Borderlands Studies*, 25(1), 1–18. <https://doi.org/10.1080/08865655.2010.9695747>
- Garcia-Villa, A. (1992). *La planificación de centros turísticos de México*. Limusa|.
- Gibson, G., & O'faircheallaigh, C. (2015). *IBA Community Toolkit: Negotiation and Implementation of Impact and Benefit Agreements*. Toronto. Retrieved from <http://gordonfoundation.ca/app/uploads/2017/02/toolkit-english.pdf>
- Gilmour, B., & Mellett, B. (2013). The Role of Impact and Benefits Agreements in the Resolution of Project Issues with First Nations. *Alberta Law Review*, 51(2), 385–400. Retrieved from <http://heinonline.org/HOL/Page?handle=hein.journals/alblr51&id=417&div=22&collection=journals>
- Greene, W. H. (2000). *Econometric Analysis* (4th ed.). New Jersey: Prentice-Hall, Englewood Cliffs.
- Grey, D., & Sadoff, C. W. (2007). Sink or Swim? Water security for growth and development. *Water Policy*, 9(6), 545–571. <https://doi.org/10.2166/wp.2007.021>
- Griffin, R. C., & Mjelde, J. W. (2000). *Valuing Water Supply Reliability*. *American Journal of Agricultural Economics* (Vol. 82). Retrieved from <https://academic.oup.com/ajae/article-abstract/82/2/414/53315>
- Groothuis, P. A., Cockerill, K., & Mcdaniel Mohr, T. (2015). Water does not flow up hill: determinants of willingness to pay for water conservation measures in the mountains of western North Carolina. *Journal of Behavioral and Experimental Economics*, 59, 88–95. <https://doi.org/10.1016/j.socec.2015.10.002>
- Guesnet, L., & Frank, C. (2014). Introduction. In *Compensation Matters - Securing community interests in large-scale investments* (pp. 1–5). Berlin. Retrieved from www.bicc.de
- Gyrd-Hansen, D., Jensen, M. L., & Kjaer, T. (2014). Framing the willingness-to-pay question: Impact on response patterns and mean willingness to pay. *Health Economics (United Kingdom)*. <https://doi.org/10.1002/hec.2932>

- Hammack, J., & Brown, G. (1974). *Waterfowl and Wetlands: Toward Bio-Economic Analysis*. Baltimore: John Hopkins Press.
- Hanemann, W. M. (1984). Welfare Evaluations in Contingent Valuation Experiments with Discrete Responses. *Agricultural and Applied Association*, 66(3), 332–341. Retrieved from <https://about.jstor.org/terms>
- Harper, W. (2000). *A comparison of direct methods for valuing environmental amenities: A case study of the White Mountain National Forest*. University of New Hampshire . Retrieved from <https://scholars.unh.edu/dissertation/2121>
- Harris, K. (2015). Because we can Doesn't mean we should and if we do: Urban communities, social and economic justice, and local economic-development-driven eminent domain practices. *Economic Development Quarterly*, 29(3), 245–261. <https://doi.org/10.1177/0891242415575423>
- Hartman, R. S., Doane, M. J. ., & Woo, C.-K. (1991). Consumer Rationality and the Status Quo. *The Quarterly Journal of Economics*, 106(1), 141–162.
- Heberlein, T. A., & Bishop, R. C. (1986). Assessing the validity of contingent valuation: Three field experiments. *Science of the Total Environment*, 56, 99–107.
- Hensher, D., Shore, N., & Train, K. (2006). Water Supply Security and Willingness to Pay to Avoid Drought Restrictions. *The Economic Record*, 82(256), 56–66. <https://doi.org/10.1111/j.1475-4932.2006.00293.x>
- Hira, A., & Busumtwi - Sam, J. (2018). *Mining Community Benefits in Ghana : a Case of Unrealized Potential*.
- Horowitz, J. K., & McConnell, K. E. (2002). A Review of WTA / WTP Studies. *Journal of Environmental Economics and Management*, 44(3), 426–447. <https://doi.org/10.1006rjeem.2001.1215>
- Howe, C., & Smith, G. M. (1994). The Value of Water Supply Realibility in Urban Water Systems. *Journal of Environmental Economics and Management*, 26, 19–30.
- Humphreys, D. (2002). From economic to sustainable development: Establishing a new framework for mineral extraction. *Minerals & Energy - Raw Materials Report*, 17(4), 3–9. <https://doi.org/10.1080/14041040209362576>
- Jefferson, T., & Taplin, R. (2011). An investigation of the endowment effect using a factorial design. *Journal of Economic Psychology*, 32(6), 899–907. <https://doi.org/10.1016/j.joep.2011.08.004>
- Johnston, R. J., Boyle, K. J., Adamowicz, W., Bennett, J., Brouwer, R., Ann Cameron, T., ... Vossler, C. A. (2017). Contemporary Guidance for Stated

Preference Studies. *Journal of the Association of Environmental Resource Economists*, 4(2), 319–405. <https://doi.org/10.1086/691697>

Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1991). Anomalies: The Endowment Effect, Loss Aversion, and Status Quo Bias. *The Journal of Economic Perspectives*, 5(1), 193–206. Retrieved from <https://www-jstor-org.proxy.lib.sfu.ca/stable/pdf/1942711.pdf?refreqid=excelsior%3Ad48414f209cc6f2e602c93015abed0dd>

Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, 47(2), 263–291. <https://doi.org/10.2307/1914185>

Kanbur, R. (2003). Development economics and the compensation principle. *International Social Science Journal*, 55(175), 27–35. <https://doi.org/10.1111/1468-2451.5501003>

Keenan, J. C., Kemp, D. L., & Ramsay, R. B. (2016). Company–Community Agreements, Gender and Development. *Journal of Business Ethics*, 135(4), 607–615. <https://doi.org/10.1007/s10551-014-2376-4>

Kim, Y., Kling, C. L., & Zhao, J. (2015). Understanding Behavioral Explanations of the WTP-WTA Divergence Through a Neoclassical Lens: Implications for Environmental Policy. *Annual Review of Resource Economics*, 7, 169–187. <https://doi.org/10.1146/annurev-resource-100913-012501>

Knetsch, J. L. (1989). The Endowment Effect and Evidence of nonreversible indifference curves. *The American Economic Review*, 79(5), 1277–1284.

Knetsch, J. L. (2007). Biased valuations, damage assessments, and policy choices: The choice of measure matters. *Ecological Economics*, 63, 684–689. <https://doi.org/10.1016/j.ecolecon.2007.02.012>

Knetsch, J. L. (2016). REFERENCE DEPENDENCE AND OTHER BEHAVIORAL FINDINGS: THE LIKELIHOOD OF SERIOUS EVALUATION AND POLICY BIASES. *The Singapore Economic Review*, 61(3), 1–11. <https://doi.org/10.1142/S0217590816400142>

Knetsch, J. L., Riyanto, Y. E., & Zong, J. (2012). Gain and Loss Domains and the Choice of Welfare Measure of Positive and Negative Changes. *Journal of Benefit-Cost Analysis*, 3(4), 1–18. <https://doi.org/10.1515/2152-2812.1084>

Knetsch, C., Siebenmorgen, P., & Bradshaw, B. (2010). Impact Benefit Agreements and Community Well-being: A missed Opportunity? *Recherches Ameridiennes Au Quebec*, 40(3), 59–68. <https://doi.org/10.7202/1009369ar>

Koetse, M. J., & Brouwer, R. (2016). Reference Dependence Effects on WTA and WTP Value Functions and Their Disparity. *Environmental and Resource Economics*, 65(4), 723–745. <https://doi.org/10.1007/s10640-015-9920-2>

- Kogut, T., & Kogut, E. (2011). Possession Attachment: Individual Differences in the Endowment Effect. *The Journal of Behavioral Decision Making*, 24(4), 377–393. <https://doi.org/10.1002/bdm>
- Kolstad, C., & Guzman, R. (1999). Information and the divergence between willingness to accept and willingness to pay. *Journal of Environment and Economic Management*, 38, 66–80.
- Le Meur, P.-Y., Horowitz, L. S., & Mennesson, T. (2013). “Horizontal” and “vertical” diffusion: The cumulative influence of Impact and Benefit Agreements (IBAs) on mining policy-production in New Caledonia. *Resources Policy*, 38(4), 648–656. <https://doi.org/10.1016/j.resourpol.2013.02.004>
- Lienhoop, N., & Macmillan, D. (2007). Valuing wilderness in Iceland: Estimation of WTA and WTP using the market stall approach to contingent valuation. *Land Use Policy*, 24, 289–295. <https://doi.org/10.1016/j.landusepol.2005.07.001>
- Lindhjem, H., & Navrud, S. (2011). Are Internet surveys an alternative to face-to-face interviews in contingent valuation? *Ecological Economics*, 70, 1628–1637. <https://doi.org/10.1016/j.ecolecon.2011.04.002>
- Lindsay, J. M. (2012). *Compulsory Acquisition of Land and Compensation in Infrastructure Projects. PPP Insights An Explanatory Note on Issues Relevant to Public-Private Partnerships* (Vol. 1). Retrieved from www.worldbank.org/ppp
- Loreto Información estratégica*. (2017). Loreto.
- Macdonald, D. H., Morrison, M. D., & Barnes, M. B. (2010). Willingness to Pay and Willingness to Accept Compensation for Changes in Urban Water Customer Service Standards. *Water Resour Manage*, 24, 3145–3158. <https://doi.org/10.1007/s11269-010-9599-7>
- Mahieu, P.-A., Riera, P., & Giergiczy, M. (2012). Determinants of willingness-to-pay for water pollution abatement: A point and interval data payment card application. *Journal of Environmental Management*, 108, 49–53. Retrieved from https://ac-els-cdn-com.proxy.lib.sfu.ca/S0301479712002332/1-s2.0-S0301479712002332-main.pdf?_tid=2ff20d1b-0532-4276-b662-81c6f89e3b44&acdnat=1526165994_760630ab9e0e8048168f51562729f274
- Martinez-Alier, J. (2001). Mining conflicts, environmental justice, and valuation. *Journal of Hazardous Materials*, 86(1), 153–170. [https://doi.org/10.1016/S0304-3894\(01\)00252-7](https://doi.org/10.1016/S0304-3894(01)00252-7)
- Mcevoy, J. (2014). Desalination and Water Security: The Promise and Perils of a Technological Fix to the Water Crisis in Baja California Sur, Mexico. *Water Alternatives*, 7(3), 518–541. Retrieved from <http://www.water-alternatives.org/index.php/alldoc/articles/vol7/v7issue2/262-a7-3-5/file>

- McEvoy, J., & Jamie. (2015). Can the Adoption of Desalination Technology Lead to Aquifer Preservation? A Case Study of a Sociotechnical Water System in Baja California Sur, Mexico. *Water*, 7(10), 5224–5238. <https://doi.org/10.3390/w7105224>
- Moon, W., Balasubramanian, S. K., & Rimal, A. (2007). Willingness to pay (WTP) a premium for non-GM foods versus willingness to accept (WTA) a discount for GM foods. *Journal of Agricultural and Resource Economics*, 32(2), 363–382. <https://doi.org/http://jareonline.org>
- Morewedge, C., Shu, L., Gilbert, D., & Wilson, T. (2009). Bad riddance or rubbish? Ownership and not loss aversion causes the endowment effect. *Journal of Experimental Social Psychology*, 45, 947–951.
- Nataf, C., & Wallsten, T. S. (2013). Love the One You ' re With : The Endowment Effect in the Dating Market. *Journal of Economic Psychology*, 35, 1–20.
- Navrud, S., & Mungatana, E. D. (1994). Environmental valuation in developing countries: The recreational value of wildlife viewing. *Ecological Economics*, 11(2), 135–151. Retrieved from https://ac-els-cdn-com.proxy.lib.sfu.ca/0921800994900248/1-s2.0-0921800994900248-main.pdf?_tid=129e5319-2712-46bb-9e6b-4b3968237882&acdnat=1522820801_81cc8e912d81caf82410cf4df5827fba
- Neuman, W. (2006). *Social Research Methods: Qualitative and Quantitative approaches* (6th ed.). Boston: Pearson Education Inc.
- Nwapi, C. (2017). Legal and institutional frameworks for community development agreements in the mining sector in Africa. *Extractive Industries and Society*, 4(1), 202–215. <https://doi.org/10.1016/j.exis.2016.11.010>
- O'Faircheallaigh, C. (2013). Community development agreements in the mining industry: an emerging global phenomenon. *Community Development*, 44(2), 222–238. <https://doi.org/10.1080/15575330.2012.705872>
- O'Faircheallaigh, C. (2015). Social Equity and Large Mining Projects: Voluntary Industry Initiatives, Public Regulation and Community Development Agreements. *Journal of Business Ethics*, 132(1), 91–103. <https://doi.org/10.1007/s10551-014-2308-3>
- O'Faircheallaigh, C. (2017). Shaping projects , shaping impacts : community-controlled impact assessments and negotiated agreements. *Third World Quarterly*, 659738(5), 1181–1197. <https://doi.org/10.1080/01436597.2017.1279539>
- Ortiz Rendon, G. (2011). Algunos apuntes sobre la corrupción en el sector agua, 1–15. Retrieved from [http://www.agua.org.mx/index.php/component/docman/doc_download/926-algunos-apuntes-sobre-la-corrupcion-en-el-sector-agua?Itemid=.](http://www.agua.org.mx/index.php/component/docman/doc_download/926-algunos-apuntes-sobre-la-corrupcion-en-el-sector-agua?Itemid=)

- Oswald Spring, Ú. (2014). Water security and national water law in Mexico. *Earth Perspectives*, 1(1), 1–15. <https://doi.org/10.1186/2194-6434-1-7>
- Paez, C., Holl, G., Soto, G., Meeker, L., Vercruse, R., & Ramus, C. (2010). *Strategies for Sustainable Water Supply and Management for Loreto, Baja California Sur, México*.
- Parks, V., & Warren, D. (2009). The Politics and Practice of Economic Justice: Community Benefits Agreements as Tactic of the New Accountable Development Movement. *Journal of Community Practice Journal of Community Practice Journal of Community Practice*, 17(2), 88–106. <https://doi.org/10.1080/10705420902856225>
- Peterson St-Laurent, G., & Le Billon, P. (2015). Staking claims and shaking hands: Impact and benefit agreements as a technology of government in the mining sector. *The Extractive Industries and Society*, 2, 590–602. <https://doi.org/10.1016/j.exis.2015.06.001>
- Petry, M., & Guesnet, L. (2014). A New Compensation System for the Oil Industry in Chad. In L. Guesnet & F. Claudia (Eds.), *Compensation Matters - securing community interests in large-scale investments* (pp. 27–33). Berlin: Bonn International Center for Conversion.
- Pickering, K., Campbell, M., Kita, K., Straatmann, D., Castro, A., Rodriguez, F., ... Bartecchi, D. (2015). *Todos Santos Community Assessment, June-July 2015*. Todos Santos. Retrieved from <https://webcms.colostate.edu/todos-santos-new/media/sites/104/2016/05/Todos-Santos-Community-Assesment-Report-2015.pdf>
- Plott, C. ., & Zeiler, K. (2005). The Willingness to Pay – Willingness to Accept Gap, the 'Endowment Effect,' Subject Misconceptions, and Experimental Procedures for Eliciting Valuations. *American Economic Review*, 95(3), 530–545.
- Price, J. I., Lloyd-Smith, P. R., Dupont, D. P., & Adamowicz, W. L. (2018). Floods and Water Service Disruptions: Eliciting Willingness-to-Pay for Public Utility Pricing and Infrastructure Decisions. *Water Economics and Policy*, 1–20. <https://doi.org/10.1142/S2382624X18500212>
- Reb, J., & Connolly, T. (2007). Possession , feelings of ownership and the endowment effect. *Judgment and Decision Making*, 2(2), 107–114.
- Rowan, M., & Streater, T. (2011). Converting project risks to development opportunities through SIA enhancement measures: a practitioner perspective. *Impact Assessment and Project Appraisal*, 29(3), 217–230. <https://doi.org/10.3152/146155111X12959673796164>
- Rowe, R. D., Schulze, W. D., & Breffle, W. S. (1996). A Test for Payment Card Biases. *Journal of Environmental Economics and Management*, 3, 178–185.

Retrieved from https://ac-els-cdn-com.proxy.lib.sfu.ca/S009506969690039X/1-s2.0-S009506969690039X-main.pdf?_tid=991df340-931b-4584-ace5-364684b9fdf0&acdnat=1526758593_8ed2a57e4aceb6c54a622f16710be159

- Ryan, M., & Watson, V. (2009). Comparing welfare estimates from payment card contingent valuation and discrete choice experiments. *Health Economics*, 18(4), 389–401. <https://doi.org/10.1002/hec.1364>
- Salkin, P., & Lavine, A. (2008). Understanding Community Benefits Agreements: Equitable Development, Social Justice and Other Considerations for Developers, Municipalities and Community Organizations. *UCLA Journal of Environmental Law and Policy*, 26(2), 291–331. Retrieved from <http://escholarship.org/uc/item/8c41d4tj>
- Salvaggio, M., Futrell, R., Batson, C. D., & Brents, B. G. (2014). Water scarcity in the desert metropolis: how environmental values, knowledge and concern affect Las Vegas residents' support for water conservation policy. *Journal of Environmental Planning and Management*, 57(4), 588–611. <https://doi.org/10.1080/09640568.2012.756806>
- Samuelson, W., & Zeckhauser, R. (1988). Status quo bias in decision-making. *Journal of Risk and Uncertainty*, 1(1), 7–59. <https://doi.org/10.1007/bf00055564>
- Sarkar, S., Gow-Smith, A., Morakinyo, T., Frau, R., & Kuniholm, M. (2010). *Mining community development agreements - practical experiences and field studies. Final report for the World Bank Environmental Resources Management (EMR) Ltd.*
- Sayman, S., & Öncüler, A. (2005). Effects of study design characteristics on the WTA–WTP disparity: A meta analytical framework. *Journal of Economic Psychology*, 26, 289–312. <https://doi.org/10.1016/j.joep.2004.07.002>
- Schafrik, S., & Kazakidis, V. (2011). Due diligence in mine feasibility studies for the assessment of social risk. *International Journal of Mining, Reclamation and Environment*, 25(1), 178–186. <https://doi.org/10.1080/17480930.2010.531587>
- Shackley, P., & Dixon, S. (2000). Using contingent valuation to elicit public preferences for water fluoridation. *Applied Economics*, 32(6), 777–787. <https://doi.org/10.1080/000368400322408>
- Sheikh, N. (2008). Community Benefits Agreements: Can Private Contracts Replace Public Responsibility? *Cornell Journal of Law and Public Policy*, 18(1), 223–246. Retrieved from <http://scholarship.law.cornell.edu/cjlp>
- Siebenmorgen, P. (2009). *Developing an Ideal Mining Agenda: Impact and Benefit Agreements as Instruments of Community Development in Northern*

Ontario. University of Guelph. Retrieved from <http://www.cbern.ca/content/uploads/sites/4/2016/03/Developing-An-Ideal-Mining-Agenda-Impact-and-Benefit-Agreements-as-Instruments-of-Community-Development-in-Northern-Ontario.pdf>

Smith, R. D. (2006). It's not just what you do, it's the way that you do it: The effect of different payment card formats and survey administration on willingness to pay for health gain. *Health Economics*, 15(3), 281–293. <https://doi.org/10.1002/hec.1055>

Söderholm, P., & Svahn, N. (2015). Mining, regional development and benefit-sharing in developed countries. *Resources Policy*, 45, 78–91. <https://doi.org/10.1016/j.resourpol.2015.03.003>

Sprenger, C., Crawford, V., Eil, D., Gill, D., Laibson, D., & Donoghue, T. O. (2015). An Endowment Effect for Risk : Experimental Tests of Stochastic Reference Points. *Journal of Political Economy*, 123(6), 1456–1499.

Stamieszkin, K., Wielgus, J., & Gerber, L. R. (2009). Management of a marine protected area for sustainability and conflict resolution: Lessons from Loreto Bay National Park (Baja California Sur, Mexico). *Ocean and Coastal Management*, 52(9), 449–458. <https://doi.org/10.1016/j.ocecoaman.2009.07.006>

Steinitz, C., Faris, R., Vargas-Moreno, J. C., Huang, G., Lu, S.-Y., Arizpe, O., ... Lopez, C. (2005). *Alternative Futures for the Region of Loreto, Baja California Sur, Mexico*. Cambridge. Retrieved from https://irsc.sdsu.edu/docs/pubs/Loreto_AlternativeFutures_Report_2005.pdf

Teschner, B. (2013). How you start matters: A comparison of Gold Fields' Tarkwa and Damang Mines and their divergent relationships with local small-scale miners in Ghana. *Resources Policy*, 38(3), 332–340. <https://doi.org/10.1016/j.resourpol.2013.03.006>

Tetreault, D. (2016). Free-Market Mining in Mexico. *Critical Sociology*, 42(4–5), 643–659. <https://doi.org/10.1177/0896920514540188>

Thaler, R. (1980). Towards a Positive Theory of Consumer Choice. *Journal of Economic Behavior and Organization*, 1(1), 39–60.

Thomas, V. L., Yeh, M., & Jewell, R. D. (2015). Enhancing valuation: The impact of self-congruence with a brand on the endowment effect. *Journal of Behavioral and Experimental Economics*, 58, 178–185. <https://doi.org/10.1016/j.socec.2015.05.009>

Toledo, V., Garrido, D., & Barrera-Bassols, N. (2015). The Struggle for Life Socio-environmental Conflicts in Mexico. *LATIN AMERICAN PERSPECTIVES*, 204(5), 133–147. <https://doi.org/10.1177/0094582X15588104>

- TSD. (n.d.). Loreto Bay. Retrieved from <http://www.tsd.ca/projects/loretobay/>
- Tunçel, T., & Hammitt, J. K. (2014). A new meta-analysis on the WTP/WTA disparity. *Journal of Environmental Economics and Management*, 68, 175–187. <https://doi.org/10.1016/j.jeem.2014.06.001>
- Tversky, A., & Kahneman, D. (1991). Loss Aversion In Riskless Choice: a Reference-dependent model. *The Quarterly Journal of Economics*, 106(4), 1039–1061. Retrieved from http://www3.uah.es/econ/MicroDoct/Tversky_Kahneman_1991_Loss_aversion.pdf
- Vasquez, W. F., Franceschi, D., & Van Hecken, G. T. (2011). Household preferences for municipal water services in Nicaragua. *Environmental and Development Economics*, 17, 105–126. <https://doi.org/10.1017/S1355770X11000234>
- Vásquez, W. F., Mozumder, P., Hernández-Arce, J., & Berrens, R. P. (2009). Willingness to pay for safe drinking water: Evidence from Parral, Mexico. *Journal of Environmental Management*, 90, 3391–3400. <https://doi.org/10.1016/j.jenvman.2009.05.009>
- Villegas, A. (2007). FONATUR and Sustainable Development in Loreto. In P. Ganster, O. Arizpe, & A. Ivanova (Eds.), *Lotero: The Future of the First Capital of the Californias* (pp. 221–234). San Diego: San Diego State University Press.
- Whitehead, J. (2006). A practitioner's primer on the contingent valuation method. In A. Alberini & J. Kahn (Eds.), *Handbook on Contingent Valuation* (pp. 66–91). Northampton: Edward Elgar Publishing Inc.
- Whitehead, J., & Blomquist, G. (2006). Analysis, The use of contingent valuation in benefit cost Title. In A. Alberini & J. Kahn (Eds.), *Handbook on Contingent Valuation* (pp. 92–115). Northampton: Edward Elgar Publishing Inc.
- Whittington, D., Adamowicz, W., & Lloyd-Smith, P. (2017). Asking Willingness-to-Accept Questions in Stated Preference Surveys: A Review and Research Agenda. *Annual Review of Resource Economics*, 9, 317–336. <https://doi.org/10.1146/annurev-resource>
- Willig, R. D. (1976). Consumer 's Surplus Without Apology. *American Economic Review*, 66(4), 589–597.
- Wolf-Powers, L. (2010). Community Benefits Agreements and Local Government: a review of recent evidence. *Journal of the American Planning Association*, 76(2), 141–159. <https://doi.org/10.1080/01944360903490923>
- Yang, S.-H., Hu, W., Mupandawana, M., & Liu, Y. (2012). Consumer Willingness to Pay for Fair Trade Coffee: A Chinese Case Study. *Journal of Agricultural*

and Applied Economics. <https://doi.org/10.1017/S1074070800000146>

Zong, J., & Knetsch, J. L. (2013). Valuations of Changes in Risks: the Reference State and Evidence of Differences Between the Measures. *Singapore Economic Review*, 58(1), 1–15. <https://doi.org/10.1142/S021759081350001X>

Appendix A: State Map of Loreto, BCS



Source: mexconnect.com

Appendix B: Municipal Map of Loreto



PLANO DE LOCALIDAD URBANA
 ENTIDAD: Baja California Sur (BS)
 MUNICIPIO: Loreto (038)
 LOCALIDAD: Loreto (0001)

LEGENDA

LINEA DE BARRIO (LÍNEA DE BARRIO)
 LINEA DE BARRIO (LÍNEA DE BARRIO)
 LINEA DE BARRIO (LÍNEA DE BARRIO)
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BOCCA DE ARMADO

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 0 10 20 30 40 50 60 70 80 90 100

ADVERTENCIA
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Appendix C: Household Survey

Survey ID :		Date :	
Surveyor ID :		Version:	

Loreto Water Use and Development Survey

A. Information About Yourself

Thank you for your participation. To begin, I am going to ask you some questions about yourself and your household

- A1. What is your gender? F M
- A2. Are you the head of Household? Yes [If 'Yes', go to A4] No
- A3. If "no", what is your relation to the head of the household? _____
- A4. Age? _____ years
- A5. How many years have you lived in Loreto? _____ years
- A6. How many people reside in your household at least 6 months of the year?
_____ people
- A7. Of these, how many are non-working dependents (children, seniors or infirm)? _____ people
- A8. What is your marital status? Married Widowed Single
 Divorced Common Law
- A9. What is the highest level of schooling you have completed?
 None High-school Other Training:
 Elementary College or University _____
 Middle-school Post-graduate degree (Years : _____)

B. Household Water Use and Management

I am now going to ask you some questions about your normal household water use.

- B1. How does the reliability of the municipal piped water service compare to 5 years ago?
 It's Better It's about the same It's worse Unsure

- B2.** Do you feel that you can count on sufficient municipal piped water in your home? Yes No
- B3.** When interruptions occur, do you receive advanced notice?
 Always Sometimes Never
- B4.** In a typical month, how often is your municipal piped water service disrupted? Days/month: _____
- B5.** How do you meet your household non-consumption water needs when the municipal water service is interrupted? [*Check all that apply*]
 Purchased Water Cistern Other:
 Water Truck Household *Tinaco* _____
- B6.** What do you dislike most about interruptions to your municipal piped water supply? _____
- B7.** Do you conserve municipal piped water in the home?
 Always Sometime Never
- B8.** How many complete bathrooms does this home have? _____ bathrooms
- B9.** Does this home use an active water meter, that is checked on a monthly basis? Yes No

C. Contingent Valuation Question

First, I will share some facts about tourism development & water in Loreto:

Tourism development generates income for residents of Loreto. Since tourism is the principal economic activity in the municipality, Loreto was designated a *Pueblo Magico* in 2012 to encourage further tourism activity. At the same time, tourism development may also increase the demand for freshwater. Recall, it's expected that Loreto's freshwater demand will increase with population growth alone.

Now, I will describe a hypothetical scenario based in Loreto's water context. At the end, I will as you a question about it. I would appreciate it if your answers are as truthful as possible. As well, I ask that you judge the costs and benefits of the scenario in relation to your household's present circumstances.

C1. WTP_{CV}

Suppose a tourism development is proposed in future, and that the developer will supply their water independently of Loreto's by building a desalination plant. Assume the tourism developer offers to build a larger desalination plant than it needs and plans to supply the surplus water to Loreto's municipal piped water system. Due to the large investment required, this project will only move forward if Loreto residents are willing to contribute part of the initial investment through a shared-cost arrangement. Assume the developer will move forward with the

desalination plant if at least half the residents of Loreto agree to pay an additional charge on their monthly water bill.

If the proposed tourism and water project proceed, Loreto residents would have access to more water supply. This increase will equal 1 additional day of water per month on average for a typical household from the municipal piped water system. For example, if a typical home experiences 2 days on average of municipal piped water service interruptions per month, they would now only experience 1 day of interruptions. **To obtain this improvement, what is the maximum amount you would be willing to pay, as an increase in your monthly water bill, for the proposed project to increase the municipal piped water availability to a typical home for an additional day each month?**

[Present the participant with the payment card] **Please state the maximum amount you are willing to pay, not what you think is reasonable. This amount will be added to your monthly water bill. Please recall this amount will then not be available for other household needs.**

<\$10 pesos	\$15 pesos	\$30 pesos	\$65 pesos	\$110 pesos	\$165 pesos	>\$230 pesos
-------------	------------	------------	------------	-------------	-------------	--------------

A. If [$>$ \$230 pesos] selected: _____ | B. IF [$<$ \$10 pesos] selected: _____

C. If [0] is selected ask why: _____

C2. WTA_{cv}

Suppose a tourism development is proposed **in future**, and that the developer will supply their water independently of Loreto's by building a desalination plant. A review of the project reveals the plant cannot be built due to Loreto Bay Marine Park regulations. Instead, the tourism developer will need to access their water supply from the same water source used by Loreto. The Impact to Loreto's water supply would equal 1 less day of water per month for a typical household per month from the municipal piped water system. For example, if a typical home experiences 2 days on average of municipal piped water service interruptions per month, they would now experience 3 days of interruptions.

In response, the tourism developer proposes to establish and manage a fund to compensate residents of Loreto. The fund would be used to apply a discount directly to your water bill each month. This strategy would distinguish Loreto from similar communities whose development has not resulted in compensation to residents from development impacts. If the total sum of discounts each month indicated by Loreto residents does not exceed the total allocated to the compensation fund, the strategy will be carried out. **To accept the reduction, what is the minimum you would be willing to accept, as a discount in your monthly water bill, if the proposed project decreases the municipal water availability to a typical home, by one additional day per month?**

[Present the participant with the payment card] **Please state the minimum amount you are willing to accept, not what you think is reasonable. This**

amount will be discounted from your monthly water bill and is not limited by the amount you currently pay.

C3. WTA_{EV}

Suppose that tourism development has occurred already and the developer is accessing its water supply from Loreto's same water source. Loreto residents now have access to a lower supply of water. The impact has been equal to 1 less day of supply per month for a typical household from the municipal piped water system. For example, if a home experienced 2 days on average of municipal piped water interruptions per month before the project, they now experience 3 days of service interruptions. In response, the developer proposes to supply its water independently by building a desalination plant to supply additional water to Loreto and return to the original level of service reliability. A review of the project reveals the plant cannot be built due to Loreto Bay Marine Park regulations.

Instead, the tourism developer proposes to establish and manage a fund to compensate residents of Loreto. The fund would be used to apply a discount directly to your water bill each month. This strategy would distinguish Loreto from similar communities whose development has not resulted in compensation to residents from development impacts. If the total sum of discounts each month indicated by Loreto residents does not exceed the total allocated to the compensation fund, the strategy will be carried out. **To forego this improvement, what is the minimum you would be willing to accept, as a discount in your monthly water bill, given that the project will be unable to return you municipal piped water supply to its previous levels and a typical home will continue to have one less day of water supply per month?**

[Present the participant with the payment card] Please state the minimum amount you are willing to accept, not what you think is reasonable. This amount will be discounted from your monthly water bill and is not limited by the amount you currently pay.

C4. WTP_{EV}

Suppose that tourism development has occurred already, and the developer is accessing its water supply from Loreto's same water source. Prior to the tourism development Loreto residents had greater availability of municipal piped water due to investments made in to maintain Loreto's water infrastructure. Thanks to these investments, the improvement in water availability from the municipal piped water system was equal to 1 additional day of supply per month for a typical household. For example, if a typical home experienced 2 days on average of municipal piped water service interruptions per month, they would now only experience 1 day of interruptions.

With the project's additional water demand, water service reliability will return to *previous* levels. To prevent this, the developer offers to build a larger desalination plant than it needs and plans to supply the surplus water to Loreto's municipal piped water system. Due to the large investment required, this project will only move forward if Loreto residents are willing to contribute part of the initial investment through a shared-cost arrangement. Assume the developer will move

forward with the desalination plant if at least half the residents of Loreto agree to pay an additional charge on their monthly water bill. **To avoid a reduction in the service, what is the maximum amount you would be willing to pay, as an increase in your monthly water bill, for this project to maintain water service availability at the current level so that a typical home with continue to have an additional day of water supply per month on average?**

[Present the participant with the payment card] **Please state the maximum amount you are willing to pay, not what you think is reasonable. This amount will be added to your monthly water bill. Please recall this amount will then not be available for other household needs.**

- C5.** How sure are you that you would pay/accept the amount?
 Definitely Sure Probably Sure
- C6.** Do you believe participants will answer the scenario question honestly?
 Yes No

D. Information Networks

Now I will ask you about your access to information in Loreto.

- D1.** Have you been a member or volunteer of any Loreto organization or group?
 Yes No
- D2.** Generally, do you participate in community events, project or meetings that take place in Loreto?
 Always Sometimes Never

Now I will ask you about your access to information. The available responses are *very, somewhat, not at all, and unsure.*

	Very	Somewhat	Not at all	Unsure
D3. Is it easy for you to find information about the future tourism development of Loreto?				
D4. Do you feel informed about potential impacts that tourism development in Loreto could have?				
D5. Would you be willing to attend an information meeting about Loreto's future tourism development?				

- D6.** Do you feel that people from the Loreto community can be trusted?
 Generally Yes Somewhat Generally No Unsure
- D7.** Do you feel that people from outside the Loreto community can be trusted?
 Generally Yes Somewhat Generally No Unsure

D8. Did you vote in the last municipal election? Yes No N/A

E. Attitudes Towards Tourism Development and Water

Now, I would like to ask you about your attitudes towards tourism development in general.

E1. How important is it for you that tourism be development compared to ranching and agriculture, which are also key economic activities of the region? Is tourism:

- Much more important Somewhat more important
 Not as Important Unsure

Tourism development may be realized in various forms. Please state how supportive you are of each of the following 3 potential projects being developed in your community. The available responses here are *very in favor, somewhat in favor, not at all in favor, and unsure*.

Scale of Development	Very in favor	Somewhat in favor	Not at all in favor	Unsure
E2. Small-scale nature-based tourism development, such as ecotourism				
E3. The development of small hotels and residences within the community				
E4. The development of large-scale hotel resorts and traditional tourism projects				

Tourism development can have a number of impacts on surrounding communities. To explore these, you may answer *very good, somewhat good, somewhat bad, bad and unsure* in this next section.

E5. How would tourism affect Loreto's economy (such as job opportunities)?
 Very Good Somewhat Good Somewhat Bad Very Bad Unsure

E6. How would tourism affect Loreto's culture (such as community cohesion and traditions)?
 Very Good Somewhat Good Somewhat Bad Very Bad Unsure

E7. How would tourism affect Loreto's environment (including the marina, esters and mangroves)?
 Very Good Somewhat Good Somewhat Bad Very Bad Unsure

E8. How would tourism affect Loreto's water resources (such as underground aquifers)?
 Very Good Somewhat Good Somewhat Bad Very Bad Unsure

To manage potential impacts from tourism development, a Community Benefit Agreement can be established between local communities and developers. These agreements are negotiated between both parties and refer to a legal contract outlining actions with respect to the social, environmental and economic impacts of a project. Community Benefit Agreements typically establish a community fund into which the developer contributes to be invested in local projects for the benefit of host communities. For example, Loreto entered into a similar agreement with Loreto Bay to allocate 1% of revenues from house sales to a trust fund to finance projects in Loreto.

- E9. Were you familiar with the concept of a Community Benefit Agreement?
 Yes No

If "YES" Ask for an example:

- E10. Given the opportunity, which of the following groups do you think are best suited to be in charge of Community Benefit Agreement negotiations for Loreto? [**Select all that apply**]

- Municipal, state or federal government bodies
- Private business from Loreto
- Community Groups
- Private business from outside Loreto
- Newly established cooperatives
- Other: _____

- E11. What is your expectation that a Community Benefit Agreement pursued in Loreto would result in fair outcomes for the community?

- Very High High Low Very Low Unsure

Why do you have this expectation?

Now, I will ask about your attitudes towards the environment in general. Please indicate how strongly you agree with the following statements. The available responses are *strongly agree*, *agree*, *disagree*, *strongly disagree*, and *unsure*.

	Strongly Agree	Agree	Disagree	Strongly Disagree	Unsure
E12. Access to natural resources (such as water) should be protected for future generations.					
E13. Risk of harm to the environment is justified if the benefits of development are high					
E14. The balance of nature is easily affected					
E15. Humans have the right to modify their environment to support their livelihoods					

F. Household Livelihood

Finally, I am going to ask you about your livelihood activities in the last 12 months.

F1. What were the main sources of income for you and members of your household in the last 12 months (that is, since last June)? [**Check all that apply**].

Employment Activity	Yourself	Household Members
Agriculture & Ranching		
Fishing & Aquaculture (commercial)		
Manufacturing Industry (fish processing)		
Construction & Transportation		
Commerce and services (not related with tourism i.e., retail)		
Tourism and related (hotel, restaurant, recreational/sports fishing)		
Government (Including schools, police, utilidades, correo)		
Non-governmental organization		
Remittances from other family members		
Other - please specify:		

- F2.** How much income did you earn from the above employment activities in the last 12 months? [***please choose a range***]
- | | |
|--|--|
| <input type="checkbox"/> less than 10,000 pesos/year | <input type="checkbox"/> 30,001 - 40,000 pesos/year |
| <input type="checkbox"/> 10,001 – 20,000 pesos/year | <input type="checkbox"/> 40,001 - 50,000 pesos/year |
| <input type="checkbox"/> 20,001-30,000 pesos/year | <input type="checkbox"/> More than 50,001 pesos/year |

- F3.** In a typical month, what is your average monthly water bill? _____\$/month
Is it a:
- | | |
|--|--|
| <input type="checkbox"/> Fixed Bill | <input type="checkbox"/> Truly Metered |
| <input type="checkbox"/> If a discount is applied, please state it _____ | |

Appendix D: Screening Criteria

Participant Validation⁴⁵

- S1.** Are you of age? Yes No
- S2.** Are you a permanent resident of this home? (*That means you have lived here for longer than a 6-month period*)
 Yes No

[If "No", return when a permanent resident is available]

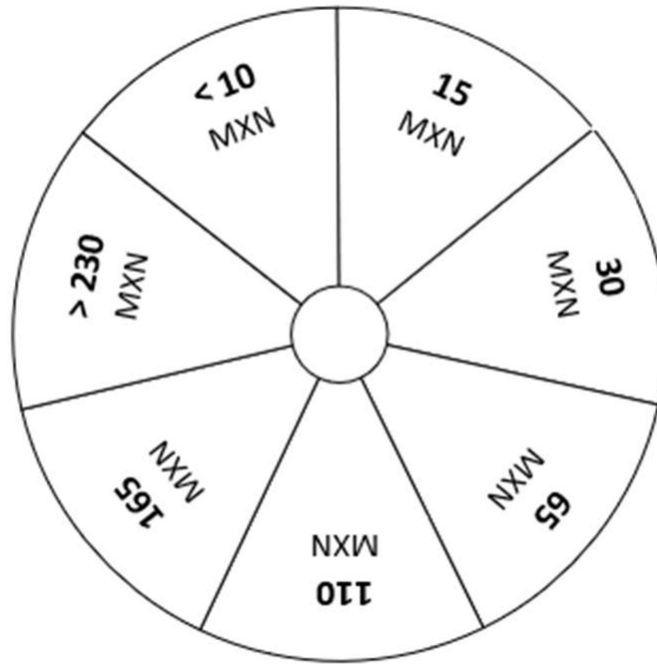
- S3.** Are you up to date on your monthly water bill payments ?
 Yes No [If "Yes", continue with the survey]

[If you are occupied, but wish to participate another time, please indicate when:

_____]

⁴⁵ If participants did not meet the screening criteria, they were thanked for their time and the surveyor moved on to the next home in the *manzana*

Appendix E: Circular Payment Card



Appendix F: Maximum Likelihood Estimation Approach

Cameron and Huppert (1989) contrast a commonly used approach that uses the midpoint of a payment card interval against one that uses maximum likelihood (ML) estimation techniques. The authors recommend the latter strategy citing gains in efficiency. ML techniques derive estimates of mean and median stated values from interval regression techniques that maximize log-likelihood functions best suited to lognormally transformed payment card data.⁴⁶ Interval regressions provide optimized values of the unknown parameters β and σ . Using estimated parameters that best suit the data, the average of the model predicted values can be obtained for the lognormal dependent variable ($\log Y$) and transformed back into the estimated conditional distribution of the dependent variable of interest (Y) as follows:

- (A) $\chi_i\beta$ - yields conditional means of the ($\log Y$) distribution for any given vector of χ variables;
- (B) $\exp(\chi_i\beta)$ –yields the median of the conditional distribution of Y ; and
- (C) $\exp(\chi_i\beta)*\exp(\sigma^2/2)$ –yields the mean of the Y distribution by scaling the conditional median (above) with an estimated constant equal to $\exp(\sigma^2/2)$, where σ is an unbiased estimate of the population error variance; by design ML likelihood estimation techniques rely on assumptions about the “ σ ” parameter.

See: Shackley and Dixon (2000), Griffin and Mjelde, (2000), Moon et al. (2007), O’Shea et al. (2008), Del-Saz Salazar (2009) and Lindheim & Navrud (2011) for a similar approach.

⁴⁶ As the logarithm of true WTP and WTA is assumed to be normally distributed, it follows that bid amounts have a lognormal distribution. Consequently, the various limits needed for estimation purposes are the natural logarithms of the payment card amounts (Brox 2003).

Appendix G: OLS Regression Results

OLS Regressions							
	WTP _{CV}	WTA _{CV}	WTA _{EV}	WTP _{EV}	EV	CV	Full
Constant	1.987*** (0.454)	1.299*** (0.435)	2.520*** (0.356)	1.657*** (0.264)	1.963*** (0.223)	1.423*** (0.327)	1.757*** (0.187)
WTA	-	-	-	-	0.089 (0.081)	0.137 (0.101)	0.113* (0.064)
FEMALE	0.039 (0.139)	0.108 (0.159)	-0.116 (0.125)	0.086 (0.113)	0.006 (0.083)	0.173 (0.108)	0.060 (0.067)
AGE	-0.009* (0.005)	0.007 (0.005)	-0.006 (0.004)	-0.013*** (0.003)	-0.009*** (0.003)	-0.000 0.003	-0.005** (0.002)
HEAD	-0.200 (0.182)	-0.407** (0.174)	-0.108 (0.164)	0.384*** (0.135)	0.124 (0.105)	-0.269** (0.126)	-0.087 (0.080)
INCOME	0.132 (0.158)	-0.081 (0.163)	-0.090 (0.140)	0.253** (0.121)	0.127 (0.091)	0.261 (0.118)	0.099 (0.074)
HHSIZE	-0.143** (0.055)	0.058 (0.052)	-0.013 (0.050)	0.037 0.033	0.012 0.029	-0.021 (0.037)	-0.008 (0.023)
TOURISM	-0.180 (0.159)	0.303 (0.203)	0.128 (0.161)	0.293* (0.151)	0.176 (0.107)	0.118 (0.128)	0.108 (0.081)
INFORM	-0.105 (0.176)	0.094 (0.154)	0.006 (0.146)	-0.061 (0.115)	-0.030 (0.092)	0.105 (0.118)	0.013 (0.071)
IMPACT_W	-0.199 (0.131)	-0.030 (0.152)	-0.029 (0.120)	-0.177 (0.116)	-0.009 (0.082)	-0.146 (0.101)	-0.064 (0.065)
IMPORT_S	0.926*** (0.209)	-0.068 (0.202)	-0.362* (0.202)	0.102 (0.156)	-0.131 (0.126)	0.305** (0.151)	0.093 (0.98)
N	57	55	59	56	115	112	227
df	9	9	9	9	10	10	10
R ²	0.425	0.163	0.148	0.424	0.174	0.152	0.084
F-Statistic	3.868	0.975	0.949	3.773	2.201	1.811	2.00
***, **, * ==> Significance at 1%, 5%, 10% level.							

Appendix H: Protest Response Rationale

WTP_{CV}

- Unwilling to pay for desalination water that would be treated (and assumed of lower quality)
- Desalination process will not work, instead will only serve to contaminate the Bay
- Unwilling to pay an increase in monthly water bill

WTA_{CV}

- Not interested in the proposal, would prefer to maintain uninterrupted service
- Proposal is not fair
- Will accept one additional day of interrupted service to the home so long as it is uninterrupted for the rest of the month
- Water has no price – does not wish to relive the water service interruptions that occurred during the development of Loreto Bay residential complex

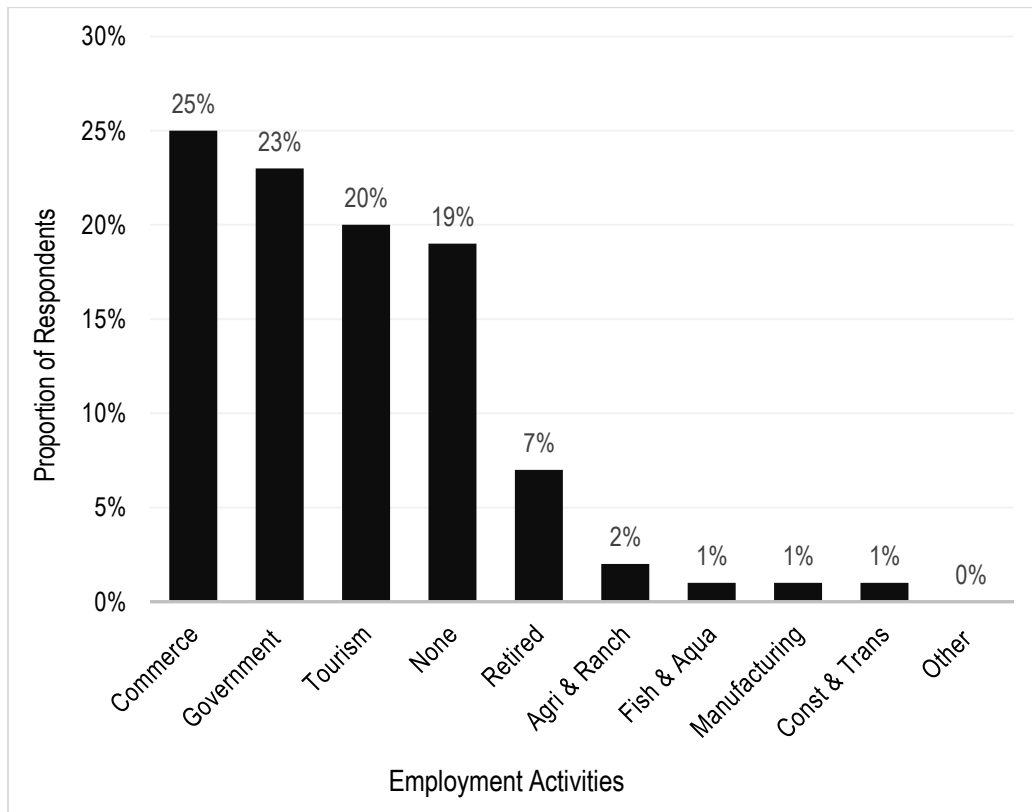
WTA_{EV}

- Tourists consumer more water than residents and are more wasteful with the resource
- Unwilling to accept anything because my water bill is low enough already
- Unwilling to accept 1 additional day of water service interruptions; would prefer to retain that day and create a culture of consciousness around use of the resource

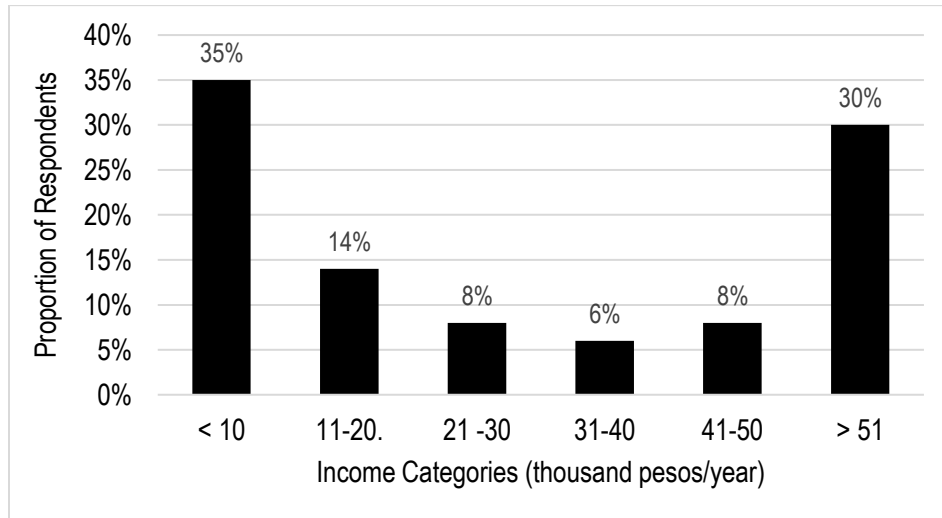
WTP_{EV}

- It is the developer's responsibility to provide funded alternatives, not the responsibility of the residents
- Unwilling to pay for desalination technologies because a dam is preferred

Appendix I: Reported Employment Activities



Appendix J: Reported Income



Appendix K: Demographic statistics of the survey sample

	Frequency	Percent	Cumulative Percent
Gender			
0 = Male	97	39%	39%
1 = Female	151	61%	100%
Head of Household			
0 = Not	69	28%	28%
1 = Head of household	179	72%	100%
Marital Status			
1 = married	107	43%	43%
2 = divorced	14	6%	49%
3 = widowed	14	6%	54%
4 = common law	43	17%	72%
5 = single	69	28%	100%
Education			
1 = none	7	3%	3%
2 = elementary	33	13%	16%
3 = secondary	47	19%	35%
4 = high school	69	28%	63%
5 = university	85	34%	97%
6 = graduate	7	3%	100%
Employment			
1 = Agri & Ranch	4	2%	2%
2 = Fish & Aqua	4	2%	4%
3 = Manufacturing	2	1%	5%
4 = Const & Trans	3	1%	6%
5 = Commerce	62	25%	31%
6 = Tourism	49	20%	51%
7 = Government	57	23%	74%
8 = Other	0	0%	74%
9 = Retired	18	7%	81%
0 = None	48	19%	100%
Income			
1 = Less than 10,000 pesos/year	85	34%	34%
2 = 10,001-20,000 pesos/year	34	14%	48%
3 = 20,001-30,000 pesos/year	20	8%	56%
4 = 30,001-40,000 pesos/year	16	6%	63%
5 = 40,00-50,000 pesos/year	19	8%	70%
6 = 50,001 + pesos/year.	74	30%	100%

Appendix L: χ^2 test results of differences in the socio-demographic characteristics of each sub group

χ^2 test of Demographic Characteristics by sub sample

Variable	Independent Sub Samples					Pooled Sub Samples		
	C1 ¹	C2 ¹	C3 ¹	C4 ¹	<i>p-value</i>	WTA ²	WTP ²	χ^2
HEAD (%)	73.7	65.5	81.4	66.1	(.19)	73.7	69.9	(.52)
GENDER (%)	36.8	36.4	45.8	33.9	(.57)	41.2	35.4	(.36)
M (%)	52.6	56.4	59.3	67.9	(.40)	57.9	60.2	(.72)
EDU2 (%)	14.0	10.9	16.9	16.1	(.81)	14.0	15.0	(.82)
INCOME (%)	42.1	52.7	62.7	44.6	(.11)	57.9	43.4	(.03*)
TOURISM (%)	26.3	16.4	18.6	16.1	(.47)	17.5	21.2	(.48)

*1 = 3 degrees of freedom used in the χ^2 test

*2 = 1 degree of freedom used in the χ^2 test

ANOVA analysis of Demographic Characteristics by Welfare Question

Variable	C1	C2	C3	C4	ANOVA	WTA	WTP	ANOVA
AGE (mean)	43.7	44.9	44.3	41.1	(.67) <i>F-stat: .51</i>	44.5	42.5	(.33) <i>F-stat: .92</i>
DEPS (mean)	1.8	1.5	1.5	1.7	(.43) <i>F-stat: .90</i>	1.5	1.7	(.10) <i>F-stat: 2.7</i>

Appendix M: Crosstabulation of Expectations of Negotiated Agreement Outcomes and Reasons for a States Expectation

	Lacks Information	Optimistic	Lacks Experience	Negative Experience	Other	Positive Experience	Total
Very High	1 (0%)	24 (10%)	1 (0%)	2 (1%)	4 (2%)	2 (1%)	34 (14%)
High	5 (2%)	69 (28%)	2 (1%)	12 (5%)	13 (5%)	9 (4%)	110 (44%)
Low	2 (1%)	1 (0%)	4 (2%)	24 (10%)	7 (3%)	0	38 (15%)
Very Low	0	0 (0%)	2 (1%)	3 (1%)	2 (1%)	0	7 (3%)
Unsure	17 (7%)	1 (0%)	10 (4%)	5 (2%)	26 (10%)	0	59 (24%)
Total	25 (10%)	95 (38%)	19 (8%)	46 (19%)	52 (21%)	11 (4%)	248

Appendix N: Aggregate monthly estimates of WTP_{CV} , WTA_{CV} , WTA_{EV} , WTP_{EV} for a 1-day change to the reliability of the municipal household water supply using ML means

Estimates of Aggregate Monthly Values		
	Estimate based on 18,912 residents	Estimate based on 5,975 homes
WTP_{CV}	\$ 942,196	\$ 297,675
WTA_{CV}	\$ 1,036,378	\$327,430
WTA_{EV}	\$ 1,037,134	\$327,669
WTP_{EV}	\$ 914,206	\$288,832