PROTECTED AREAS GOVERNANCE IN BELIZE:

A TRIPLE BOTTOM LINE EVALUATION AND DECISION ANALYSIS

By

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EXECUTIVE SUMMARY

In 2005, Belize adopted the National Protected Areas Systems Plan (Meerman & Wilson, 2005), which outlines ecological monitoring and resource management goals for the 18% of the country that is designated as protected lands. The National Protected Areas Systems Plan, while comprehensive in terms of resource management, fails to recognize the challenges and opportunities related to the potential social and economic impacts of ecotourism, which is becoming increasingly important in Belize. In order to provide the environmental policy makers in Belize with a more holistic view of the impacts of their decisions, this degree project examines protected areas management in two ways:

Conceptual Framework
A review of the literature on protected areas management, the ecotourism industry, and community development provides lessons on how communities in other countries have managed environmental resources, created sustainable livelihoods, and promoted beneficial tourism development.

Decision Analysis
Building on the conceptual framework, a decision analysis explores the magnitude of entrance fees paid at three of Belize's protected areas and the impact of a price increase given the economic, social, and environmental goals of the government level decision makers.

The results of the conceptual framework literature review and the pricing decision analysis confirmed much of the previous literature on protected areas pricing in developing countries, with the main conclusions being:

1) A doubling or quadrupling of fees will likely not result in a loss of revenue or jobs from decreased tourism over the long-term.

2) Charging higher fees can prevent damage to sensitive protected areas by limiting the numbers of tourists who will be willing to pay to access the site.

From these general conclusions, the following recommendations were made to be included in the Belize National Protected Areas Systems Plan:

Policy is needed: Based on information gathered through pricing and capacity research, the government of Belize should implement the following policies: 1) Update the pricing of protected areas; 2) Secure land rights for indigenous communities; and 3) Participate in voluntary carbon markets to earn income for reduced emissions through deforestation.

Research is needed: The government of Belize must determine the demand for tourism at the different sites through willingness to pay surveys as well as the ecological carrying capacity of each site through ecological monitoring. This information will allow for pricing that best captures the true demand while also establishing limits on a site that is at risk of exceeding its carrying capacity.

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INTRODUCTION

In recent years, environmentally oriented tourists, with good intentions and deep wallets, have descended upon Belize to enjoy the pristine coral reefs, the isolated rain forests and the ancient archaeological sites. In a span of less than 15 years, the former banana republic has been transformed into an "off the beaten path" destination seekers dream, bringing a host of new income opportunities to the local people and increased revenue to the government (*Belize Tourism Diagnostics,* 2004). However, as other countries in the region have already experienced, increased tourism does not benefit everyone equally and cruise ships and the related busloads of tourists can have significant negative impacts on environmentally sensitive sites, threatening the quality of the irreplaceable natural and cultural assets of Belize.

In recognition of the role that the natural areas play in the sustainability of the country's future, the leadership in Belize developed plans and goals to assist with the long-term management of the country's protected areas. In 2005, a government-sponsored taskforce, with the assistance of a consultant, released The Belize National Protected Areas Systems Plan (hereafter called the Protected Areas Plan). This plan builds on and consolidates the abundance of plans, reports, and management frameworks that had already been created by various consultants, government agencies, and environmental NGO's in order to lay out an encompassing plan for managing protected areas in Belize. Box 1.1 summarizes the underlying principles and results of this plan.

Box 1.1: Protected Areas Plan

Belize National Protected Areas System Plan

Underlying Principals

- **Ecosystem Approach**: *Integrated management of terrestrial, coastal and marine resources at the scale of functioning ecosystems, which include the human population and its cultural diversity.*
- **Precautionary Principle**: *If the consequences of an action are unknown but there are reasonable grounds to believe they will be negative, then it is better not to carry it out.*
- **Importance of Science:** *Good conservation must be based on sound knowledge provided by scientific work on key processes and influences on terrestrial, coastal and marine ecosystems.*
- **Importance of Local and Indigenous Community Knowledge:** *Draw upon the scientific, technical, and local knowledge of local and indigenous communities.*
- **Monitoring and Evaluation:** *Provide for monitoring and evaluation procedures, in order to assess effectiveness in implementation actions. Allows for adaptive management.*
- **Cost-effectiveness and Efficiency:** *Activities must be cost-effective and efficient. Duplication of effort must be avoided and activities must be harmonized through coordination.*

Results

1. **Formulation of comprehensive protective area policy:** *general policy framework in which the National Protected Areas Systems Plan is to be implemented*
2. **Protected Area System Assessment and Analysis***: assess the present protected area network and assess its characteristics in terms of comprehensiveness.*
3. **Management Procedures and Sustainable Use:** *current administrative and management procedures at system and site level are assessed and improvements are identified.*
4. **Strengthening Management and Monitoring:** *achieve effective protected area management through sound procedures, capacity building, adequate financing, information, and monitoring.*

Source: Meerman and Wilson (2005)

Chapter 1: Introduction

Protected Areas Systems Plan

The responsibility for ensuring the implementation of the Protected Areas Plan is divided between two government officials. The first, the Minister of the Environment, oversees the natural parks and reserves as well as the forest reserves that provide lumber and other resources for the country (Meerman & Wilson, 2005). The second, the Director of the Institute of Archaeology, is housed under the National Institute of Culture and History (NICH) and oversees the Maya[1] monuments and all caves, which because of the abundance of Maya Archeological artifacts uncovered in them, are also considered cultural sites (Belize NICH Website, 2008*).* These two positions manage different types of protected areas that share the characteristics of being significant sources of income through tourism as well as being under threat from overuse. Each of these Ministers must decide how to improve the ways that protected areas are managed in Belize in accordance with the long-term development goals that have been laid out by policy makers and government leaders.

In addition to this internal pressure, the Ministers also face pressure from a network of external stakeholders that have varying perspectives on the purpose and management goals for the protected areas in Belize. The tourism industry, which includes both domestic and international private businesses, is focused on a quality product and good value for customers but might not support restrictive access or a substantial increase in price if it meant a loss of tourism to neighboring countries (Jayawardena, 2002). At the same time, tourism in Belize depends heavily on the ecotourism niche, so the industry as a whole is concerned with the loss of biodiversity and natural beauty because of the impact that it would have on future tourism revenues (*Belize Tourism Sector Diagnostics*, 2004).

International non-governmental organizations (NGO's) also play a key role in environmental decision making in Belize, as several of the largest and most visible protected areas in Belize are cooperatively managed by the Audubon Society and receive funding from Conservation International, two significant names in international environmental issues (Meerman & Wilson, 2005). These international NGO's are mission and constituent driven, and because of this must meet the conservation goals of their donors and larger organizations in establishing a protected area before addressing the potential income that the protected area might provide to a local community through tourism. Because the funding that comes from the international environmental NGO's is vital to the protection and management of Belize's protected areas, these organizations have a strong influence over the environmental policies of the country. Competing against the powerful business interests of the tourism industry and the international environmental NGOs, local communities have the strongest stake in the decisions made by the Ministers on how a protected area is managed but are often the ones with the weakest voice in the final decision (Meerman and Wilson, 2005). Despite having the least influence over

[1] By convention in Mesoamerican/Mayanist studies, the form Maya is used as both a singular and plural noun, and as an adjective- thus, "the Maya civilization" and not "the Mayan civilization", "my life among the Maya" and not "among the Mayas". The exception to this is in the field of linguistics, where Mayan is used, thus: "Mayan languages". It is by no means a hard and fast 'rule' or always observed in the scientific literature, but it is one which is consciously recognized by many in the field, and it is used throughout this paper (From wikipedia guidelines)

protected areas policy, local communities are the ones whose livelihoods are most closely connected to the local resources, whether that is directly through traditional slash and burn farming or resource extraction or indirectly through alternative livelihoods employment in the ecotourism industry.

Research Question

This analysis is focused on the delicate balance between protecting valuable ecosystems in the tropics of Central America, supporting rural communities as they struggle to overcome poverty, and meeting the economic development goals of a small, formally agrarian country. Specifically, this analysis will examine how the primary environmental decision makers in Belize might create protected areas management that meets the social, economic, and environmental goals being promoted by the international community as well as by the national government. This work builds on several key policy recommendations that were highlighted in the Belize National Protected Areas Plan concerning the management of the protected areas and will seek to answer the question:

> *How can the primary environmental decision makers in Belize capture the economic benefits of ecotourism while balancing the social, economic, and environment goals laid out in the National Protected Areas Systems Plan?*

The intended audience for this study is the environmental decision makers in Belize: the Minister of the Environment and the Director of the Institute of Archaeology. In addition, the international NGO's and ecotourism operators that work in Belize and other developing countries will also benefit from the results of this research.

Research Methods

This project will be organized into two parts that when combined will provide a complete picture of protected areas management and environmental decision making in Belize. The first part will be a literature review of the existing research on environmental protection in developing countries, ecotourism in developing countries, and how environmental management and tourism relate to poverty alleviation and community empowerment. The second part will use a decision analysis framework to look at the pricing of protected areas in Belize as an example of a specific policy tool that has the potential to meet the environmental, economic and social goals of the government and the protected areas stakeholders.

Literature Review

In Belize, protected areas management cannot be cleanly separated from ecotourism. Revenue from tourism and the demand for natural areas as ecotourism destinations drive the government to protect rainforests and marine areas. At the same time, addressing poverty and development challenges is strongly tied to both the natural resources of Belize and the tourism industry. This three-way relationship between environmental protection, tourism development, and poverty alleviation must be better understood by the decision makers in Belize before moving forward with protected areas management policies. The current literature and research that will inform

this project can best be understood through a triple bottom line framework, which considers the social and environmental outcomes of a policy or decision in addition to the economic costs and benefits.

The environmental literature focuses on the global environmental issues that a small developing country must consider when developing protected areas policies and examines what the international bodies are doing to promote environmental sustainability in development. Protected areas management and the different forms of governance that developing countries have pursued while protecting fragile natural areas have also received considerable attention in the environmental literature. The economic literature examines the ecotourism industry and the opportunities and risks that have been associated with tourism in developing countries. This section uses several case studies on countries that have experienced high levels of ecotourism and how this has impacted the natural areas in those countries. Finally, the socially focused literature looks at how international development organizations have addressed poverty in less developed countries in a way that preserves the environment and empowers communities through sustainable sources of income.

After examining the environmental, economic, and socially focused literature that pertains to protected areas management and policies in developing countries, the main points are synthesized into a conceptual framework. This framework provides a sense of where these three areas overlap, what research has been done in this area of overlap and what research is still needed. The framework provides a baseline of how the pricing of protected areas, which is the focus of the decision analysis section, can be viewed through the lessons learned from the review of the environmental, economic, and social literature.

Pricing Decision Analysis

Building on the triple bottom line framework developed through the literature review, the protected areas pricing decision analysis uses three protected areas in Belize to demonstrate the economic, environmental, and social impacts of different levels of entrance fees on the protected areas and surrounding communities. The analysis uses a decision tree, which is a sequence of decisions presented in a graphic of nodes and branches that assign values and probabilities to each possible outcome. The three protected areas that are examined result in three different decision trees. For each decision tree, the choices that the decision maker faces are whether to keep the entrance prices at their current levels, whether to double the prices, or whether to quadruple the prices. These choices are based both on pricing levels in other countries in the region and the real costs to the government of Belize of maintaining the protected areas.

The outcomes that result from the pricing decision analysis encompass the possible economic and social implications as well as the possible environmental impacts of each pricing level. The likelihood that these outcomes will occur differs based on economic studies of pricing of ecological tourism destinations and the historic numbers of tourists at the site. For each site, the decision analysis provides an expected value for each entrance price, which allows the decision maker to weigh the different choices against one another and choose the best scenario for each

protected area. The intent for the decision analysis is not only to demonstrate the impacts of entrance pricing at the three specific sites, but also to provide the decision makers with a tool that can be replicated at any of the protected areas in Belize by changing the numbers of tourists and other factors associated with the decision to fit the scenario.

Limitations

Literature on the topics of ecotourism and sustainable development is fairly abundant but like this study is generally limited to case studies of individual experiences rather than taking a wider perspective. The decision analysis is dependent upon economic models that are estimates and uses tourism numbers from Belize that are several years old. The age of the data presents a challenge because of the sensitivity of the tourism industry to changes in the economic climate. Additionally, the impetus for this research is based on the author's personal experience as a Peace Corps volunteer in Belize for two years, and while the analysis strives to be as objective as possible, some biases are to be assumed.

Chapter 2: Background

BACKGROUND

Belize is a small, English-speaking country located on the Caribbean coast of Central America (see appendix A for a political map). It is one of the least populated countries in the world with a total population of around 270,000 and a population density of 28.2 people per square mile (CIA World Factbook, 2008). A former British Colony, Belize gained its independence in 1981 and continues to be a stable democracy and part of the British Commonwealth with a popularly elected parliament and Prime Minister. In this small, essentially private-enterprise economy, tourism is the number one foreign exchange earner followed by exports of marine products, citrus, cane sugar, bananas, and garments (CIA World Factbook, 2008).

Tourism in Belize

Tourism began to gain popularity in the 1990's in Belize, and grew substantially from just 60,000 visitors in 1980 to over 250,000 in 2007 (Pearce, 1984; *Belize Immigration Statistics*, 2008). The two major types of tourism in Belize are overnight tourists and cruise ship passengers. Both categories present distinct opportunities and challenges to policy makers in attempting to procure benefits to communities and to the country as a whole, while preserving the natural environment. Table 2.1 presents the number of tourist arrivals in both overnight and cruise ship tourism.

Table 2.1: Tourist Arrivals in Belize

Overnight tourists by Mode of Arrival	**2003**	**2004**	**2005**	**2006**	**2007**
Air	151,978	162,675	174,636	178,552	183,133
Land	60,154	60,018	54,096	60,207	58,822
Sea	8,442	8,139	7,841	8,550	9,700
Total	220,574	230,832	236,573	247,309	251,655
Day Tourists from Cruises					
Cruise ship passengers	575,196	851,436	800,331	655,929	622,753
Cruise calls into port	315	406	370	295	278

Source: Belize Immigration Statistics (2008)

Most of Belize's tourists arrive via cruise ship, though this number has decreased in the past several years from a peak in 2004. All cruise ship tourists arrive in Belize City, which is centrally located on the coast, and cruise ship tourists spend only the day in Belize on shore-excursions. Shore-excursions are by necessity located within an hour to two-hour drive from the port, meaning that the benefits of cruise-ship tourism are concentrated in the districts of Belize and Cayo. The majority of overnight tourism is also located along the central coast, with most overnight tourists arriving in Belize and then traveling on to the outer cayes (islands). In terms of mode of arrival, those tourists arriving by sea are coming into smaller locations in the southern portion of the country and tend to be lower budget travelers who spend more time at inland destinations (*Belize Tourism Diagnostics*, 2007).

Chapter 2: Background

Tourism in Belize is currently managed by the Belize Tourism Board (BTB), which is a government appointed authority that designs appropriate polices, certifies hotels, and supports tourism development as a whole (BTB Website, March 2009). The Belize Tourism Industry Associate (BTIA) is the private industry advocacy organization that focuses on marketing, capacity building, and policy formation (BTIA Website, March 2009). These two entities work closely together on the overall tourism policy in Belize, but they currently lack representation from rural communities that receive tourists, such as rural Maya villages (*Belize Tourism Diagnostics*, 2007).

With the increase in tourism over the last decade, this industry now represents a substantial proportion of Belize's GDP. According to the World Travel and Tourism Council's 2009 Annual Report, tourism in Belize represented 29.7% of Belize's Gross Domestic Product (GDP) with the contribution to GDP expected to rise from US $434.6 million in 2009 to 31.1% of the GDP (US $794.3 million) by 2019. This places Belize at first out of 19 countries in Latin America and sixteenth in the world in terms of share of tourism to the national economy, relative to size. The contribution of the travel and tourism economy to employment is expected to rise from 36,000 jobs in 2009, (29.8% of total employment) to 51,000 jobs, (31.3% of total employment) by 2019 (World Travel & Tourism Council, 2009). Table 2.2 demonstrates the growth trends in the travel and tourism sector from 2002 to 2006.

Table 2.2: Tourism Expenditure & Employment

	2002	2003	2004	2005	2006
Tourist Expenditure (in millions US$)	132.8	155.7	172.7	174.7	199.4
Employment (hotels & restaurants)	6,466	6,453	7,108	8,722	8,878
Employment in Tourism	7,972	8,315	11,062	12,865	13,198
GDP of Belize (in million US$)	1,849	1,974	2,071.2	2,214.4	2,372.0
Tourism Expenditures as % of GDP	14.4	15.8	16.7	15.8	16.8

Source: Belize Central Statistics (2006)

Development Goals

Despite substantial gains in the numbers of tourists visiting Belize and a subsequent rise in tourism related employment and income, poverty, low levels of education and lack of basic services are still are a problem in many parts of the country. The 2004 Human Development Report (HDR) for Belize reports that 33.5% of the population was still living in poverty with residents of the most rural of the six districts, Toledo, being 3 times more likely to be living in poverty (79% compared to 24.5% for the rest of the country). Table 2.3 shows tourism arrivals by district alongside the indigence rate of each district.

Table 2.3: Indigence rates and tourism numbers by district

District	2007 Overnight Tourism Arrivals	Indigence Rate[2]
Belize	183,133	24.5
Cayo	36,267	41
Corozal	22,555	26.7
Stann Creek	740	26.5
Toledo	8,960	57.6
Orange Walk	N/A	24.9

Source: Belize Tourism Statistics, Poverty Indicators (2006)

The Belize HDR progress report, which measures Belize's progress towards achieving the UNDP Millennium Development Goals, identifies three main pillars that Belize must address in a poverty-reduction policy:

1) Sustained macro-economic growth;
2) Increased access to basic services; and
3) The protection of the most vulnerable groups

In formulating policies that support the creation of community-based tourism and increases the capacity of rural communities to benefit from increased tourism, the environmental decision makers must keep in mind these overall development goals of Belize.

Protected Areas Management

Belize's natural areas are considered its greatest asset, both in terms of the monetary value of tourism and extractive industries as well as in terms of less tangible ecosystem services values (FAO, 2009). Based on a limited range of environmental assets (subsoil assets, timber, non-timber forest resources, cropland, pastureland and protected areas), the World Banks estimates that the per capita value of Belize's natural capital is $ 6,950, making up 13% of the total wealth of the country (World Bank, 2006). The natural capital of Belize contributes to the economic benefits derived from entrance fees charged to tourists, so the management of tourism is closely related to the management of the protected areas in many cases.

The protected areas system comprises national parks, nature reserves, wildlife sanctuaries, natural monuments, forest reserves, marine reserves, archaeological sites and archaeological reserves and are managed by different government agencies including the Ministry of Natural Resources, the Forest Department, and the Institute of Archaeology (see Appendix B for a map of Belize Protected Areas). Table 2.4 breaks down the size and percentage of total protected areas of each type of area in Belize. Currently, tourism dollars contribute directly to the management of these protected through the Protected Areas Conservation Trust (PACT Belize, 2006). The trust is primarily financed from the collection of a conservation fee of BZ$7.50 paid in by visitors to the country upon their departure and a 20% commission of the cruise ship

[2] Indigence is defined as the inability to meet the minimum cost of energy requirements necessary for healthy existence. Belize 2004 Millenium Development Goals Report.

passenger head tax. Additionally, PACT can also collect 20% commission of all recreation related license fees and concession fees on protected areas. An independent government agency, PACT is an environmental trust fund serving and enabling an empowering role in the conservation, preservation, enhancement, and management of Belize's natural resources and protected areas (PACT Website, 2009). PACT provides grants and training to rural communities that would like to develop tourism, but the organization is small compared to the capacity needs of rural communities and lacks strong government policies to support effective community-based tourism initiatives (Meerman & Wilson, 2005).

Table 2.4: Belize Protected Reserves by Type

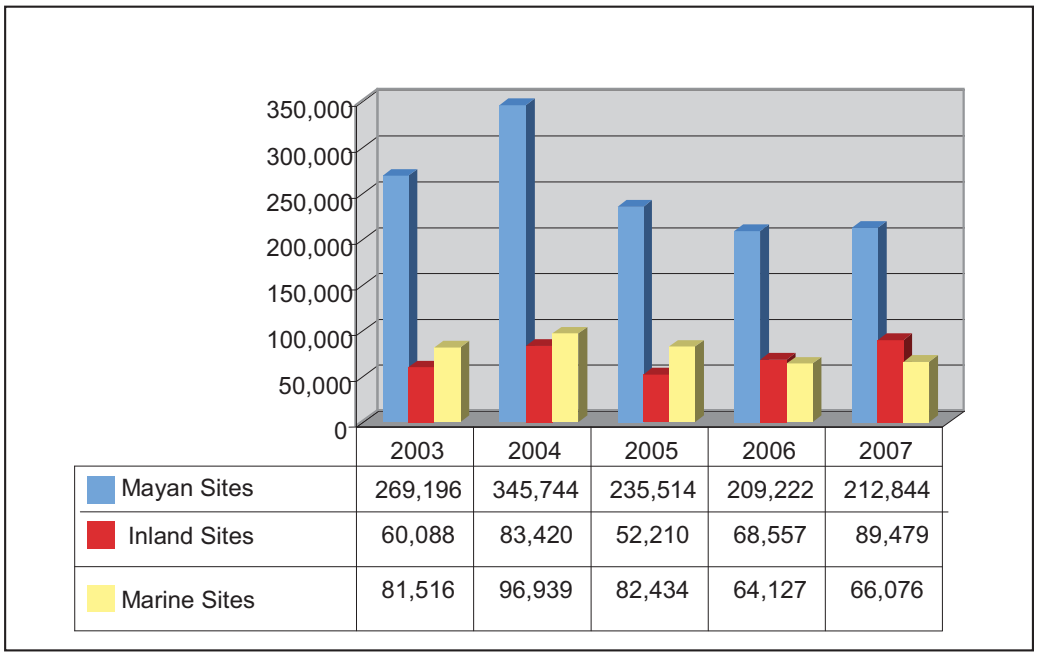
Category	Status	#	Acres (approx.)	Hectares (approx.)	%
Conservation Management Categories	Marine Reserves (incl. Spawning Aggregations)	11	26,595	10,763	0.19
	National Parks	16	410,536	166,138	2.92
	Natural Monuments	5	17,382	7,034	0.12
	Nature Reserves	3	111,228	45,013	0.79
	Spawning Aggregation Sites	11	916	371	0.01
	Wildlife Sanctuaries	7	368,786	149,243	2.63
					6.82
Archaeological Reserves	Archaeological Reserves	12	28,620	11,582	0.20
Bird Sanctuaries	Bird Sanctuaries	7	15	6	0.00
Extractive Reserves	Forest Reserves	16	939,815	380,331	6.69
	Marine Reserves	8	372,730	150,839	2.65
					9.35
Private Reserves	Private Reserves	8	325,346	131,663	2.32
					18.53

Source: Biodiversity and Resources Data System of Belize, 2009

Many of the most popular tourism sites are Maya archaeological sites that tourists pay a fee to the Institute of Archaeology in order to access. The Institute of Archaeology also manages all of the caves in Belize, which attracts huge numbers of both overnight and cruise ship passengers. The fees that are collected at Maya sites and caves are used to protect and maintain the sites, but there is no limit on the number of visitors and several of the most popular sites are at risk of being destroyed due to high numbers of tourists visiting each day[3]. Figure 2.1 shows the numbers of tourists that visited the 20 most popular destinations in Belize by type of site, with Maya Archaeological sites being the largest source of tourism visits.

[3] Interview with Jaime Awe, Director of Belize Institute of Archeology, May 15, 2008.

Figure 2.1: Visits to Protected Areas by Destination



	2003	2004	2005	2006	2007
Mayan Sites	269,196	345,744	235,514	209,222	212,844
Inland Sites	60,088	83,420	52,210	68,557	89,479
Marine Sites	81,516	96,939	82,434	64,127	66,076

Source: Belize Tourism Board Statistics (2008)

The inland protected areas draw tourism based on the canopy rainforests and the plants and animals that are present there, though this is also an area at risk. In 2000, nearly 60% of Belize's land area was covered by forests, however, this is a nearly 15% decline from 74.5% in 1990, indicated a rapid reduction in a short period of time. According to a 2000 study, Belize is a net sink of greenhouse gases, absorbing twice as much CO_2 as it emits, but as forested areas decline and the number of tourists increase, Belize could see that proportion decrease (Environmental Statistics for Belize, 2000). In addition to cultural and eco-tourism on the land, many tourists come to Belize to experience the marine resources. Belize is home to some of the most important coastal resources, including the largest coral reef system in the Western Hemisphere and a UNESCO World Heritage Marine Site known as the Blue Hole, but tourism (in addition to other threats), could destroy these sensitive areas (UNESCO World Heritage Website).

Based on the current state of tourism in Belize and the policies that are already in place, it is clear that there is room for improvement. Many communities, including those that currently receive tourism, continue to live in extreme poverty, while the capacity to benefit from tourism is low, and protected areas are at risk from unsustainable tourism practices and illegal land-use. Those who might benefit from long-term community-based projects are instead encroaching on protected areas in order to expand agriculture and extract resources illegally (Belize Millennium Goals Report, 2004). One especially significant challenge to developing tourism in the most impoverished district, Toledo, is the lack of land ownership in the Maya villages. The Maya in Belize have the highest levels of poverty, but have not been granted legal ownership over their land, and thus cannot benefit from the land beyond resource extraction. Box 2.1 details the current state of the Maya Land Legal battle.

Box 2.1: Maya Land Rights in Belize

"MAYA VILLAGES BACK IN BELIZE SUPREME COURT"

On October 18, 2007, the Supreme Court of Belize issued its landmark decision affirming the rights of the indigenous Maya communities of Belize to their traditional lands and resources and declaring those rights protected by the Constitution of Belize in light of relevant international law. Following that decision, Indigenous Peoples Law and Policy Program (IPLP Program) Professor S. James Anaya, who is currently the United Nations Special Reporter on the situation of human rights and fundamental freedoms of indigenous people stated that "this seminal judgment constitutes the most far reaching application of international law by a domestic court to recognize the rights o f indigenous groups to their traditional lands and resources." When the new government was elected in February 2008, Maya leaders and their legal representatives attempted to engage it in discussions concerning implementation of the Supreme Court judgment. At first, the actions of the government were encouraging. The new government took a concrete, effective step to protect Maya customary rights by issuing a directive suspending leasing, permitting for natural resource exploitation, and other land dealings in the Toledo District until further notice, pending the process of implementing the Supreme Court judgment.

However, in an abrupt about-face mere weeks after it was issued and without any notice to the Maya communities, the government effectively revoked the directive, limiting its application to the two claimant villages in the lawsuit, and leaving the lands of the 36 other Maya villages in Toledo District unprotected and vulnerable to exploitation by the government and third parties. The government of Belize then took the position that it has no responsibility to identify or respect Maya village lands unless their customary title has been proven in court – and has adopted a policy of delay with respect to the implementation of this judgment.

(Excerpt from Indigenous Peoples Law & Policy Program article at the University of Arizona)

Source: University of Arizona, Law & Policy Program Website

Despite these significant challenges, Belize is in a much better situation than many of its peers in Central America and the Caribbean. The high proportion of protected areas, the emphasis on cultural preservation, the English speaking population, and the stable political system all combine to put Belize in a position to implement policies that will effectively address income inequalities through the support of community-based tourism.

In promoting community-based eco-tourism, several main problems have already been identified by the government and academic researchers. These include: 1) degradation of the natural environment from too many tourists; 2) lack of control and involvement by local communities in the management of tourism sites; 3) lack of knowledge and skills by local people in tour guiding and working in the tourism industry; and 4) lack of enforcement over private tourism businesses (Belize MGD Report, 2004). Future policy aimed at supporting community-based tourism must seek to protect and preserve natural areas and cultural artifacts for many reasons, not least because these are the main draws for tourists to Belize and thus tourism related income. Future generations must be able to benefit equally from these resources while allowing for the sustained livelihoods of those who rely on agriculture and forest products for food and income.

Chapter 3: Literature Review and Framework

CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

The environmental decision makers in Belize face a complex decision in how to manage protected areas that serve both income generation and ecological purposes. This decision often involves weighing environmental protection goals and economic development pressures against each other. In order to develop a tool for the environmental decision makers in Belize to use in deciding how to create income for rural communities, protect the natural area, and support the tourism industry, it is important to understand the current research on protected areas, tourism, and poverty alleviation in the context of a developing country. The literature is organized around a triple bottom line framework, which emphasizes social, economic, and environmental impacts and outcomes an issue.

The situation that Belize currently faces in balancing environmental protection against social and economic needs is not unique, so much of the literature draws on case studies from other countries. Costa Rica and other countries in Central America and the Caribbean have faced similar challenges recently, while Nepal and the South Pacific have been addressing environmental protection and ecotourism related development for much longer. The academic literature has documented some of the issues that are relevant to Belize, but the bulk of the research does not directly address the overlapping dynamics that are in play in Belize. The literature review will provide an understanding of the existing state of research in the environmental, social, and economic issues that the environmental decision makers in Belize face. This review will also address the more limited body of knowledge that exists where the three parts of the triple bottom line intersect, including the pricing of protected areas in developing countries, which will be addressed in more depth in the following decision analysis.

Environmental: Natural Areas Protection and Management

By instructing global leaders that society could obtain "development that meets the needs of the present without compromising the ability of future generations to meet their own needs," the Brundtland Commission's 1987 report established sustainable development as a goal to be pursued by developing countries alongside GDP growth and better food security (*Our Common Future,* 1987). In the twenty-two years since the release of that seminal report, less developed countries have continued to struggle in meeting their economic development goals in a way that does not contribute to the degradation of the environment. In 2000 at the UN Millennium Summit, the United Nations Development Program (UNDP) adopted the 8 Millennium Goals which provide quantifiable targets to be achieved in developing countries by 2015, of which Goal 7 is focused on environmental sustainability (UNDP website).

In the decades since the Brundtland Report and even since the creation of the Millennium Development Goals, the global community has increasingly focused on global climate change and the impact that this will have less developed countries. This focus is reflected in the interim UNDP Goal 7 data, which reports that carbon emissions per unit of economic output fell by more than 20% in the developed regions, while they increased by 35% in South-Eastern Asia and by 25% in Northern Africa (UNDP Development Report, 2009). While some of the carbon

emission increases in developing countries result from an increase in manufacturing or automobile use, land use change currently accounts for 18% of total global greenhouse gas emissions with much of that coming from the loss of rainforest in equatorial countries like Brazil and Indonesia (IPCC, 2007). Deforestation is increasingly identified as a major contributor to carbon emissions in addition to contributing to biodiversity loss. Latin America and the Caribbean have more than 33% of the world's total forest biomass, and 65% of all tropical forest biomass, representing a major source of emissions should these forests continue to be destroyed. It is estimated that the CO_2 emissions caused by the loss of carbon sinks in Latin America is about 2 billion tons per year, which is roughly equal to the GHG emissions of the region (Veragara, 2007). The International Panel on Climate Change (IPCC) Fourth Assessment Report states that about 65% of mitigation potential is located in the tropics and about 50% of that total could be achieved through preventing deforestation (IPCC, 2007).

Because deforestation is one of the major environmental issues faced by developing countries, particularly in the tropical forests of Latin America, much of the literature on strategies for sustainable development has focused on land management policies. The most consistent conclusion from the literature on the institutional arrangements for protected areas management is that a commons system of land management does not provide adequate incentives for resource preservation, with most articles on protected areas management citing Hardin's tragedy of the commons as the theoretical justification for private and secure land rights as the basis for protected areas (Dietz et al., 2003). One form of land management that has received considerable attention as a way to both protect the environment and empower communities is that of community-based protected areas management (Ingle, 2007). Development agencies and national governments tout community managed protected as a way to empower local communities to have a greater role in the decision making, and thus a greater incentive to ensure that the resources are managed properly (Twyman, 2000).

Case studies on community-managed protected areas and collaborations in developing countries highlight both the benefits and challenges of this form of environmental protection. A study of three protected areas in Brazil that are being managed through partnership arrangements found that while the management arrangements provided better infrastructure and resources for the protected area and increased knowledge for local communities, the arrangements did not necessarily result in direct local participation, while government bureaucracy and money conflicts created problems for the partnerships (Rocha & Jacobson, 1998). In a study of community managed protected areas in Botswana, researchers found that the history of political corruption and distrust by locals of the government along with power disparities created significant difficulties for community managed protected areas, despite deep concern by local peoples about the degradation of their natural resources and wildlife (Twyman, 2000). Additionally, a community-based environmental management project in Vietnam focused on sharing power as a key goal and found that successful environment projects were dependent on taking into consideration the political, economic, cultural, social, and organizational characteristics of the local context (Ingle & Halimi, 2007).

Chapter 3: Literature Review and Framework

In addition to encouraging greater community participation in environmental management, the UNDP and FAO have begun to advocate for more market based solutions to deforestation and other environmental problems faced by developing countries such as Belize (FAO, 2008). Two such market-based solutions are: 1) placing economic value on ecosystem services at a local level and 2) allowing countries to earn credit in carbon markets for deforestation avoided. Ecosystems services are the aspects of ecosystems utilized (actively or passively) to produce human well-being and compensating land owners for this service is increasingly advocated in less developed countries as a way to ensure intact forests and clean water (Fisher et al., 2008). In Mexico, for example, the government compensates landowners for conserving forests in important watersheds and in Costa Rica the government has taken the progressive step of paying landowners approximately $45 per hectare per year for carbon sequestration, water regulation services, biodiversity conservation, and scenic beauty provision (Fisher et al., 2008). In addition to payments for ecosystems services or sustainable resource use, poor community members could benefit from these schemes through increased land tenure, strengthening of local environmental institutions, and training in resource management (Greig-Gran, 2005).

In their cost-benefit analysis of resource conservation in Madagascar, Kremen et al. (2000) found that while conservation and sustainable use of natural resources could provide some economic benefits, at the national level, large-scale logging provides even better economic returns. Many developing countries likely face a similar situation, according to the researchers in this case, and they suggest that an international program that provides economic incentives for resource conservation would allow conservation to be able to compete with extraction as a source of income for resource rich tropical countries (Kremen et al., 2000). The existing international agreement on climate protection, the Kyoto Protocol, provides the groundwork for market-based resource conservation in less-developed countries. Two market-based programs under the Kyoto Protocol that have the potential to encourage conservation through economic incentives are the Clean Development Mechanisms (CDC) as well as Carbon Credits for Reduced Emissions from Deforestation and Degradation (REDD).

Currently, carbon markets consist of both the regulatory market, which was developed under the Kyoto Protocol, and smaller voluntary carbon markets. The Kyoto market consists of three different flexible trading mechanisms: 1) Emissions Trading between Annex-1 governments; 2) Joint Implementation of projects in Annex-1 countries; and 3) the Clean Development Mechanism (CDM) program (UNFCCC Website). The smaller voluntary carbon markets generally use project-based crediting mechanisms similar to the CDM, but operate outside international agreements. Companies, individuals, and other organizations without mandatory emissions targets, driven by concerns about corporate social responsibility and climate change, can offset some or all of their emissions in these markets. Voluntary carbon markets were estimated at US$92 million in 2006 (EcoSecurities, 2007). One of the key features of the voluntary carbon markets that applies to countries that still have large areas of forest intact is carbon credits for reducing emissions from deforestation and degradation (REDD). The REDD program allows countries to earn income through credits received for leaving an existing forested area as-is rather than convert it to farming or logging (FAO, 2009). Currently, REDD projects

are not recognized in the Kyoto Protocol trading system, though they are able to be traded on the voluntary markets. In general, market-based environmental initiatives like carbon credits and ecosystems services valuing are gaining favor in developing countries that are looking to diversify their economies. Though in Belize and many other small developing countries, this transition to market-based environmental projects has yet to occur and tourism continues to be the most important contributor to national economies.

Economic: Ecotourism and Economic Growth

Ecotourism is a term developed in the tourism industry sometime in the 1970's to indicate a tour that is focused on the viewing and enjoyment of pristine natural areas, but has since grown to encompass a more holistic sense of social responsibility rather than just the viewing of nature (Blamey, 2001). According to two of the world's leading environmental NGO's, The Nature Conservancy and the World Conservation Union (WCU), ecotourism is defined as, "Environmentally responsible travel to natural areas, in order to enjoy and appreciate nature (and accompanying cultural features, both past and present) that promote conservation, have a low visitor impact and provide for beneficially active socio-economic involvement of local peoples," (Nature Conservancy Website*).*

As an industry, ecotourism is unique because it developed out of a demand for an alternative to traditional tourism, and is thus founded on the idea of social responsibility. In the media and in the literature, there has been much attention to the positive economic benefits that ecotourism can provide to impoverished communities, as highlighted in a recent Harvard Business School feature about economic opportunities in developing countries (Ashley et al., 2007). The report concludes that tourism businesses can increase positive economic impacts for developing countries by providing employment and training, improving procurement to include local farmers and small enterprises, linking tourists to the local culture, involving traditionally marginalized groups such as women and children, and collaborating with NGO's, local governments, and businesses.

In addition to the potential social outcomes of ecotourism, the tourism industry is also concerned with how their business might impact the environment as well as how the changing environment might impact their business. A 2009 report on the effects of climate change on the adventure/ecological tourism industry warns that for tourism markets and companies working in close contact with environments and communities that might be impacted by climate change, anticipating and preparing for potential shifts is crucial (*Exploring the Effects of Climate Change*, 2009). This point lends support to tourism policies at the national government level that anticipate possible changes in the environment whether from climate change or human-caused degradation.

While the bulk of the literature on ecotourism tends to focus on the consumer demand and the environmental and economic benefits that communities can realize from ecotourism when compared to traditional mass tourism, some researchers have begun to highlight the risk associated with ecotourism and make recommendations on how ecotourism can better meet the

ethics it claims to embody. One perspective on ecotourism is that in the planning stages, the perspectives of local communities are not well represented. Potts & Harrill (1998) argue that tourism planning has failed to account for social and political inequalities that exist within a society and that sustainable community tourism should be considered a problem of social development rather than in terms of humankind versus nature. To remedy this, they propose a "travel ecology" that calls on tourism planners to recognize the tensions between the larger tourism industry as the primary players in the global economy and the desire for communities to cultivate tourism as an enriching experience and a source of meaningful work (Potts & Harrill, 1998). Simpson (2001) echoes the idea that community involvement is key to tourism development and advances a framework of tourism development that links stakeholder participation to the long-term sustainability of a tourism project both in terms of providing stable incomes and protecting environmental resources. In theory, greater stakeholder participation will maximize the sustainability of the change that comes as a result of tourism development, especially since the change can be disruptive of traditional lifestyles (Simpson, 2001).

A 2002 report on the state of tourism in the Caribbean found that while in some countries, Belize included, efforts have been made to develop alternative forms of tourism to address the concerns of mass tourism, there is still a need for partnerships between the main stakeholders in the industry and that the local community must be the main focus of tourism development to ensure sustainability (Jayawardena, 2002). From an environmental policy side, this report recommends that public sector authorities have to be focused on assessing the carrying capacity for each tourism attraction and must ensure the sustainability of these attractions for the benefit of current and future generations of the local population (Jayawardena, 2002). While the literature emphasizes that the ability of local communities to benefit from ecotourism is still being developed, the tourism industry and tourists seek out ecotourism as a form of travel that not only protects the environment, but professes to address social inequalities as well.

One example project in El Salvador, by the International Ecotourism Society and FUNDEMAS (the Business Foundation for Social Action) was to establish a national strategy for the sustainable development of tourism through effective partnerships among various stakeholder groups and decision makers (IES Website). By promoting this form of social action on their website, the IES establishes ecotourism as one way to address poverty and social inequalities in the countries that are visited. Bringing tourism and development stakeholders to the same table, such as in the IES example, is a first step in poverty alleviation in developing countries like Belize, but sustainable policies depend on a mix of policies, programs, and initiatives that has been difficult to achieve so far.

Social: Development and Alternative Livelihoods

The UNDP Development Index ranks countries on a variety of development indicators and lists them from richest to poorest, with Belize ranking number 80 out of all countries in the world, up from 99 in the 2004 report (UNDP, 2009). Though in Belize, as in many less developed and developing countries, the inequalities between the poorest and the richest are still stark (Belize MDG, 2004). Addressing these inequalities has been a primary motivator in developing income

generation projects, as in the case of ecotourism related businesses and alternative livelihoods, but the ways in which communities, the national governments, and private businesses interact can be difficult to address and can hinder a community from benefiting in a meaningful way from ecotourism related development or being able to protect their natural resources. While all stakeholders have the potential to benefit from ecological and community based tourism, lack of capacity and education in rural communities prevents those who would most benefit from increase tourism-related income from realizing those benefits.

The issue of international aid to less developed countries is a contentious one, with traditional models of direct financial assistance to governments being questioned, and more community-oriented approaches that focus on sustainability and resource conservation gaining favor (Farrington, 2001). A sustainable livelihoods approach puts the poor at the center of analysis while using a rights-based approach that allows for participatory planning and strengthening of community organizations, among other bottom-up approaches (Farrington, 2001).

In her examination of the linkages between conservation and development, Brown (2002) suggests that conservation projects that are focused on improving the economic situation of the rural poor have not been successful because governments do not adequately understand the complexity of communities, the difficulties in bringing about effective participation, over-simplifying assumptions about empowerment, and not fully considering the sustainability implications of their projects. Brown argues that in order for decision makers to effectively promote development and protect natural resources in a way that takes into consideration stakeholder relationships, governments must: 1) recognize that stakeholders are not a unified whole; 2) validate the diversity of knowledge that contributes to protected areas management, including local and indigenous knowledge; 3) share knowledge across all stakeholders; and 4) include all who will be impacted by the decision.

In recognition of interdependent link between natural resources and environmental sustainability, in 2007 the United Nations Environmental Program (UNEP) formed the UNDP-UNEP Poverty-Environment Facility to coordinate and support their Poverty-Environment Initiative and to further strengthen the UNDP-UNEP partnership. The Poverty-Environment Initiative is a joint program to help countries develop their capacity to “mainstream” poverty-environment linkages into national development planning processes, such as the Millennium Development Goals Achievement Strategies. One of the main products that has come out the UNDP-UNEP linkage is the recognition of three categories of ecosystems services that are vital to development: 1) provisioning (food, fiber, fuels); 2) regulation (purification, detoxification, mitigation of droughts and floods); and 3) enriching (spiritual, aesthetic, social) (UNEP, 2004).

Programs such as the UNEP and UNDP Poverty-Environment Initiative recognize the interdependent relationships between the social issues associated with poverty, the environmental issues with establishing protected areas management, and the economic issues faced by developing countries that are just beginning to participate in the larger world economy through tourism or other commerce. Establishing a framework that recognizes that local

development and national economic progress are dependent on natural resources, while also identifying an area of common ground between these issues, will allow the environmental decision makers in Belize to move forward with comprehensive protected areas policies.

Conceptual Framework

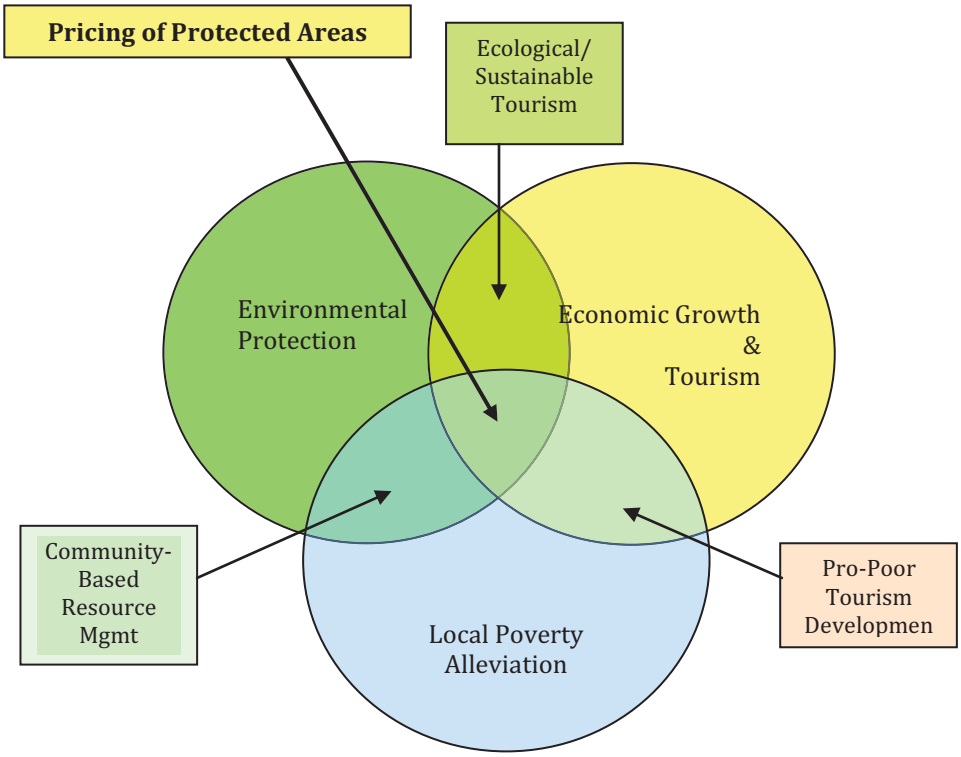
The above literature provides a baseline within the triple bottom line framework of the difficult situation faced by the environmental decision makers in Belize. While some of the existing literature addresses two out of the three, finding a solution that covers the economic, social, and environmental issues in protected areas management continues to present a challenge. The literature that focuses on the environment that is relevant to this project focuses on protected areas management and governance in less developed countries. The economic literature focuses on how ecotourism can contribute to economic growth in developing countries as well as the limitations to ecotourism as a source of income. The social literature tends to focus on stakeholder relationships and the power differences between rural communities, the government, and business owners in developing ecotourism. One area that has been discussed in the literature that may overlap with all three parts of the triple bottom line is the entrance fees associated with the pricing of protected areas. Figure 3.1 conceptualizes the way in which environmental protection, economic growth, and poverty alleviation relate to one another.

Protected Areas Pricing

The relationship between protected areas and economic development in less-developed countries is not well understood, notably in the dynamics of entrance fee pricing and tourism, but some effort has been made to link tourism fees with greater income opportunities and better environmental management. A study of Komodo National Park in the Philippines showed that entrance fees failed to meet the operating costs of the park and used questionnaires to determine whether tourists would be willing to pay significantly higher fees in order to access the park (Walpole et al. 2001). According to the researchers in this study, a moderate to significant increase in park entrance fees (from $1 US to $5 US) would provide greater income for the management of the park while not reducing tourism numbers significantly, however, a substantial increase to $14 US might reduce the numbers of tourists by up to 70%.

In addition to the level of pricing, differential pricing of a protected area that discriminates between local users and international users is one method that might allow environmental decision makers in a developing country to increase tourism revenues while balancing the need to protect the ecological soundness of the area. One study on the optical pricing level of protected areas in Costa Rica suggests that raising the fees charged to international visitors, which are more likely to pay higher fees, will allow for increased revenue but will not reduce the ecological impacts of increased numbers of visitors. On the other hand, charging higher fees to national visitors, which are assumed to be more sensitive to higher prices, will result in less visitations from that group and thus less ecological impacts (Alpizar, 2006). However, this study emphasizes that equity concerns should be considered, and that higher revenues from foreign visitors should offset the costs of ecological mitigation related to national visitors.

Figure 3.1: Conceptual Framework for Decision Analysis



Another Costa Rican Study offered tourists, both Costa Rica and foreign, hypothetical options associated with a popular volcano site and a less well known volcano that was soon to be opened up for tourism (Hearn & Salinas, 2000). The researchers found that tourists preferred better infrastructure, better viewing opportunities, picnic facilities, more information and for foreign tourists, restrictions on some trails to improve the seclusion of the site, as 72% of the tourists in this study expressed concern about congestion and quality of their visit. When it came to willingness to pay, foreign visitors were willing to pay a higher fee than local tourists, but in both cases the tourists would have preferred a lower fee than they were charged, but still paid the higher fee (Hearn & Salinas, 2000)

Across the board, economic studies on the level of pricing to access protected areas in developing countries have found that the levels of pricing do not sufficiently cover the operating costs of the parks or the negative externalities associated with increased tourism (Alpizar 2001; Walpole et al. 2001; Brown 1997) and that most tourists visiting protected areas in less developed countries are willing to pay much higher prices to access those sites than is currently being collected (Walpole et al., 2001; Ellingson, 2007; Baral, 2008; and Laarman, 1996). Some researchers have gone further by assessing whether the expenditures of tourists in developing countries offsets the negative environmental impacts caused by traveling to that country (Gossling, 2005). For the purposes of this analysis, the willingness of tourists to pay in Belize

was based on the cases examined in the above literature, with Belize specific data and projections used when available.

The following section builds on the assumptions outlined by the research on tourism, development, and protected areas management. While no solution can perfectly capture the potential environmental, economic, and social benefits of ecotourism while at the same time avoiding the inevitable risks that have been identified by the authors discussed above, the following section will examine one potential strategy that the environmental decision makers in Belize could consider. The entrance fees that are currently charged to tourists, both domestic and international, provide income to the national government while tourism provides jobs to local communities. The decision analysis will explore whether increasing the fees paid by visitors to protected areas in Belize results in the best outcome from the perspective of the decision maker when economic and social impacts are combined with environmental impacts.

Chapter 4: Decision Analysis Methods and Findings

PRICING OF PROTECTED AREAS USING A DECISION ANALYSIS

A decision analysis, or a decision tree, allows a decision maker, in this case the environmental decision makers in Belize that are responsible for protected areas management, to weigh a set of mutually exclusive options against one another. A decision tree is appropriate when values can be placed on the outcomes of each decision, whether that value is in terms of money, acres of forest or subjective utility gained, and probabilities of each outcome materializing can be estimated (the likelihood that outcome A, B, or C will occur if the decision maker decides to pursue Option 1 instead of Option 2).

The importance of performing this kind of analysis, which attempts to balance the economic, social and environmental outcomes of a particular policy decision, has been supported by a recent Organization for Economic Cooperation and Development (OECD) working paper, which documents the difficulties of providing economic and policy-relevant information about sustainable economic management of natural capital to country level policy makers through a series of case studies (OECD, 2009). These difficulties are often seen as an important reason for inadequate integration of the environment in macroeconomic and sector polices and the report concludes that for governments wishing to undertake an economic analysis of the environment and natural resources include the following (OECD, 2009):

1) Place overall responsibility with the ministry of finance or planning;
2) Relate to central policy makers' priorities and language;
3) Ensure a process that stimulates learning and interaction between policy makers and researchers;
4) Draw on existing data and/or liaise with teams planning research;
5) Ensure that the analysis is evidence-based; and
6) Make findings broadly accessible.

While this analysis does not attempt to do all these things, it is an example to the environmental decision makers in Belize of how they can take factor environmental considerations into their decisions. In a review of uses and methods of making multi-criteria, environmental decisions, Kiker (2005) emphasizes the increasing importance of including a variety of stakeholders into the construction of the decision, and that failure to do so could result in a "decide then defend" decision and an elimination of potentially controversially options earlier in the process. In constructing the decision faced by the environmental decision makers in Belize in pricing of protected areas in Belize, the primary goal was to include all of the relevant stakeholders, while also including potentially difficult to quantify environmental and social outcomes that might otherwise be left out.

Methods

The decision to change entrance fee pricing at Belize protected areas can be summarized into three possible mutually exclusive scenarios: 1) whether to increase the fees moderately (double current rates); 2) increase the fees significantly (quadruple current rate); or 3) keep the fees the

same. Each of these decision outcomes will have some effect on the number of people who choose to visit the protected areas, which will in turn affect the amount of revenue that is collected from park entrance fees, the ecological impact of these visitors, and the intangible social and cultural life of the communities that are impacted by tourism in protected areas. The tool used to weigh these options and their possible impact is a decision analysis. This framework allows for the comparison of the different pricing scenarios of protected areas in Belize and provides the decision makers with a tool that can be adapted to managing protected areas across Belize. The model is based on estimates and projections, so the outcomes are limited in terms of their generalizability, but the method in which the decision analysis is constructed will be useful for the environmental decision makers in Belize when looking at the pricing of protected areas in the future.

To illustrate the decision process, I will use three different protected areas in Belize that represent three different types of protected areas. The first protected area represents a highly visited Maya Archaeological site that is at risk of overuse, the second is a biological preserve that is currently less visited but which is highly sensitive to increased visitation, and the third is a remote cave that is in the early stages of tourism development. Within each of these management cases, the environmental, social, and economic outcomes will be taken into account through two stages that first consider the economic and social impacts and then second the environmental impacts. Below, the two levels of the analysis are summarized with the basic equations used to estimate the social, economic, and environmental values (for a complete summary of values and assumptions used, see Appendix C).

- *LEVEL 1 → Economic Value = Net Present Value (NPV) of numbers of tourists projected over a 50 year period x Entrance fee paid per tourist (either $5, $10, or $20)*

- *LEVEL 1 → Social Value = NPV of estimated guides per site x average income earned per year + other expenditures per tourist x number of tourists*

    - *LEVEL 2 → Environmental Impact: positive influence of protected area (NPV of value of land preserved) – ecological damage from tourism (NPV of forgone profits from damaged land)*

Economic Value

The economic values used in each of the decisions come from Government of Belize reports on the tourism industry, with current visitation numbers as a baseline and an assumed growth rate in tourism of 2% per year based on industry reports (World Travel and Tourism, 2009). The probabilities that are assigned to the different possible outcomes were estimated based on previously discussed willingness to pay studies that measure the price sensitivity of ecotourists and the carrying capacity of different types of tourism sites.

Social Value

In all three of these sites, the daily expenditure of a tourist is assumed to be $70 a day, which is an average of the amount spent per day by cruise ship passengers ($44) and overnight tourists ($96) (*Cruise Tourism in Belize*, 2006). Also factored into the social value of tourism is the number of local tour guide jobs in the district and the per trip pay of a tour guide in that district, as reported by the Belize Tourism and Industry Association (BTIA Tourism Statistics, 2006).

Environmental Value

The environmental value of the protected area is also taken into consideration as part of the decision. One method for placing value on protected areas is known as reduced emissions for deforestation and degradation (REDD) which establishes carbon credits for avoided deforestation (Meizlish et al., 2007). In this analysis, the carbon market scenario that has been used assumes the calculation and sales of credits every five years from 2012 onward, with no sales of REDD credits prior to 2017 as that is the earliest that researchers predict that an international market could be established. The analysis assumes a starting price of $18 per ton of CO_2 based on value of issued Certified Emission Reductions (CER) in the Clean Development Mechanism (CDM) in 2006 (Meizlish et al., 2007). The amount of carbon stored in tropical forests is estimated to be 549 tCO_2/ha[4], so the potential revenue from a REDD based Carbon trading is the $18 x 549 x (size of protected area in hectares). The price for carbon trading of US$18tCO2 that is used as the baseline price may be lower than future carbon prices in regulated markets, so the analysis assumes an increase of carbon price of up to $34 after 50 years.

Also taken into consideration in the environmental impact of the protected area is the long-term viability of the site and potential degradation from tourism or other use. This long-term value is captured in terms of net present value of forgone tourism expenditures in situations where there is high environmental degradation (site is no longer used after 10 years), medium degradation (site is not longer used), and low degradation (site is used at least 50 years).

Since both the potential income gained (and forgone in the case of high ecological damage) from the tourism site and the potential carbon credits gained from the land area of the protected area rely on projections of future value, the discount rate used to value these sites in the present is also important. A discount rate is generally used to reflect uncertainty of realizing future profits, so if future income is highly uncertain, a higher discount rate is used then if the outcome is more likely. In the case of carbon markets, which are dependant on international trading schemes and country level adoption, some researchers have suggested using a rate as high as 35% (Meizlish et al., 2007) or as low as 5% by the Voluntary Carbon Standard (2007). A range of discount rates are tested to evaluate how sensitive each given decision is to the different levels of uncertainty.

[4] Based on Meizlish et al. (2007) analysis, which assumes 150 tons of carbon per hectare multiplied by the molecular weight conversion factor of 3.66 to estimate metric tons of carbon dioxide equivalence, the standard unit traded in carbon markets.

Probabilities

In a decision tree, each of the possible outcomes is assigned a probability based on previous cases or on willingness to pay studies conducted in other comparable tourism destinations. In this decision analysis, probabilities were used on level 1 for whether the numbers of tourists would increase, stay the same, or decrease based on the entrance price of the protected area and then on level 2 for whether the environmental impact would be high, medium, or low based on the numbers of tourists. Appendix D displays a model decision tree for the $20 fee level with assigned probabilities to demonstrate how each level has different probabilities based on different assumptions, which will be discussed in the outcomes.

Cases and Outcomes

Altun Ha Archeaological Reserve

Altun Ha is a Maya Archaeological site located about 30 miles from the main the population center of Belize, Belize City. As a Maya Archaeological site, it is currently managed under the Belize Institute of Archaeology. Altun Ha is the most popular tourism destination in Belize due to its close proximity to the cruise ship docks in Belize City. In 2002, 58,175 people visited the site, with the number increasing dramatically in 2003 to 96,861. Because up to 600 people might visit Altun Ha on one day during high tourist season, it is also an example of a protected area that may be near its ecological carrying capacity (*Belize Tourism Sector Diagnostics*, 2004). Additionally, there is pressure from within the tourism industry to limit the numbers of tourists that can visit in one day because of the perception that the stayover markets attracted to Belize for its world-class nature, heritage and cultural resources do not expect to see sites overrun with hundreds of tourists (*Belize Tourism Sector Diagnostics*, 2004). At $5.00 US, the park entrance fee may not represent the amount that tourists are willing to pay as well as offsetting the possible ecological damage that is occurring.

In this analysis, the number of current and future tourists is estimated from data available on cruise ship numbers. In 2003, the last year for Altun Ha visitation numbers, the number of cruise ship passengers coming into Belize was 575,000, which was a dramatic increase from the previous year, when about 318,000 cruise ship passengers arrived in Belize (BTB Arrival Statistics, 2008). This nearly 80% increase in cruise tourism is close to the 70% increase in visitors to Altun Ha in that same period, so it can be assumed that the numbers of cruise ship passengers can serve as a fairly close proxy for the numbers of visitors to Altun Ha. Appendix C gives a complete breakdown on the assumptions and numbers used in the Altun Ha decision analysis.

The results of the decision tree analysis, shown in Table 5.1, indicate that Altun Ha is more sensitive to the economic impacts of a given entrance price level than to the potential environmental impacts that could come as a result of a given entrance fee. In the majority of the scenarios that were tested in the decision tree, the $5.00 level provides the highest expected value, especially so in the cases where only the economic impacts are taken into account, or when the discount rate for environmental impacts is higher than the discount rate for economic

impacts. The two scenarios that led to the $20 entrance fee having the highest expected value were when both level 1 and level 2 of the analysis were discounted at either the 10% or 20% level, indicating a higher uncertainty about both economic and environmental outcomes in the future. This means that if the decision makers are uncertain about Altun Ha's ability to continue to draw tourists at current levels or with growth at 2% per year, then charging a higher fee would lead to a better outcome, but if they believe that tourism will continue to be strong well into the future, then charging higher fees would result in a loss of tourism dollars that is greater than the ecological value gained from a decreased impact.

Table 5.1: Altun Ha Expected Values

Altun Ha Findings	$5 Fee (p=.5,.2,.3)	$10 Fee (p=.4,.3,.3)	$20 Fee (p=.1,.3,.6)
Economic Only	$146,862,757	$146,530,553	$130,215,338
5% Econ DR, 35% envr DR	$146,326,138	$142,819,305	$127,846,257
5% econ DR, 20% Envr DR	$148,087,944	$144,905,709	$130,906,454
20% both DR	$40,975,536	$43,197,412	$47,577,967
10% both DR	$80,341,271	$82,136,213	$84,155,496
5% DR, 10% Envr DR	$150,246,337	$147,494,135	$134,784,980
5% DR, 5% Envr DR	$151,907,593	$149,499,836	$137,824,019

A sensitivity analysis was performed to see if uncertainties could be adjusted to determine whether environmental impacts or loss of future profits could change the decision outcome. Because Altun Ha is small in size, future benefits from REDD Carbon Markets do not have a major impact on the outcomes of the decision analysis. When a 5% discount rate is assumed, in order for the $10 entrance fee to have the highest expected value, the demand at the $5 and $10 levels must be assumed to be the same, with a lower demand at the $20 level (a 50% likelihood of a decrease in tourists at $20). In order for the $20 fee to be preferred with a 5% discount rate, the decision maker would have to assume that an increase would lead to an 80% chance that there would be a drop in tourists before the environmental benefits gained from fewer tourists outweigh the economic benefits from tourism (see Appendix D for a complete sensitivity analysis). In general, if the decision maker assumes that tourists will be sensitive to price increases but the future is not highly discounted, then charging a higher fee is a better strategy because it preserves the site by deterring some tourists. If the decision maker assumes that people are not price sensitive and will continue to come regardless of whether the price is increased, then the decision maker will prefer alternatives that lead to quicker economic benefits before the site becomes too degraded from overuse.

Cockscomb Basin Jaguar Sanctuary

Cockscomb Basin Wildlife Sanctuary is a 128,000 acre (51,800 hectare) reserve located in a remote part of Belize and is primarily accessed by day tours from the nearby coastal resort town of Placencia. Compared to other tourism destinations in Belize, it receives relatively few visitors, but the local Maya communities depend on tourism income to support their families rather than relying on resource extraction and traditional farming. Cockscomb Basin is a major tourist draw

because it is one of the few places in Central America where Jaguar, Puma, Margay, Jaguarundi, and Ocelot are all found in the wild, the estimated 80 resident Jaguars that are in the area are an especially important tourism draw (Belize Audubon Website, 2009).

As with all protected areas in Belize, the entrance fee is $5 US, but given the large area and the small amount of income from the park, monitoring is limited and poaching of wildlife and timber is a major threat to the long-term viability of the protected area. To make up the difference between the cost of monitoring and the income from visitor fees, the Government of Belize has a cooperative management agreement with the Belize Audubon Society, which is affiliated with the larger Audubon International. While Cockscomb Basin attracts barely 10% of the tourism of Altun Ha, visitors to Cockscomb increased substantially from 6,343 in 2002 to 10,062 in 2003. Increasing the fees from $5 US to $10 or $20 per day to be more inline with sensitive protected areas in neighboring countries, but raising fees might impact the number of visitors, the probabilities of which are assigned based on the price elasticity of demand that has been researched at protected areas and ecotourism destinations in other tropical countries (Ellingson, 2007; Walpole et al., 2009).

The initial decision analysis assumes that as the price of the entrance fee increases from $5 to $10, then to $20 the probability of a decrease in tourists will go up while the probability that tourism will increase will go down. In this case, it is assumed that a substantial increase in tourism will have a significant impact on the future viability of the site, both because of the ecological sensitivity of the site and the demand for a pristine and isolated destination from the tourists that visit Cockscomb (Walpole et al., 2009). The outcome of the decision analysis, as shown in Table 5.2, reflects the importance of future environmental outcomes, in that in all of the scenarios at the $20 level result in the highest expected value for the decision maker. Because potential carbon credits are included in the environmental analysis, the large pristine tropical forested area of Cockscomb make the land potentially very valuable as a source REDD Carbon Credits. However, even when environmental outcomes are not included in the analysis, the $10 entrance fee level is highest because the visitors to Cockscomb are unlikely to be sensitive to price increases at that level, with the assigned price sensitivity based on ecotourism demand cases in other similar countries (Baral et al., 2006; Hearn, 2002).

Table 5.2: Cockscomb Expected Values

Cockscomb Findings	$5 Fee (p=.5,.2,.3)	$10 Fee (p=.4,.3,.3)	$20 Fee (p=.1,.3,.6)
Economic Only	$8,321,498	$8,486,591	$7,747,486
5% Econ DR, 35% envr DR	$939,931,503	$974,057,141	$1,171,307,203
5% econ DR, 20% Envr DR	$1,336,922,944	$1,393,532,690	$1,735,838,704
20% both DR	$1,330,852,497	$1,387,542,709	$1,730,701,717
10% both DR	$1,819,227,575	$1,905,131,970	$2,443,134,594
5% DR, 10% Envr DR	$1,823,156,329	$1,908,969,322	$2,446,292,731
5% DR, 5% Envr DR	$2,196,260,512	$2,305,182,240	$2,999,953,286

Chapter 4: Decision Analysis Methods and Findings

The size of Cockscomb Basin and the current low levels of visitors result in a decision that is resistant to changing, even when much higher or lower price sensitivity is assumed, so the sensitivity analysis focused on the likelihood of environmental impacts resulting from tourism. In this case, to get the decision to flip from a preference for the $20 fee option to a lower fee option, the assumption of high ecological damage would need to decrease substantially. When the demand for tourism is assumed to be inelastic even up to the $20 level (probabilities of increase or decrease in tourism are the same across all pricing levels), and the environmental impacts assumption is relaxed to at most a 20% likelihood of high environmental damage caused by an increase in tourism, then the expected values become very close to one another, though the $20 level still results in a higher expected value. This holds true for both a 5% discount rate and a 20% discount rate, demonstrating that the natural resources at Cockscomb basin have a strong long-term potential in terms of REDD Carbon Credits and as a productive site for tourism and that short-term gains cannot be realized from keeping fees lower because the numbers of tourists are to small to increase or decrease substantially (see Appendix D for a complete sensitivity analysis).

Blue Creek Community and Cave

Blue Creek Cave (locally known Hokeb Ha) is a recently developed protected area in the most remote and most impoverished district of Belize (Toledo). The cave is a "wet" cave, meaning that tourists experience the cave by swimming through a series of underground waterfalls with the aid of a guide. The hike to the cave is through a recently established, locally-managed protected rainforest reserve as well as a privately owned "eco-lodge." The Belize Tourism Board has yet to obtain visitor number data from this site because it is recently established, but estimations from local tour guides state that around 1,500 people visited in 2006 and 2007, with up to 50 people coming through in one day.

There is currently no formalized monitoring of this site and the money that is being collected ($5 US) is being split between the community and the Institute of Archaeology, which is responsible for managing all caves in Belize. Almost all of the tourists that come to Blue Creek arrive with an organized tour from a beach destination several hours away. Many of the tour operators complain that having too many people visiting the cave during high season spoils the experience for their guests, since the space is limited and part of the allure is the darkness and quiet of the river cave experience[5]. The decision in this case is to increase the fees to access the site in a manner similar to the other management cases, from $5 to either $10 or $20.

In the baseline decision analysis, tourism demand is assumed to be the same as the other two sites, in that as prices go up, fewer tourists will visit. This demand assumption is kept the same for comparison purposes, but the sensitivity analysis will explore several scenarios that might be more likely in the Blue Creek case, given the remote location, small numbers of tourists, and particularly high demand for cave tourism in Belize. In recognition of the high sensitivity of cave systems, the Belize Tourism Board does enforce tour size limits, which could lead to excess

[5] Interview on March 1st, 2008 with Bruno Kipplinger, a private tour operator that is based 30 miles from Blue Creek and operates several trips a week to the site.

demand for cave tours when tourists are not able to get into a cave tour (BTB Press Release, 2008). This excess demand was captured in the decision model through lower probabilities that tourism will decrease. The limits on the size of tour groups means that ecological damage is less likely than in the cases of Altun Ha and Cockscomb Basin, neither of which have limits on the numbers of tourists that can visit the site in one day.

The baseline decision analysis yielded similar results to the Cockscomb Basin case, as the two sites are comparable in that they are more ecologically sensitive and attract a much smaller number of tourists than the Altun Ha case, which is based on the Maya Archaeological site and cruise ship tourism. Table 5.3 shows the expected values for the different scenarios, with the $5 fee level resulting in the highest expected value only in the case where environmental impacts are taken out of the decision.

Table 5.3: Blue Creek Expected Values

Blue Creek Findings	$5 Fee (p=.5,.3,.2)	$10 Fee (p=.4,.3,.3)	$20 Fee (p=.1,.3,.6)
Economic Only	$7,679,402	$7,253,319	$5,212,861
5% Econ DR, 35% envr DR	$53,864,898	$55,316,306	$59,366,562
5% econ DR, 20% Envr DR	$74,476,242	$77,505,604	$86,289,723
20% both DR	$68,520,230	$72,105,179	$82,772,011
10% both DR	$95,771,470	$101,393,724	$118,087,522
5% DR, 10% Envr DR	$99,804,869	$105,001,192	$120,286,191
5% DR, 5% Envr DR	$119,265,224	$126,231,850	$146,827,761

A sensitivity analysis was conducted to see if changing the assumptions regarding the elasticity of tourism demand or environmental sensitivity would result in different pricing level. The sensitivity analysis revealed that the preferred option in the Blue Creek case is highly robust, regardless of the likelihood of visitors increasing or decreasing. The additional income gained from the $20 scenario makes this the best decision even when there is a much higher likelihood of the numbers of tourists decreasing and the assumption of ecological damage is loosened even further. This holds true at discount rates of both 5% and 20%. For a complete breakdown of the scenarios and assumptions tested in the decision analysis, see Appendix D.

Summary

The expected values for each of the management cases suggest that higher pricing is feasible in all of the protected areas and could lead to better economic, social and environmental outcomes in the future. Table 5.1 summarizes some of the possible future outcomes of implementing changes in entrance fees at the three protected areas and the possible social, environmental, and economic effects on the sites if higher pricing were implemented.

Chapter 4: Decision Analysis Methods and Findings

Table 5.1: Findings Summary

	Environmental	Social	Economic
Altun Ha	*The Altun Ha site is small, so the environmental value of the site does not have a major impact on the pricing levels.*	*Altun Ha provide considerable employment for the local community, so loss of tourism could have a major impact on the community.*	*In terms of tourism revenue, the best scenario for the decision maker would be to keep fees the same, but to establish capacity limits to preserve the site.*
Cockscomb	*Cockscomb Basin is a valuable environmental resource in terms of potential Carbon Credits and long-term viability as a biological reserve.*	*The population around Cockscomb is small, but the jobs and other expenditures from tourism reduce the necessity to rely on resource extraction and poaching.*	*Cockscomb's economic impact is limited in the short term because of the small numbers of tourists, but the tourists are sensitive to the pristine nature of the park.*
Blue Creek Cave	*Tourism levels are small now, so there is not immediate risk of destruction, but caves are sensitive. High entrance fees protect against excess demand.*	*The Maya heritage of the community is an important factor, and an increase in fees could go towards a cultural center and provide local jobs so families do not have to relocate.*	*The remote location of the site means that when tourists arrive, they have less alternative activities and a high willingness to pay. The money can go towards poverty relief in a very poor location.*

Note: See appendix C for a full description of values and assumptions used in this analysis.

Chapter 5: Analysis of Findings

ANALYSIS OF FINDINGS

In accordance with the adopted National Protected Areas Systems Plan, the environmental decision makers in Belize must decide how to best manage the network of protected areas in Belize in a way that provides a source of revenue for the national government, incomes for local communities, and protects the natural resources for future generations. Acknowledging the triple bottom line of this decision, or the potential environmental, economic, and social implications of the decision faced by Belize, underlines the complexity of any possible solution.

With the dramatic rise in tourism and the increasing demand for environmentally focused tourism destinations, the environmental decision makers in Belize have considerable incentives and pressures to maintain the natural resources of the country for the foreseeable future. Tourism based demand for these natural resources could also contribute to the degradation of these resources if not carefully managed, as evidenced by the amount of previous research focused on the environmental impacts of tourism. Also important will be how environmental management and tourism will contribute to the alleviation of poverty in the country, which is especially present in the Maya communities. In looking at how environmental protection and resource management, social development through alternative livelihoods, and economic development through tourism revenue have been addressed in the literature in combination with the pricing of protected areas, this research has attempted to create a model that can be used by the environmental decision makers in Belize in the future. Through this process, several key themes emerged that will assist in formulating policy recommendations:

Theme 1: Capacity is a problem
Much of the literature on international development through sustainable livelihoods emphasizes the need for education and capacity development as a way to empower communities to have more control over their own poverty alleviation (UNDP, 2009; FAO, 2007). The need for capacity focused training was echoed in the case studies of both community-based tourism projects (Jayawardena, 2002) and in community-managed protected areas. When looking at the results of the decision analysis of the three Protected Areas in Belize, it is apparent that additional capacity will be need in order for the environmental decision makers in Belize to realize the full benefits from the protected areas. In all three cases, the decision makers are advised that higher entrance fees will lead to greater benefits for the country and local communities, but raising entrance fees and increased revenue will mean that more trained individuals will be needed to decide how to fairly distribute these resources.

Theme 2: Resource protection means different things to different stakeholders
The literature on protected areas management and stakeholders emphasizes that collaboration can lead to more sustainable outcomes, as long as the stakeholders involved are clear about the expectations in the collaboration (Kootz & Thomas, 2006). In Belize, the long-term viability of the protected areas means more than just preserving the ecosystems and biodiversity. Local communities, including indigenous Maya villages that have lived in the same forests for thousands of years, rely of the resources and land for their livelihoods. Tourism business owners

and operators rely on pristine natural areas and unique biology like Jaguars as well as the Maya Archaeology sites and cultural heritage as tourism draws. International NGO's, many of which are involved directly in the management of protected areas, want pristine natural areas for the sake of biodiversity at an international level. Meanwhile, government officials want to collect revenue from protected areas entrance fees while also maintaining the natural areas for the future of the country.

All of the stakeholders have the same goal of preserving the protected areas, but the pricing of the protected areas may not be able to meet the goals of all of the stakeholders at once. The decision analysis revealed that when environmental outcomes are left out of the decision, a lower price might be preferred. This would ensure that tourism would not decrease, but when environmental viability is considered in the decision, a higher entrance price is almost always preferred.

Theme 3: Uncertainties matter

The literature on protected areas management addresses some of the uncertainty associated with tourism and climate change and how the international community might respond in terms of emissions reductions and assistance to developing countries. The most relevant uncertainties associated with the situation faced by the decision makers in Belize at this point are the demand for tourism and the global climate. Tourism is highly influenced by the state of national economies; travel is one of the first things that people eliminate when they are facing economic hardship, which in turn impacts the economy of a country like Belize that is highly dependent on tourism (World Travel & Tourism, 2009). Global climate change is also an issue that is becoming increasingly urgent when it comes to planning for future economic growth in a small developing nation, and Belize has been identified by the UNFCC as particularly vulnerable to changes in climate (Richardson, 2007). As a tropical country that is in the path of major hurricanes, Belize is at risk for a major weather event which could have the devastating effect of causing physical destruction, impeding tourism, and destroying tropical forests (Richardson, 2007). In addition, the barrier reef that spans the length of Belize's coast is a primary draw for tourists, but the reefs have already experienced significant bleaching in some places, caused by warmer water temperatures, and the IPCC estimates that the Caribbean Reefs are at a threshold where any additional warming could result in complete loss of the coral reefs (IPCC, 2007)

To a degree, these uncertainties were represented in the decision analysis through different discount rates, tourism elasticity, and vulnerability to environmental degradation, but the reality of these uncertainties, in addition to the capacity issues and variety of stakeholders impacted, remains a real challenge to the environmental decision makers in Belize. From these themes, specific actions can be undertaken that will address the environmental, social, economic issues explored in this analysis. The recommendations that follow will allow the environmental decision makers in Belize to move forward with the Belize National Protected Areas Systems Plan with tools that provide a comprehensive picture of protected areas management in Belize.

Chapter 6: Recommendations and Conclusion

RECOMMENDATIONS AND CONCLUSION

The literature on the relationship between economic development, ecotourism in developing countries and the protection of natural resources points to the need for a pricing system that more accurately reflects the costs associated with resource protection and better captures the demand of tourism. Developing countries that seek to provide more sustainable and stable incomes for impoverished communities might realize these goals through charging higher prices, the consequences of which were examined above. Based on the literature as examined through the conceptual framework and the results of the protected areas pricing decision analysis, the decision makers in Belize should focus on research-based actions to provide a baseline for good decision making and policy actions that institutionalize the goals of income generation and environmental protection.

Research Based Actions

The environmental decision makers in Belize must gain a deeper understanding of the unique environmental, social, and economic dynamics that are in play in the country through several specific research goals that will enable the creation of meaningful policies.

Perform or support a consumer valuation study of the key tourism destinations in Belize

Similar to the work that has been done in other highly touristed and ecologically sensitive sites in developing countries (Ellingson & Seidl; Baral et al.), Belize should promote or encourage a representative study that examines the prices that consumers of tourism in Belize are willing to pay. Being that Belize is a fairly small country with a high number of tourists and an English speaking population, the logistics of conducting such a study would not be difficult. The environmental and tourism Ministries in Belize could partner with the University of Belize and a foreign University that has expertise in the field of tourism pricing and contingent valuation techniques in order to establish a baseline for what tourists are willing to pay at the different tourist destinations.

Determine Ecologically Sensitive Sites through Impact Assessments

The natural area or cultural sites that draw tourists are at risk of serious damage, in terms of intangible ecological value as well as in terms of the loss of value as a tourism site. However, that number of tourists that are appropriate in each site may be unknown. The Government of Belize should work with experts in the fields of environmental impacts on biodiversity and degradation of culturally important sites to determine the risks associated with unlimited numbers of tourists and establish scientifically sound limits that are appropriate to each site. If these limits fall below the numbers of tourists that are visiting the site or below the number that is predicted to visit if the site were priced according to the level that was determined during a willingness to pay survey, then the decision makers will have to consider what policy options might be used to limit the numbers of tourists and what possible economic impacts those limits might have on the local people. If it is determined that the number of people currently visiting a site is below the threshold of environmental impacts, then the decision makers should create a

long-term management plan for addressing future increases in tourism and how the area will continue to serve the economic needs of the community and the ecological goals of the country.

Policy Actions

Once the environmental decision makers in Belize have an understanding of the willingness of tourists to pay and the ability of sensitive natural areas to absorb certain numbers of tourists, they can establish policies that reflect the reality of tourism and environmental protection. The Belize National Protected Areas Systems Plan currently serves as the policy framework for managing protected areas, but the following recommendations add to this plan by recognizing the importance of integrating tourism-related goals and both community-level and broader-global concerns into protected areas management.

Update Pricing to Reflect Outcomes of Research

The current Protected Areas System Plan addresses the management of Belize's system of National Parks from a scientific perspective, but in reality the parks not only serve as reserves for biodiversity of flora and fauna, but also as key tourism destinations that provide the National Government and local communities with a source of income. Integrating the protection goals of the environmental decision makers in Belize with the development and business goals of the country through a system of protected area pricing will allow the National Parks and Reserves to better protect the natural resources of Belize and provide sustainable tourism related income for the government and communities. Based on the findings from the literature review and the protected areas pricing decision analysis, the environmental decision makers should consider pricing each protected area in Belize according to one of the following three options:

1) **Demand Based Pricing**. Set the entrance price for foreign tourists at a level based on the willingness to pay, which would be determined by a willingness to pay (WTP) or contingent valuation survey. The result of this option would that the number of tourists would continue to increase or decrease based on the demand for tourism in the region but would not reflect the environmental sensitivity of the location. This option would be best suited for an area that is not at immediate risk for environmental degradations but is popular enough that the cost to access the site is not captured by the current pricing.

2) **Environmental Based Pricing**. Use both a willingness to pay survey to determine the demand-based price and an environmental impact assessment to determine whether the number of tourists currently visiting is higher or lower than the optimal environmental capacity for that site. If the numbers are higher than the capacity, set the entrance price higher than the WTP level and if the numbers are lower, then set the price at the WTP level until the numbers reach the capacity, then raise the price. This option would require a continual monitoring of the capacity of the site and the numbers of visitors to ensure that there is equilibrium between the demand for accessing the site and the environmental carrying capacity of the site.

3) **Limited Access**. In the case where the demand for a site is very high and the environmental capacity is very low, pricing may not be able to adequately limit the numbers of tourists on any given day. In this case, the price can be set above the WTP level with an additional daily cap on visitors based on the carrying capacity of the site. The carrying capacity of the site would need to be determined by scientific study.

Secure Land Rights for Local Community Managed Protected Areas

In addition to the major protected areas and archaeological sites in Belize that are managed by the Government and cooperative agreements with international NGO's, there are also protected areas that are managed by local communities. This provides the community with the incentive to preserve their natural resources rather than farm or use the land for extraction of resources and poaching of animals. However, in much of the Southern portion of Belize the rural Mayan communities lack secure tenure of their land. As discussed earlier, the 21,000 Maya who live in the Southern part of Belize have traditionally lived and subsisted on a reservation-type system of land, where the government of Belize has allowed them to farm and extract resources from the surrounding tropical forests according to traditional methods. However, because the reservations continue to be owned by the government and the Maya do not have legal rights over the land, the incentive to use the resources unsustainably is great because at any point the government could grant logging or oil concessions to private industry (Rain Forest Foundation, 2007). The legal status of the Maya land is changing as a result of a 2007 Court Ruling in favor of traditional land tenure as a justification for ownership rights, but there are actions that the government should take in order to facilitate private land rights in the Maya villages and to integrate secure land tenure for rural communities into the protected areas policy of the country.

Licensed property would mean granting rural communities in Belize a private legal right that provides a degree of security and exclusivity to the resources and transferability of the land use to future generations (Raymond, 2003). In the case of Blue Creek, the community could promote the area to increase the numbers of tourists, receive revenue from people who access the site, build a visitors center in the community, and open related businesses such as restaurants and guest houses, but if the land could be taken back by the government for the purposes of logging concessions that would bring revenue to the entire country, then the community is risking valuable time and resources in developing the area for tourism. Instead, the community sees more benefit in continuing to farm, log, and hunt the land in a way that is unsustainable. Granting property rights to land users encourages more responsible use of the land, with users standing to reap the benefits of their ecologically responsible behavior in future years, rather than lose out to their competitors (Raymond, 2003). In other countries in Latin America, governments have begun granting ownership to indigenous communities, including 103 million hectares in Brazil and 12 million hectares in Bolivia, though lack of enforcement has allowed for illegal occupation and logging in vast areas of these forests (FAO, 2009).

While the granting of private land rights in southern Belize is primarily a question of legal status, this action should be integrated into the National Protected Areas Systems Plan. This plan

discusses the inclusion of indigenous and rural people into the management of land and protected areas, but does not discuss the legal status that these people hold over the land. The Belize National Policy on protected areas should include details about how communities can obtain legal ownership over their land and how they can establish community managed protected areas. The risk of granting private ownership to rural communities is that they may decide to manage their land in a way that is not in accordance with the priorities of the environmental decision makers in Belize, so the government should also provide communities with the education and resources needed to manage their lands and promote environmental protection and tourism revenues related to the protected areas as the best solution.

Participate in a REDD Voluntary Carbon Market

The benefits of establishing and ensuring the long-term viability of protected areas in Belize falls not only on the people of Belize who can realize local tourism revenue and the Government that obtains a large share of its GDP from tourism-related revenues, but also on the global community. Participation in a voluntary carbon market to receive carbon credits through the reduced emissions from deforestation and degradation (REDD) program will provide benefits to Belize in the form of income from carbon credits while still allowing the environmental decision makers to focus on local priorities. Establishing protected areas not only provides for tourism income and protects ecologically important sites for the benefit of the people of Belize, but the carbon that is sequestered by the tropical forests of Belize provides a service to the world as a whole, and participating in a global carbon market will allow the country to benefit from the carbon sink services provided by their forests.

As the least densely populated country in the region (12 person per Km) with the highest proportion of forested land in Central America (72% versus average of 44% for Central America), Belize does not face the same population presses on its resources as the other countries in the region. It is estimated that Belize has 59 million tons of carbon stored in the biomass of its forests (FAO, 2009). By participating in a voluntary carbon market, the environmental decision makers in Belize will be able to justify setting aside more lands as protected areas rather using these lands for agriculture or logging. Combined with higher entrance fees for accessing protected areas, carbon credits through REDD and a voluntary carbon market will ensure that Belize is more completely capturing the demand and value of their forests.

Chapter 6: Recommendations and Conclusion

Conclusion

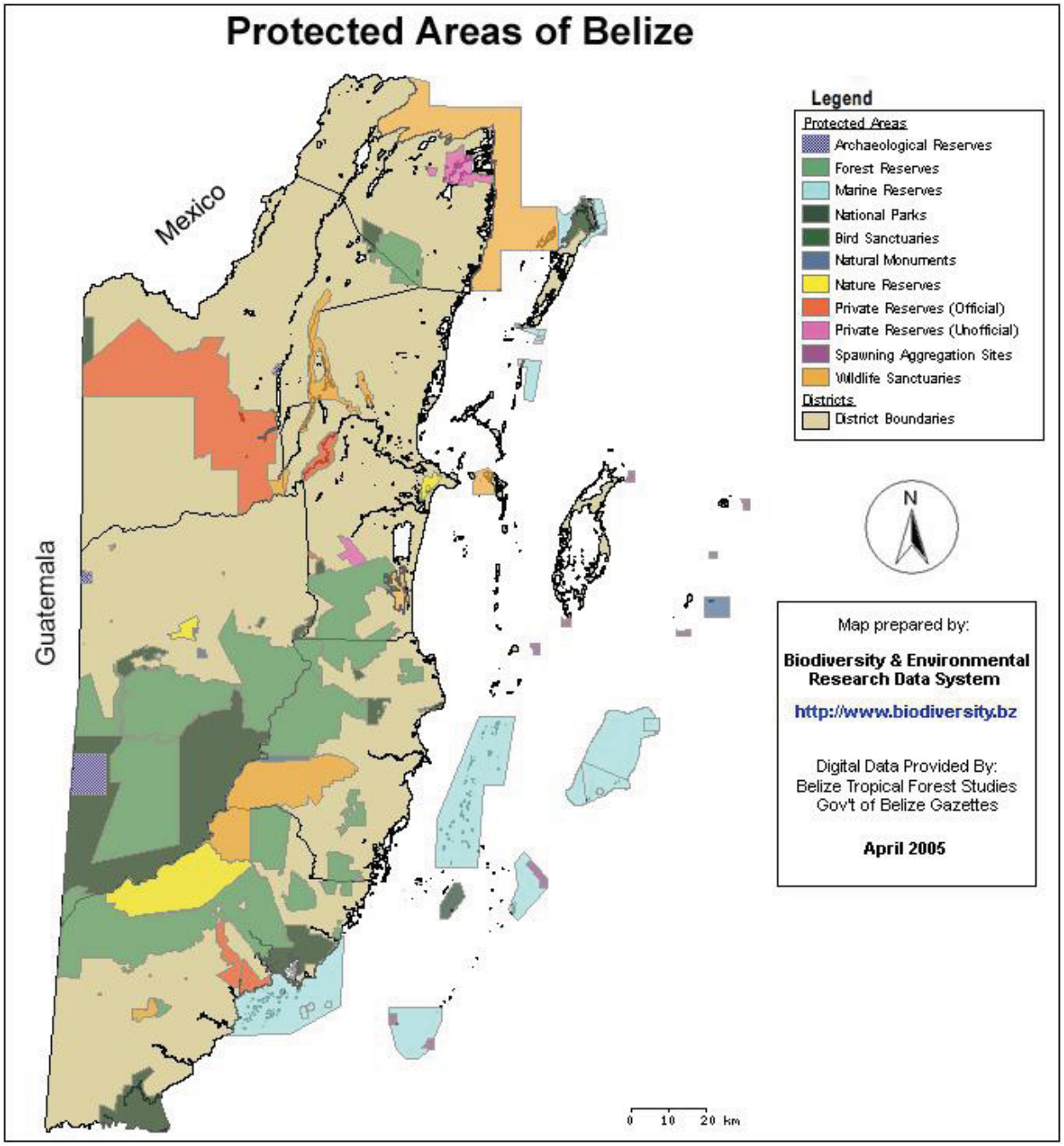
This analysis has provided the theoretical basis for focusing on the economic, environmental, and social aspects of protected areas management and ecotourism in a developing country while providing a tool for the Minister of the Environment and the Director of the Institute of Archaeology to use in moving forward with the Belize National Protected Areas Systems Plan. With uncertainty about the future, both in terms of demand for tourism and the possibility of income through carbon markets, the environmental decision makers in Belize must enact policies that protect the natural resources for the long-term while providing economic benefits in the short-term. Being aware of the ecological carrying capacity of each site and the willingness to pay to access popular tourism destinations will allow the government to charge entrance fees that better capture the real demand, which should be much higher than the $5 currently being charged to foreign tourists. Additional revenue from tourism can then be used to strengthen the protected areas systems plan that is already in place and increase the capacity of local communities to benefit from tourism rather than leaving them to rely solely on extractive sources of income.

Appendix

Appendix A: Map 1 – Political map of Belize

Appendix

Appendix B: Map 2 - Protected Areas in Belize



Appendix

Appendix C:
Explanation of Values and Assumptions

The following values and assumptions were used in construction the decision tree analysis

General

Economic Discount Rate: *To model a high discount, which assumes high risk, for future profits gained from tourism entrance fees, a 20% rate was used and to model low discount, or low risk, for future profits, a 5% and a %10 rate were used.*

Carbon Discount Rate: *The carbon discount rate represents the risk associated with the assumption that in the future, profits can be gained through carbon credit markets, so a higher rate of 20% assumes that this is less likely and a lower rate of 5% assumes that this is probable.*

Growth Rate: *The 2009 World Travel and Tourism Study indicates that a 3.5% growth rate in the numbers of tourists to Belize is to be assumed, but for the purposes of this analysis I have tested a growth/decline rate as high as 5% and as low as 2% to see if this impacts the expected values of the different pricing scenarios.*

Per Visitor Other Expenditure: *Based on tourism industry studies, a per tourist daily rate of $70 is assumed at each destination as additional income to the community in the form of souvenir, local craft, food, and other purchases.*

Number of Tour Guides: *The number of guides working is dependent on the number of tourists arriving. The table below shows how the number of tour guides has stayed consistent between 4.6 to at most 5.5 guides for every 1,000 tourists. This number will be used to estimate the number of guides working at each site currently and in the future will be averaged to 4.7 guides per thousand visitors.*

	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Total Tourist Arrivals	195,766	195,955	199,521	220,574	230,832	236,573	247,309
Total Guides	929	907	1098	1005	1127	1113	1145
Guides/1000 Tourist	4.74	4.62	5.5	4.55	4.88	4.7	4.63

Altun Ha Assumptions

Land Size: 500 Hectares
Numbers of Tourists in 2008: 4500
Numbers of Tour Guides: 21
Yearly income of Tour Guide: $2,450
Price Sensitivity

- $20: 10% chance visitor increase, 30% visitor stay the same, 60% visitors decrease
- $10: 40% chance visitor increase, 30% visitor stay the same, 30% decrease
- $5: 50% chance visitor increase, 30% visitor stay same, 20% decrease

Environmental Sensitivity

Because Altun Ha is already assumed by some accounts to be above capacity, the likelihood of high environmental impact from further increase in tourism is assumed to be higher than in the other cases.

Visitor Increase: 90% high envr impact, 5% med envr impact, 5% low envr impact
Visitor Same: 40% high envr impact, 30% med envr impact, 30% low envr impact
Visitor decrease: 20% high envr impact, 20% med impact, 60% low impact

Cockscomb Basin
Land Size: 51,800 (Belize Audubon Society Website, 2009)
Number of Tourists in 2008: 4,624[6]
Numbers of Tour Guides: 22
Price Sensitivity
$20: 10% chance visitor increase, 30% visitor stay the same, 60% visitors decrease
$10: 40% chance visitor increase, 30% visitor stay the same, 30% decrease
$5: 50% chance visitor increase, 30% visitor stay same, 20% decrease
Environmental Sensitivity
Visitor Increase: 70% high envr impact, 20% med envr impact, 10% low envr impact
Visitor Same: 40% high envr impact, 30% med envr impact, 30% low envr impact
Visitor decrease: 20% high envr impact, 20% med impact, 60% low impact

Blue Creek Cave
Land Size: 2300 hectare[7].
Number of Tourists in 2008: 2,800[8]
Numbers of Tour Guides: 13
Price Sensitivity
$20: 10% chance visitor increase, 30% visitor stay the same, 60% visitors decrease
$10: 40% chance visitor increase, 30% visitor stay the same, 30% decrease
$5: 50% chance visitor increase, 30% visitor stay same, 20% decrease
Environmental Sensitivity
The numbers of visitors to Blue Creek is currently very small, so a smaller likelihood of environmental impact is assumed at the 2% growth rate over 50 year.
Visitor Increase: 50% high envr impact, 30% med envr impact, 20% low envr impact
Visitor Same: 30% high envr impact, 30% med envr impact, 40% low envr impact
Visitor decrease: 20% high envr impact, 20% med impact, 60% low impact

[6] Estimated from average of actual tourism numbers between 2000 – 2006 (Belize Tourism Industry Association, 2006)
[7] Estimated size based on interview with Belize Forestry officials and a national meeting on protected areas management, February, 2008.
[8] Estimated from daily tourism counts conducted by author and Blue Creek Village tour guides from December 2007 – June 2008.

Appendix

Appendix D: Sensitivity Analysis

Key for Sensitivity Analysis

Level 1 Probabilities: (Probability of visitors increasing, probability of visitor staying the same, probability of visitors decreasing)

Level 2 Probabilities: (Probability of high environmental damage, probability of medium environmental damage, probability of low environmental damage)

Outcome: The pricing decision that results in the highest expected value given the probabilities and discount rate assumed in each scenario.

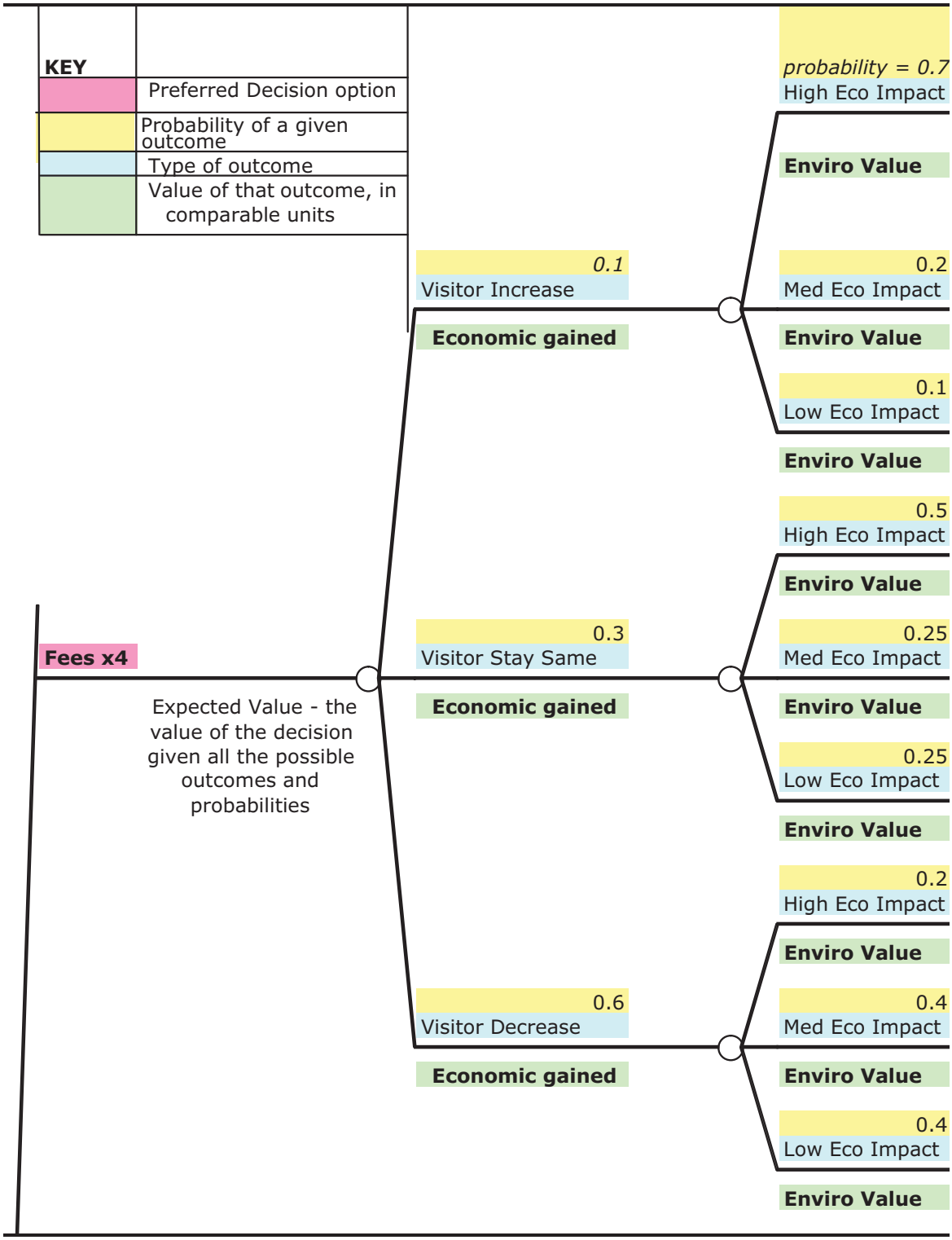
ALTUN HA SENSIVITY Scenario	**Level 1 Probabilities**	**Level 2 Probabilities**	**Outcome**
LOW tourist sensitivity/MED environmental sensitivity	$20(70%,10%,20%); $10(70%,10%,20%); $5(80%,10%,10%)	Increase(50%,20%,30%); Same(40%,40%,20%); Decrease(20%,20%,60%)	5% DR = $20, 20% DR = $20 ($5 2nd)
HIGH tourist sensitivity/MED environmental sensitivity	$20(20%,50%,30%); $10(30%,50%,20%); $5(50%,30%,20%)	Increase(50%,20%,30%); Same(40%,40%,20%); Decrease(20%,20%,60%)	5% DR = $5, 20% DR = $5 ($20 2nd)
HIGH environmental sensitivity/HIGH tourist sensitivity	$20(20%,50%,30%); $10(30%,50%,20%); $5(50%,30%,20%)	Increase(80%,10%,10%); Same(70%,20%,10%); Decrease(50%,20%,30%)	5% DR = $5 ($20 2nd), 20% DR = $5 ($20 close 2nd)
LOW environmental sensitivity/HIGH tourist sensitivity	$20(70%,10%,20%); $10(70%,10%,20%); $5(80%,10%,10%)	Increase(80%,10%,10%); Same(70%,20%,10%); Decrease(50%,20%,30%)	5% DR = $20, 20% DR = $20
COCKSCOMB SENSIVITY Scenario	**Level 1 Probabilities**	**Level 2 Probabilities**	**Outcome**
LOW tourist sensitivity/MED environmental sensitivity	$20(70%,10%,20%); $10(70%,10%,20%); $5(80%,10%,10%)	Increase(50%,20%,30%); Same(40%,40%,20%); Decrease(20%,20%,60%)	5% DR = $20, 20% DR = $20 & $10 very close
HIGH tourist sensitivity/MED environmental sensitivity	$20(20%,50%,30%); $10(30%,50%,20%); $5(50%,30%,20%)	Increase(50%,20%,30%); Same(40%,40%,20%); Decrease(20%,20%,60%)	5% DR = $20, 20% DR = $20
HIGH environmental sensitivity/HIGH tourist sensitivity	$20(20%,50%,30%); $10(30%,50%,20%); $5(50%,30%,20%)	Increase(80%,10%,10%); Same(70%,20%,10%); Decrease(50%,20%,30%)	5% DR = $20, 20% DR = $20
HIGH environmental sensitivity/LOW tourist sensitivity	$20(70%,10%,20%); $10(70%,10%,20%); $5(80%,10%,10%)	Increase(80%,10%,10%); Same(70%,20%,10%); Decrease(50%,20%,30%)	5% DR = $20 & $10 very close 20% DR = $20 & $10 very close

Appendix

BLUE CREEK SENSIVITY	Level 1 Probabilities	Level 2 Probabilities	Outcome
LOW tourist sensitivity/MED environmental sensitivity	$20(70%,10%,20%); $10(70%,10%,20%); $5(80%,10%,10%)	Increase(50%,20%,30%); Same(40%,40%,20%); Decrease(20%,20%,60%)	5% DR = $20, 20% DR = $20
HIGH tourist sensitivity/MED environmental sensitivity	$20(20%,50%,30%); $10(30%,50%,20%); $5(50%,30%,20%)	Increase(50%,20%,30%); Same(40%,40%,20%); Decrease(20%,20%,60%)	5% DR = $20, 20% DR = $20
HIGH environmental sensitivity/HIGH tourist sensitivity	$20(20%,50%,30%); $10(30%,50%,20%); $5(50%,30%,20%)	Increase(80%,10%,10%); Same(70%,20%,10%); Decrease(50%,20%,30%)	5% DR = $20, 20% DR = $20
HIGH environmental sensitivity/LOW tourist sensitivity	$20(70%,10%,20%); $10(70%,10%,20%); $5(80%,10%,10%)	Increase(80%,10%,10%); Same(70%,20%,10%); Decrease(50%,20%,30%)	5% DR = $20, 20% DR = $20

Appendix

Appendix E: Model of Decision Tree



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