DISSERTATION

PROTECTED AREAS, ECOTOURISM, AND GATEWAY COMMUNITIES: ECONOMIC ANALYSIS OF THE MONARCH BUTTERFLY SANCTUARY, MICHOACAN, MEXICO.

Submitted by

Antonio Kido

Department of Agricultural and Resource Economics

In partial fulfillment of the requirements

For the Degree of Doctor of Philosophy

Colorado State University

Fort Collins, Colorado

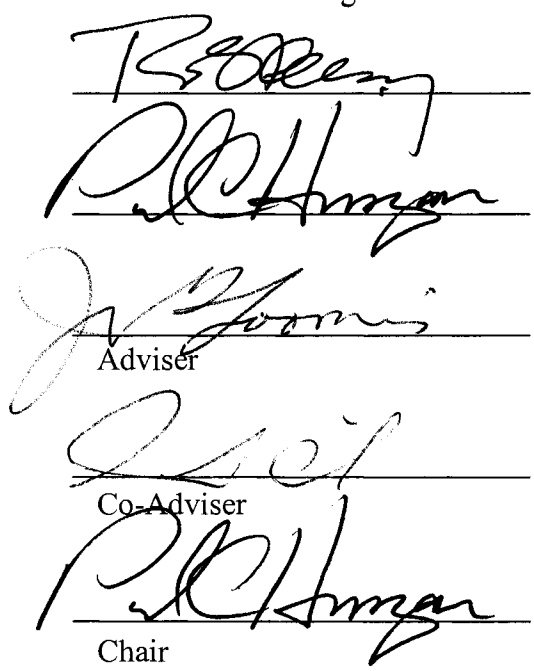
Spring 2004

COLORADO STATE UNIVERSITY

February 3, 2003

WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY ANTONIO KIDO ENTITLED "PROTECTED AREAS, ECOTOURISM, AND GATEWAY COMMUNITIES: ECONOMIC ANALYSIS OF THE MONARCH BUTTERFLY SANCTUARY, MICHOACAN, MEXICO" BE ACCEPTED AS FULFILLING IN PART THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

Committee on graduate work



Adviser

Co-Adviser

Chair

ABSTRACT OF THE DISSERTATION

PROTECTED AREAS, ECOTOURISM, AND GATEWAY COMMUNITIES: ECONOMIC ANALYSIS OF THE MONARCH BUTTERFLY SANCTUARY, MICHOACAN, MEXICO.

Although conservation policies and practices have always been influenced by political and economic factors, economic analysis has played a limited role in conservation decision-making until recent years. Many people are realizing that the fundamental forces driving the loss of biological diversity (e.g. land conversion and over-exploitation of natural parks) have economic roots. Economics is concerned with the allocation of scarce resources among competing human wants and can provide especially useful tools for addressing conservation issues. This dissertation describes an economic analysis with emphasis on the distribution of benefits among stakeholders derived from the sanctuary of the monarch butterfly in Mexico.

Economic valuation is presented and contrasted by two related techniques for measuring recreational demand, and welfare measures are derived from these techniques. People's price response to higher fees versus higher travel costs is also analyzed. The magnitude of local economic impact from

tourism spending and multiplier effects is explored. Finally, policy scenarios that provide potential solutions depending on the account stance of the analyst and the attribution of property rights are investigated.

Antonio Kido
Department of Agricultural
And Resource Economics
Colorado State University
Fort Collins, CO 80523
Spring 2004

AKNOWLEDGEMENTS

I want to thank the Consejo Nacional de Ciencia y Tecnologia (Conacyt) and Colegio de Postgraduados en Ciencias Agrícolas for their financial support. I also want to thank the members of my committee for their contribution to this dissertation.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I : INTRODUCTION

When cost-benefit analysis started in the U.S. in the 1930's, economic valuation was generally perceived in terms of market prices. To value something one ascertained an appropriate market price, adjusted for market imperfections if necessary, and then used this to multiply some quantity (Hanemann, 1994). However, two theoretical developments changed this situation. Hotelling's paper on public utility pricing arguing that the appropriate welfare criterion is maximization of aggregate consumers' plus producers' surplus. The second development was Samuelson's theory of public goods and his findings that their valuation must be based on vertical aggregation of individual demand curves. Together, these developments led to an important paradigm shift, one that contributed directly to the emergence of nonmarket valuation including recreational sites as natural parks (Hanemann, 1992).

This shift implies that economics is not just the study of markets, but more generally the study of human preferences and behavior. The conceptual link to nonmarket valuation is the recognition that, while demand curve is not observable if there is no market for commodity, there still exists a latent demand curve that can be approached by travel costs and contingent valuation methods (Haneman, 1994).

Natural parks have existed since the 15th century and their conversion to protected areas has increased around the world in recent years, beginning during the second half of the 19th century in the USA, Australia and New Zealand (Leitmann, 1998). In the USA, Yosemite was transformed into a National Park in 1864 and Yellowstone Park was established in 1872. In Australia, Port Hacking was declared a National Park in 1879 (Beal, 1996). Since then, interest in conservation and environmental protection of natural lands has grown steadily.

Classifying and managing nature reserves have also evolved since that time. It is generally believed by people that conservation of natural areas is determined by objective and scientific means. However, there are other factors affecting policy decisions regarding conservation. Financial and political issues play an important role in influencing institutions, which may finally decide all types of managing strategies. Different managerial goals can be found depending upon the manager's perspective. At least three managing positions can be identified: a) national scale governmental organizations or public agency, b) regional or community scale governmental organizations or stakeholder associations, c) and directly or indirectly affected private individuals and landowners (Leitmann, 1998).

Under private ownership, economic agents can usually freely trade property rights. Communal ownership refers to property owned jointly by local governments and communities (e.g. ejidos, tribes). Public ownership refers to

property controlled by the state on behalf of all its citizens (Shogren, et al. 2003).

The theory of public goods (Samuelson 1954, 1964) is often referred to justify public ownership of property. In his seminal work of 1968, Samuelson suggests that when two goods (one private and one public) enter simultaneously into many people's indifference curves, assuming a set of individual tastes and a social welfare function which depend upon these tastes, it is possible to find that the perfect-competition market model will not work optimally, and a better configuration can make everyone involved better off.

Nowadays, other definitions of public goods applied to protected areas can be found. One of these definitions describes public goods as commodities or services that once produced can be supplied to additional users without affecting their availability to the original consumer. In addition, "pure" public goods are both non-rival and non-exclusive. Non-rivalness means that consumption by one individual does not reduce the quality or quantity of the good available to other consumers. Non-exclusiveness means that there is no way to prevent others from making use of the good. These two attributes impede the allocation of these kinds of goods using markets institutions (Hendry, 1993).

However, the important issue to determine is whether protected areas are public goods by nature. Some people suggest that protected areas have attributes of both public goods and private goods. People who believe that biodiversity conservation is for the benefit of all people, including future generations, argue that biodiversity is a public good. On the other hand, many of the benefits from

protected areas such as tourism are private (Clark, et al., 1995). This particular aspect of protected areas has led to an important debate. On one side, there are groups attempting to reduce the negative economic impacts of public land designation and to protect private rights. On the other side, environmental groups are arguing for more protection of environmental assets. Many landowner's argument is that they are forced to bear all conservation costs that should be the responsibility of the society. Therefore, they believe they should be compensated for their conservation efforts and they should also make the decisions about how much to conserve and through what measures since property rights of the land belong to them. However, many environmentalists fear that such voluntary measures will be ineffective for actual conservation. They seek both certainty about conservation results and an official declaration that their rights to the continued existence of plants and wildlife are at least on par with the development rights of landowners (Domerus, 2003).

This dilemma has no easy answers, but it appears to make sense to divide up the aspects of protected areas management into public functions and private functions and allocate property rights accordingly. In static settings, a plausible choice raises only distributional issues. That is, as long as the individual and the government (representing social interest) can negotiate over conservation policy, an economically efficient outcome can be achieved regardless of whether the law confers a conservation entitlement on the public or a development entitlement on landowners, when transaction costs are zero (Coase, 1960).

Because at least one side of protected areas fits as a public good, government has traditionally managed protected areas to provide public benefits (Beal, 1996). Those potentially competing benefits may include ensuring environmental protection and public access to recreation. Command and control schemes have been the most common tools for managing nature parks on public lands by governments. However, other measures for managing have also been employed. Such measures include fiscal policies such as revenue generation from public natural areas, which is often undertaken through imposing a nominal entrance fee (Pilaro, 2001).

However, the government management strategies have shown several disadvantages. First, policies that expand public protected areas are constrained by limited public funds and local support. Private landowners and local communities have often had little if any incentive to collaborate on conservation strategies because government conservation policies have not provided incentives for this land protection (Botha, 2000). Second, public agencies tend to run all their operations using their own resources and staff. Accommodation of visitors to the area might be underpriced on the pretext of making the parks affordable to most people as a right of citizenship (Hannah, 1992). Similarly, public access to public goods is often underpriced due to the nonprofit policies of many government agencies, necessitating average cost, or "cost recovery," pricing strategies. Third, governments can influence the management of parks for political purposes and can exploit them financially to subsidize activities other than conservation (mostly in developing countries). Thus, public

ownership could result in management practices that are economically inefficient, inequitable, and sometimes unsustainable (Berglas, 1981).

Private property is managed by the incentive to gain the fruits of the landowners' labor, which is driven by the goal of maximizing profits. Local entrepreneurs and commercial farmers may view wildlife conservation as a potential industry. Privately owned land can be used for commercial purposes such as sport hunting, game ranching and nature tourism and private conservation is a significantly increasing industry (Bean, 1998).

The ability of property owners to manage their own natural areas will depend on their awareness of important habitats on their land, their willingness to protect ecological values, availability of technical advice and the potential costs of management. Several types of incentive systems exist to encourage landowners to manage natural areas (Leiftmann, 1998). Incentives may be positive (payments for positive conservation) or negative (taxes on actions that negatively affect biodiversity). Conservation incentives need not be monetary. Tax credits or forgiveness of debts can be just as valuable as cash to a property owner. Technical assistance can reduce the cost of conservation. Regulatory relief, which can also serve as a powerful incentive and insurance against the economic risks of conservation, is another potentially effective incentive (Domerus, 2003).

It is important to have in mind that public action can occur at different government levels such as federal, state, and/or local legislation, and strategies from each of these levels of legislation might not coincide with each-other.

Therefore, choices about who should implement managing strategies may be critical (Cardenas, et al., 2000). For example, the federal government looks for the maximization of social benefits (use and non-use values) in contrast to the local government, which looks for maximization of net revenue to the community and potential use values of protected areas and natural resources. The local government management strategy is also referred to as the community-based management position since local government may face less resistance from local groups to initiatives and at the same time may establish a better cooperative network with stakeholders. This managing strategy looks to establish a cooperative network among communities and other involved groups, where communities' initiatives can be translated into a sustainable management of nature reserves. This strategy also seeks to identify opportunities for financing communities from marketing services (COINBIO, 2000).

Both of these strategies (national and community) have important arguments on their side. The community-based strategy presents arguments based on efficiency considerations and based on higher inclusion of key local stakeholders. The federal government's position lies in considering protected areas as a national concern or priority and, thus, best managed by a central authority on behalf of society (Daly and Cobb, 1989).

Two approaches for community-based natural resource management are the most commonly practiced in the world: special municipal programs, and efforts that promote sustainable local development, such as eco-tourism (Lintner, et al., 1998). In the special municipal program, it is recognized that the

participation and co-operation of local authorities will be a determining factor in achieving sustainable development. According to ACOPS (1994) this managing system consists of a plan where physical, economic, and social characteristics of a coastal zone are assembled, spatial control of tourist traffic is pursued, promotion of harmonious tourism is encouraged, and raising and investing revenue is required. The second key issue of this system is the coordination between the local authorities and key stakeholders for management improvement.

The sustainable local development managing system focuses on the aspirations and orientations of the local human population as the most critical variable, especially if the well-being of the communities is clearly linked to preservation of the natural site. Local authorities may encourage stakeholders' participation (Wells and Brandon, 1992).

International studies indicate that eco-tourism programs have a better chance of succeeding when they match the following goals: making tourists' experiences focus on special features of the natural area, such as wildlife's importance for ecosystems; maximizing the flow of revenues to the host region and landowners through an alliance among stakeholders; and educating as many people as possible about threats to the local environment (Leitmann, 1998).

The advantages of community-based natural resource management have been promoted by agencies as diverse as governments, local communities, NGOs and the World Bank (Duffy, 2002). In response to this community based management strategy and the revenue-generating capacity of ecotourism, a

number of local communities have decided to establish tourist services. Such activities are intended to ensure that the host communities retain all the revenues from ecotourism. Mexico provides an example of a comprehensive approach to supporting initiatives by indigenous people and peasant communities. These groups own 95 percent of priority conservation areas in the country (COINBIO, 2000).

Nature reserves require innovative management and protection to secure ecological integrity, and this is not likely to be achieved through traditional statutory reserves. Shrinking budgets, lack of agency capacity and lack of local support have limited the management and expansion of the formal conservation network (Polaski and Solow, 1999). There is a need to explore other management options for natural reserves. Under this context, one of the contributions of this dissertation lies in expanding the analysis of several policy options for protecting a natural area when it is driven by community-based management goals.

1.1 Problem statement

Ecological tourism is gaining interest both internationally and locally at many refuges for wild animals. The wintering site of the monarch butterfly is no exception. A problem that has come to light, however, is how to analyze economic interactions among the different stakeholders in the reserves when ecotourism is present. How to maximize profits is the main concern for the landowners. However, maximizing social welfare is the principal responsibility

of national government policy. Local authorities and gateway communities, on the other hand, are concerned with maximizing the economic impact of tourist spending. These conflicting interests are found in the biosphere reserve of the monarch butterfly located in Mexico.

The butterfly reserve serves as a refuge for the monarch butterfly, and landowners are banned from undertaking forestry activities. At the same time, however, such a refuge attracts thousands of people for watching the monarch butterfly. In November of 2000, a Mexican presidential decree legally expanded the protected area and established 56,259 hectares (ha) as a new protected area that serves as a refuge for the monarch butterfly. From the 56,259 ha area, 14,000 ha are considered core zones where no human activity is allowed, and 42,000 ha are considered buffer zones where landowners are allowed to extract a certain amount of wood through government permits during the months when the monarch is not at the sanctuary. The area was officially declared a refuge reserve area on March 25, 1980 (Diario Oficial de la Federacion 1980). Then, on September 30, 1986, former Mexican president, Miguel de la Madrid, declared a 16,100 ha area as a special biosphere reserve (Diario Oficial de la Federación, 1986). In the same year (1986), this Special Biosphere registered 30,000 visitors. By the 2000-2001 season, the number of visitors had increased to approximately 100,000.

In this context, conflicting interests among stakeholders need to be specified. At the local level, landowners face governmental restrictions for exploiting their lands (limited agricultural potential but higher forestry

potential). Landowners are the most affected group under preservationist policies since they are denied access to their lands. However, many of these landowners are in favor of tourism's use of the sanctuary because they obtain benefits from this recreational (non-consumptive use) activity. Their main objective would be to maximize revenue from entrance fees. However, the area of the monarch sanctuary falls into two gateway communities and the local governments of the both communities have an obvious interest in the sanctuary, since it has great economic potential as a tourist destination. Local governments are, thus, interested in maximizing economic impact from tourism spending into local communities. These communities provide visitors with tourist services such as restaurants, transport, souvenirs, and hotels, and their support for policies regarding management aspects may differ from those of the federal government.

At the national level, the monarch sanctuary can be viewed as a national heritage for Mexicans. The monarch butterfly has been used as a symbol for the North American Free Trade Agreement (NAFTA). Therefore, federal government is more interested in maximizing social welfare and enhancing conservation of the sanctuary. The above-mentioned context lets us consider efficiency, equity, and sustainability issues as a part of the broader concept of social welfare, although equity and sustainability might involve subjective economic aspects (McEvoy, 1998).

1.2 General objective

The general objective of this dissertation is to provide an empirical economic performance of the monarch butterfly sanctuary under its current management strategy. This empirical analysis looks for, in a simple fashion, a description of the benefits and costs of the protection of the sanctuary and to whom they may flow among stakeholders under different scenarios of property rights. It is a fact that conservation has more possibilities to succeed if relevant stakeholders are provided with appropriate incentives (Okidi, 2001). It is also important to mention that the most relevant contribution in this study is not the precise calculations of benefits derived from the monarch sanctuary but its contribution to the literature utilized for analyzing the distribution of these benefits among stakeholders, since conflicting interests are present in protecting natural areas. This study also contributes to the analysis of the strategies for managing the sanctuary that could be most favored by a wider number of stakeholders.

1.3 Specific objectives

With regard to the economic analysis of conservation on community-owned natural reserves, I propose to develop the following objectives:

1. To estimate the non-consumptive use of the sanctuary of the monarch butterfly using combined revealed and stated preference information and zonal travel cost approaches.
2. To measure economic benefits to landowners of the sanctuary when entrance fees are able to change.

3. To measure economic impact on gateway communities from visitors to the sanctuary.
4. To measure price responsiveness of visitors under increases in fees versus increases in travel costs.
5. To analyze different policy options of management of the sanctuary, given the competing objectives of the federal government, communities surrounding the sanctuary and the sanctuary landowners.

1.4 Approaches

In order to achieve the aforementioned objectives, several economic tools are sensible to use. The demand for recreation can be measured by travel cost and contingent behavior techniques. It is a fact that benefits stemming from the migration of monarchs are associated with recreation and watching this phenomenon. Then, results from these techniques could provide consumer welfare estimations. The price sensitivity measures from changes in entrance fees in contrast to changes in travel costs are also provided by estimation of recreational demand. Analyzing economic benefits to landowners when varying entrance fees will give an idea of what the most efficient outcomes for maximizing revenue are. For measuring the spending impact on local communities, an export base analysis can be developed. This analysis allows us to calculate an income multiplier, which represents a key element for calculating economic impact in local communities. The analysis is complemented with

gateway communities' input in the context of an eco-tourism framework for delimiting local and non-local spending. Finally, several management strategies and policy options can be explored under the reallocation of property rights framework.

1.5 Hypotheses

As a consequence of the evolution of the techniques for measuring economic values of environmental assets, it is quite intuitive to expect that recent techniques will perform better than old ones. It is expected that recreational demand will be price inelastic to fees. Therefore, increases in fees could provide more revenue to landowners. When visitors spend money at the sanctuary, more income is generated in communities and a positive effect exists. However, any increase in the entrance fee will reduce the number of visitors to the sanctuary, affecting the spending in communities. The hypotheses proposed in this dissertation are:

1. The use of a combined revealed and stated preferences approach for measuring recreational demand gives advantages over the zonal travel cost approach.
2. There is a margin for increasing entrance fees at the sanctuary in order to maximize landowner's revenue.
3. A positive effect occurs on income generation in communities surrounding the sanctuary with tourist spending but an increase

in entrance fee will adversely affect visitation and economic impact on gateway communities.

4. People visiting the sanctuary are more sensitive to facing higher travel costs than higher admission fees.

5. Because of the wide spectrum of, sometimes conflicting, objectives for managing protected areas, it is possible to achieve a balance of the benefits derived from the sanctuary among stakeholders when a mixture of management strategies is implemented.

1.6 Structure of the dissertation

This dissertation is divided into 8 chapters. Introduction refers to Chapter 1 and elaborates on the problem statement, objectives, and hypotheses. Chapter 2 describes three key elements of the analysis: protected areas, ecotourism, and gateway communities with special emphasis on the fees systems as a management strategy. Chapter 3 presents a revision of the concepts of biosphere and ejido (a type of community-owned property in Mexico) and describes briefly the study area. Chapter 4 explains the analytical materials and economic concepts used in this study. In Chapter 5, econometric models and data collection are described. Chapter 6 presents the results for the specified models in the previous chapter, and Chapter 7, explains results for economic impact among stakeholders. Finally, Chapter 8 provides some conclusions and future research directions.

CHAPTER II

PROTECTED AREAS, ECOTOURISM, AND GATEAWAY COMMUNITIES

Economic concepts including demand estimation, revenue generation, and pricing issues, are directly applicable to protected areas and ecotourism. If prices, such as park entrance fees or wildlife tour fees, are to be used to raise revenue, or to protect sensitive resources from overuse, then knowledge of the relevant demand functions and their price elasticities are useful and important. Private firms in the ecotourism industry have faced this problem all along and have presumably develop the necessary knowledge for facing these economic issues. But the problem is relatively new when the public sector is involved. The situation is complex because countries are making different types of protected areas, with important differences among them in terms of resources, management, objectives, and clientele.

2.1 Protected Areas

A protected area is an area especially dedicated to the protection and maintenance of biological diversity and of natural and cultural resources, and managed through legal or other effective means (IUCN and WWF, 1994).

The definition embraces the universe of protected areas. All sub-categories of protected areas must fall within this definition, although in

practice the precise purposes for which protected areas are managed differ considerably. Along with more traditional conservation aims, protected areas can also embrace the maintenance of cultural and traditional attributes, education, scientific research and tourism and recreation (Dudley, et al. 1999). Within this over-arching definition, protected areas are further subdivided into six categories:

- Strict nature reserve: An area of land and/or sea possessing some outstanding or representative ecosystems available primarily for scientific research and/or environmental monitoring;
- Wilderness area: A large area of unmodified or slightly modified land and/or sea, retaining its natural characteristics and influence without permanent or significant habitation, which is protected and managed to preserve its natural condition;
- National park: A natural area designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation, and (c) provide a foundation for spiritual, scientific, educational, recreational, and visitor opportunities, all of which must be environmentally compatible;
- Natural monument: An area containing specific natural/cultural features of outstanding or unique value for their inherent rarity;
- Species management area: Area of land subject to active intervention for management purposes so as to assure the maintenance of habitats to meet the requirements of specific species;

- Protected landscape: An area of land, coast or sea as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant cultural and/or ecological value and often with high biological diversity (Idem 1999, p. 34).

The basis of categorization is by primary management objective. While all categories are important, they imply a gradation of human intervention. In recent years, the emphasis of protected areas management has been broadened and extended to reflect wider uses that are driving the protected areas.

Officially recognized protected areas now include "extractive reserves", where a portion of the protected area is used for sustainable forms of production; "landscape protected areas," where biodiversity is embedded as one element in a working landscape; and the traditional national parks, where tourism is allowed (Dudley, et al. 1998). This categorization is important to local people because it provides them with information on what degree they are allowed to take economic advantages of the protection of natural assets.

2.2 Fee Structure on Protected Areas

Managerial decisions about fees often are based on achieving objectives of revenue generation, cost recovery and/or visitation control. However, decisions are often made with little or no consultation with affected stakeholders, notably the tourism industry and local communities. Such a lack of consultation can lead to unintended effects, and even a reversal of fee decisions (Lindberg, 2001).

If a decision is made to charge or to increase fees after review of the advantages and disadvantages, consideration of possible fee objectives can help guide determination of the appropriate fee type and amount. Various objectives exist, including:

1. Cost recovery, which involves generation of sufficient revenue to cover part or all of tourism's financial costs and possibly tourism's other costs;
2. Generation of profit, with the excess of revenue over cost being used to finance traditional activities (at the destination or at other sites) or to achieve other objectives;
3. Generation of local business opportunities, which may involve low fees in an effort to maximize number of visitors and/or the earmarking of fees to enhance site or experience quality;
4. Provision of maximum opportunities for learning and appreciation of the natural resource, which may also involve low fees;
5. Visitor management to reduce congestion and/or ecological damage, which would involve fees high enough to influence visitor behavior (Idem 2000, p 8).

It is important to make a distinction between government and private management goals when imposing fees for visiting parks. The objectives of cost recovery and generation of profits differ substantially depending upon who makes the decision of charging fees. The government has usually considered average cost pricing and has not been motivated by maximizing revenue but by social welfare, since equity or fairness in the distribution of society's good, is an

important issue for the government. However, if operating and maintaining costs of the park are not covered by admission fees but through taxation from citizens, then government's management's of the park is not efficient. There is another issue, referred to as congestion externalities, that affects parks management. Average cost pricing will result in greater visitation (between Q_0 and Q_1) and greater congestion than marginal cost pricing (Q_1), and cause economically inefficient visitation rates. Further, if the admission fee is zero, then an open access situation exists and an even higher level of visitation (Q_0) can be expected. An important question to solve is what the optimal visitation when congestion externalities are present (Field, 2000).

Figure1 Socially efficient visitation rates

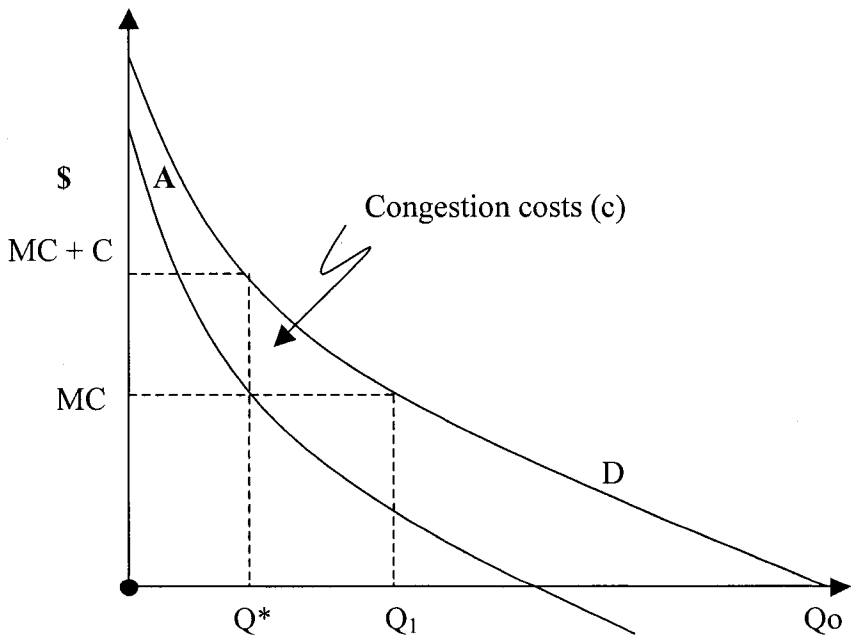


Figure 1 assumes that the marginal costs of operating the park are constant at a level of MC. If a price were charged equal to this amount, visitation would go to q1 visitor-days per year. However when the rate of visitation increases at a public park, the new visitors may cause congestion that lowers the value of the visitation experience. In the figure a demand curve adjusted for congestion is shown (A). The height of the demand curve (D) shows the willingness to pay of the marginal user; the height of the adjusted demand curve (A) shows the marginal willingness to pay minus the congestion costs. The socially efficient use rate is now q* and the new admission fee for obtaining this efficient use rate must be equal to the standard marginal costs (MC) plus congestion costs (C) (Idem, p.346).

2.3 The issue of the price responsiveness

Several of the arguments for and against fees rest on the assumption that visitation is price responsive (price elastic). For example, fees will reduce visitation by low-income groups only if such people stop visiting the park as a result of the fee. Likewise, fees will be most effective for visitor management if demand is price elastic. On the other hand, fees will be most effective for revenue generating if demand is price inelastic, if the increased revenue per visitor is not offset by a decreased number of visitors. Generally speaking, visitation to park areas is price inelastic (USDA, 2001; McCarville et al., 1999; Beal, 1996; Knopman and Stoeckl, 1995). That is, there may be a price response (and even modest responses may be important), but the number of visits will

decrease by less, in percentage terms, than the price increase (Lindberg 2001). However, when substantial travel cost increases are present, more people would stop visiting parks.

According to the USDA (2001) visitation to recreation sites continues to appear unaffected in any significant way by new fees. For example, Rocky Mountain National Park did not experience an obvious drop in visitation despite a doubling of the fee from $5 to $10 per visit. The Grand Canyon and Yellowstone, increased fees from $10 to $20 following the Rocky Mountain National Park strategy. McCarville, et al. (1999) report similar results for national parks in Western Canada. When Knapman and Stoeckl (1995) used travel cost analysis to estimate demand curves for two parks in Australia, they estimated an elasticity of -0.014 and -0.0015. They also note that Australian empirical studies typically generate elasticity estimates of -0.033 to -0.40, meaning that a 1% increase in travel costs will result in a 0.03% to 0.4% decrease in visitation for a net increase in total travel expenditures.

For developing countries, a study of wildlife viewing demand in Kenya found price elasticities of -0.17 to -0.84 for foreigners and -1.77 to -2.99 for residents (Navrud and Mungatana, 1994); foreigners' visitation decisions were price inelastic and residents were price elastic. Chase et al., (1998) estimated price elasticities for three different parks in Costa Rica using contingent behavior analysis. These estimates were -2.87, -1.05, and -0.96. However, in an analysis using actual price and visitation data for the same parks in Costa Rica, Lindberg and Aylward (1999) found elasticity values of -0.0513, -0.296, and -

0.238 respectively. Romo (1997) calculated a price elasticity of -0.09 for the monarch butterfly sanctuary in Mexico. All previous studies considered only user fees for calculating elasticities instead of travel cost elasticities.

With respect to price responsiveness, when using travel cost instead of entrance fees, Englin and Cameron (1996) estimated a price elasticity of -1.0 when using contingent behavior techniques for Nevada anglers. Hellerstein (1995) estimated average travel cost elasticity for five different parks: the national park estimate was -0.7; the state park estimate was -1.0, the regional park estimate was -0.9; the municipal park estimate was -3.5; and the local park estimate was -1.5.

In summary, price responsiveness may vary across sites, fee levels, respondent income, and cost levels depending many times on the existence of substitute sites. However, none of the previous studies presented any comparisons between the estimation of the elasticity looking at total travel cost versus the estimation of the elasticity looking at only the entrance fee. This study differs from former studies in making a clear distinction of the effect that total travel cost versus the entrance cost has on visitation.

2.4 Sustainable development

In 1987, the Brundtland Report to the United Nations first suggested a definition for sustainable development. The report defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World

Commission on Environment and Development, 1987). The idea of sustainable development as cited in the Brundtland Report was to bring together the apparently disparate concepts of economic development and environmental conservation (Lewis, 2001). The report envisioned economic development and conservation as entities that could coexist. As the argument for sustainable development became more prevalent, the idea that tourism development could not only be economically feasible, but also sustained gave birth to the contention that it was possible to create sustainable tourism. Just as there was debate over the possibilities of sustainable development, the possibility of sustainable tourism has generated controversy (Lewis, 2001). Butler (1993) said that while certain forms of tourism have been hailed as being sustainable, most notably those such as alternative tourism, or ecotourism, other forms have not met sustainability criteria.

2.5 Ecotourism concept

Ceballos-Lascuarian is widely acknowledged as having first coined the term ecotourism in 1981 (Wearing and Neil, 2001). He used the word in 1983 in discussions as president of PRONATURA, a conservation non-governmental organization, and as director general of SEDUE, the Mexican Ministry of Urban Development and Ecology. At the time, he was lobbying for the conservation of rainforest areas in the Mexican state of Chiapas. One of the arguments he used for maintaining the integrity of the forest was the promotion of ecological tourism in the region, emphasizing that ecotourism could become a very

important tool for conservation. The first appearance of the word in the written form was in the March-April 1984 edition of *American Birds*, in an advertisement for tourist operations initiated by Ceballos-Lascuarian. His definition first appeared in the literature in 1987 in a paper entitled "The Future of Ecotourism", and this initial definition was expanded upon by Boo (Wearing and Neil, 2001).

> "We may define ecological tourism or ecotourism as that tourism that involves travelling to relatively undisturbed or uncontaminated natural areas with the specific object of studying, admiring and enjoying the scenery and its wild plants and animals, as well as any existing cultural aspects (both past and present) found in these areas. Ecological tourism implies a scientific, aesthetic or philosophical approach, although the ecological tourist is not required to be a professional scientist, artist or philosopher. The main point is that the person that practices ecotourism has the opportunity of immersing him or herself in nature in a way that most people cannot enjoy in their routine, urban existences" (Boo, 1990).

A number of important basic ecotourism concepts have emerged in recent years. The notion of movement or travel from one location to another is obviously a fundamental component. This travel should be restricted to relatively undisturbed or protected natural areas, as ecotourism focuses on the promotion of nature. Such natural areas offer the best guarantee for encountering sustained natural features and attractions. Thus, in travelling to unspoiled natural environments the travel has the specific purpose of experiencing the natural environment. Ecotourism would seem to exclude such activities as business travel, travel to cities, conventional beach holidays, and sporting holidays, where the experience is not focused on the natural environment of the area visited.

2.6 Gateway communities and economic impact analysis

In favor of eco-tourism, Dufy (2002) argues that this type of tourism is socially inclusive and ensures genuine participation for local people. There are several criticisms of eco-tourism, such as only a few locals benefit from the industry's growth, and it represents a seasonal, fluctuating business that can rise and fall quickly as a result of economic changes (Burr, 1991; McLaren, 2003).

A series of papers around the world have studied eco-tourism and its impact on local communities (Leitmann, 1998; Barking, 2000; Fennel and Dowling, 2003). These studies show a mixture of results. On the one hand, some studies show community tourist activities as an important tool to spur development efforts and strengthen local efforts to improve environmental management practices (Colombo, Sri Lanka case study by Leitmann; and the community museum program in the state of Oaxaca, Mexico by Barkin). On the other hand, some studies reveal the difficulty of implementing even the best intentioned of the projects, because of contentious and paternalistic political systems (Eco-tourism in Akama, Cyprus by Fennel and Dowling; and Ecology theme park of Xcaret in Mexico by Barkin). When the eco-tourism strategy has succeeded, a higher multiplier or "ripple" effect on gateway communities is more likely to be found.

The interface between ecotourism and protected areas is of particular interest in areas where communities may serve as gateways to protected lands. Such communities are likely to have economies closely related or dependent on natural resources-based tourism and/or renewable resource extraction (usually

communities within a radius of 30-60 km of distance from natural areas) (Goldman, et al. 2003). Potential problems and opportunities exist along this zone of interface from unappealing entryways and traffic congestion to growing demands on community's services.

Impact studies examine the economic effects that an industry or project has on communities. Economic impact studies need to provide information about the effects an industry has on jobs and income. The effects an industry or project has on various groups among communities (its distribution effects) are often more important than its economic efficiency (Goldman, Idem). Economic impact assessments focus on actual flows of money into a region in contrasted with economic valuation or benefit-cost studies that generally measure willingness to pay and producer surplus. Economic impact analysis measures benefits to the region, not the benefits to the visitors themselves. Economic impact tools are designed to help evaluate policies and programs based on their contributions to a region's economy. In a program evaluation context, the program evaluated must be clear in order to properly attribute economic changes to the given program. The region defines which visitors are considered local or tourist, which spending should be included, and which primary and secondary effects should be counted.

Multipliers in economic impact analysis capture the size of the secondary effects, usually expressed as a ratio of total effects to direct effects. Total effects are direct effects plus the secondary effects. A sales multiplier of 2.0, for

example, means that for every dollar received directly from a visito,r another dollar in sales is created within the region through indirect effects.

Many studies have elaborated on the advantages of economic impact analysis in protected areas. For example, the Great Smoky Mountains National Park in the Eastern United States hosted under 10 million visitors in 1997 (Stynes, 2000). Gateways communities of Gatlinburg, Pigeon Force, Townsed and Cherokee were favored by $9.8 million on total sales. Tourism-related industries accounted for $1.8 million of all sales and supported around 18,000 jobs. Mount Rainier National Park in the northwestern united States hosted 1.3 million recreation visits in 2000 (Ya-Yen., et al. 2002). Park visitors spent $30 million dollars in the local area generating $9 million in direct personal income and supporting 649 jobs. Badlands National Park in South Dakota, USA reported 1.1 million recreation visits in 2000 (Probst., et al. 2002). Park visitors spent $19 million dollars in the local area, generating $5.2 million in direct personal income for local residents and supporting 438 tourism-related jobs in the area. The Sequoia and Kings Canyon National Parks in California, USA were visited by 1.13 million people in 2002 (Stynes and Ya-Yen 2002). Park visitors spent $65 million dollars within the local region and generated $22.3 million in direct personal income for local residents, supporting 1,243 jobs in the area.

CHAPTER III

BIOSPHERE, EJIDO AND BACKGROUND STUDY AREA

The concept of the biosphere reserve emerged from and constitutes an essential part of the UNESCO's Man and Biosphere program. According to Batisse, (1986) a biosphere reserve conserves the natural resources and special natural qualities of its region. The ideal biosphere reserve has areas locally managed for economic development with respect for the conservation of the protected areas. These managed areas are used for tourism, forestry, and recreation. The biosphere reserve is a place for education and training. Local people, landowners, and organizations cooperate on conservation and development issues affecting the region. The involvement of local people is essential to a biosphere reserve. There are over 352 biosphere reserves in 87 countries (July of 2003). In the USA there are 47 reserves and 99 legally protected sites under government or private ownership. In this country (USA) most biosphere reserves are either national parks (32) or national forests (15) (US MAB Program, 2003).

Currently, Mexico has 166 protected areas (Table 3-1). According to the nomenclature of the International Union for Conservation of Nature (IUCN), the highest number of the protected areas belong to the National Park category (58),

followed by Nature Conservation Reserve/Managed Nature Reserve/Wildlife Sanctuary (57), and the Biosphere Reserve category (14). Mexico uses a similar nomenclature to that of the IUCN but also includes a Special Biosphere Reserve category with the same objectives as the Biosphere Reserve when the size is smaller than 10, 000 ha. The Monarch Butterfly Sanctuary in Michoacan is one such Special Biosphere Reserve.

Table 3-1 Protected areas in Mexico

Categories	Number	Percent	Area (ha)
Strict natural reserve	1	3.6	19,170
National park	58	34.9	825,066
Nature conservation reserve	57	34.3	5, 604, 355
Protected landscape	1	0.6	100
Resource reserve	27	16.3	1, 238, 542
Biosphere reserve	14	8.4	6, 586, 353
Natural monuments	3	1.8	2,590

Source: Updated information from Romo 1997.

3.1 Concept of Ejido

Article 27 of Mexico's constitution allows the federal government of the United Mexican States to create agrarian lands for the benefit of its citizens.

With its constitutional inception in 1917, Mexico began the process to provide farmers a beneficiary interest in land owned by the government. Entitled under the agrarian law, these government parcels, known as "ejidos", are recorded in the national agrarian registry in Mexico City. The ejidatarios can live, farm, homestead and construct dwellings on the property. Under the agrarian law previous to the 1992 agrarian reform, the ejidatarios could not sell, lease, subdivide, joint venture, contribute, mortgage or encumber the property. In essence, they had the use and benefit of the land but they did not have the title to it. In 1992, the Mexican congress passed legislation opening the way for the privatization of communally controlled ejido land.

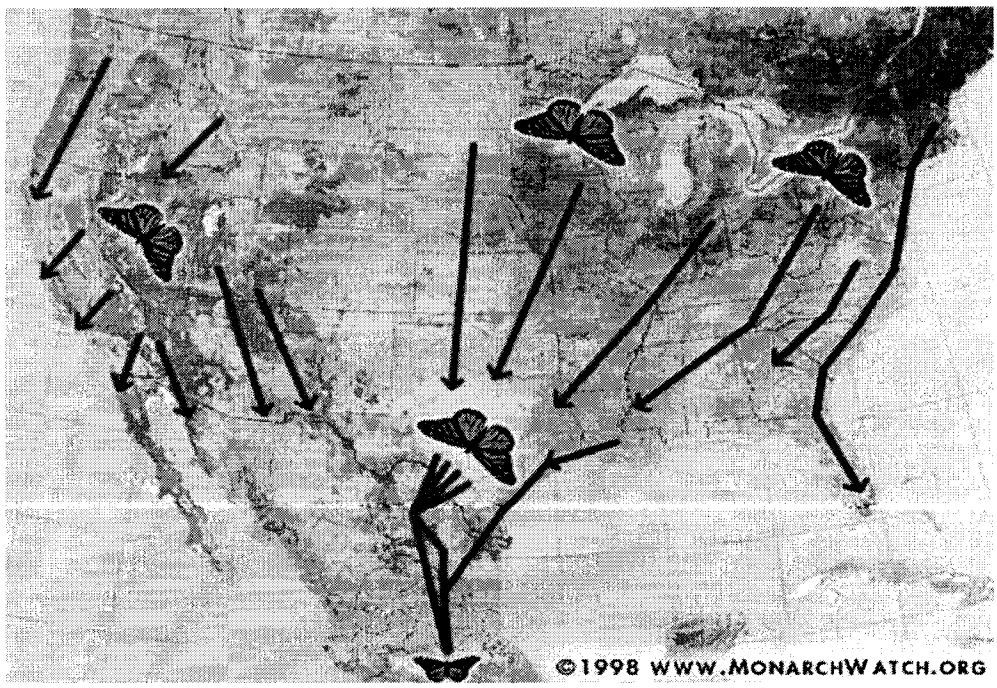
The arguments for implementing such reform can be summarized as follows. First, a title provides security, which in turn increases the owner's incentive to invest in the land since he or she is more certain of being able to reap the rewards of the investment. Security is an important benefit, however it was not really new in the 1992 reform since ejidatarios have always had secure use rights to their parcels. A second benefit of a title is that it permits land transfers. Ability to transfer a title can also increase a farmer's incentive to invest since the investment can be recovered via rental or sale in the event of a liquidity crisis. Third, the ability to transfer land allows it to move from low productivity to high productivity uses, increasing overall efficiency in the economy. The fourth benefit of a title is that it can be used to guarantee loans from lending institutions. As such, a title can increase the owner's access to credit, and may therefore increase the amount that he or she invests in the land,

which in turn could result in increased production. The potential implication of the 1992 agrarian reform in Mexico is that landowners have the option of selling their lands if they perceived this option as an opportunity cost compared to tourism development. However, it is difficult to think in an important demand for these lands due the existence of a government restrictions for their exploitation.

The Monarch Butterfly Sanctuary is somewhat unique as a Biosphere Reserve as it is found on ejido rather than strictly public lands and is, therefore, subject to potentially different management incentives than are most Biosphere Reserves in Mexico or worldwide.

3.2 Background of the study area

Figure 2 Migration of the monarch butterfly



During the summer, the monarch butterfly lives in the United States and Canada. It migrates annually in a long journey of over 2,500 miles in search of a mild climate for hibernation and reproduction. Eastern Michoacan offers the most favorable conditions for the monarch butterfly, including the required vegetation for the insect, protection against the wind, and stable temperatures. How these butterflies manage to find their way over such a long distance remains a mystery, but the most surprising thing is that not a single butterfly completes the round trip, as the insects live for only several months. Thus, the butterflies that arrive at the sanctuary are actually descendents of the ones that left the previous spring. Most of the monarchs migrate to Mexico's mountains. The rest of the population migrates to the coast of California between San Francisco and Los Angeles. The eastern migration, which is much larger and older than the western migration, also includes minor overwintering sites in Florida.

The Special Biosphere Reserve of the monarch butterfly is located in the vicinity of 10 municipalities, but only 5 ejidos (landowners) surround the buffer zones of the most important sanctuary open to visitors. Five sanctuaries have been established in the Reserve, but only two of the sanctuary areas are open to tourists: "El Campanario" and "Sierra Chincua". Both open sanctuaries are located between the two gateway communities of Angangueo and Ocampo. The "Sierra Chincua" sanctuary was opened to visitors on December 10, 1996. The sanctuary "El Campanario" has been open to tourism since 1980, and it is the primary destination for visitors. The sanctuary "El Campanario" is located in the

ejido "El Rosario". Although the Mexican federal government controls the sanctuary, and since the sanctuary is on ejido land, the ejidatarios (member of the ejidos) have pre-emptive rights. They charge an entrance fee of 15 pesos ($1.50 US for 2000-2001 season) per person.

According to the Bureau of Tourism in the state of Michoacan (2003) and based on the sanctuary book record of visitors located in the sanctuary during the last 8 seasons, the visitation had followed the trend shown in table 3-2.

Table 3-2 Visitors to the monarch sanctuary

Season	Visitors
1994-95	100,487
1995-96	101,979
1996-97	89,435
1997-98	158,072
1998-99	NA
1999-00	120,632
2000-01	105,526
2001-02	97,725

Table 3-2 shows that annual visitation to the monarch butterfly sanctuary is around 100,000. The 1997-98 season registered the highest number of visitors with 158,072. The second highest was the 1999-2000 season with a total of

120,526 visitors. For the 1999-2000 season, 97.2 percent were identified as national or domestic visitors, and for the 2000-01 season, domestic visitors represented 95.6 percent. In our surveyed sample of visitors for the 2001-02 season domestic visitors represented 98.7 percent and foreigners represented only 1.23 percent. Some 86 and 60 percent of total visitation was concentrated in February and March in the 1999-2000 and 2000-01 seasons, respectively.

Figure 3 Map of the cities and municipalities.

Ejido "El Rosario" has a population of less than 250 people and its main income alternatives are logging, agriculture in small sloping areas, and tourism. The closest municipalities to the "El Campanario" sanctuary, after ejido "El Rosario", are Ocampo and Angangueo. Ocampo has a total labor force of 4,955

people (Mexican Census 2000). Almost 40% of the labor force is employed in agricultural, livestock, and forestry activities (Mexican Census 2000).

There are three industrial codes (transport, recreation, and restaurants) categories related to tourist activity, and jointly they employ 7.5% of the total labor force in Ocampo. The second closest community to the sanctuary "El Campanario" is Angangueo, whose total labor force is 2,484 according to the Mexican Census 2000. The labor force is distributed among manufacturing with 22.8%; agriculture, livestock, and forestry with 10.7%; trade with 10.6%; construction with 10.2%; education with 8.37%; and mining with 7.6%. Services related to tourism are transport, recreation, and restaurants and hotels and altogether they employ almost 6% of the labor force.

CHAPTER IV

ANALYTICAL METHODS

4.1 Concept of values

There is general agreement that the services derived from natural resources can be classified into use and nonuse services and that the value of these services can be classified into use values and nonuse values (Blomquist and Whitehead, 1995).

Use values

Direct use values include consumptive use of natural resources, as well as non-consumptive uses such as recreation, education, and research. Indirect use values include maintenance of natural ecosystem functioning; e.g. water catchments protection, carbon fixing, and conservation of biological diversity.

Non-use values

Non-use value may also be broken into different categories: option, existence or bequest value. There is some debate about whether option value is a use or non-use value, because it is a non-use value in the present, and a use value in the future. All non-use values are also non-market values (Eagles, et al., 1998). Existence values are those values derived from the satisfaction of knowing that something exists. Bequest value is the value of preserving a peculiarly remarkable environment for benefit of heirs.

4.2 Theory of environmental goods

4.2.1 Public goods

A public good is a good which possesses two properties: a) it is non-rivalrous, meaning that it does not exhibit scarcity, and that once it has been produced, everyone can benefit from it; and b) it is non-excludable, meaning that once it has been created, it is impossible to prevent people from gaining access to the good (Lesser, 1997). Public goods are said to be "pure" when they posses these properties absolutely. In practice, most public goods are impure or are confined to particular localities (Stabler, 1997). Public goods provide an example of market failure. Because no private organization can reap all the benefits of a public good, which they have produced, economic theory concludes that there will be insufficient incentive to produce it. Consumers will take advantage of public goods without contributing to their creation. This is called the free rider problem. One general solution to the problem is for governments to raise taxation to fund the production of public goods. The difficulty is to determine how much funding should be allocated to different public goods, and how the costs should be split.

4.2.2 Club theory

Buchanan's paper (1965) proposing an economic theory of clubs remains as the seminal work on collective consumption arrangements. A characteristic of collective use is the possibility of congestion and decreasing individual utility or benefits as the number of people using a facility increases. This characteristic is absent in the consumption of purely private goods. The cost of using a facility is likely to fall for individual users as costs as shared among more users. Vital to the theory is the ability to exclude potential

users by the enforcement of property rights. Buchanan concludes that the optimal size of a club or communal-use facility, for a given size of the facility, occurs where the cost of the admission of an additional member equals the marginal benefit. In tourism, many forms of congestible public goods are relevant. For example, too many visitors at a destination crowds beaches or parks. Fisher and Krutilla (1972) conclude that admission of additional users could continue, and the density of users increases, until aggregate net benefits were maximized. The essence of the above analysis is that optimal capacity for a site is dictated by its users' perception of, and preferences for, congestion (Cornes and Sandler, 1986).

4.2.3 Local public goods

Tiebout introduced the term "local public goods" into the economic literature in 1956. Until this paper changed the focus, public goods were conceived as goods that, if available to one person, were available to all. The non-excludability of public goods has an important consequence, namely that a decentralized mechanism to achieve their optimal provision cannot be found; that is, it is not generally possible to find a way to get individuals to reveal their true valuation for public goods (Samuelson, 1968; Nowlan, 1988).

Tiebout (1956) argued that there was a class of public good, the local public good, for which a decentralized mechanism for achieving optimal allocation did indeed exist. This is especially true for goods such as parks provided by local governments. Local public goods exhibit non-excludability but they are partially rival because they are subject to congestion (Musgrave, 1969).

Tiebout's model is one in which each local community or jurisdiction provides a mix of public goods. Those who live in the jurisdiction receive the benefits of these goods and pay for them through a tax levied equally on each taxpayer. There are no interactions between jurisdictions. The key factor is the mobility of people. If people can costlesstly move from one jurisdiction to another, they will move to the jurisdiction in which the mixture of services and tax level provides them with the greatest net benefit. Because of congestion, there will be some optimum or least-cost size for each community. This site will occur where the benefit of sharing the infrastructure costs with another taxpayer will be just equal to the crowding cost imposed by the new person (Nowlam, 1988).

Local public good theory has a close counterpart in the club good theory (Buchanan, 1965; Fisher and Krutilla, 1972; Cornes and Sandler, 1986). Like in the case of local public goods, where communities provide these goods only to tax-paying members of the jurisdiction, clubs are able to restrict the provision of club services to these who are members. Club goods are thus excludable, like private goods, but like local public goods they are only partially rivalrous.

4.3 Welfare measures

Welfare measures provide an indicator of individuals' utility. These indicators allow the calculation of impacts on consumer benefit or loss when a change in the access cost for demanding goods occurs. Economic theory considers several alternative ways to measure a consumer's surplus: named compensating variation (CV), equivalent variation (EV), compensating surplus (CS), and equivalent surplus (ES) (Hicks, 1943).

In the analysis of price changes, the measures of welfare conventionally used are compensating variation and equivalent variation. For a price decrease, compensating variation measures the maximum willingness to pay to secure the change, while equivalent variation measures the minimum willingness to accept to forgo it. For a price increase the opposite situation occurs (Brookshire et al., 1980).

The equivalent surplus asks what change of income is required, given the old prices and consumption level of good x, in order to make the individual as well off as that person would be with the new price set and consumption. The compensating surplus asks what compensation payment will make the individual indifferent to the original situation and the opportunity to purchase a new quantity of the good whose price has changed (Freeman, 1993).

Clinch and Murphy (2001) describe that compensating variation and equivalent variation can be developed as consumer surplus measures, when analysis is referred to calculate changes in quality and quantity on environmental assets. In this setting, compensating variation measures both the maximum amount the person is willing to pay for an increase in the quantity of the good and the minimum amount the person is willing to accept in compensation for a decrease. The equivalent variation measures the minimum amount the individual is willing to accept to forgo an increase in the quantity of the good as well as the maximum willingness to pay to avoid a decrease. This study focuses in getting willingness to pay measures for the calculation of the social regional welfare of the sanctuary of the monarch butterfly through Hanemann's formulae proposal described in Chapter V. The Hanemann proposal allows us to describe the link between the derivation of WTP estimates and discrete choice models within the random utility

framework and it is suitable to this study because elicits WTP measures that come from combining multiple data sources (Hensher, et al., 1999). Loomis (1997) derived WTP estimates using Hanemann's approach for obtaining the economic value of changes in instream water flow.

4.4 Economic valuation methods

4.4.1. Travel cost method

The travel cost method is used to estimate economic use values associated with ecosystems or sites that are used for recreation. The method can be used to estimate the economic benefits or costs resulting from: a) changes in access costs for a recreational site; b) elimination of an existing recreational site; c) addition of a new recreational site; and d) changes in environmental quality at a recreational site (Bockstael, 1996)

Techniques for estimating recreation demand involving travel cost approaches have evolved since 1960s. This dissertation considers two of these techniques for measuring the economic value of natural parks.

4.4.1.1 The traditional zonal travel cost model and literature review

The zonal travel cost technique uses variations in travel cost to estimate the demand for the site. To know the demand function for a site, it allows for estimation of the consumer surplus of visitors and, consequently, the recreational value for the site. The application of this method generally includes the following steps (Dixon, et al. 1996):

1. For a given recreation site, the surrounding area is divided into concentric circular zones for the purpose of measuring the travel cost from each zone to the site and return.
2. Visitors at the site are sampled to determine their zones of origin.
3. Visitation rates, defined as visitors per day per capita, are calculated for each zone of origin.
4. A travel measure is constructed to indicate the cost of travel from the origin zone to the recreation site and return.
5. Visitation rates are regressed on travel costs and socioeconomic variables such as average income and median educational attainment.

The use of the zonal travel cost models for measuring recreation demand have been heavily criticized on a variety of grounds (Cameron and Trivedi, 1986; Kirman, 1992; Stoker, 1993; Anderson, 2000; Karisin, 2001). One particular concern is the trip generation function. That is, recreationists are classified according to their zone of origin. In order to have a reasonable sample size, the zones of origins may need to be quite small, in which case travel costs may not behave well in the statistical model (Karisin, 2001). Another concern with zonal models is that some of the independent variables may need to be aggregated across the zones' inhabitants, which may increase the error or decrease the likelihood of finding significant features. Ultimately, this point raises the question about whether a zonal model is compatible with an individual utility-maximization approach (Stoker, 1993).

Different types of travelers is another concern for these models. These types of recreationists violate the assumption that the travel costs which people incur to visit a site

are a good proxy for the amount they value the use of the site (Bockstael, 1996). The zonal model generally does not have the flexibility to include costs, which vary between individuals; because it assumes that everyone from a given zone has approximately the same costs, based on travel from the center of the zone (Anderson, 2000). Although, the zonal model can include socioeconomic variables (e.g. income, education, race, age) based on averages for the region collected through census data, it is pointed out that inclusion of income data may prove insignificant, as income may differentiate participants from non-participants, but not occasional users from frequent users (McConnell, 1985).

There are also some technical concerns relating to the formulation of the demand curve, and the resulting consumer surplus figure. These center on the difference between Marshallian and Hicksian curves (McConnell, Idem). The shortcomings of the traditional zonal travel cost model suggest that the uses of aggregate data are limited. In particular, if only averages and sums are available, only linear models can be estimated consistently (Hellerstein, 1995).

4.4.1.2 Stated and revealed preference technique and literature review

A conceptual innovation used by Cameron (1992) in order to avoid the criticisms of the traditional zonal method was to develop a combination of the two methods' data (travel cost and contingent valuation methods) in the production of single new data set. The travel cost data capture current behavior while the contingent valuation data supply information about the likely behavior under specific scenarios. A model can be developed using the information of a travel cost set and a contingent valuation set by imposing

restrictions in the cross-equation parameters without losing consistency in the utility functions specified. Adamowicz, Louiviere, and Williams (1994) estimated the consumer demand for an environmental amenity using a standard travel costs approach, a standard contingent valuation approach, and a joint revealed-stated preference approach. The latter approach used the multinomial logit technique. The use of joint analysis by these authors was to show the possibility of reducing colinearity, generally present in applications of revealed preference. A second point that the authors highlight is the necessity of an explicit design of surveys for obtaining information that allows the building of a model using revealed and stated preferences.

Englin and Cameron (1996) used a Poisson fixed effects model for estimating consumers' demand of an environmental good. They used contingent scenarios in combination with price and quantity for testing the hypothesis that contingent behavior data reflect the same observed behavior in consumers' demand. The dependent variable was the number of trips made to the site.

Rosenberger and Loomis (1999) developed a random effects Poisson regression model for assessing a value of ranch open space. The contingent behavior question was structured by a hypothetical situation in which the ranchland was transformed into urban and resort use. Information about the number of trips during a year, the size of the group, and distance traveled were also included in the surveys.

Chase et al. (1998) present a contingent behavior paper for evaluating user fees as a guide for park pricing strategies when valuing ecotourism in a developing country such as Costa Rica. Reported elasticities were –1.05, -0.96, and –2.87. Results show that the price elasticities are quite different for the three studied parks. In two of them the

elasticity is near unity, while at the third demand is quite elastic. It was also found that at one park the actual admission price was quite close to the revenue-maximizing one, at one park it was well below, and at the other was well above the revenue maximizing price. The study used combined stated and revealed preference information and estimates were calculated by random effects and tobit models.

4.5 Export base analysis approach

The theory behind Export Base Analysis argues that for people to inhabit an area they need money to purchase from the external economy those things that cannot easily be produced locally. Exports give them the money to pay for the imports that make life in a particular location viable. This causal relationship is often described in terms of an income or employment multiplier: export activity has an amplified effect on the rest of the economy (Power, 1995).

Export base analyses are used by several economic agents. Governments use them to prepare annual budgets. Businesses rely on them for producing short-run market demand forecasts and for analyzing longer-term growth strategies. Policymakers turn to them to get new ideas for programs and policies to promote regional growth in communities (Krikela, 1997). This analytical technique has also been used for measuring the tourism industry's impact on communities (Goldsmith 2001; Donelly, 1998; Wells, 1997; Christ, 1994; Swanson and Barbier, 1992; Thomas, 1990; Pye and Lin, 1983). Goldsmith used it for calculating the impact of ski tourism in Summit County, Colorado. Wells documented the range of financial and economic impact studies of nature tourism, Christ examined revenue generation in Kenya's game reserve, Swanson and Barbier

considered the economics of wildlife, and the rest of the studies focus more on applying the income multiplier to generation of income and employment resulting from tourism.

In assessing the economic impact of ecotourism, a primary consideration is the residual spending that is brought to a county. Thus, export base analysis fits well with the objective to measure ecotourism's impact on the gateway communities in the sanctuary.

Economic base studies assume that all local economic activities can be identified as basic or non-basic. The basic sector is made up of local businesses that are entirely dependent upon external factors. Local resource-oriented firms and manufacturing are usually considered to be basic sector firms. Other examples include agriculture, mining, tourism, and federal government. The non-basic sector is composed of those firms that depend largely upon local business conditions. For example, a local grocery store sells its goods to local households, businesses, and individuals. Almost all local services are identified as non-basic because they depend almost entirely on local factors. Other non-basic industries include retail, commercial banking, local government, and services (Parr, 1999).

Economic base studies also examine the relationship between total employment and the employment in the basic sector. The ratio of total employment and basic employment provides an indicator of how many jobs in a region are supported by the dollars generated by that region's export-oriented employment (Fik, et al., 1991).

From a large list of studies (more than 354 referenced items) related to export base analysis, a number of theoretical and practical issues have been raised (Williamson, 2001). Among the most important of these is the one regarding its suitability as an explanation of long-term growth as opposed to short-run changes in income and

employment (Wheat, 1973; Harris, 1985). Also it has been generally accepted that the theory is more applicable to smaller regions, which are less economically diverse and more open to trade (Houston, 1967; Ghosh and Chacrabarti, 1973). Another qualification of the theory is that a region's external revenues are not totally independent of its internal characteristics. The levels and independent increases of a region's natural and human resources and capital supplies can enhance the competitiveness and diversity of the region's exports (Houston, 1967).

Among the major strengths of the export base theory as a foundation of operational models for regional analysis are (1) its focus on some of the most important sources of independent demand, (2) the probability that for relatively small regions the export-type demands will be of critical importance and will be free of any significant amount of complicating interregional feedback, and (3) the fact that the theory can be applied through the use of relatively simple methods (Williamson, op cit, p.4).

Bolton published a major study in 1966, which provided considerable evidence in support of the export base theory. He performed a simple linear correlation analysis of annual data of per capita export income and per capita dependent income for each of the 50 states, the District of Columbia, and nine census regions in the USA. Correlation coefficients of over 0.90 were obtained in 82 percent of the strata.

A study published in 1970 showed poor results in terms of the support they gave to export theory. Moody and Pupper (1970) concluded that they did not find much statistical support for the usefulness of the crude aggregate employment multiplier. Two empirical studies done by Pfouts (1957, 1958) are generally considered an important criticism of the export base theory. Pfouts measured regional growth by population

growth and calculated the basic-service ratio from employment data using simple linear correlation analysis of census data.

4.5.1 Measurement of the economic base

Two non-survey procedures are usually employed for identifying basic or export activity in the current research: location quotient and minimum requirements procedures.

4.5.1.1 Location Quotients

Location Quotients (LQ) is a non-survey procedure of identifying export sectors. It relates and compares the relative proportion of local income it to its national equivalent. If the local ratio were greater than the national ratio, it would stand to reason that the local economy is producing more in a particular sector than is being locally demanded. This is because the national ratio is being used as a frame of reference (Harris et al., 1998). This approach has been a favorite of researchers for years because it requires only limited amounts of data. However, Gibson and Worden (1980) found in two different experiments that the location quotients approach produced two or three times larger multipliers than the survey technique. They concluded that greatly inflated multipliers are frequently produced when LQ is based on towns of comparable size.

4.5.1.2 The minimum requirement technique

The minimum requirement technique is a major competitor with the location quotients method for estimating the export base. It differs from the location quotient approach by comparing a region's employment structure with a sample of similar-sized

regions or city-size classes rather than with the reference frame of the nation. For any industry i, the region with the minimum share of its employment in that industry is identified. Other regions (cities) in the size class are assumed to export some of the industry's output, with the exports estimated as proportional to the difference between the regional employment share in that industry and the industry's share in the minimum share region (Richardson, 1985). The key assumption of this approach, that all of the production of the minimum region is for local consumption, may not hold. It may be an exporter. Also, other regions may have larger or smaller shares of employment production for local consumption than the minimum region. Tests on the accuracy of this approach have shown mixed results. On the positive side, Ullman et al. (1969) found that minimum requirement measures of exports overestimate exports generated by survey techniques by only 7 percent. On the negative side, Greyta (1969) found that the minimum requirement technique underestimated gross manufacturing estimates by an average of 58.3 percent. Isserman (1980) found that in 22 out of 101 communities the technique estimated the export base as smaller than the location quotient estimate. In spite of the lack of cogent theoretical support, some analysts have favored its use for practical reasons (inexpensive and fast).

4.5.1.3 Census survey

A final method to be mentioned is a census survey of every employer (public and private) in a region, asking them to specify the proportion of their revenue generated outside the region. This method is most appropriate when the region is small and where interindustry linkages are weak. Adjustments need to be made to correct employment

estimates to full-time equivalents. Where cost considerations rule out a full survey, a sample survey may be a good substitute (Gibson and Worden, 1980). Some studies suggest that census survey multipliers are the best estimates of the export base multiplier in a regional economy (Gibson and Worden, 1980, Richardson, 1985, Williamson, 2001). Gibson and Worden (1980) reported a detailed methodological investigation of different strategies for estimating economic base employment multipliers for 20 Arizona communities in the US. The techniques considered were (1) census survey; (2) the location quotient; and (3) the minimum requirement technique. They concluded, that a census survey is the most satisfying means of assuring that the economic base multipliers reflect the peculiarities of a given study area, although it is time consuming and expensive. Criticisms of the census survey technique point to high cost, potential selection bias, and the accuracy errors of respondents as the main shortcoming of this technique (Harris, et al., 1998). Here, census survey analysis to identify and quantify tourism spending.

4.6 The regional multiplier

The methodology used to determine the effects of changes in export demand on regional income is derived from the regional application of the classical Keynesian model (Williamson, 2001):

$$Y = [\, I / 1 - (b = I) \,] X$$

Where income (Y) is a function of autonomous expenditure (X), the marginal propensity to consume (b), and the marginal propensity to import (I). There are many versions of the Keynesian income multiplier capable of accounting for interregional trade, induced investment, and government spending. A simple variant that measures the multiplier as the propensity to consume within the region of disposable income is:

$M = 1 /[1 - (b - I)]$

Replacing (b – I) by NB/T, it is possible to express the same relationship as:

$M= 1 / [1 - (NB/T)]$

Or

$M_i = T_i/B_i$

Where M_i can be defined as the direct sales multiplier which refers only to those economic activities affected by the studied industry; NB = employment or income in non-basic activity; B = employment or income in the basic activity; and T = total employment or income in the county. A variety of restrictive assumptions are needed to justify 1 / (1 – NB/T) as the regional multiplier, such as the presence of excess capacity and the linearity of the aggregate income function. Two more assumptions for operationalizing the export base model are that income is proportional to employment and that the ratio of export employment to total employment is constant. The multiplier tells us that for any increase in employment in the basic activity, total employment is assumed to increase by M times the initial change in basic activity (Billings, 1969). It is possible to define the economic

sales multiplier as the ratio of a region's total sales to the basic industry sales. The latter multiplier was used in this study since information about local sales was more available.

CHAPTER V

LOCALLY RELEVANT RESEARCH AND NEW MODEL SPECIFICATION FOR THE ECONOMIC VALUATION, UNIT OF ANALYSIS, AND DATA COLLECTION

5.1 Locally relevant research

Developing countries just recently joined developed countries in the analysis of ecotourism and wilderness areas. Travel Cost and Contingent Valuation methods (both pioneered in the U.S.) are the primary approaches used in the former countries (Chase et al., 1998). However, the use of these approaches in developing countries has been problematic, basically, due to greater data constraints and eliciting consumers' valuation of environmental amenities (Chase, 1995).

In Mexico, Romo (1997) and Perez-Septien (1997) used aggregate standards demand models for assessing a value of the sanctuary of the monarch butterfly in 1997. A representative consumer model needs to be specified for the use of aggregate data. This representative consumer is defined so that the estimation of a model using the representative consumer yields results that are equal to the same model estimated using the actual micro level data. Romo (1997) used a linear model with additive error term and OLS techniques, which

regresses demand (visitors rate) on average characteristics (average travel cost and family size) for obtaining the underlying individual coefficients. Perez-Septien calculated an inverse demand model, which regresses travel cost on visitation rate for representing the individual behavior. Both authors used the traditional zonal data models (Table 5-1).

Table 5-1 Methods and regressions specified by Romo and Pérez for the economic valuation of the monarch butterfly sanctuary.

Romo (1997)	Pérez (1997)
Methods	
1. Travel Cost method	1. Travel Cost Method
Regressions	
2. $Vi/Pop = a_o + a_1TC + a_2FS + e_i$	2. $CV = A * Q^{\alpha}$
Vi/Pop : Visitation rate	CV : Travel cost
TC : Travel cost	Q : Visitation rate
FS : Family size	
Functional Form	
3. Linear regression using OLS	3. Log-log regression using OLS
Information	
4. 200 surveys during February	4. 157 surveys during February

Because the Perez-Septien specification regression might not yield estimates for equivalent comparisons for consumer surplus, only Romo's model will be replicated in this study with information for the 2001-02 season.

Table 5-2 Parameters of the regression estimated by Romo 1997.

Variable	Coefficient	T-ratio
Intercept (a_0)	-4.91	-0.07
TC (a_1)	-0.0778	-3.57
FS (a_2)	1.99	1.43
Adjusted R^2	0.36	
F-ratio	7.95	

The travel cost coefficient is negative and it is statistically significant. The coefficient of the family size variable also has the sign expected, but its significance level is 0.10.

Maximum travel cost was estimated by determining the distance at which the demand is zero:

$$TC\ max = a_0 + a_2 / a_1 \qquad (5.1)$$

Consumer surplus per person (CS) was estimated by:

$$CS = 0.5 * (TCmax - TC\ I)\ Vi/pop \qquad (5.2)$$

And total welfare (W) was calculated by:

$$W = CSi * \text{ visitors in the season} \qquad (5.3)$$

Romo assumed that welfare remains constant forever for calculating the present value (PV) using the following formula:

$$PV = W/r \qquad (5.4)$$

Where the annual interest rate (r) is assumed to be 4 per cent. Using the above-described formulae, Romo found the net present value of tourist visitation to the sanctuary was $88.5 million in the year 1997. Price elasticity was -0.09 and the optimal entrance fee was established at $10.5 dollars resulting in a 20% decrease in visitation and total annual revenue of 135 thousand dollars. If the present value of visitation to the sanctuary is extrapolated to the value for the season 2001-02 (using the Mexican consumer price index), it is found at $108 million and total annual revenue of $165,000.

5.2 The random effects/error probit model

As was commented before, new techniques have come to light in order to surpass old techniques' limitations. For example, Anderson (2001) pointed out that a big problem of using zonal models is that there is no correlation between distance and price since the same distance can be traveled at a great variety of costs. As an example of this problem, the survey conducted in the 2001-02 season at the monarch sanctuary found people traveling from the same site had different spending patterns for the same purpose. Thus, it makes sense

to use recently developed techniques for measuring recreation demand. One of these techniques is the use of the random probit model. Loomis (1997) suggests that the random probit model is useful where the same person responds to a series of dichotomous questions regarding current visitation, intended visitation, and WTP. In particular, stated and revealed preference responses are often dichotomous, for example, when the site is visited at most once a year (e.g., the Grand Canyon and Yellowstone), and probit models are useful for these settings.

The basic structure of the random effects model is represented as follows:

$$Z_{it} = \beta X_{it} + U_i + \epsilon_{it}, \quad Yit = 1 \text{ if } Z_{it} > 0, \; Y_{it} = 0 \text{ otherwise,} \qquad (5.6)$$

Where Z_{it}, Y_{it}, and β are vectors of latent, indicator, explanatory variables, and vector of coefficients, respectively, i indexes individuals in the sample and t indexes the number of responses per person or visitor. In addition, U_i are unobservable characteristics specific to individual i. The U_i are random disturbances (or random effects) that are common to and constant over a given individuals' responses and assumed to be uncorrelated with the other regressors. The ϵ_{it} are the transitory errors due to random response shocks across individuals.

The log likelihood of the random effects probit model described by Greene (1995) is:

$$\ln L = \{ \int_{-\infty} 1 / (2\pi)^{1/2} \; e^{-\epsilon 2/2} \; \Pi_t \, \Phi(r_{it} \, z_{it}) \, d\epsilon_{it} \} \qquad (5.7)$$

where $r_{it} = 2y_{it} - 1$ and $z_{it} = [\beta' X_{it} + [\rho/(1 - \rho)]_{1/2} \epsilon_{it}]$

5.3 Model Specification/Empirical methods

The particular character of tourism makes many traditional valuation techniques difficult or inappropriate to apply for welfare estimations. Some models cannot be used to derive a demand function for the recreational service since the site is only visited once. However, Hanemann (1984) showed that the problem of CVM discrete choice could be recast as a visit/no visit decision at current trip costs and higher trip costs under a utility difference framework. Consider first the decision to actually visit the site. Let utility of individual i (U_i) be defined as the sum of deterministic (V_i) and random components (ϵ_i) where ϵ_i is an independently and identically distributed random variable with zero mean that reflects components of the utility function unobservable to an analyst. Let V_{ij} (Y_i – TC_i - EFo, Q=1) be the deterministic utility from taking a trip when site quality does not change (i.e. Q=1), where Yi is income, TC is travel cost and EF_0 is entry fee. If the individual does not make the trip, the deterministic part of utility is V_{i0} (Y_i) assuming weak complementarity, that is, site quality does not matter when the site is not visited. If we observed the individual at the recreation site, then it must be the case that the utility difference must satisfy:

$$V_{i1} (Y_i - TC_i - EF_0, Q=1) - V_{i0} (Y_i) > \epsilon_{i0} - \epsilon_{i1} \qquad (5.8)$$

This utility difference is driven by the observable trip choice and hence may be considered revealed preference information. If we add the contingent behavior question with a positive response, we can infer that the utility difference must also satisfy:

$$V_{i1} [Y_i – (TC_i + \$X; EF = 1] - V_{i0} (Y_i) > \epsilon_{i0} - \epsilon_{i1} \qquad (5.9)$$

If the response is no, then

$$V_{i1}\,[Y_i - (TC_i + \$X, EF = 1] - V_{i0}\,(Y_i) < \epsilon_{i0} - \epsilon_{i1} \qquad (5.9.1)$$

A model for testing differences between stated and revealed preference data sets and using the random/error- component approach is developed as:

$$Y_{it} = \beta_0 + \beta_1(C+EF) + \beta_2 I + \beta_3 DC + \beta_4 DCB + \beta_5 DCB(TC + EF) + \theta_i + \omega_{it} \qquad (5.9.2)$$

where $Y_i = 1$ if the person does visit the site and zero otherwise (under different admission fees); (C + EF) is the average travel cost to the site with contingent behavior scenarios for entrance fee; I represents the average income from visitors, and DC is an index number the measuring the perception of people's congestion. DCB is a dummy for stated preference information, and DCB (TC+C) is another dummy for revealed information. θi is the unobservable characteristic specific to each individual, and ωit is the transitory error across individuals.

A model for testing sensitivity to increases in travel costs is also specified:

$$Y_{it} = \alpha_0 + \alpha_1(C+TC) + \alpha_2 I + \alpha_3 DC + \alpha_4 DCB + \alpha_5 DCB(C + TC) + \theta_i + \omega_{it} \qquad (5.9.3)$$

where Yi = 1 if the person does visit the site and zero otherwise (under different travel costs); (C + TC) is the average travel cost to the site with contingent behavior scenarios for travel costs all else variables the same as in (5.9.2).

Welfare measures form the specified models are derived as:

$$WTP = [\beta_0 + \beta_2 (I) - \beta_3 (DC)] / \beta_1 \qquad (5.9.4)$$

5.3.1 Statistical Hypotheses

For the proposed model, the statistical research hypotheses look for:

a) Testing the willingness to pay for the conservation of the sanctuary

Ho: Mean WTP = 0 Ha: Mean WTP > 0

b) Testing that butterfly viewing is a normal good

Ho: $\beta_2 = 0$ Ha: $\beta_2 > 0$

c) Testing that congestion adversely affects the benefits of visitors

Ho: $\beta_3 = 0$ Ha: $\beta_3 < 0$

d) Testing the differences between the revealed preference data set and the stated preference data set by including a dummy variable in prices.

Ho: $\beta_4 = 0$ and $\beta_5 = 0$ Ha: $\beta_4 \neq 0$ and $\beta_5 \neq 0$

e) Testing sensitivity to increases to fees versus increases in travel cost

Ho: ε (C+EF) = ε(C+TC Ha: ε(C+EF) $\neq$ ε(C+TC)

5.4 Unit of Analysis

The design of the initial questionnaire was discussed with two members of the researcher's committee. A total of 8 undergraduate students (6 women and 2 men) of the school of economics of Universidad Michoacana de San Nicolas de Hidalgo were trained for conducting the surveys. The questionnaire was written in English and Spanish. The first stage included the administration

of 12 questionnaires among professors, students and staff of the University who had visited the sanctuary. The idea of this pre-test was to let students become familiar with all of the questions. Only 8 questionnaires were returned, and one of the students decided not to continue participating in the process.

The second stage included another pre-test of the questionnaire at the sanctuary. In all, 30 surveys were administered. This stage allowed us to determine that the best points for interviewing subjects were in the two parking lots after visitors had concluded the trail. This pre-test also allowed us to realize that visitors were traveling in groups of 40-50 people and some of these groups were composed of students under 18. The strategy was to interview an adult in the group and look for groups that travel in vehicles.

The third stage of the process consisted in the administration of a total of 450 questionnaires during all weekends in February and March of the year 2002. Less than 5 percent refused to answer the survey. From the total of 450 questionnaires, 407 were used in the analysis, which contained complete information on the contingent questions.

Travel and food expenses, as well as a symbolic reward per questionnaire, were offered to each student who participated as surveyors in this study. The questionnaire was only administered to adults 18 years old and above, and it contained 25 questions. It took 12 minutes on average to respond to the survey.

5.5 Data collection

5.5.1 Stated preference information

Visiting the sanctuary at different entrance fees.

An entrance fee can be considered as a powerful policy instrument to restrict or to encourage visiting the sanctuary. An entry fee is charged per visitor at the sanctuary. In the 2001-2002 season, a $1.50 per adult fee was imposed. The specific question regarding different entry fee scenarios was formulated as would you had visited the sanctuary if:

A $2.50 entrance fee was imposed ?

A $5 entrance fee was imposed ?

A $10 entrance fee was imposed ?

A $25 entrance fee was imposed ?

Visiting the sanctuary at different travel cost

Joint models are based on the premise that questions must focus on hypothetical behavior rather than hypothetical prices. Therefore, a question intended to discover contingent behavior was included in the survey. This question asked visitors if they would have visited the sanctuary if their total costs were 25%, 50%, and, 100% higher than their estimated current travel cost. A previous question about the total expenses of the visitors' trip was also included (Q10).

5.5.2 Revealed preference information

Data on current travel cost and distance traveled were included in the survey as well as questions regarding demographic characteristics of visitors. Several questions regarding the overall quality of the sanctuary were included. These questions refer to the level of congestion perceived by visitors (Q15) and to the quality of the parking lot, the restroom area, and food service area (Q16, Q17, and Q18).

Number of decreasing visits at different travel cost

Question 2 of the questionnaire asked, How many times have you visited the Sanctuary during the present season (Nov 2001 – March 2002). From the total of surveyed people, only a few had visited the sanctuary more than one time. A question about at what level of higher costs would the visitor have changed the number of visits to the sanctuary in the season was included in the questionnaire (question 14). However, in the pre-test stage this question was answered by less than 5% of the people and generated confusion among the surveyors because the great majority of visitors had visited the sanctuary only one time during the season, and it was not likely that they visited the sanctuary again within the same season (the questionnaire was conducted during the last two months [February and March] of the season 2001-2002). This information coincides with previous information collected by the Bureau of Tourism of the state of Michoacan.

CHAPTER VI.

DATA ANALYSIS AND RESULTS FOR THE ECONOMIC VALUATION OF THE SANCTUARY

6.1 Statistical evaluation of the surveys

Among the statistics of the sample surveyed at the sanctuary, it is important to mention that the average actual cost per visitor was 54.77 dollars (under different scenarios of entrance fee). When using intended questions, the average cost per person was 72.49 dollars (under the different scenarios travel cost). The average age of respondents was 42 years old. The education level on average was completed high school. The monthly income average was established 498.77 dollars.

Table 6-1 Variables and units

Variable	Mean	unit
Absolutecost	54.77	Dollars
Relativecost	72.49	Dollars
Congestion	1.73	Index number
Education	2.43	Years of schooling
Income	498.77	Dollars
DCB		Dummy 1
DCBTC		Dummy 0

Table 6-1 describes the variables and units used in the specified models in Chapter V. The absolutecost variable represents the total cost per person plus the cost established for the different scenarios of entrance fee. The relativecost represents the total cost per person plus the cost established for the different scenarios of travel cost. Both variables are measured in dollars units. The congestion variable was initially established as an index from 1 to 10 measuring people's perception congestion. However, better estimates were obtained using an index from 1 to representing low perception of congestion (up to 4 in the 1 to 10 scale) and 2 representing moderate and high perception of congestion (from 5 to 10 in the 1 to 10 scale). Education represents the years of schooling of the interviewed people. The income variable was specified in five different ranges of per month salary. In the model estimation, the minimum amount of the salary was established at 200 dollars and the maximum at 800 dollars. For the other ranges, the average of the range was used. DCB represents a dummy variable coded as 1 for actual response and 0 for intended responses and DCBTC represents a dummy variable coded as 0 for actual response and 1 for intended responses.

Twenty different states were identified as origins of visitors (Table 6-2). Most of the visitors came from the Distrito Federal, Estado de Mexico, Michoacan and Jalisco with 22%, 16%, 14%, and 11.5% of the visitors.

Table 6-2 Visitors origins for the season 2001-2002

Origin	Number of visitors	Percentages
Distrito Federal	93	22.85
Estado de México	66	16.2
Michoacán	56	13.7
Jalisco	47	11.5
Guanajuato	32	7.86
Puebla	32	7.86
Querétaro	15	3.68
Veracruz	15	3.68
Aguascalientes	10	2.46
Morelos	9	2.21
Hidalgo	7	1.72
USA	5	1.23
Tlaxcala	6	1.4
Nayarit	4	0.9
Sinaloa	3	0.7
Chiapas	2	0.5
Otros	4	0.9
Total	407	100.0

6.2 Results for the random effects probit model

6.2.1 Empirical results.

Recalling that our price variable was constructed taking into consideration cost per visitor and our contingent behavior scenarios were constructed asking for changing visitation at different ranges of admission fees, going from 2.5 up to 25 dollars, a more comprehensive understanding of visitation patterns can be described using the estimated demand equation.

Table 6-3 Coefficients estimates for the probit model (entrance fee)

Variable	Parameter	t-ratio
Intercept	-0.043	-2.94
Abscost	-0.000377	-5.00
Congest	-0.032	-0.68
Income	0.00006	4.10
D C B	0.0069	0.22
DCBTC	0.0024	-0.004
Loglikelihood	-1101	

Table 6-3 presents regression results from the model for estimating visitation at the sanctuary of the monarch butterfly (See appendix 3). All of the signs of the estimated coefficients are as expected; however, congestion is not significant. The own-price

coefficient is negative and significant; that is, when entrance fees increase, visitation declines.

The income coefficient is positive and significant, reflecting the importance of income in influencing visitors' visitation decisions.

The congestion coefficient is negatively signed as expected, but it was found not significantly different from zero, which precludes us from making any inference about this variable. Therefore, there is no measured congestion effect on visitation. The dummy variables for stated and revealed behavior were not statistically significant.

Table 6-4 reports regression results from the model using different scenarios of travel costs. Again all coefficients have the expected signs but again congestion is not statistically significant.

Table 6-4 Coefficient estimates for the probit model using the relative cost variable (travel cost).

Variable	Parameter	t-ratio
Intercept	--0.83	0.573
Relcost	-0.000179	-4.90
Congestion	-0.023	-0.511
Income	0.0000497	3.42
DCB	0.125	1.526
DCBTC	-3.41	-1.465
Loglikelihood	-1109	

Haneman's (1989) formula was used as reference for calculating the consumer surplus. The value of the consumer surplus per person was found at 82.2 dollars (using 5.9.3) and was derived from the model using the entrance fee variable. Using the same 4% discount rate as before, the net present value of tourism visits to the sanctuary was calculated at 200 million dollars for the whole season.

Since there is little agreement on the correct discount rate for valuing natural resources, a sensitivity analysis of the present value of tourism visits to the sanctuary is presented under different discount rates (Table 6-5). Welfare is assumed constant and formula (5.1) is used for obtaining present values.

Table 6-5 Present value of the sanctuary under different discount rates.

Discount rate	4%	6%	8%	10%
Present value (millions)	200	133	100	80.37

Results from the two analyzed models present some differences from just how it was hypothesized in this study. Inclusion of more variables and combining information might be causing such differences. It is generally believed, however, that there are at least four advantages of the probit and panel data sets: a) they have an advantage by reducing the omitted bias problem generally present in OLS calculations; b) they avoid the aggregation bias problem; c) it is possible, in some cases, to distinguish between actual and intended behavior responses; and d) these models allow one to estimate quality

changes in the environmental assets that could be impossible to measure another way (Cameron, 1992; Loomis, 1997).

6.3 Elasticities

It was hypothesized that visitors are less responsive to changes in fees than changes in travel costs. Own-Price elasticities were calculated for the absolute cost model (5.9.2) and relative cost model (5.9.3) and are described in Table 6-6. They were estimated as: ξabscost = [dY/d(C+EF)*(C+EF)/Y] for the admission fee variable and ξrelcost = [dY / d(C + TC) * (C+TC)/Y] for the travel cost variable.

Table 6-6 Elasticities

Own-price elasticity for entrance fee
ξabscost= -0.0003779 (547/0.55) = -0.37
Own-price elasticity for travel cost
ξrelcost = -0.00018 (724/0.) = -0.23

The estimate elasticity for the fee variable is -0.37, and -0.23 for the travel cost variable, indicating that people are more sensitive to changes in fees than to changes in travel costs. Moreover, a 1% change in entrance fee is far smaller than a 1% change in travel cost. As a result, estimates imply that people are substantially more sensitive to changes in fees than to changes in travel costs.

The demand elasticity is likely to change as we move along the estimated demand curve, the values of the dependent variables under different entrance fee scenarios were forecasted using the E-views package and are presented in table 6-7.

Table 6-7 Forecasted values and predicted elasticities for the absolute cost model under different fees

Fee (dollars)	Forecasted values of absvis	Elasticities at forecasted values
2.5	0.55	$\varepsilon_{p\,2.5}$ = - 0.0003779 (572\0.54) = - 0.39
5.0	0.51	$\varepsilon_{p\,5.0}$ = - 0.0003779 (597\0.51) = - 0.44
15.0	0.43	$\varepsilon_{p\,15}$ = -0.0003779 (667\0.61) = -0.61
16.0	0.40	$\varepsilon_{p\,16}$ = -0.0003779 (707\0.40) = -0.67

It was also hypothesized that landowners could obtain more revenue when charging higher entrance fees. The estimated demand function and the own-price elasticity allow us to analyze how the revenue of the site can be maximized.

According to the estimated demand function for the entrance fee variable and the current entrance fee of $1.50, the sanctuary is being operated with an own-price elasticity of -0.37, which means that the sanctuary is being managed within the inelastic range of the demand curve where the total revenue is increased with changes in price. Therefore, the sanctuary's revenue would increase if higher entrance fees were charged.

Because the site only captures the entrance fee, and other sources of income were not available, the total revenue of the reserve is given by:

R = (entrance fee) * (visitors)

Given the park visitation demand relationship and the calculation of elasticities at each different fee level reported above, the revenue-maximizing fees of the sanctuary are shown in table 6-8.

Table 6-8 Park revenues under different fees

Entrance fee	Visitors	↓ Visitors %	Revenue
1.5	97,725	0	146,587
2.5	59,612	39	149,030
5.0	54,726	44	273,630
15.0	***38,112***	***61***	***571,695***
16.0	32,249	67	515,988

Results from table 6-8 show that landowners obtain $146,587 as revenue when they charge an admission fee of $1.50. The number of visitors for the 2001-02 season was estimated at 97,725.

If landowners would charge a $5.00 entrance fee, they would make $273,630 from visitors. When charging a $15.00 fee they would make $571,695 from visitors but a $16.00 fee would raise only $515,988 making less revenue than a $15.00 dollar fee. The

above table illustrates that the optimal fee for landowners is $15.00 dollars per person. The above table also illustrates that a 61 percent reduction in visitation would take place at a $15.0 fee. The model predicts that 61% of people would stop visiting the sanctuary at $15.0 fee.

6.4 Results for Romo model

The regression of visiting rate against travel cost and socioeconomic variables established by Romo was:

$$Vi/Popi = a_0 + a_1TC + a_2FS + e$$

The author calculated variables as: Vi/Popi is visitation rate and was calculated as [(100,000 * visitors) /Population]. Round trip distances were calculated by using a road map. Family size was obtained from the Mexican census of population for 1990. When replicating Romo's model two differences were found:

- Origins. Romo identified 26 geographical sites of tourist origins. Municipalities within a distance of up to 250 km were identified as origins. Municipalities beyond 250 km were grouped by states, and these states were then identified as origins. Our study considered 16 states as origins for the analysis because it was not possible to find a clear relationship between distance and cost for the other 4 states. People from the 16 states account for more than 95% of the total of visitors.
- Travel cost variable. Romo calculated two travel cost variables. The first one includes gas, car maintenance, car depreciation, and tolls (some of them might be not appropriate because represents fixed not variable costs). The second

one includes the additional costs of insurance and travel time (specified as 50% of the average annual wage across visitor origins). Our model used the sample average cost per km calculated at 0.16 dollars for TC1 and at 0.24 dollars for TC2.

Table 6-9 Variables used in the estimation of Romo's regression

Origins	Visitation rate	Family size	Distances (Km)	Total cost
Distrito federal	1.0562	4.02	233	81.75
Edo Mex	0.4924	4.52	200	72.19
Michoacán	1.3731	4.64	143	55.39
Jalisco	0.7265	4.52	419	155.59
Guanajuato	0.6706	5.03	385	121.33
Puebla	0.616	4.75	290	111.18
Queretaro	1.0438	4.7	278	97.85
Veracruz	0.2122	4.29	604	200.54
Aguacalientes	1.0349	4.69	606	188.34
Morelos	0.5655	4.21	246	106.21
Hidalgo	0.306	4.51	278	111.63
Tlaxcala	0.6091	4.93	315	120.4
Nayarit	0.4248	4.14	616	212.64
Sinaloa	0.1156	4.39	1140	368.01
Colima	0.1801	4.07	626	214.3
Guerrero	0.0317	4.66	585	175.26

Variables used for replicating Romo's model are reported in Table 6-9. Visitation rate was calculated as [(total visitors * number of visitors per state to the sanctuary) / state's population]. Family size variable was obtained from the Mexican census of population 2000. Time cost was specified as 50% of the average wage across visitor origins. Results of the parameters of the regression are presented in Table 6-9-1.

Table 6-9-1 Coefficients for Romo's model using information obtained from the season 2001-2002.

Variable	Parameter	t-ratio
Intercept	0.5683	0.411
TC_2	-0.0029	-2.559
FS	0.101	0.346
Adjusted R^2	0.25	
R-squared	0.37	

The travel cost presents the correct sign, and it is statistically significant. However, the family size variable is no longer statistically significant, and the adjusted R^2 dropped from 0.36 to 0.25. Using the formulae described in Chapter 5 (from 5.1 to 5.4), the present value of the sanctuary was calculated at 250 million dollars. This value was obtained using a discount rate of 4 percent and an exchange rate of 1 dollar per 10 Mexican pesos. Romo's calculation of the present value of tourism visits to the sanctuary at 2001-02 dollars season was found at 108 million dollars. The difference in estimates might be the difference in the use of the cost variable.

CHAPTER VII.

EXPORT BASE ANALYSIS AND ECONOMIC IMPACT ON LOCAL COMMUNITIES

7.1 Ecotourism at the sanctuary

Local communities are trying to attract visitors sensitive to and interested in natural beauty, and visitors' spending contributes to generating income and jobs in these communities. At the same time, they learn about protecting biodiversity. This type of visiting is referred as ecotourism, and has been taking place at the monarch butterfly sanctuary. A simple way for calculating the participation of tourist spending in the communities is through the export base analysis. The export base analysis framework was explained in previous chapters.

Klosterman (1990) identifies two key decisions that need to be made at the beginning of the export base analytical process: a) Identify the study area. The researcher should be sure to identify the boundaries of the local economy versus the external world. b) Select the measurement units. Export base analysis is undertaken using sales, income or employment data. The number of jobs is the most common data set because employment data is available from the Census Bureau. The Colegio of Mexico (1995) classifies population centers

affected by tourism according to their closeness to each of the five sanctuaries in the biosphere. In that study, the closest communities to the sanctuary "El Campanario" are: El Rosario, Ocampo, and Angangueo. This paper uses this classification for delimiting the area of study.

Exports can be either goods or services sold to individuals or firms outside of the local area. However, it is important to note that in order to export these items, they do not have to physically leave the geographical district. For example, "services can be exported from the region either when local residents travel outside the area to provide the service or when nonresidents come from outside the area to purchase services, as ... for a vacation" (Blair, 1995).

For the purpose of this study, tourist activity will be treated as an export on the basis of the previous explanation. While it is impossible to sell monarch butterfly recreation to consumers, it is possible to allow individuals from outside of the monarch sanctuary to travel to the point where it is possible to watch and to admire the flying of the monarch butterfly.

7.2 Mexican economic classification

An economic classification is based on the Mexican Classification of Economic Activities by the Mexican government (Censos Economicos de Mexico, 1999). This classification refers to primary, or agricultural; secondary, or industrial; and tertiary, or commerce and services, sectors. An example of industrial codes classification is presented in table 7-1.

Table 7-1 Mexican classification of economic activities.

Level	Code	Description
Sector	3	Manufacture industries
Sub sector	31	Foods, beverages and tobacco
Unit	3112	Lacteous product industry

7.3 Data analysis

Economic census provided the format for classifying economic activity. All G-codes of economic activities related to industrial, commercial and service sectors were taken from the Economic Mexican Census of 1998. Agricultural activities are measured in a different census for a different year in Mexico and they are not included in the study.

A survey process was implemented for measuring total sales and jobs in local communities. The intention of the survey was to gather specific information about annual sales in local businesses as well as the percentage of the sales due to tourists. Information about number of employee's year round and additional employees during the season was also asked. Sixty-five surveys were attempted within the 2001-2002 year with six refusals. A total of 59 surveys were used in the analysis, or a 90% response rate. These estimates are conservative because it was not possible to obtain information on agricultural and construction sectors due to the unavailability of the local people for giving information about these sub-sectors.

7.4 The sales multiplier

With the information obtained from the surveys, two sales matrices were constructed (table 7-2 and 7-3).

Table 7.2 Matrix of sales in Angangueo, Michoacán.

		(Thousands,pesos)		
G-CODE	Industry description	Annual total sales	Tourist sales	%
G31	Food, beverages and tobacco	2,128	851.72	40.0
G32	Textiles, clothing	96	4.8	5.0
G33	Wood industry	289	28.9	10
G35-39	Other manufacture	177	88.5	50
G61	Wholesale trade	19	17.1	90
G62	Retail trade	2,496	1,872 .0	75
G71	Transport	543	273.0	50
G92	Education and research services	113	33.9	30
G93	Restaurants and hotels	208	151.84	73
G94	Recreational services	35	10.5	30
G95	Professional services	596	0.0	0.0
G96	Maintenance services	270	0.0	0.0

From Table 7-2, it is concluded that tourist spending in the region has a strong influence in several sub-sectors. The food, beverages and tobacco sub-sector represents 40% of the total sales. The wholesale trade sub-sector also has an important participation of tourist spending with 90%. Restaurants and hotels, not surprisingly, are influenced strongly; tourism represents 73% of the spending in this sub-sector. On the other hand, maintenance and professional services registered zero direct impact from tourist spending.

Table 7-3 Matrix of sales in Ocampo, Michoacán

		(Thousands,pesos)		
GCODE	Industry description	Annual total sales	Tourist sales	%
G31	Food, beverages and tobacco	161	75.12	46
G33	Wood industry	613	0.0	0.0
G38	Other manufacture	44	17.6	40
G61	Wholesale trade	359	287.2	80
G62	Retail trade	2,217	2,172.6	98
G71	Transports	162	145.8	90
G92	Educational and research services	242	60.5	25
G93	Restaurants y hotels	109	101.2	93
G94	Recreational services	12	10.8	90
G95	Professional services	55	0.0	0.0
G96	Maintenance services	230	0.0	0.0

For the sales matrix in Ocampo (table 7-3), it is possible to observe almost the same pattern of tourist spending as in Angangueo. The food, beverages and tobacco sub-sector participates with 46% of the total sales directly attributable to tourists. In the wholesale trade sub-sector tourism accounts for 80% of the sales. In the transport sub-sector tourism receives 90% of the spending. This is explained because many of the visitors hire public transportation that goes from Ocampo to the sanctuary. The retail trade and restaurant and hotels sub-sectors could be over-represented since many small shops and food shops along the road from Ocampo to the sanctuary were surveyed and included in the survey process. Professional and maintenance services did not register direct tourist sales during that season.

The sales multiplier was obtained by dividing the total annual sales by the sales generated from tourist spending reported by local businesses in the survey conducted in the region of study. Total annual sales were 11.18 million pesos and tourism spending was 6.2 million pesos in both communities. The sales multiplier, therefore, was 1.8. That means that for every peso spent by tourists, 0.8 pesos were additionally spent directly into the local communities. Thus, the hypothesis on tourist spending is confirmed.

7.5 Economic impact analysis

Several measures of the changes in economic activity can be generated. The most widely used are changes in sales (or spending) and changes in income.

The spending of visitors within the local area becomes sales or receipts for local businesses or other organizations selling products and services to visitors.

For recreation and tourism, the action for which impacts are estimated may be some change in the management strategy that would alter the number of visitors and amount of spending in the local area. While economic impact analysis can get quite complicated, the basic procedure is quite simple and is represented as follows:

Economic impact = (Number of visitors * Average spending per visitor
* multiplier) (7.1)

Using the economic impact formula (7.1), it is possible to calculate the economic impact on local communities under two scenarios of entrance fee to the sanctuary.

At the current 1.50 dollars entrance fee, visitors were estimated at 97,725 and the average expense per person was calculated at 26.5 dollars. Thus:

Economic impact at 1.50 fee = 97,725 * 26.5 * 1.8 = 4,661,482

If landowners imposed the revenue-maximizing fee as admission for visiting the sanctuary (that is, 15.0 dollars), a reduction on visitation of 61% would take place, resulting in a total economic impact of:

Economic impact at 15.0 dollars fee = 38,112 * 26.5 * 1.8 = 1,817,942

The direct loss for local businesses would be around 3 million dollars if this increase in admission fee took place.

7.6 Policy option's analysis

Having outlined the principal results from the specified models of this dissertation, it is possible to describe how benefits and losses are more likely to be distributed under different options of management strategies. The analytical reasoning is based on the Coase theorem (1960) that establishes that when the property rights are clear and enforceable and transaction costs are zero, there is no need for government intervention to correct externalities, because the economic agents can bargain to achieve a Pareto optimal allocation. As a way of illustration of this theorem for this particular setting, it is necessary to assume that reallocation of rights and responsibilities are possible. It is also possible to describe as many management strategies as objectives are found.

Let us begin with the landowner's best management strategy, since they currently hold property rights of the land. Due to the restriction to exploit their lands in any other economic use but recreation, landowners seek to maximize revenue from visitor's fees. This objective is reached when landowners impose $15.0 as an entrance fee. Total revenue raises from $146,587 to $571,695. Shortcomings of this strategy are described next. First, it reduces regional social welfare from 8.01 million dollars to 3.12 million dollars. Second, this option

also decreases visitation affecting local communities. Economic impact falls from 4.6 million dollars to 1.8 million dollars.

A second objective, should allow the federal government to enhance environmental preservation of the sanctuary as its responsibility on behalf of wildlife protectors' rights. This objective could be reached by suspending visitation to the sanctuary and compensating landowners with an amount equal to the present value of the sanctuary estimated in this study (200 million dollars). If the government objective was to provide maximum national social welfare, instead of highest environmental protection, then the management strategy should allow the greatest possible number of visitors. Disadvantages of these proposals are also present. First, it could be financially unsustainable. Second, social welfare would reduce under the first government strategy, or over-exploitation might occur under the second. Third, local communities' benefits will suffer a big loss making no money from the sanctuary under the first strategy. Fourth, it is less likely that tourism can be separated from an environmental management policy.

Now, assuming that local communities have the rights of exploiting the viewing of the butterfly over the landowners, the objective of local governments would be to maximize local economic impact and the management strategy should let the current admission fee operate at the same level. Local businesses would benefit by 4.6 million dollars. Under this scheme landowners are the biggest losers by an amount of $425,108.

Finally, it is possible to describe an income-distribution option for managing the sanctuary. This strategy would seek to have local businesses compensate landowners.

Local businesses should compensate landowners up to the point at which landowners maximize revenue (that is, $425,108). In this way, landowners would be indifferent to charging a higher fee and not reducing the number of visitors to the sanctuary, therefore maximizing regional welfare. Under this scheme, local businesses' total revenue would decrease by 425,108 dollars, making about 4 million dollars, and still benefiting by almost 2.2 million over the landowner solution.

The former analysis can be graphically represented as follow:

Figure 4 Optimal pricing for the monarch sanctuary

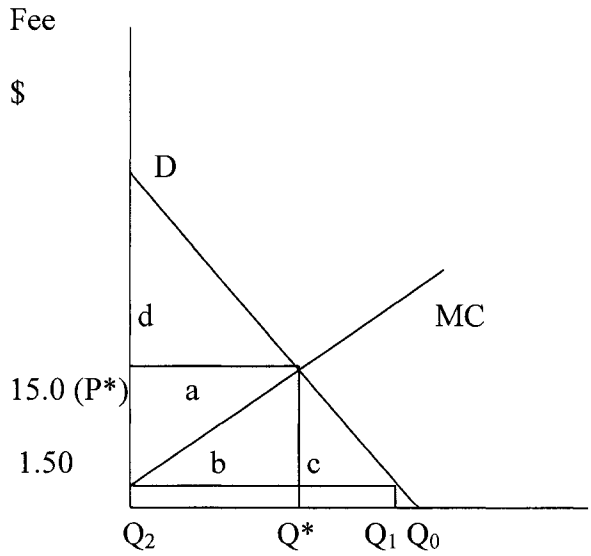


Figure 4 shows the equilibrium for provision of the outdoor recreation for this specific setting where MC represents the optimal price for visiting the sanctuary. In early times open access was a common scheme for some public parks. Q_0 represents the open access solution and the optimal strategy for local businesses. The efficiency point is represented by Q* and was found at 15 USD entrance fee for the monarch butterfly sanctuary.

Local communities are more benefited at any point to the right of Q* because demand and spending would increase. Q_1 represent a solution when local communities subsidize landowners in order to compensate revenue and maintains admission fee at current levels. Thus, visitation do not decrease and local spending remains the same. The compensation amount should make landowners indifferent for changing the optimal admission fee (at P*).

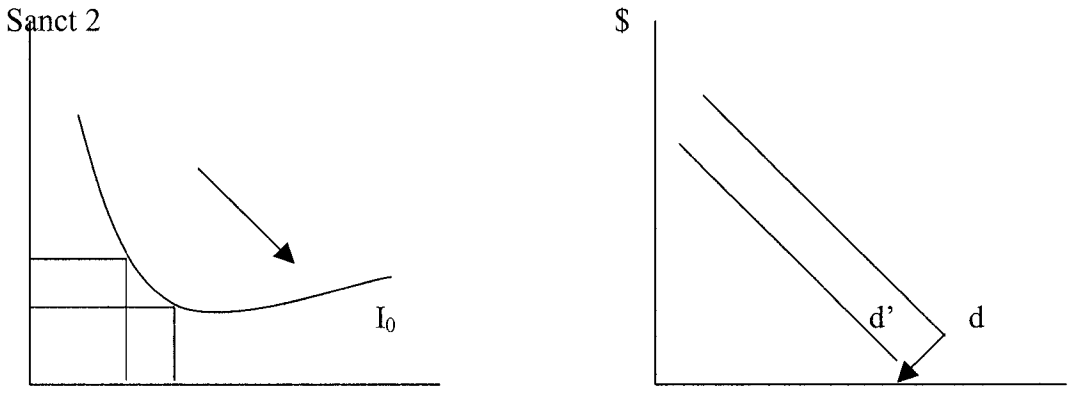
Federal government would achieve a higher preservation at any point to the left of Q*. Therefore if priority is conservation, price should increase substantially in order to reduce demand, and this solution is represented by Q_2 .

In summary, if policy makes to move from Q* to Q_0 local businesses are favored but if policy moves from Q* to Q_3, federal government's objectives are met.

Still, under this specific region, it is possible to consider the possibility to promote another sanctuary for visitation. Opening and advertising a new sanctuary (hereafter, sanctuary 2) would lower the demand for sanctuary 1 since some people would shift visitation. Economic theory considers this case as a consumer choice problem since people would face the decision of visiting one of

two parks instead of visiting only one park. It is possible to represent this scenario graphically as follows:

Figure 5 Changes in demand for recreation provision when opening a new sanctuary with lower prices.



The figure illustrates the effect in visitation to sanctuary 1 when sanctuary 2 establishes a lower entrance fee. Demand for sanctuary 1 decreases from d to d' because people substitute sanctuary 1 for sanctuary 2. Under this scenario, total visitation and regional welfare is not affected and congestion is avoided but landowners' revenue decrease for sanctuary 1 and economic impact also decrease for communities surrounding sanctuary 1.

There is one more policy option for this situation, which considers the consumer choice problem as an increase in income that affects visitation (income effect). It is necessary to assume that more people can visit both

sanctuaries (by advertising), which represent the situation of an increasing on the people's income. Thus, visitation can be guided in order to avoid decreases in revenue for communities and regional welfare would increase. Admission fees should be established at the efficiency fee at sanctuary 2 and compensation would be take effect on sanctuary 1.

The overall analysis shows that there is not "right" or "wrong" stakeholders' standpoint. Instead, a more or less appropriate solution depends on management's specific objectives. In reality, a mixture of objectives can be reached and, therefore, a mixture of management strategies can be implemented for protected areas.

CHAPTER VIII

CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS

Many people believe that protected areas are priceless and that they are part of a country's national heritage. Thus, these people consider it to be an ethical wrong to place an economic value on them. Other people believe that protected areas are managed by scientific objectives and that economics and politics have nothing to do with such as environmental protection. However, there are another group of people who believe economics can be a useful tool for guiding management decisions in protected areas. In this broader sense, an economic analysis in the monarch butterfly sanctuary located in Mexico was presented in this dissertation, taking into consideration conflicting objectives among stakeholders as a key issue. In a more detailed sense, the analysis of this dissertation presented an economic valuation of the monarch butterfly sanctuary, taking only non-consumptive use values in the evaluation through two different techniques: a) the traditional zonal travel cost approach, and b) the combined revealed and stated preference information approach. The random effects probit model was specified for the panel nature of the information given the same estimates for the binomial and the random models.

The present value of tourism visits to the sanctuary using the random estimates was calculated from a range of discount rate options. This present value ranges from 80 million to 200 million dollars.

Elasticities were derived from the two models for measuring price responsiveness of the visitors, finding that people are more price responsive to higher entrance fee costs than higher travel costs. The own-price elasticity for the model using admission fees was also estimated for calculating the revenue-maximizing admission fee. The optimal entrance fee from the landowners' perspective was calculated at 15.0 dollars, suggesting that a policy option to compensate landowners from the "expansion-taking" would be to let landowners increase the entrance fee to the sanctuary in order to maximize revenue. However, this fee policy would have different effects among stakeholders in the gateway communities and would reduce social regional welfare. Therefore, an export base analysis approach was utilized for obtaining the sales multiplier. This multiplier indicates the impact of tourism spending on local businesses. The sales multiplier was estimated at 1.8, indicating that local communities receive a positive economic impact at the current visitor level. This suggests that a better managing strategy for local businesses is operating the sanctuary at the current fee of 1.50 dollars.

Finally, an economic impact analysis was developed using two scenarios of fee for forecasting total economic effect in communities. This analysis showed that communities would suffer a big loss in tourist sales if a 15.0 dollar fee were imposed because reduction in visitation would be substantial.

The overall analysis shows how different strategies for managing the sanctuary can be implemented depending upon the manager's objectives, However, since initial property rights of the land belong to ejidatarios, an

income-distribution strategy seems to be the best option (as a second best solution) for the particular setting of the expansion-taking governmental measure. This strategy allows maximizing social regional welfare. This position combines management strategies that seek to gain a balance between conflicting interests of stakeholders and achieve different objectives.

Many of the ideas explored in this dissertation require far more considerations that could be covered in future research. First, the full economic potential of the region should be explored, since forests can provide distinct economic services from recreation. Second, the eco-tourism strategy should consider the whole biosphere and the whole region since many initiatives point to opening more sanctuaries. Third, an interdisciplinary study should be carried out, including not only economic values but also biological and climatic aspects of the butterfly migration under dynamic settings in order to better understand influence of visitation, not only on human congestion, but also on the ecological robustness of the biosphere reserve.

BIBLIOGRAPHY

ACOPS. (1994) Advisory Committee on Protection of the Sea South East Asia. Seminar on the Management of Coastal Cities and Towns. Localizing Agenda 21. Pattaya, Thailand.

Adamowicz, W., J. Louviere and M. Williams. (1994). Combining revealed and stated preference methods for valuing environmental amenities. *Journal of Environmental Economics and Management* 26: 271-292.

Andersson, J. (2001). To Estimate Recreational Welfare Measures for International Tourism. Department of Economics, Gothenburg University. (Draft).

Bates, N. (1999). Paying to Play: The Future of Recreation Fees. *Parks and Recreation* 34(7): 47-52.

Batisse, M. (1986). Developing and Focusing the Biosphere Reserve Concept. *Nature and Resources* 12: 2-15

Barkin, D. (2000). Straightening Domestic Tourism in Mexico: Challenges and Opportunities. Universidad Autonoma de Mexico. Mexico, D.F.

Beal, D. (1996). A Theoretical Market Model for National Parks of Different Ecological Character Managed by One Agency. *Review of Marketing and Agricultural Economics* (64-2): 177-82

Bean, M. (1998). The Endangered Species Act and Private Land: Four lessons Learned from the Past Quarter Century. *Environmental Law Report* (28): 1070-1090.

Berglas, E. (1981). The Market Provision of Club Goods Again. *Journal of Public Economics* (15): 389-93.

Billings, Bruce (1969). The Mathematical Identity of the Multipliers Derived from the Economic Base Model and the Input-Output Model. *Journal of Regional Science* (9): 471-80.

Blair, J. (1995). Local Economic Development: Analysis and Practice. Thousand Oaks, CA: SAGE Publications.

Blomquist, G. C. and J. Whitehead. (1995). Existence Value, Contingent Valuation, and Natural Resources Damages Assessment. *Growth and Change* (26): 573-589.

Bolton, R. (1966). Defense Purchases and Regional Growth. Washington, DC. Brookings.

Boo, E. (1990). Ecotourism: the Potentials and Pitfalls. World Wide Fund for Nature, Washington DC.

Botha, M. (2000). Advancing Payments for Biodiversity Conservation Outside of Protected Areas. Biodiviersity Support Program. USAID.

Boum, A. (1998). Cultural Commodization, Commercialization or Cultural Authenticity. *Contours* (8): 18-20.

Bocksteal, N., and K. Kolstad. (1991). Recreation. In Measuring the Demand for Environmental Quality, John Braden and Charles (Eds). Elsevier.

Bockstael, M. E. (1996). Travel Cost Methods. In: The Handbook of Environmental Economics, Bromley (Ed). Blackwell Publishers. UK.

Brokshire, D., A. Randall and J. Stoll. (1980). Valuing Increments and Decrements in Natural Resource Service Flows. *American Journal of Agricultural Economics* 62 (40): 478-88.

Brower, L. P. and M. Missrie (2001). Quantitative Changes in Forest Quality in a Principal Overwintering Area of the Monarch Butterfly in the States of Michoacan and Mexico. World Wildlife Fund, Mexico.

Buchanan, J. M. (1965). An Economic Thoery of Clubs. *Economica* (32): 1-14.

Burr, S. W. (1991). Review and Evaluation of the Theoretical Approaches to Community as Employed in Travel and Tourism Impact Research on Rural Communities. Leisure and Tourism: Social and Environmental Changes.

Butler, F. (1993). An International Nature Torurism Travel Cost Model: Estimating the Recreational Use Value of a Proposed National Park in Madagascar. Paper presented at the Allied Social Science Association, New Orleans.

Cameron, C. and P. Travedi. (1986). Econometric Models Based on Count Data: Comparisons and Applications of Some Estimators and Tests. *Journal of Applied Econometrics* (1): 29-53

Cameron, T. A. (1992). Combining Contingent Valuation and Travel Cost Data for the Valuation of Nonmarket Goods. *Land Economics* 302-17.

Cardenas, J.C., J. Strand, and C. Willis. (2000). Local Environmental Control and Institutional crowding out. *World Development* (28); 1719-32.

Christ, C. 1994. Kenya Makes Revenue Sharing Top Priority. *Ecotourism Society Newsletter* (4): 1-5.

Clark, C. , L. Davenport and P. Mkangal (1995). Designing Policies for Setting Park Users Fees and Allocating Proceeds among Stakeholders. The World Bank.

Clinch, H. and G. Murphy (1999). The Economic Theory of WTP and WTA. In: Valuing Environmental Preferences. I Bateman and K. Willis (Eds). Oxford University Press.

Coase, R. (1960). The Problem of Social Cost. *The Journal of Law Economics* (4): 213-45.

COINBIO 2000. México-Indigenous and Communities Biodiversity Conservation Project. World Bank. Project Information Document.

Cornes, R., and T. Sandler (1986). The Theory of Externalities, Public Goods, and Club Goods. Cambridge; New York: Cambridge University Press.

Chase, L. (1995). Cuotas de Entrada a los Parques Nacionales en Costa Rica. Centro Agropecuario y Tropical Internacional de Ecosistemas. CATIE.

Chase, L. C., D. Lee, W.D. Schultz and. D. Anderson H. (1998). Ecotourism Demand and Differential Pricing of National Park Access in Costa Rica. *Journal of Land Economics* 74 (4): 566-82.

Daly, H., and J. Cobb. (1989). For the Common Good: Redirecting the Economy toward Community, the Environment, and a Sustainable Future. Beacon, Press. Boston.

Diario Oficial del Gobierno Federal de Mexico. (1980). Decreto que establece la Reserva Especial de la Biosfera de la Mariposa Monarca. Ciudad de Mexico.

Diario Oficial del Gobierno Federal de Mexico (1986). Nuevo Decreto Sobre la Reserva Especial de la Biosfera de la Mariposa Monarca.

Diario Oficial del Gobierno Federal de Mexico, Noviembre (2000).

Dixon, J. A., L.F. Scura, R.A. Carpenter and P.B. Sherman (1996). Economic Analysis of Environmental Impacts. Second Edition, London. Earthscan Pub.

Domerus, H. (2003). A Policy Portfolio Approach to Biodiversity Protection on Private Lands. *Environmental Science and Policy Journal* (6): 217-32.

Donnelly, M., D. Vaske and J. Loomis. (1998). Economic Impact of State Parks: Effects of Park Visitation, Park Facilities, and County Economic Diversification. *Journal of Park and Recreation Administration* (16): 57-72.

Dudley, G., K. Smith and R. Smith. (1999). The Role of Forest Protected Areas in the Landscape. Draft Paper for the Council on Foreign Relations.

Dudley, G., K. Clark and R. Harmon. (1998). Protected Areas for a New Millennium, WWF and IUCN, Gland, Switzerland.

Duffy, R., (2002). A Trip Too Far. Ecotourism, Politics and Exploitation. Earthscan Publications. London.

Dusan, T. (1998). Traffic Control and Transport Planning: A Fuzzy Sets and Neural Networks Approach. Kluwer Academic Publishers. Boston, US

Englin, J. and T.A. Cameron. (1996). Augmenting Travel cost models with contingent behavior data: Poisson regression analyses with individual panel data. *Environmental and Resource Economics* 7: 133-47.

Fenell, D. A. and R. Dowling. (Eds) (2003). Ecotourism Policy and Planning. CABI publishing. UK.

Field, C. B. (2001). Natural Resource Economics: An Introduction. Published by Irwin/ McGraw-Hill. New York, NY.

Fik, T., R. Amey and E. Malecki. (1991). Changing employment profiles and growth: An economic base study of Florida counties. *Growth and Change* 84-104.

Fisher A. C. and J. Krutilla (1972). Determination of Optimal Capacity of Resource-Based Recreation Facilities. *Natural Resources Journal* (12): 417-444.

Fix, P. and J. Loomis. (1998). Comparing the economic value of mountain biking estimated using revealed and stated preference. *Journal of Environmental Planning and Management* 41: 227-236.

Freeman III, A. M. (1993). The Measurement of Environmental and Resource Values: Theory and Methods. First Ed Washington, D. C. Resources for the Future, Inc.

Ghosh, A. and A. Chakrabarti. (1973). Programming and Inter-Regional Input-Output Analysis: An Application to the problem of Industrial Location in India. Cambridge University Press.

Gibson, L. J. and A.W. Marshall. (1980). Estimating the Economic Base Multiplier: A test of Alternative Procedures. Division of Economic and Business Research. College of Business and Public Administration. The University of Arizona.

Goldman, G., A. Makazawa and D. Taylor. (2003). The Economic Impact of Visitors to Your Community. Western Rural Development Center.

Goldsmith, R. (2001). Summit County Ski Tourism: an Export Base Analysis. Thesis. Colorado State University

Greene, W. (1995). LIMDEP Version 7.0. User Manual and Reference Guide. Bellport NY: Econometric Software, Inc.

Greyta, A. (1969). Methods of Regional Analysis: An Introduction to Regional Science. Cambridge. The M.I.T. University Press.

Hanemann, M. (1984). Welfare Evaluations in Contingent Valuation Experiments with Discrete Choice Responses. *American Journal of Agricultural Economics*: 1255-1263.

Hanemann, M. (1989). Welfare Evaluations in Contingent Valuation Experiments with Discrete Choice Data: Reply. *American Journal of Agricultural Economics*: 1057-1061.

Hanemann, W. M. (1992). Preface: Notes on the History of Environmental Valuation in the USA. In: Pricing the Environment: The European Experience. Narvaud Stale (Ed). Oxford, UK: Oxford University Press.

Hanemann, W. M. (1994). Valuing the Environment through Contingent Valuation. *Journal of Economics Perspectives* (8): 19-25

Hannah, B. (1992). African People, African Parks. Conservation International, Washington, DC.

Harris, C. C., and B.L. Driver. (1987). Recreation User Fees: Pros and Cons. *Journal of Forestry.* May: 25-29.

Harris, H. (1985). The Urban Economics: A Multiregional Multi-Industrial Forecasting Model. *Papers of the Regional Science Association* (35): 143-56.

Harris, T., G. Ebai and S. Shonwiler. (1998). A Multidimensional Estimation of Export Base Agricultural Experiment Station Project. The University of Nevada Foundation.

Hellerstein, D. (1995). Welfare Estimation Using Aggregate and Individual-Observation Models: A Comparison Using Monte Carlo Techniques. *American Journal of Economics* (45): 234-43.

Hendry, R. (1993). User Pays, Who Pays? Proceedings Anals Conference. Brisbane.

Hensher, M., R. Ross and T. Salas (1999). Uncovering Regulators' Social Welfare Weights. *The Rand Journal of Economics* (15): 152-155.

Hicks, J. (1943). The Four Consumer's Surpluses. *Review of Economic Studies* (8): 108-66.

Houston, D. (1967). The Shift and Share Analysis of Regional Growth. A Critique. *Southern Economic Journal* (33): 557-81.

INEGI (1999). Los Censos Economicos de Mexico. Instituto Nacional de Geografia, Estadistica e Informatica. Mexico, DF.

Inman, P. (1998). The Case of Ecotourism in Costa Rica. IN K. von Moltke, et al. Global Products Chains : Northern Consumers, Southern Producers, and Sustainability. United Nations Environmental Program.

Isserman, A. M. (1980). The Location Quotient Approach to Estimating Regional Economic Impacts. *Journal of the American Institute of Planners* (43): 35-41.

IUCN Commission on Natural Parks and Protected Areas with the assistance of the World Conservation Monitoring Centre. (1994). Guidelines for Protected Area Management Categories. IUCN, Gland, Switzerland.

Kirman, A. (1992). Whom or What Does the Representative Individual Represent. *Journal of Economic Perspectives* (6): 117-36.

Klosterman, J. (1990) The Economics Base of the Metropolis. *Journal of the American Institute of Planners* (21): 114-132.

Knopman, B. and N Stoeckl (1995). Recreation User Fees: An Australian Empirical Investigation. *Tourism Economics* (1): 5-15.

Krikela, A. C. (1997). Why Regions Grow: A review of Research on the Economic Base Model. *The Economic Review Journal* 28 (1): 3-17.

Lintner, S., S. Arif and M. Hatzioles. (1998). The Experience of the World Bank in the Legal, Institutional and Financial Aspects of Regional Environmental Programs. Washington, DC. World Bank.

Leiftmann, J. (1998). Options for Managing Protected Areas: Lessons from International Experience. *Journal of Environmental Planning and Management* (41): 129-43.

Lesser, Z. (1997). Provision for Social Goods. In: Public Economics. J. Margolis (Ed). International Economics Association.

Lewis B. J. (2001). Self-developed Rural Tourism: A Method of Sustainable Tourism Development. In: Tourism, Recreation and Sustainability. Stephen F McCool and Neil Mosey (Eds). CABI Publishing, UK.

Lindberg, K (2001). Protected Area Visitor Fees. Overview. Cooperative Research Center for Sustainable Tourism. Griffith University. Australia.

Lindberg, K. B. Aylward (1999). Price Responsiveness in the Developing Country Nature Tourism Concept: Review and Costa Rican study case. *Journal of Leisure Research* (31) 281-299.

Loomis, J. (1997). Panel Estimators to Combine Revealed and Stated Preference Dichotomous Choice Data. *Journal of Agricultural and Resource Economics* 233-245.

McCarville, R., D. Sears and S. Furness. (1999). User and Community Preferences for Pricing Park Services: A case Study. *Journal of Park and Recreation Administration* (17): 91-105.

McConnel, D. (1985). Economica and Consumer Behavior. Cambridge UK: Cambridge University Press.

McEvoy, Y. (1998). A Systematic Test of an Enterprise Strategy for Community-based Conservation. *Conservation Biology* (15): 1585-1592.

McLaren, D. (2003). Rethinking Tourism and Ecotravel. Kumarian Press, Inc. USA

Mexican Census of Population. (2000). Instituto Nacional de Estadistica, Geografia e Informatica. Mexico, DF.

Mitchell, R. E. (2001). Community Perspectives in Sustainable Tourism. Lessons from Peru. In: Tourism, Recreation and Sustainability, McCool and Mosley (Eds). CABI Publishing

Merino S. (1995). La Reserva Especial de la Biosfera Mariposa Monarca. Problemática y Perspectivas. El Colegio de Mexico. Mexico, DF.

Moody, H. and F. Buffer. (1970). The Empirical Verification of the Urban Base Multiplier: Traditional and Adjustment Process Model. *Land Economics* (46): 91-98.

Munasinghe, M. and L. Erns. (1993). Environment Economics and Valuation in Developing Decision Making. In: Environmental Economics and Natural Resource Management in Developing Countries, Munasinghe (Ed). CAB Publishing.

Musgrave, R. A. (1969). Provision for Social Goods. In Public Economics, J. Margolis and H. Guitton (Eds). International Economics Association. London.

Navrud, S. and E.D. Mungatana (1994). Environmental Valuation in Developing Countries: The Recreational Value of Wildlife Viewing. *Ecological Economics* (11): 135-151.

Nowlan, D. M. (1988). A Short Essay on Local Public Goods. Congress of Environmental Economics. Toronto, Canada.

Okidi, J. (2001). The Potential for Community-Based Management of Forest resources in Uganda. http:// www.edlis.org/fulltext/EPRC_Okidi2.pdf.

Parr, J. (1999). Regional economic Development: An Export-Stages Framework. *Land Economics* (79): 94-124.

Pfouts, R. (1957). An Empirical Testing of the Economic Base Theory. *Journal of the American Institute for Planners* (23): 64-69.

Pfouts, R. and T. Curtis. (1958). Limitations of the Economic Base Analysis. *Social Forces* (36): 303-10.

Pilaro, M. (2001). Aquatic Reserves: Creating Tools for Education, Science, and the Environment. Washington State Department of Natural Resources.

Polaski, S. and H. Domerus. (1998). When the Truth Hurts: Endangered Species Policy on Private Land with Imperfect Information. *Journal of Environmental Economics and Management* 35: 22-47.

Polasky, S. and T. Solow (1999). The role of Land Trusts in Biodiversity Conservation on Private Lands. *Idaho Law Rev* (38): 453.

Power, T. M. (1996). Lost Landscapes and Failed Economies: The Search for a Value of Place. Island Press. Washington, D.C.

Prospt, D., D. Stynes and S. Ya-Yen (2000). Economic Impacts of Badlands National Park Visitor Spending on the Local Economy. Cooperative Park Studies Unit. University of Idaho. Review Draft.

Pye, E., and T. Lin. (1983). Tourism in Asia: The Economic Impact. Singapore. Singapore University Press.

Romo, J.L. (1997). El Santuario de la Mariposa Monarca en Mexico desde una Perspectiva Economica. Tesis doctoral. Division de Ciencia Forestales. Universidad Autonoma Chapingo. Texcoco, Mexico.

Rosenberger, R. and J. Loomis. (1999). The Value of Ranch Open Space to Tourists: Combining Observed and Contingent Behavior Data. *Growth and Change* 30: 366-383.

Perez-Septien, G. (1997). Turismo en las Áreas Naturales Protegidas: Valuación Economica de los Beneficios Recreativos del Santuario de la Mariposa Monarca. Tesis de licenciatura. Instituto Autónomo de Mexico. Mexico, D.F.

Samuelson, P. (1954). The Pure Theory of Public Expenditure. *The Review of Economics and Statistics* (36.4): 387-89.

Samuelson, P. (1964). Public Goods and Subscription TV: Correction of the Record. *Journal of Law and Economics* 517-21.

Samuelson, P. (1968). Pitfalls in the Analysis of Public Good. *Journal of Law and Economics* 314-25.

Sanctuary Record Book. (2002). Dirección general para la operación de la reserva especial de la biosfera de la mariposa monarca. Morelia, Mexico.

Shogren, F., M Parkhurst, and C. Settle (2003). Integrating economics and ecology to protect nature on private lands: models, methods, and mindsets. Environmental Science and Policy (6) : 233-242.

Stabler, O. (1997). On the Optimal Structure of Local Governments. *The American Economic Review* (85.5): 1224-1240.

Stoker, T. (1993). Completeness, Distribution Restrictions, and the Form of Aggregate Functions. *Econometrica* (52): 887-907.

Stynes, D. (2002). Economic Impact of Great Smoky Mt National Park Visitor on the Local Region, 1997-2000. Department of Park, Recreation and Tourism Resources. Michigan State University.

Stynes, D amd S. Ya-Yen (2003). Impact of Visitor Spending on Local Economy: Sequoia and Kings Canyon National Parks. Department of Park, Recreation and Tourism Resources. Michigan State University.

Swason, T., and E. Barbier. (1992). Economics for the Wild. London : Earthscan.

Tiebout, C. M. (1956). A Pure Theory of Local Expenditures. *Journal of Political Economy* (64): 416-24.

Ullman, E., M. Davey and H. Brodsky. (1989). The Economic Base of American Cities. University of Washington, Center for Urban and Regional Research.

USMAB Program. (2003). USDA Forest Service. Washington, DC. http:// www.mabnetamericas.org/brprogram/usbr.html.

USDA. (2000). U.S. Department of Agriculture. Recreation Fee Demonstration Program: Program Report to Congress Fiscal Year 1999. Washington, DC.

Vickery, W. (1994). Statement to the Joint Committee on Washington DC. Metropolitan Problems. *Journal of Urban Economics* (36) : 42-65

Viewpoint. Papers of the Regional Science Association (35) : 110-26

Wearing, S. and J. Neil. (2001). Expanding Sustainable Tourism Conceptualization: Ecotourism, Volunteerism and Serious Leisure. Tourism, Recreation and Sustainability. F McCool and Mosey (Eds). CABI Publishing.

Wells, M., and K. Brandon. (1992). People and Parks: Linking Protected Area Management with Local Communities. Washington DC. WWF and USAID.

Wells, M. P. (1997). Economic Perspectives on Nature Tourism, Conservation and Development. Environment Department Paper No 55. Washington, DC. The World Bank

Wheat, L. (1973). Regional Growth and Industrial Location: An Empirical Analysis. Vol (77) (2). May 2001.

Williamson, R.B. (2001). Predictive Power of the Export Base Theory. *Growth and Change:* 1-25

World Commission on Environment and Development (1987). Our Common Future. Oxford University Press, Oxford.

Ya-Yen, S., D. Stynes and D. Prospt (2002). Economic Impacts of Visitors to Mount Raivier National Park. Cooperative Park Studies Unit/ University of Idaho.

APPENDIX I

SURVEYS FOR TOURISTS

Oral Survey for Tourists Date: _____

Weather	
Temperature	
Population of Butterflies	
ID' s Interviewer	

A. Introduction.

Hello, my name is _____and I am collaborating in a project research for the Economics' School of Universidad Michoacana de San Nicolas de Hidalgo about the monarch butterfly. The objective of this study is to estimate the recreation use of the *Santuario de la Mariposa Monarca*. I am highly interested in your opinion about visiting this site because it can provide us valuable information on how society perceives and manages wildlife. In this survey there are not right or wrong answers. Your responses will be kept strictly confidential and anonymous. The interview will take approximately 15 minutes.

I. Travel Cost Questions

1. Where do you live?

Municipality/City_____ State_____

If foreign, what country? _____

2. How many times have you visited the Sanctuary this season (Nov 2001-March 2002)?

(Including this time)

_____ Times

3. Have you visited the Sanctuary in the past?

Yes_____ No_____ if not skip to Q5

4. Year of the last visit?

_____

5. Was visiting the site

_____the major purpose of your visit to this area?

_____Other. Specify_____

6. How did you travel to the Sanctuary of the Monarch Butterfly?

By car_____ by bus_____ by plane_____ Other_____

7. How long are you going to stay at the Sanctuary?

_____ hours _____ do not know

8. About how long did it take you travel from your home or hotel to the Sanctuary?

_____ hours _____ minutes

9. About how many kilometers is it from your home to the Sanctuary?

_____Km

10a. How much were the expenses of you and other members of your group on this trip?

Amount spent in:

$_____ Gasoline and other car expenses

$_____ hotel expenses

$_____ Food in grocery stores

$_____ Food in restaurants

$_____ Other expenses (e.g. film, masks)

10b. Number of people traveled with in your group

_____ people

II. Contingent Behavior Questions

11. Would you had visited to the Sanctuary if: (current fee is 15 adults and 10 children)

a) A 25 pesos entrance fee was imposed?

Yes_____ No_____ if not skip to Q12

b) A 50 pesos entrance fee was imposed?

Yes_____ No_____ if not skip to Q12

c) A 250 pesos entrance fee was imposed?

Yes_____ No_____ if not skip to Q12

12. Would you had visited the Sanctuary if your total cost were:

25% higher than your current costs? Yes_____ No_____ if not skip to Q13

50% higher than your current costs? Yes_____ No_____ if not skip to Q13

100% higher than your current costs? Yes_____ No_____

13. Would you change the number of visits you take each season to the Sanctuary of the monarch butterfly if:

a) A $20 pesos entrance fee was imposed?

Yes_____ Number of season visits at $20 _____

No_____ If no, skip to Q14

b) A $75 pesos entrance fee was imposed?

Yes_____ Number of season visits at $75_____

No_____If not, skip to Q14

c) A $250 pesos entrance fee was imposed?

Yes_____

No_____

14. Would you change the number of your season visits to the Sanctuary if the trip's cost were?

a) 25% more expensive than your current cost?

Yes_____ Number of season visits at 25%_____

No_____ If no, skip to Q15

b) 50% more expensive than your current cost?

Yes_____ Number of season visits at 50%_____

No_____ If no, skip to Q15

c) 100% more expensive than your current cost?

Yes_____ Number of season visits at 100%_____

No_____

15. Would you consider that the current level of visitors to the sanctuary is crowded?

1 2 3 4 5 6 7 8 9 10

1_____ 2_____

(low perception) (Moderate-high perception)

16. How would you rate the quality of the parking lot area in the Sanctuary?

Very good____ Good____Fair____ Poor____ Terrible_____No opinion_____

17. How would you rate the quality of the restroom area in the Sancatuary?

Very good____ Good____Fair_____ Poor____ Terrible____No opinion_____

18. How would you rate the quality of the food service area in the Sanctuary?

Very good____ Good____ Fair_____Poor____ Terrible_____No opinion_____

III. Identification of respondents

19. Are you Male_____ Female_____

20. What is your age? _____ Years

21. What is your highest year of formal schooling? (Circle one)

a) Elementary/Secondary 1 2 3 4 5 6 7 8 9

b) High School 10 11 12

c) Technical/College 13 14 15 16 17

d) Graduate 18 19 20 21 22

22. What is the number of people who accompany you on this trip?

Children_____ Adults_____ Total_____

23. Which of the next categories best describes your monthly income?

a) Under 2,000 pesos _____

b) Between 2,001 and 4,000 pesos _____

c) Between 4,001 and 6,000 pesos _____

d) Between 6,001 and 8,000 pesos _____

e) 8,001 pesos or over _____

APPENDIX II

ORAL SURVEY FOR LOCAL BUSINESSES

Oral survey for local companies Date_____

Hello, my name is_____ and I am collaborating in a survey sponsored by Universidad Michoacana de San Nicolas de Hidalgo. The purpose of this study is to know your opinion about the economic impact that tourists have in your community. This information will be kept confidential and the information will be only used statistically.

Business type_____

1. How many year round employees do you have (self included)?

_____ Employees

2. How many additional people do you employ during the tourist season?

_____ Employees

3. How long have you been in this business?

4. What percentage of your annual sales, do you believe is generated by the people visiting the Sanctuary of the Monarch Butterfly?

_____%

5. Approximately, what are your annual sales during the season of visiting the Sanctuary of the Monarch Butterfly?

_____ Pesos during the season

6. What percentage of your annual sales, do you believe come from people who live in?

a) Within the State of Michoacan _____ %

b) Outside the State of Michoacan but in Mexico_____ %

7. What additional services could be provided to the tourists of the sanctuary that would financially benefit local people?

_____
_____
_____
_____

8. How would they benefit tourists?

_____
_____
_____
_____
_____

Thank you for your answers. If you have any comments, please tell me about it.

_____
_____
_____
_____
_____
_____

APPENDIX III

RANDOM PROBIT ESTIMATES FOR THE ABSOLUTE COST MODEL

Reestimated RANDOM EFFECTS Probit Model
Maximum Likelihood Estimates

Dependent variable	ABSOLUTE
Weighting variable	ONE
Number of observations	1628
Iterations completed	15
Log likelihood function	-1101.137
Sample is 4 pds and	407 individuals.

Variable	Coefficient	Standard Error	b/St.Er.	P[|Z|>z]	Mean of X
Constant	-0.04344	0 .1479	-0.294	0 .76	
ABSCOST	-0.000377	0.00007	-4.98	0.00	547.20
CONGESTI	0.032058	0 .04682	0.685	0.49	2.47
INCOME	0.000060	0.00001	4.109	0.00	4987.7
DCB	0.0069	0.031	0.219	0.9520	0 .25
DCBTC	0.005	0.5518	0.004	0.2182	157.88

APPENDIX IV
RANDOM PROBIT ESTIMATES FOR THE RELATIVE COST MODEL

Reestimated RANDOM EFFECTS Probit Model	
Maximum Likelihood Estimates	
Dependent variable	RELVIS
Weighting variable	ONE
Number of observations	1628
Iterations completed	13
Log likelihood function	-1109.791
Sample is 4 pds and	407 individuals.

|Variable |	Coefficient |	Standard Error |	b/St.Er.	|P[|Z|>z]	| Mean of X|
Constant	-0.07296	0 .1457	-0.501	0.61	
RELCOST	-0.00018	0.000036	-4.967	0.00	724.91
CONGESTI	-0.0270	0.04676	-0.579	0.56	2.47
INCOME	0.000049	0.00001	3.427	0 .00	4987.71
DCB	0 .12528	0.07984	1.569	0.116	0 .25
DCBTC	-3.41460	2.33000	-1.465	0.142	257.00

APPENDIX V

RESULTS FOR ROMO'S MODEL

Model: MODEL1
Dependent Variable: Visitation

Parameter Estimates

Variable	Parameter Estimate	T for H0: Parameter=0
INTERCEP	0.568	0.41
TC2	-0.0029	-2.59
FS	0.101	0.34
R-square	0.37	
Adj R-sq	0.27	

APPENDIX VI
SURVEY RESULTS FROM LOCAL BUSINESSES

Survey Results for Angangueo

sector	# responses	
G31	9	40
G32	1	5
G33	1	10
G35-39	1	50
G61	1	90
G62	5	75
G71	1	50
G92	2	30
G93	8	73
G94	1	30
G95	1	0
G96	1	0

Survey Results for Ocampo

Sector	# responses	% represented
G31	3	46.6
G33	1	0
G38	1	40
G61	2	80
G62	11	98
G71	2	90
G92	1	25
G93	3	93.3
G94	1	90
G95	1	0
G96	1	0