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RECONCILING THE IMPACTS OF TOURISM DEVELOPMENT WITHIN COMMUNITIES

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OF TOURISM DEVELOPMENT WITHIN COMMUNITIES

BY

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ABSTRACT

The growth and further development of the tourism industry at the community level often leads to more impacts than just the often-acknowledged jobs, wages, and tax revenues. Socio-cultural impacts such as crime and congestion are felt within the destination community. Similarly, environmental impacts such as erosion and the destruction of precious coral reefs are also felt within the community. All of these impacts resulting from tourism influence the quality of life within tourism communities as well as influencing the quality of experiences gained by tourists to that community.

Tourism plays an important role in the economy of Block Island. It is becoming increasingly popular and, as a result, conflicts between residents and tourists is increasing in frequency. Indeed, congestion levels on the Great Salt Pond have reached the point where many residents want to put a limit on the number of recreational boaters allowed.

This study develops and then applies a community-based tourism computable general equilibrium model to Block Island in order to sort out the windfall of information already available about the impacts which tourism development has recently brought. In essence, this study assesses who wins, who loses, and by how much from tourism development.

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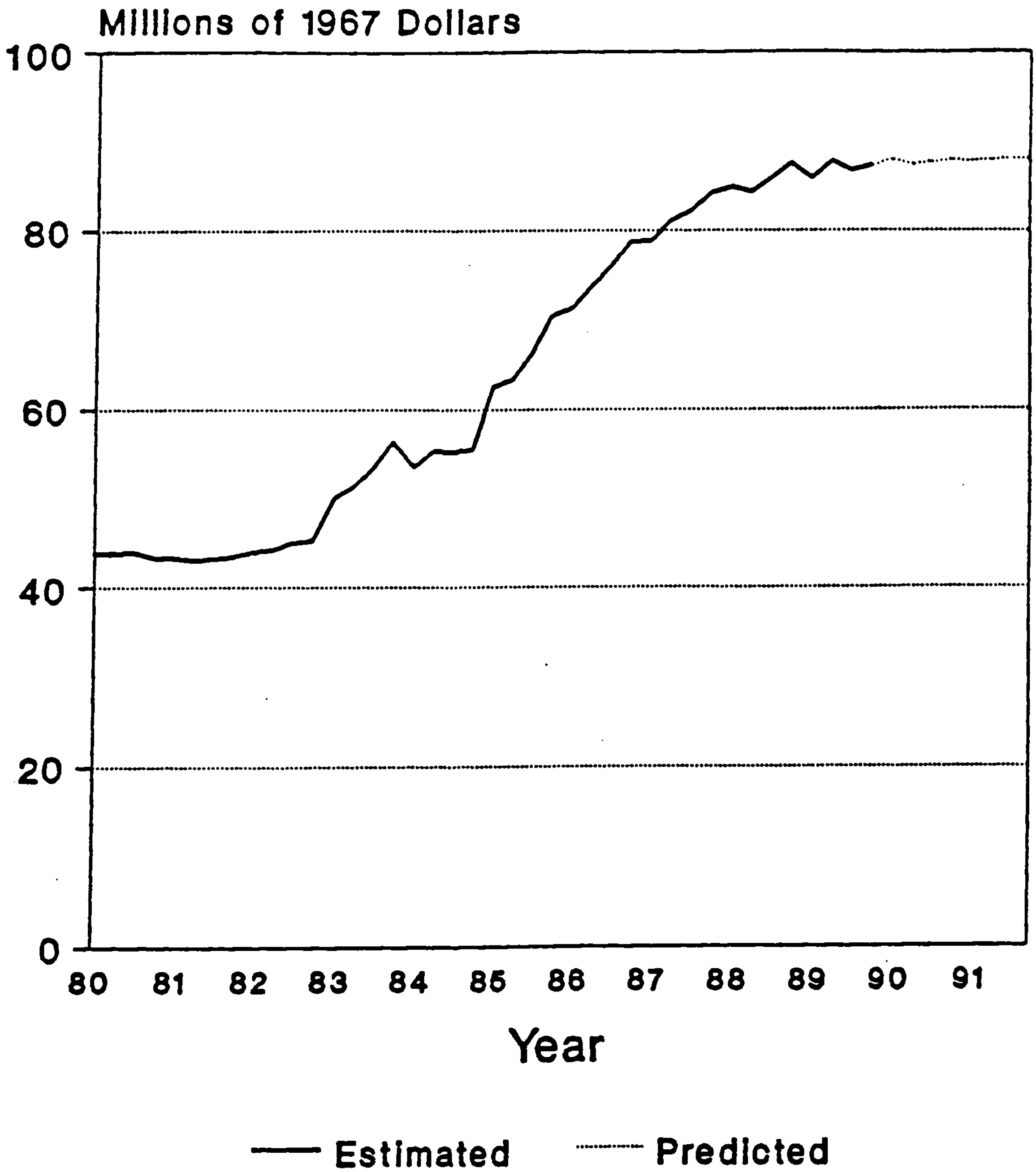
CHAPTER 1 INTRODUCTION

Over the course of the 1970s and 1980s, tourism development became a very popular economic development strategy for communities. The primary attraction of tourism development for these communities was to be found in the large financial benefits of increased jobs, wages, and tax revenues. Few communities, however, anticipated the costs to the community's residents which often seem to accompany tourism development: inflation, seasonal employment, pollution, erosion, crime, and congestion. In the 1990s, tourism growth seems to be slowing, residents are increasingly less tolerant of tourists and the industry which caters to them, and environmentalists are becoming even more alarmed over the impacts of tourism development on the very attraction base upon which the industry is dependent. Today, more than ever, communities must be fully aware of the consequences of choosing tourism as an economic development strategy within communities.

The Rhode Island tourism industry, for example, has experienced rapid growth over the past decade in both actual and deflated dollars. Recent data, however, shows a marked slow down in growth. Figure 1.1 shows deseasonalized and deflated dollars of actual sales by the Rhode Island tourism

Figure 1.1 Rhode Island Tourism Sales, Deseasonalized and Deflated.



Source: OTTR/REN/URI

industry from the first quarter of 1980 through the predicted value for the fourth quarter of 1991. Average annual growth in tourism sales from 1981-1987 was about 11 percent. In 1988, the real growth rate dropped to five percent and, in 1989, that rate had slowed even further to only two percent. When adjusted for price increases (estimated to be four percent) the nominal growth rate was approximately six percent in 1989 (Table 1.1).

Nearly half-way through the impressive growth in tourism, Tyrrell and Spaulding (1984) conducted a survey to determine attitudes of residents toward future tourism growth within the State of Rhode Island. Their study showed that a favorable attitude toward tourism growth was prevalent in Rhode Island but that variations exist among residents, business-owners, and town government officials. Households, in general, were shown to be favorable toward growth on the whole but less favorable toward the location of specific facilities close to home (primarily because of the problems of traffic congestion and litter). Businesses and town officials also favored the growth of tourism, recognizing that the benefits from increased employment and earnings can only be realized when tourism growth occurs close to home.

Table 1.1 Rhode Island Travel and Tourism Industry Summary Statistics

ESTIMATED IMPACTS FOR 1988-89

	1988r	1989r	Percent Change
SALES REVENUES (Millions of Dollars)			
Retail Trade	650.6	677.3	4.1%
Services	415.7	454.1	9.2%
Transportation	151.0	164.3	8.8%
Total	$1,217.3	$1,295.7	6.4%
WAGES GENERATED (Millions of Dollars)			
Retail Trade	133.7	142.3	6.4%
Services	101.8	109.3	7.4%
Transportation	32.9	35.4	7.6%
Total	$268.5	$287.0	6.9%
JOBS SUPPORTED (Full Time Equivalent Positions See Note (1))			
Retail Trade	15,143	15,440	2.0%
Services	8,449	8,676	2.7%
Transportation	1,768	1,905	7.7%
Total	25,360	26,021	2.6%
FIRMS INVOLVED (Full Time Equivalent Businesses See Note (1))			
Retail Trade	1,453	1,498	3.1%
Services	1,946	1,928	-0.1%
Transportation	388	406	4.6%
Total	3,787	3,833	1.2%

Notes:

(1) Full Time Equivalent Units are computed as the sum of the portions of employees' time or the portions of business operations that are devoted exclusively to the industry.

r revised.

The study of Rhode Island residential attitudes toward tourism growth also uncovered some interesting differences among the state's various regions. For example, the metropolitan regions were consistently favorable toward tourism growth. Rural areas were less favorable toward the idea of unrestricted tourism growth. "In the South Shore region, which is mostly rural with many attractive beaches, there was noticeable disagreement between groups; households did not favor tourism growth, while businesses and government officials were highly in favor it. On Aquidneck Island, groups were consistent in their lack of enthusiasm for the growth of tourism as measured by the attitude scale" (Tyrrell and Spaulding 1984:32-33).

1.1 Statement of the Problem

Communities seeking to increase the quality of life of its residents have a variety of economic development strategies from which to choose. Some of the more popular options often pursued by communities include the formation of industrial parks designed to lure manufacturing plants, the sponsorship of co-operatives which lower the barriers to entry for many cottage industries within the community, and even investing in the development and promotion of tourism to the community. Indeed, over the past ten years many communities have experienced rapid economic growth as a result of successfully developing their tourism industry.

The benefits to the communities actively engaged in the development and promotion of tourism have been primarily financial and include increased jobs, wages, and tax revenues. Many of these communities have subsequently increased the investment in their tourism industry as well as the amount of money spent annually promoting their communities as attractive tourism destinations. In addition, communities which have previously only witnessed the benefits accompanying tourism development in other communities have been quick to invest in and promote their respective tourism industries in order to capture a share of the financial benefits. But the benefits from community tourism development are not restricted to merely economic benefits. Additional socio-cultural benefits often cited by proponents of tourism development include the wider range of consumer goods and services provided to the residents, as well as new sources of education and information. Likewise, environmental benefits touted by tourism development proponents often include the preservation and protection of unique biological ecosystems (e.g., parks, preserves, etc.) as well as improved access to such sites.

Unfortunately, many of the communities choosing tourism development as the vehicle for achieving economic growth due so without fully considering the economic, socio-cultural and environmental costs which are often associated with such development. For example, along with the economic benefits are such considerations as inflation, leakage of tourism revenues outside the community, and the distributional issue of who actually wins and loses from development. Often accompanying the economic growth are socio-cultural costs including crime, congestion, and the commercialization of religious ceremonies. Similarly, environmental costs often incurred with development include congestion, pollution, erosion, and the destruction or endangerment of plant and wildlife species.

A wealth of disciplinary studies have been conducted to examine th positive and negative impacts associated with community rism development. Each of the discipline-based approaches ve sought to either enhance the benefits from or minimize the costs of tourism development (i.e, increase the quality of life). At any point in a tourism development cycle, these disciplinary studies can estimate impacts of tourism development upon the community. The estimation of such specific impacts is, however, only the first step in comprehensive impacts analysis. The necessary second step should reconcile these impacts to determine if the community will be better off.

In order to help communities better analyze tourism development strategies, a system must be developed whereby the net impacts of such strategies can be determined. This study will explore a system which will help the community to determine who wins and who loses from alternative tourism development strategies as well as by how much. Accordingly, an index will be constructed to describe how each community resident is effected by the economic, social, and environmental impacts of tourism. The objectives of this study are to: 1) show how a community can reconcile the apparently contradictory impacts of tourism development; 2) illustrate how a computable general equilibrium model might provide such a framework for reconciling tourism-related impacts; and 3) illustrate how that framework can be utilized by communities to analyze alternative tourism development scenarios contemplated for improving the community's quality of life.

1.2 Study Method

In order to satisfy the objectives of this study, a computable general equilibrium model will be developed for a community. The specific aim of this approach is to convert the general equilibrium structure of a typical tourism community from an abstract representation of an economy into a realistic model of an actual economy. The idea behind such a general equilibrium model is to use these models to evaluate policy options by specifying production and demand parameters and incorporating data reflective of real economies. The primary reason for choosing a computable general equilibrium approach for this study is that it provides the best features of both benefit/cost analysis and impact analysis. A computable general equilibrium model involves a complex set of equations which characterizes the behavior of all individuals, firms, and resources of a specific economy by their formal and informal interactions. Like benefit/cost analysis, computable general equilibrium analysis can provide "yes" or "no" answers about tourism development and, like impact analysis, these answers can be provided separately for each group of interest. In addition, computable general equilibrium analysis provides these features using a single behavioral framework based on conventional economic theory.

Developing a computable general equilibrium model involves two basic steps. First, the consumer side of the model must be determined. The number of consumers or groups of consumers (e.g., residents and tourists) must be specified, as well as their initial endowments of commodities (e.g., capital, etc.) and sets of preferences. Such information results in demand functions for each commodity of concern. Since it would be impossible to design a framework in which each individual within a community is represented, the compromise will be a framework in which individuals with similar characteristics are treated as one group (e.g., resident wage-earners, resident capital-owners, and tourists). Next, the production side of the model must be developed. Given that producers maximize profits utilizing a certain technology, appropriate production functions can be characterized by a set of prices and levels of production such that market demand equals supply for all commodities of concern.

A representative model of a tourism community system will be built within the organizational framework of the computable general equilibrium model described above in this study. Such a model of a tourism community system must also satisfy the following specific requirements of this study: capture the nature of the tourism industry; include impacts to identified groups of community residents (wage earners), tourists, and businesses (resident capital-owners); and provide a measure of well-being so that changes in the tourism community's well-being can be evaluated. Hence, the relevant literature on the specifics of computable general equilibrium modeling (e.g., Scarf and Shoven 1984, Shoven and Whalley, 1984) plays an important role in this study's approach. Likewise, a review of literature on the tourism industry at the community level is required in order to identify and incorporate the appropriate industry characteristics into the model (e.g., Flemming and Toepper 1990, Schaefer 1989, Matheison and Wall 1982).

The computable general equilibrium model for a tourism community includes three simplified markets: labor, capital, and consumer. In each of these markets, the quantity supplied and demanded can be derived. Equilibrium in each market can be characterized by a set of prices and levels of production and consumption such that market demand equals market supply. The labor market, for example, consists of an aggregate supply function which characterizes resident wage-earners' supply of labor and an aggregate demand function which characterizes the industries' (leisure and non-leisure) demand for labor. At mutually agreed upon prices (i.e., wages), which simultaneously satisfies those supply and demand functions, the labor market is said to be in equilibrium. For the capital market, the same process applies. A supply function for capital can be described for resident capital-owners who supply the firms with capital and, in return, receive rent (or income). Leisure and non-leisure firms' demand for capital can be mathematically derived from their production technology for producing their respective goods or services. Again, a set of mutually agreed upon prices (i.e., interest rates) will result and the capital market will be in equilibrium.

The mathematical formulation of the conditions for a consumer (resident wage-earners, resident capital-owners, and tourists) attempting to maximize utility results in an individual demand function for goods or services within the market for leisure and non-leisure consumer goods. Aggregating all of the individual demand functions results in a market demand function. Similarly, a mathematical function describing the production technology of profit-maximizing firms producing consumer-oriented leisure and non-leisure goods and services is utilized to derive a firm's supply function for a given good or service as well as the demand for labor and capital discussed above. Aggregating all of the individual firm's supply functions results in a market supply function which, when combined with the market demand function of the consumer sector, leads to an exchange between producers and consumers at mutually agreed upon prices and equilibrium within the consumer goods market is achieved.

Finally, the influence of changes in the qualities of goods and services on the equilibrium of the system can be thought of as a factor influencing either the consumers' utility functions or the firms' production functions. Therefore, if items such as congestion and pollution are important determinants of the level of satisfaction received by individuals consuming a certain good or service, a characteristic measure of this quality can be incorporated into the consumers' utility functions.

The computable general equilibrium model which was developed as part of this study will be demonstrated on a "real world" case which has been extensively studied utilizing a variety of disciplinary approaches in the past. The case selected by the researcher is the increasing congestion of pleasure boats and the resulting deterioration of water quality on the Great Salt Pond, Block Island, Rhode Island. This specific case was selected because it represents two of the major problems facing many tourism communities: increasing tourism-related demand for natural resources and the subsequent deterioration in that resource quality.

In addition, the Block Island case was selected because of the large quantity of data previously collected, analyzed, and made available to that community by various disciplinary approaches. Communities such as Block Island are well-aware of the specific impacts resulting from tourism development: increased revenues, job creation, decreased environmental quality, increased congestion, etc. In addition, these impacts have been well-documented by numerous studies over the years and the results of these studies are readily available to policy-makers within the community. Yet such communities seem unable to reconcile these contradictory impacts. Hence, the case of Block Island provides the researcher with an opportunity to show these communities how to sort out this windfall of information by incorporating it into the computable general equilibrium framework utilized in this study.

This study primarily utilizes secondary data obtained from two previous research projects conducted recently for the Town of New Shoreham (Block Island), located within Rhode Island. The first of these studies was a Ph.D dissertation (Wey 1990) which examined congestion and water quality problems for the Great Salt Pond on the Island and was based upon over 300 completed questionnaires of residents and tourists during 1989. The second study was conducted by students enrolled in the Advanced Planning Studio class within the Graduate Curriculum in Community Planning and Area Development at the University of Rhode Island (CPAD 1990). This study examined the impacts of increased development upon the Great Salt Pond as well as the need for economic development of the area. Other studies such as those generated by the Rhode Island Department of Environmental Management (1981) which addressed the preservation and management of open space on Block Island will also be utilized in this study.

1.3 Overview

Chapter Two of this study explores some of the commonly used definitions of tourism as well as the major considerations when attempting to define tourism. In addition, the chapter will discuss tourism volume and travel flows from an international, national, regional, and state perspective. Next, tourism development at the community level will be presented. Finally, this chapter will highlight many of the socio-cultural, environmental, and economic impacts often attributed to tourism development at the community level and discuss efforts undertaken to reconcile the often contradictory impacts of tourism.

Regardless of the alternative contemplated by a community, knowledge and application of economic welfare theory is essential to the formation of appropriate policy formulation. Chapter Three provides a review of applied economic welfare theory for both producers and consumers as well as illustrating how this theory can be used to obtain policy information in the area of community tourism development.

Chapter Four provides an overview of the economic theory underlying general equilibrium models, how such models are constructed, and the economic welfare measurement within the general equilibrium framework. In addition, this chapter focuses specifically upon applied general equilibrium analysis and how these applied models are implemented. The chapter then presents an overview of some of the traditional applications of general equilibrium models in the areas of taxation and international trade. Finally, a community-based tourism computable general equilibrium model is created.

Chapter Five presents an overview of the Great SAlt Pond tourism community on Block Island, Rhode Island and discusses why it was chosen as a specific application of the community-based tourism computable general equilibrium model. The method used for calibration of the model and the results which it yields under an alternative development strategy are then presented (i.e., the details of "who wins" and "who loses" from an increase in the number of boats utilizing Great Salt Pond within the tourism community as well as "by how much").

Chapter Six summarizes the major findings of the community-based tourism computable general equilibrium model of Block Island and draws some conclusions about policy. Limitations of the study and implications of the results are assessed.

CHAPTER TWO TOURISM AND THE COMMUNITY

2.1 Tourism

Even though mass tourism is a relatively recent phenomenon, having evolved primarily since World War II, it has become an industry of worldwide importance. There are, of course, numerous references to travel and tourism throughout history (McIntosh and Goeldner 1990). Regardless of how long tourism has been in existence or the number of references it has received throughout history, one central issue has continued to plague the industry: what is a "tourist?" and is there a common definition for "tourism?" From the literature, it appears that no single, mutually agreed upon definition exists.

This chapter will explore some of the commonly used definitions of tourism as well as the major considerations when defining tourism. In addition, the chapter will discuss tourism volume and travel flows from an international, national, regional, and state perspective. Next, tourism development at the community level will be presented. Finally, this chapter will highlight many of the socio-cultural, environmental, and economic impacts often attributed to tourism development at the community level and discuss efforts undertaken to reconcile the often contradictory impacts of tourism.

2.1.1 Definitions of Tourism

Tourism has been be defined in many different ways by many different authors and organizations. Colloquially, it is thought of as people who are visiting a particular place for sightseeing, visiting friends and relatives, taking a vacation, or just having a good time. If the subject is considered further, it may include people who are participating in a convention, a business conference, or some other kind of business or professional activity, as well as those who are taking a study tour under an expert guide or doing some kind of scientific research or study (McIntosh and Goeldner 1990). More formally, tourism is known as the temporary movement of people to destinations outside their normal places of work and residence, the activities undertaken during their stay in those destinations, and the facilities created to cater to their needs (Mathieson and Wall 1982). In its simplest sense, tourism has even been defined as encompassing all travel (including business) with the exception of commuting (Gunn 1988).

Because of the discrepancies surrounding the definition of tourism, many authors and researchers have turned to official government agencies or quasi-public organizations for assistance. The U.S. Department of Commerce defines a traveler or tourist as "any person traveling outside his/her community of residence, and its immediate surroundings to engage in activities for pleasure, business, educational, or personal reasons which are not part of that person's regular routine of activity, such as traveling to and from a regular place of work or school" (US Dept. of Commerce 1981:9). Authors such as Lundberg (1985:6) state the following: "...this book will use the definitions developed by the National Tourism Policy Study Final Report. Tourism is synonymous with travel. The overtones of the word tourist (often a deprecating term) are impossible to erase, but here the term is used to refer to an individual who travel outside his or her home community. All activity outside the home community (except daily commuting to and from work) regardless of distance traveled, destination, origin, or mode of transportation is considered under the broad term of travel. The purpose of the trip is unimportant; it can be pleasure, business, convention, personal, or any other reason. The traveler may use any mode of transport--auto, bus, train, or other."

Still others recommend an entirely different course. "Government agencies in search of a comprehensive definition of tourists, and one which will facilitate the measurement of this activity, have resorted to the more general term of 'visitor.' The definition most widely recognized and used is that produced by the 1963 United Nations Conference on Travel and Tourism in Rome, which was adopted by the

International Union of Official Travel Organizations (IUOTO) in 1968. It states that a visitor is: any person visiting a country other than that in which he has his usual place of residence, for any reason other than following an occupation remunerated from within the country visited" (Murphy 1985:5). And many researchers will avoid the whole issue and measure only the number of trips of those who have traveled a pre-specified distance and spent a pre-specified amount of time within a destination.

Recently, Hunt and Layne (1991) replicated a study conducted in 1977 by the U.S. Travel and Tourism Administration to determine the use and preference for travel and tourism definitions and terms. The 1977 study solicited comments from 56 state and territorial offices of tourism and 130 cities. The 1987 study conducted by Hunt and Layne (1991) used the same survey instrument and solicited comments from 56 state and territorial offices of tourism and 260 city organizations responsible for tourism activities at the local level. The 1977 study yielded little consensus on the definition of "tourism." By 1987, "states and city organizations appear not to have accepted a standard definition for travel and tourism. In fact, while a slightly larger percentage of the combined group of respondents did prefer a single definition in 1987, less consensus seems to exist within the groups, particularly among the states and territories" (Hunt and Layne 1991:10).

The most significant finding of their study appeared to be the acceptance of the term "tourism." In 1977, the preferred term was "travel." The authors conclude that "tourism" appears to be becoming an acceptable term to singularly describe the activity of people taking trips away from home and the industry which has developed in response to this activity.

The ambiguity surrounding the term "tourism" naturally spills over into forming a common definition of a "tourism industry." The idea of a tourism industry would give some unity to the idea of tourism, and from an image and a political viewpoint it sounds attractive. From an image viewpoint, tourism is thought of in ambiguous terms. From a political viewpoint, because tourism dollars are felt through[illegible]e community and by almost all its residents, it is difficult to appreciate and measure. There is no standard industrial classification number for the tourism industry (although Canada is now experimenting with a Tourism Satellite Account) so that political support matched with economic assistance has been hard to garner. But the central issue still remains: first, tourism must be commonly defined and then its components can be identified and categorized.

There are, as illustrated, many definitions of tourism (for a thorough discussion which traces the evolution of terminology and definitions used in travel and tourism see

Hunt and Layne 1991). Similarly, there is some divergence in the perceived need for a common definition. Different government, tourism industry associations, researchers, and other interested people use varying definitions depending on the data they require and the scope of their research. For example, when tourism research is being conducted, the criteria used to differentiate one type of tourist from another often depend on the interest or focus of the researcher or of the organization for whom the research is being carried out. Definitions, therefore, are somewhat arbitrary and must be interpreted in that context in analyzing tourism research information for marketing and other types of planning (Coltman 1989:3).

Much has been said recently about the need for tourism to have common definitions so that comparisons can be easily made. Common definitions which lead to comparable results can be informative in some situations. For example, if a state travel office is interested in how its current directed advertising compares to previous campaigns, common definitions are required. However, comparisons of advertising results between states, regardless of common definitions, may reflect only the drawing power of unique attractions and not the effectiveness of individual state campaigns. Common definitions do not guarantee comparability not is comparability required for results to provide valuable insights. Unfortunately, the controversy over definitions masks the contribution of many tourism studies (Tyrrell and Toepper 1991).

2.1.2 Considerations in Establishing Definitions

However tourism may be specifically defined, there does seem to be some general agreement as to some of the components and issues which should be considered when attempting to establish a definition. According to the U.S. Department of Commerce (1981), which houses the U.S. Travel and Tourism Administration, when defining tourism one should ensure that it excludes normal activities (i.e., forbids ordinary day-to-day activities such as commuting to and from work) and its practitioners (i.e., tourists) must consume tourism-rela[illegible]ds and services, provide a source of tourism demand, and travel a specific minimum distance (used to exclude day trips and the relationship upon economic impacts).

Additional considerations when attempting to establish a definition focus more specifically upon what will be included and/or excluded. According to some authors (Gee, Makens, and Choy 1989), the role of government must be explicitly recognized since they regulate, operate, develop, and in many cases own tourism-related attractions, services, etc. The authors continue to identify four basic dimensions of tourism which ought to be incorporated (somehow) into a definition of tourism: distance, length of stay, residence of the traveler, and purpose of travel. Sometimes mode of travel should also be included (Gee, Makens, and Choy 1989). Another researcher who has studied the definitional issue considerably is Cook (1975). Cook identified six categories or groups of definitions. These groups included definitions based on (1) geographical restrictions, (2) purpose of trip, (3) miles traveled, (4) time away from home, (5) mode of transportation, and (6) a combination of operational limitations.

2.2 Tourism Volume and Flow

Tourism is often thought of as the largest peacetime movement of people in the history of mankind. According to some estimates, tourism may well be the largest industry in the world by the year 2000. Presently, world annual travel spending of $2 trillion exceeds the Gross National Product of any country in the world with the exception of the United States and Japan. In addition, tourism has continued to grow faster than the growth rate of the world's GNP (Waters 1989).

The importance of tourism as an industry has been recognized in both developed and developing countries. Most countries have established government agencies or departments of tourism, encouraged and even directly sponsored tourist development, and witnessed the proliferation of small businesses and multinational corporations contributing to and deriving benefits from the tourism industry. There is a widespread optimism that tourism might be a powerful and beneficial agent that brings about both economical and social changes. Indeed, tourism has stimulated employment and investment, modified land use and economic structure, and made a positive contribution to the balance of payments in many countries throughout the world (Mathieson and Wall 1982).

2.2.1 International Tourism

International travel has become one of the healthiest growth industries in the U.S. For the first time, visitor spending within the U.S. in 1989 reached $43 billion and exceeded the spending of American travelers outside the U.S. borders ($42.6 billion). Sometime in the mid-1990's, the tally for foreign visitors to the U.S. should finally top the number of Americans traveling outside the United States (Zelinsky 1990).

Total foreign tourism to the U.S. increased 55 percent over the last five years and reached $39.8 million. The receipts from that foreign spending grew 2.4 times and reached $52.8 million. According to the recent research conducted by the U.S. Travel and Tourism Administration

(1991), international visitors came to the U.S. primarily for vacations (51%), business trips (29%), or to visit friends and relatives (20%). Eighty percent of these visitors came from six nations: Canada, Mexico, Japan, the United Kingdom, West Germany and France. Inbound travel for 1990 came in just shy of 40 million arrivals. The first three major sources of arrivals were Canada, Mexico, and Overseas. The greatest growth was from Canada with 17.2 million visits to the U.S. Travel from Mexico increased 7 percent to 7.7 million arrivals and travel from Overseas countries increased 6 percent- much slower than in the previous four years (Cook, 1990). The contribution of foreign visitors to America's economy goes far beyond the immediate cash left behind. In 1988, the travel-generated business that was attributed to foreign visitors in the U.S., was responsible for some 300,000 jobs, attributing an annual payroll of $3.8 billion, and for an estimated $2.1 billion in federal, state and local taxes (Zelinsky 1990).

There are several economic forces which have contributed to the creation of tourism-related revenues in the U.S. The first has been an increased amount of personal wealth and discretionary income in a number of European and East Asian countries, as well as the wealth from certain sectors of Latin America and Middle Eastern societies. The relatively sluggish growth in international travel by Americans reflects the fact that the United States resides in a rather stagnant economy. A second factor is the lower value of the U.S. dollar, which makes travel to and within the U.S. a bargain for many foreigners (Zelinsky 1990).

The U.S. outbound market has experienced changes in the past few years. The U.S. Travel and Tourism Administration estimates that in 1990 there were over 44 million U.S. travelers leaving for international destinations. This is about a six percent increase over 1989, which reverses the last two-year trend of very slow growth rate of about two percent. Mexico was number one in terms of U.S. outbound departures, with over 15.5 million travelers in 1990 (a nine percent increase over the previous year). Canada was the number two destination. For the second straight year, there was a decline in the number of travelers to Canada, with just over 12.5 million U.S. travelers taking trips to that country. In 1990, over $48.1 billion was spent by U.S. travelers going to all foreign destinations, up about 11 percent over 1989 (Cook 1991).

Americans seem to be traveling more than ever before. Over the last five years, outbound travel by Americans grew to over half the amount of inbound travelers (44.1 million). Many Americans have been to at least one foreign country and 99 percent of U.S. citizens have traveled outside their own state (Rounds 1988). In a study conducted by Rounds (1988) involving a sample of 3148 Americans, ages 18 and older, 71 percent of Americans have traveled outside the United

States. Two factors which seem to contribute to this statistic are the individuals' education and income levels. Eighty-six percent of all the college students have been to another country, while 75 percent of the individuals having some type of college education have been to another country, and 62% of those with a high school diploma or less have visited another country. Similarly, 84 percent of adults with household incomes of $50,000 or more have been to a foreign country, compared with 59 percent of those with annual incomes of under $10,000. The survey also stated that 78 percent of those individuals who are 60 and older are more likely to travel outside the U.S. compared with 57 percent of those individuals between the ages of 18 and 24.

The most popular foreign countries for U.S. travelers are those that border the U.S. Nearly half of the Americans have been to Canada, and over 1/3 have been to Mexico. Twenty-six percent have been to Europe, and 19 percent have visited the Caribbean. Only one American in 12 has been to the Orient or Central America, and just seven percent have been to South America. Even fewer have been to the Middle East (5%) or Africa (4%) (Rounds 1988). After Canada and Mexico, the individual countries that Americans are most likely to have lived in or visited are Germany (17%), Great Britain (15%), France (15%), and Italy (12%). Only seven percent of Americans have been to Japan, three percent to Australia, and one percent to both India and the Soviet

Union (Rounds 1988).

Although these fairly current figures depict an increase in the number of Americans traveling abroad, there have been numerous elements which have recently contributed to a slowdown in that growth. Some of the major elements affecting international tourism have been the Middle East Crisis, bankruptcy filings of many major airlines, both increased fuel prices and air fares, and the recession of the U.S. economy.

2.2.2 Tourism within the U.S.

As the awareness of tourism as an economic development agent has increased, interest has also increased in understanding the relationship of foreign visitor spending within individual states. Most international visitors favor certain states which have attractions such as Disneyworld or Disneyland, the Grand Canyon, the Great Lakes, and the Statue of Liberty. States located on either the west coast or the east coast, as well as those possessing large international airports (e.g., Illinois) tend to receive high international visitation. Nearly half (48%) of the overseas visitors arriving by air in 1988 confined themselves to visiting a single state. Just 28 percent were able to sample three or more states, and the average number of states visited by foreign tourists was only two (Zelinsky

1990).

The top states visited by overseas travelers in 1990 were California (4.8 million); New York (4.5 million); Florida (3.5 million); Hawaii (2.3 million); Nevada (1.2 million); Washington, D.C. (1.2 million) and Illinois (1.1 million). Some of the states had very few overseas travelers, such as Mississippi, Rhode Island, Arkansas, Delaware, Nebraska and Kansas. Both social and cultural considerations, as well as time and cost constraints, produced a striking differences in the ethnic composition of tourists in different places. For example, Japanese visitors basically prefer Hawaii, while the Canadians concentrate on certain northern states along the Canadian-U.S. boarder, and Latin Americans seem to be drawn to Florida, Texas, Arizona and California (Zelinsky 1990).

Despite concerns that total travel in 1990 might be down because of the economy and the Middle East crisis, overall travel in the U.S. did show an increase of two percent for 1990, according to the U.S. Travel Data Center's National Travel Survey. After a sharp increase in 1989, business travel, however, posted a decline in 1990. This represents the first decline in business travel since 1983. The overall growth in travel in 1990 came from the pleasure market. Person-trips (a trip here is defined as someone who travels more than 100 miles and spends at least one night away from home) taken for pleasure-- that is visiting friends and relatives, outdoor recreation, sightseeing and entertainment-- totaled 984 million in 1990, four percent more than in 1989. Vacation person-trips increased two percent in 1990 (Cook 1991)

The slowdown in travel's growth combined with rising prices resulted in only a 1.1 percent increase in real travel industry sales, after adjusting for inflation, in 1990. Travel industry employment grew faster than overall U.S. employment in 1990, at about 3.2 percent for the year. However, when comparing 1990 to 1989, as well as to the 1984-89 period, much slower rates of growth can be seen for 1990.

By industry sector, the U.S. airline industry had an estimated loss of $2 billion in 1990 while automobile travel had a 4 percent increase. Amtrak had a reasonably good year with a 3.6 percent increase over 1989. Occupancy rates, which reflect both demand as well as increases in accommodation room supply, increased by only about 0.5 percent. One sector of the industry which seems to have done very well in 1990 was the cruise line industry. According to the Cruise Lines International Association (CLIA), the number of North American passengers rose to 3.7 million last year, 12 percent more than the previous year.

Travel agency performance was also good in 1990. According to the Airlines Reporting Corporation (ARC), the number of agencies rose to over 37,000, an 8 percent increase over 1989. Most of this growth, however, is due to the very rapid increase in satellite ticket printers. According to the National Park Service, visits fell slightly in 1990, about 1 percent. Certain parks experienced good growth in visitation- like Bryce Canyon and Yellowstone, while others suffered declines- such as the Grand Canyon and Yosemite (Cook 1991).

2.2.3 Regional Tourism

As in other years, the Southeast was the most popular destination region in 1990 within the U.S., followed by the West, Midwest, Great Lakes and Northeast. The South and West tend to draw a larger percentage of travelers than the percentage of the population they have, while New England draws a significantly smaller percentage. The National Travel Survey suggests that in 1990, travel was up the most to destinations in the Great Lakes region, followed by those in the Midwest. The West also experienced a small increase in visitors, while New England and the Southeast suffered small declines (Cook 1991)

In 1989 3.2 million international visitors came to the New England area. The largest share was from Canada with 2.1 million followed by the overseas market at 1.1 million. In 1986-87 Massachusetts received the largest share of foreign visitor spending with 56 percent of the total $865.3

million. Following in order were Maine (16%), Connecticut (12%), Vermont (7%), Rhode Island (5%), and New Hampshire (5%) (USTTA 1990).

2.2.4 Rhode Island Tourism

One way to estimate the success or failure of tourism within individual state is to examine their respective tourism budgets. The average state travel office budget reached $7.1 million and 35 states reported increases over last year. Nevertheless, a number of others have felt the pinch of budget cuts, due in part to a softening economy. A large component of each state's budget is allocated for advertising. The average advertising budget remained stable at $2.4 million in 1990-1 (Cook 1991).

Tourism is the largest industry in Hawaii, generating $4.8 billion annually. By 1968, over a million tourists were visiting Hawaii. The Hawaiian islands drew nearly 7 million visitors from around the world in 1988, and projections suggest that by the year 2000, Hawaii can expect 8 million visitors (Liu, et al, 1987). Yet, even smaller and less well known states, such as Rhode Island, have done well in tourism growth during the 1970s and 1980s. Rhode Island has experienced more rapid growth than most states-averaging 14 percent per year over the past three years (1985-88) (Tyrrell 1989).

Recent tourism growth in Rhode Island has slowed, however--largely due to the economic recession which New England is experiencing. Growth rates of sales, wages, and jobs in all sectors of the tourism industry are generally less than those of previous years. Sales figures within the industry have leveled off and airport passenger traffic rose by a scant one percent in 1989 (compared to the previous year's dramatic growth of nearly 11%). Visitation to the properties of the Newport Historic Preservation Society (e.g., the Breakers, etc.) fell by five percent in 1989 and even the sale of gasoline for highway use declined four percent during that period (Tyrrell and Toepper 1990).

In 1989, an estimated 28.5 million travelers visited Rhode Island, an increase of 2.4 percent over 1988 figures. These visitors stayed an average of 1.4 days each for a total of 40.1 million visitor days. The largest group of visitors included in this statistic was travelers passing through the state, accounting for 57 percent of all visitors. The second largest group of visitors to Rhode Island is the day-trippers (20%), followed by business travelers (7%) and leisure travelers (7%) staying at hotels and motels. The relative economic importance of the visitor groups, however, is considerably different from their relative numbers given above. In terms of dollars spent, leisure travelers staying at hotels and motels account for 31 percent of the total. Day-trippers account for 18 percent and business travelers account for an additional 17 percent of the total dollars spent by visitors in Rhode Island (Tyrrell and Toepper 1991).

The State of Rhode Island has, for analytical purposes, been broken into six tourism regions: Providence, Aquidneck Island, Northern Rhode Island, Warwick, South County, and "Statewide" (which encompasses the area excluded by the five regions specifically identified above). Of these six regions, South County ($283 million) receives the greatest share of estimated travel and tourism sales, followed by Aquidneck Island ($240 million), Providence ($232 million), Statewide ($194 million), Warwick ($186 million), and Northern Rhode Island ($159 million) receives the smallest share of estimated travel and tourism sales (Tyrrell and Toepper 1991).

2.3 Tourism and the Community

Related to the problem of definition is that of setting the appropriate scope for any tourism analysis. This implies determining regional boundaries as well as identifying major components. As in the case of definitions, scopes vary. However, unlike definitions which may not restrict the value of a study, an incorrectly chosen scope will lead to an incomplete result. If a scope is too narrow, important linkages and feedback will be overlooked.

On the other hand, if a scope is too broad, practicality dictates that critical impacts will be obscured. In general, the scope of the study should reflect the magnitude of the problem. There is increasing evidence that the appropriate level for analyzing tourism impacts is the community (Tyrrell and Toepper 1991).

For example, the greatest impacts of the industry are felt within the community. The product and image that intermediaries package and sell is a destination experience, and as such creates an industry that is highly dependent on the goodwill and cooperation of host communities. Many destination area attractions are public property or public goods, and the hospitality needed for a memorable visit must come from members of the public as well as employees of the industry. Increasingly, development of new facilities requires public investment in infrastructure and shared facilities; and many festivals or events that evolved to fill local needs are being commercialized and promoted as tourist events. It is the citizen who must live with the cumulative outcome of such developments and needs to have greater input into how his community is packaged and sold as a tourist product on the world market (Murphy 1985)

Plog (1991:213) highlights that the "battles that go on between developers and community groups have become more strident each year. They will become even more heated in the years to come, unless steps are taken toward cooperation with people affected by the new projects." Murphy (1985) stresses that those people living and working in the center of tourist destination communities are the most negatively affected in their everyday life from tourism development.

Businesses serving tourists tend to be clustered within communities which possess tourism attractions (Gunn 1988). Residents, who feel the impacts, live and work in the community as well. One of many studies which illustrate the importance of monitoring community resident viewpoints with respect to tourism development was conducted by Tyrrell and Spaulding (1984), among others. In terms of community attitudes towards tourism, Murphy (1985) identifies three determinants: 1) the type of contact which exists between resident and visitor can have a bearing on a resident's reaction to, and support of, the industry; 2) the relative importance of the industry to individual and community prosperity will be a factor; and 3) a tolerance threshold in resident receptiveness can be expected in terms of the volume of business a destination can handle.

While research appears to be fairly well-developed into community attitudes towards tourism development and the factors which may influence them, incorporation of such resident views finds its way into the actual planning process much less often (Pearce 1991). The industry possesses great potential for social and economic benefits if planning can be redirected from a pure business and development approach to a more open and community-oriented approach which views tourism as a local resource. The management of this resource for the common good and future generations should become the goal and criterion by which the industry is judged. This will involve focusing on the ecological and human qualities of a destination area in addition to business considerations.

Lastly, many tourist attractions and services are owned and managed by the community's government. Indeed, many times land in public domain is often the responsibility of the lower levels of government: regions, counties, and municipalities. These governmental bodies may also have the power to introduce building codes and zoning codes. In terms of physical development, the community government's most important function may well be the issuance or denial or building permits. Provision of the infrastructure, the presence or absence of which may influence tourism development, also tends to be the responsibility of community-level government (Pearce 1991). Finally, promotion of the community as an attractive tourism destination is usually funded and implemented at the community level.

This section has presented the community concept in its ecological and systems forms as a means by which to develop and assess the tourism industry. The industry's attitude toward the environmental needs to progress from economic exploitation to one of stewardship if attractive landscapes and amenities are to be preserved or developed. Public opinion and political power must be courted and won if the industry is to continue to rely on government support and community assets for its survival and success. By stressing the community and systems aspects of tourism it now becomes apparent that this activity is now interwoven into the social, economic, and environmental aspects of all communities, whether or not they are major destinations. Under these circumstances, tourism can be integrated into the general planning procedures of all communities and can become coordinated with facility developments in the physical and social fabric of destination areas.

2.4 Tourism-Related Impacts

It should be fairly obvious after the foregoing discussion that tourism contributes to international trade and is instrumental to the economic welfare of many nations, including the United States. Much the same thing can be said about tourism at the local community level: it brings in a wealth of financial benefits. In the future, with the average hours per week worked predicted to grow shorter and leisure time to become more abundant, the effects of tourism on any community's economy and the lives of its residents will surely become more pronounced. Some even speculate that tourism may evolve into the world's largest service industry (Honomichl 1984).

Tourism, however, has been found to have both positive and negative impacts upon communities of all sizes. While the industry has frequently been promoted as a force for the positive social, environmental, and economic impacts, destination communities striving for such benefits have often learned that tourism as an agent for change is not costless. Unfortunately, some communities have been unaware of the costs and difficulties associated with the benefits of tourism prior to pursuing it as an development strategy (Murphy 1985).

A great deal has been documented with respect to the various positive and negative impacts that tourism can have on destinations. These tourism-related impacts usually are the result of interactions between tourists and the destination area and its population. Positive impacts tend to be present until limits are exceeded (e.g., carrying capacity, etc.) when impacts turn from positive to negative. Tourism impacts are dynamic, changing with corresponding changes in destination features, trip characteristics, and the personal and behavioral attributes of tourists (Mathieson and Wall 1982).

For many years, the positive impacts of tourism have been well-promoted. Until recently, communities considered tourism-related impacts such as jobs, wages, and taxes the financial rewards that could easily to any area with only a little development and promotion. Any social, economic, or environmental costs were of no concern. However in recent years, thoughtful observers, environmentalists, social scientists, and even developers and managers of tourism have begun to raise questions about the degradation of environmental resources, congestion along community streets, social conflict between hosts and guests, and opportunities foregone because of inappropriate zoning laws (Gunn 1988).

There are basically three distinct types of impacts: economic, socio-cultural, and environmental. The purpose of the following three sub-sections of this chapter is to present an overview of these tourism-related impacts--especially those occurring at the community level.

2.3.1 Socio-Cultural Impacts

There are many items which have been incorporated into the socio-cultural category of impacts of tourism, including the preservation of ethnic food and culture, the growth of prostitution, the breaking down of prejudices, etc.. These items have been well-examined by anthropologists and sociologists in their investigation into the effects of tourism on the social relations between hosts and guests (tourists) and on the cultural integrity of destination communities. Socio-cultural impacts tend to induce immediate changes in quality of life in destination communities, as well as directly or indirectly causing longer-term changes in a society's norms and standards. The latter changes may gradually change a community's existing social relationships and even its artifacts (Murphy 1985).

Specific tourism impacts which are often felt at the community level and will be addressed in this brief review of literature include Xenophobia, the Demonstration Effect, Neo-Colonialism, Prostitution, Visibility/Recognition, Breakdown and Reinforce Barriers, Food, Religion, Crime, Secondary Home, Peace, and the Commoditization of Culture.

<u>Xenophobia</u>

In the initial stages of tourist development, many individuals in the host population of a destination community have an overwhelming feeling of enthusiasm. These feelings are attributed to the fact that the potential investment and benefits of tourism will bring in an over abundant amount of revenues and jobs. For this reason, tourism development has often received support from governments and local. The initial euphoria and enthusiasm which are associated with the preliminary phases of tourism begins to dissipate as the industry expands and tourist numbers increase (Mathieson and Wall 1982).

In the socio-cultural impacts of the guest/host relationship, there needs to be a mutual understanding of both a spatial and temporal guideline as the number of tourists increase. As this happens and the understanding is constantly being violated by the exceeding number of tourists, the attitudes of euphoria will quickly change to that of xenophobia, the fear or hatred of outsiders/foreigners. These negative attitudes of the host population can be detrimental to the tourism industry in their area. Resentment tends to be the highest in what Jafari (1974) termed "tourist magnetic" areas, where tourism is the principal source of income to the community, and all activities become oriented to accommodating tourist demand, which may be limited to a short season. Although the livelihood of residents may be derived from the presence of tourists, they view the approaching season with mixed feelings, and value the off season when only permanent residents are present (Jordan 1980).

As Fox (1977) noted in his review of social impacts in the Pacific Islands, the political leaders of newly developed destinations such as Tonga, the Cook Islands, Samoa and Fiji, at one time professed that: "tourism will improve our country's economy and will benefit our island's people... We are proud to have tourists see our culture and beautiful island." They now express fearful concern for the increased strains imposed on traditional customs and lifestyles.

In comparison to Fox, Rivers (1973:52) expressed the increasing hostilities by the host communities towards the foreign tourists when he stated: "Among black Jamaicans there is a growing consciousness that the kind of tourist industry which has sprung up around them is both demeaning and exploitative, and resentment to white visitors is widespread. Trinidad has only just lifted its state of emergency; Antigua is playing down recent bomb outrages; the Bahamas still experience bouts of black militancy; and the United States Virgin Islands and Puerto Rico have rushed through costly courtesy campaigns to persuade the natives that tourists are good for them."

Demonstration Effect

The introduction of foreign ideologies and ways of life into societies which have not been exposed to tourist lifestyles previously may cause many problems. For example, it may generate a longing on the part of the residents to behave in a similar manner as the tourists. This tendency has been termed the "demonstration effect" (Bryden 1973). According to Mathieson and Wall (1982), the demonstration effect can be beneficial if it encourages individuals to learn new aspects in order to improve their society. More often than not, however, the demonstration effect usually leads to resentment of the tourists by the residents. The host community's feeling of resentment is derived from the development of luxury hotels and other types of foreign tourist facilities and also by the tourists' behavior. Tourists on vacation have fewer constraints than they do at home and they tend to behave and spend in a less-inhibited fashion. As a consequence of witnessing such behavior, hosts often develop misconceptions about the potential they have for living in such a manner.

Along these lines, in Smith's analysis (1977) of the Eskimo communities of Kotzebue and Nome, she noted the development of a specialist minority population in the community. This group included those individuals who danced and demonstrated crafts to visiting tourists. They were mainly older members of the community who had retained, overtly, their traditional costumes and crafts and were, thus in a position to capitalize on them. The younger and better educated Eskimos acquired jobs in government and business in an attempt to achieve their western aspirations. Smith also described the older members of the community as "marginal men" who have adopted some foreign ways of life, including new products, but at the same time, live the culture of their ancestors.

In contrast to these statements, Boissevain (1979) reported how the young people of Gozo, a small island close to Malta, have welcomed the opportunity to view the outside world through their tourist contacts. One result of this exposure has been a change in the traditional local gatherings at Sunday morning markets. A few years ago both the young and the elderly would meet at the markets to shop and socialize together. Recently, however, the younger crowd has stopped going to the markets to socialize with the older crowd and have begun meeting in the pubs on Sunday evenings to socialize among themselves.

Neo-Colonialism

The movement of metropolitan citizens from the developed economies of Europe and North America to societies of the less developed world has a long history. According to some authors, the growth of tourism in these destinations has been only a change in the form and magnitude of travel without a major alteration in its colonial quality. Although the legal ties between metropolitan powers and tourist destinations has changed, and many developing countries have received independence, the economic relationship between the two have essentially remained the same. This condition has prompted the charge that tourism is a "neo-colonial" activity (Mathieson and Wall 1982).

There are three economical conditions that support this claim according to Mathieson and Wall (1982). To begin with, many developing countries rely on the incorporation of travelers to their country as a means of revenue. They attempt to fully accommodate the needs of the tourists in order to bring about increasing profits and return of business. The success of these strategies depends largely on the attitudes and relationships of the host. The second condition is related to the aspect of transferability of wealth. The revenues that are acquired from tourism are generally divided up into two distinct areas: the place of origin where most goods and services being consumed were produced or they are redirected back to the foreign investors. The third condition deals with employment of non-locals in both professional and managerial positions. Although tourism does provide many new career opportunities, a vast majority of these are being occupied by individuals other than the resident/host themselves.

Similarly, according to Bryden (1973) and Hills and Lundgren (1977), national economies in less developed countries have shown a considerable amount of generated tourism revenues being returned directly to the tourist-generating countries. In one study, it has been estimated as much as 77 percent of the tourism money was returned to these urban-industrial economies (Perez 1974). This return flow was created by payment of loans and dividends on foreign investments, as well as the importation of goods and services to supply the tourists, and the salaries of senior personnel who are temporary residents. Due to the amount of return, a community may feel it is building a prosperous industry but when the final bills come in and bank charges have been paid, there is often little left in the community.

<u>Prostitution</u>

Another socio-cultural impact often claimed to result from tourism development is prostitution. There are many hypotheses as to why there is an increase in prostitution in many tourist resorts but none appear to have been readily proven. It is stated that tourism, in and of itself, has contributed to the break away from puritanical bonds. To those who truly believe this, tourism allows an individual to feel a sense of freedom to explore his inner-self and conduct himself in a manner other than he otherwise might (i.e., this newly found freedom translates directly into the desire for sex!). Another theory is that many tourist destinations attract prostitutes first, and then their clients (tourists), by creating an environment which contributes to this type of behavior.

Advertising which exploits the "four S's" of tourism - sea, sun, sand, and sex - through the use of exotic pictures and saucy slogans (e.g., "It's better in the Bahamas!"), has created images for such places as the Caribbean and Pacific Islands as havens for sexual enjoyment. The alleged permissiveness and promiscuity of the inhabitants of these islands have become somewhat of a selling point for these destinations (Turner and Ash 1975). Anthony (1988) addresses the issue of prostitution in the U.S.S.R. and states that prostitutes worked quite openly and aggressively in the major hotels catering to foreigners: male tourists are frequently subjected to persistent pestering by "painted" girls, who "swarm" around hotel lobbies, restaurants and bars. According to Anthony, the prostitutes in the Soviet Union are not living what might be considered a glamorous life, however. They sell their favors for as little as a stick of Western deodorant or even a cheap bottle of wine.

Recognition/Visibility of Culture

Another socio-cultural impact area is that of tourism's bringing increased recognition or visibility to a community. Many residents are proud of the fact that their community is recognized throughout the world as an attractive place in which to live and visit. Others, however, do not share that same viewpoint. Tyrrell and Spaulding (1984) studied the benefits and problems associated with tourism growth among the community groups within Rhode Island. They found that households were favorable towards tourism growth as a whole, but less favorable towards the location of specific tourism facilities close to their home (i.e., "not in my backyard"). This was primarily due to the problems of traffic congestion and litter. The metropolitan regions, however, were consistently favorable towards growth, while in the South Shore region, a noticeable disagreement between groups occurred. A majority of the households in this region did not favor tourism growth, while businesses and government officials were highly in favor of it.

Similarly, Long, Perdue, and Allen (1990) concluded that the perception of tourism impacts among residents tends to increase with increasing levels of tourism development. They also concluded that the favorability of resident attitudes towards additional tourism development initially increases with tourism development and eventually declines over time. Lastly, the authors concluded that residential attitudes concerning the appropriateness of special user fees and taxes becomes more favorable with increasing levels of tourism within the community.

Another socio-cultural impact associated with tourism and residential attitudes concerns noise pollution. In this case, tourism is considered a little too visible within a community. Off-road vehicles and motorcross bikes cause considerable noise on Queen's Beach, Hawaii. The noise is particularly evident in an otherwise unpopulated, semi-pristine area (Manheim 1990). Also in Hawaii, where some of the most spectacular scenery is remote or entirely inaccessible by automobile, helicopter operators have carved themselves a lucrative niche in the state's tourist-based economy. As helicopter pilots and their passengers happily hover over puffy clouds tinted pink by the setting sun, those who have to put up with the deafening noise- residents, hikers, boaters, hunters, and park rangers- and airport officials responsible for safety see a picture that's not quite so rosy (Conrow 1989).

Like many of the state's visitor-related businesses, the helicopter industry has proliferated with few controls. As a result, complaints about helicopter flight paths and altitudes and about the frequency of flights have taken off in the last two years. This has been particularly true on the island of Kauai, which probably has the worst situation in the state. Last year, Kauai registered about 85,000 helicopter flights- one flight every three minutes during daylight hours. Angry residents say they object to choppers buzzing their, destroying the solitude of wilderness area, frightening game animals, and generally disrupting the peacefulness of their rural lives (Conrow 1989).

Breakdown of Cultural Barriers

Another socio-cultural impact of tourism involves the breaking down of cultural barriers such as stereotypes and other cultural misperceptions. Still other times, tourism only serves to reinforce such stereotypes. Ambroise-Rendu (1989) describes how inhospitable and difficult the Cuban people are towards tourists, in his article, "Cuba Says 'Come On Down'." In Rendu's article, he sites some very disturbing and disrespectful situations that have occurred while tourists were traveling throughout Cuba. He discusses how foreigners are treated with extreme suspicion by restaurant staff and made to wait for inadequate and poor food service. While in some hotels in Cuba, the service of the staff is somewhat similar to that of their facilities, elevators are constantly broke-down, air conditioning throughout the hotel is minimal and the room service is close to non-existent. All of these unsatisfactory characteristics seem to portray a society that refuses to adapt itself to a country that is genuinely managed and maintained by the level of revenues generated by incoming tourists. Although the Cuban government has devised a tourism-development plan to refurnish its existing hotel facilities and increase the amount of tourists arriving in the country, there are many shortcomings that need to be addressed and recognized by tourist officials before Cuba becomes a major tourist attraction.

Food

According to the U.S. Travel Data Center model developed to estimate the economic effect of tourism at the various levels, approximately 30 percent of the U.S. residents and foreign visitors money is spent initially for food and about 20 percent is spent on private and public transportation (Mill and Morrison 1985). Due to the fact that more tourist dollars are spent on food and beverages than any other service, those states highest in food service sales are also top tourist states. Because the type of food service provided is related to tourist needs, many areas have successfully developed menus indigenous to that area in order to increase the opportunity for outsiders to experience their culture as well as increase the economic benefits to the community (i.e., restaurants will purchase locally grown produce, etc.).

Sheldon and Fox (1988) discuss a survey that was conducted in order to investigate the relationship between food service and tourism both in destination choices and in the vacation experience for three different nationalities of tourists, Japanese, Canadians and Americans. Cultural differences were found in the three nationalities studied. The Japanese were found to differ considerably from the Americans and Canadians in their behavior and preference with regard to food service when on vacation. For example, food service has a stronger influence on the Japanese's choice of destination. Additionally, the Japanese self-prepare fewer meals and are more likely to skip breakfast than lunch. However they are less willing to try new cuisines than Americans and Canadians and they also have a stronger preference for fine dining restaurants.

It was determined that when choosing a restaurant for lunch or breakfast, tourists are more concerned with finding the best value for their dollar than any other feature, whereas at dinner the "quality" of the cuisine is most important. It was also discovered that quick service and experiencing new types of cuisines are less important for tourist when choosing restaurants. Overall, hotel coffee shops and fine dining restaurants were found to be most popular at breakfast, fast food outlets at lunch, and restaurants that serve local trade at dinner.

As a direct result of tourism, many communities have a wide variety of restaurants available to both tourists and residents. Many seasonal communities simply lack the number of year-round residents necessary to support a fast food restaurant such as McDonalds. Yet because of the tremendous volume of tourists, destination communities often find themselves facing an array of fast food restaurants from which to choose as well as the problems commonly associated with such places: pollution and congestion.

Religion

Another socio-cultural tourism impact category is religion. Religion has been a powerful force which has long caused people to travel to spiritual centers in many parts of the world. Relationships between tourism and religion have changed from their traditional form. Holy places such as Jerusalem, Mecca, and Median, have become tourist destinations for visitors lacking a strong spiritual relationship (Mathieson and Wall 1982). Many conflicts have risen between the locals and the tourists that are both curious and religiously devoted. The reason for these conflicts is the significance of these holy places. As the tourists increase, these holy places seem to be detracting from their religious importance to that of monetary importance. Many churches have collection boxes, souvenir booklets and post cards that are on display for sale. Some churches also conduct guided tours for a price, or at least a donation is emphasized.

Hunt (1987) discusses how the Himalayan Kingdom of Bhutan have barred tourists from visiting its sacred sites, due to the "defiling" of the sites and the "moral corruption" which were believed to have been largely caused by foreign visitors. Tourists were not allowed to visit temples, monasteries, or sacred mountainous states that were located between Tibet and India. The ban on tourists visiting religious sites was imposed because tourism was seen as undermining the buddhist faith. A special commission appointed to study the impact of tourism on Bhutanese society, found that visitors were going to the sacred places out of curiosity, not faith, and were indiscrimately photographing sacred images and in some cases defiling them. Additionally, tourism was found to be responsible for the moral corruption of some Bhutanese, who had been driven by "greed" to desecrate Buddhist shrines and the sacred images from temples and monasteries.

Crime

An impact of great concern to residents and tourists alike is crime. Where wide economic disparities exist between host and guests, or where narcotics usage is widespread, tourists may be singled out for robbery or terrorism - not because they are tourists, but because they are easy targets. Travelers are unaware of cultural differences in body language; their attention may be distracted by the novelty of a strange environment; or they may be intent on a personal interest. For the criminal, it is safer to prey upon the tourist because once that individual's vacation ends, they seldomly return to prosecute the perpetrator, even if they are apprehended.

There has been substantial amounts of research conducted which seem to point to a positive relationship between the steadily increasing rates of crime and tourism development within destination communities. Lin and Loeb (1977) indicated three factors that they felt contributed to the influencing relationship between tourism and crime: (1) the population density during the tourist season, (2) the location of the resort in relation to an international border, (3) the per capita incomes of hosts and tourists. In a study undertaken in Miami, Florida, McPheters and Stronge (1974) noted a close similarity between the tourist season and crime season. It was suggested that this similarity reflected the response of criminals to the increased availability of targets and congestion during the tourist season. Since these factors increased the potential gains and reduced the probability of detection from the point of view of the criminal, more illegal activities were performed. Economic crimes (robbery, larceny and burglary) had a similar season to tourism, while auto theft and crimes of passion (murder, rape and assault) did not (Mathieson and Wall 1982).

Reeds (1989) discusses how Europe's thieves are "hunting down" American tourists. He states that purse snatching, currency rip-offs and sophisticated new scams in some cities are growing as fast as the influx of visitors. According to the article, reports of stolen American passports in Paris are up as much as 20 percent compared to the previous year. The previous year's record for pick pocketing in Paris totalled 44,725 and was expected to be surpassed the following year. Additionally, most officials agree that street crime is induced by the increasing amount of drug dealers in some locations, as well as the increasing number of unemployed individuals. A few examples of illegal acts in Europe include: the gangs of Gypsy youngsters that menace Paris metro riders by pick-pocketing them clean; purse snatchers on mopeds; and Italian motor scooter bandits that lift bags from foreigner's shoulders. Bolder thieves on the outskirts of Seville, Spain, smash car windows as cathedral bound sightseers stopped at traffic lights and snatch purses. In London, pick-pockets are most prevalent on Oxford Street, where a majority of department stores are located.

Second Homes

Certain economic characteristics of the second home market can make it an attractive proposition for peripheral regions. To begin with, second homes represents a direct flow of revenue from the industrial-urban centers, providing important basic revenue for those selected regions. The revenues from these second homes is widely dispersed throughout the destination communities due to the numerous individual purchases of goods and services made by the second home owners. The expenditures are more dependable than many other forms of tourism revenue because of the second-home owner's commitment to the area and willingness to return year after year. This in return seems to make second-home revenues "less fickle than other types of tourism" (Hendell 1977:76) and does not require heavy expenditures on promotion and marketing.

Along the lines of socio-cultural impacts, Shurma-Smith (1990) reveals how second home resort properties are passed down to their present descendants, thus conserving the elite identity based on kinship connections with pioneer settlers. The business generated by entrepreneurs who made their wealth through servicing the resort brought constant friction between the elite homeowners and the servicing group. Similarly, Gilligan (1986) examines the manner in which locals regard tourists. He suggests that there was a clear indigenous conceptualization of visitors in Cornwall, which arose from local sentiment favoring local community identity. Such sentiment provided an effective mechanism which excluded visitors from the definitive locals. This mechanism for exclusion ensured that tourism had little impact on the local population whose identity was preserved intact.

In contrast, Kohn (1986) depicted an opposite situation in the Scottish Inner Hebrides. Through the acquisition of second home sites and the emergence of a new group of settlers who first came as tourists, the boundary between the hosts and the guests gradually broke down. Given the absence of strong segregation makers, such as Cornwall, Kohn stresses that in certain situations the category of guest is more differentiated than is commonly described in the literature.

Peace

Many researchers believe that tourism can play a vital role in helping the world to achieve peace through the promotion of goodwill and increased understanding among people. Travel and tourism, according to some (D'Amore 1988), provides the opportunity for individuals to gain first-hand knowledge of the larger world. Properly designed and developed, tourism has the potential to help bridge the psychological and cultural distances that separate people of diverse races, colors, religions, and stages of social and economic development. Not all researchers would agree, however. Ap and Var (1988) showed that while tourism professionals view tourism as an economic activity that has positive impacts, the belief that tourism promotes and contributes towards world peace was not sustained.

Commoditization of Cultures

The commoditization of a community's culture is another socio-cultural impact resulting from tourism development. "When tourist purchase a vacation as a package they also buy culture as a package. Regardless of how ancient or complex the destination culture, it is reduced to a few recognizable characteristics, such as arts and crafts, dance, music, buildings and special functions or ceremonies, and is promoted as a commodity" (Turner and Ash 1975: 140). In spite of the success of this strategy it has often conjured up inaccurate and romanticized images of destination areas and their populations. As Lenguel (1975) learned, the tourist sees the country or destination visited in terms of its superficially picturesque, predictably "exotic," or "typical" aspects, and experiences local life highly selectivity and episodically. The shorter the stay, the greater the distortions of reality.

Along with these problems of people obtaining the wrong impression, is the problem of culture being destroyed or changed by the increase in tourism. Greenwood's (1977) analysis of the effects of tourism on the "Alarde," the major public ritual of Fuenterrabia, Spain is a prime example. The Alarde signifies the solidarity and unity of the village, and expresses the ideas of equality, and common destiny openly. The Alarde, traditionally a private ceremony, has become a public attraction through government and commercial promotions. To the town performers, the ceremony has now lost it's meaning, and they are unwilling to perform.

In contrast to Greenwood's analysis of the breakdown of culture through tourism, Urbanowicz (1984) concludes that tourism literature brought most visitors to Tonga to observe the traditional Tongan life, in it's native habitat--not a fabricated representation of it. Forster (1964) pointed out that one of the fascinating aspects of the tourism process in the Pacific, is the deliberate creations of a, "phony-folk-culture." The inhabitants developed this to provide the tourists an, "authentic native culture." The Tongans seek to insure the active preservation of the traditional Tongan way of life and culture by integrating traditional patterns into mass tourism and not making traditional culture, a contemporary, "phony-folk-culture."

2.3.2 Environmental Impacts

While the term environment has, as of late, become rather broadly defined, this section of the chapter will focus predominantly upon the examination of the effects of tourism on elements of the natural environment. Hence, the creation of man-made environments and so on is of less concern. The environmental impacts associated with tourism have also been well-studied, although the researchers have been somewhat less prolific. Within the past five years, however, the U.S. society has experienced what is being called a "green" revolution and attention is once again being focused upon the relationship between man and his natural environment.

Investigators of the environmental impacts associated with tourism development have identified the following major categories: 1) carrying capacity concerns; 2) damage to vegetation; 3) decreased water quality; 4) decreased air quality; 5) damage to wildlife and sealife; and 6) changes in geology (e.g., erosion). They have, however, also identified some positive environmental impacts as well, including the preservation of open space and access to coastlines and the establishment of parks, forests, and preserves (Mathieson and Wall 1982).

Although environmental impacts can be found anywhere and in any setting, they are frequently found in coastal areas where tourist development has taken hold. Coastal zones contain a variety of fragile ecosystems that are susceptible and vulnerable to the onslaught of tourism, and in places sand dune areas and coral reefs are being destroyed. Even the hardier coasts are threatened by haphazard and unsightly tourist accommodation development, by litter and the effluent of tourism. Some parts of the Mediterranean shore are said to be close to death from the effects of tourist pollution (Barlow 1988).

Due to the alien and hidden nature of marine resources, their protection is often overlooked by resource administrators and the public alike. The vastness of the sea implies an unlimited capacity to absorb mankind's pollution and the side-effects of our commercial and recreational uses. However, sustainable development of these coastal and marine resources will become increasingly critical as they are subjected to further growth in tourism (Marion 1990).

It is well-known that successful tourist packages combine a number of different interests- sport, wildlife, local customs, historical sites, spectacular scenes, food and dancing and water. The sea, lakes, rivers, swimming pools, and waterfalls all have high recreation value for both domestic and international tourism (McNeely and Thorsell 1988). The natural environment provides some of tourism's most important resources and most tourism development is based upon the natural environment. It is inevitable, therefore, that tourism establishes innumerable points of contact between mankind and nature. The resulting tourist-environment relationship is frequently regarded in a positive light. Through the enjoyment of natural amenities tourists gain an appreciation of the natural environment and they have a better understanding of nature. It is through understanding that mankind will achieve the harmony with nature that is essential to a symbiotic relationship. Thus, tourism contributes to peace with nature by furthering knowledge and understanding of the natural environment. On the other hand, tourism, like many other human activities, often has disruptive and damaging effects on the natural environment, and it tends to create conflict rather than harmony (Barlow 1988).

This section of the chapter on impacts will examine several of the more pressing environmental impacts associated with tourism development at the community level. Additionally, the scope of these impacts have been limited to those environmental impacts in predominately coastal areas due to the focus of this study.

Carrying Capacity

While the notion behind the concept of carrying capacity is simple, its application is complex since it is difficult to measure change and establish causality. The fundamental concept is that each environment has an ability to sustain activities up to a certain level, but once this level is exceeded some form of deterioration can be expected in the environment (Murphy 1985). Most carrying capacity studies in tourism focus upon the physical and biological dimensions of the environment. Bell and Bliss (1973) studied the effects of visitor trampling in the alpine meadows of the Olympic National Park in the State of Washington and found that the greatest amount of damage occurred with the first rampling. After the fragile plants were destroyed, the hardier plants and soil were found to be very resistant. As a result of their study, carrying capacity limits were established in the park as well damage-reducing measures such as asphalt trails on the most popular routes.

Vegetation Damage

Many of the studies into the environmental impacts of tourism development address the effects of vegetation and soil trampling. Mathieson and Wall (1982) identify a variety of tourism activities which impact vegetation: the collection of flowers and plants; careless use of fire; the chopping of trees for fire; excessive dumping of garbage; pedestrian and vehicular traffic; as well as camping.

The effects of trampling include an increase in soil compaction and erosion and changes in plant cover and species diversity (Pearce 1989). Merriam and Smith (1974) researched the damage to vegetation in wilderness camps in the Boundary Water Canoe Area in northeastern Minnesota and found relatively little change in the tree growth, soil compaction, and water quality of campsite environments after initial land-use change. They found that the greatest damage to vegetation occurred within the first season.

Wall and Wright (1977) draw a number of conclusions about the impact of tourism upon vegetation: 1) the greatest damage to vegetation cover occurs with the initial use of an area; 2) there is a decline in the diversity of species with continued use; 3) some vegetation cover in certain ecosystems register little deterioration because of its high proportion of resilient species; 4) the reproduction rates of vegetation are greatly reduced in trampled areas; and 5) soil compaction will influence plant growth and the age structure of vegetation.

Decreased Water Quality

Another impact upon the environment resulting from tourism is pollution in the form of sewage. The most widespread problem in resort communities is water pollution through the discharge of inadequately treated effluent. In time, this practice may give rise to the eutrophication of the water bodies through an increase in water pollution such that human health may be seriously impaired and/or natural flora and fauna destroyed (Pearce 1989).

In Monkey Mia (in Shark Bay), Western Australia, the main tourist attraction is the dolphins. But the facilities in the area are primitive and the sewage from the nearby resorts is discharged into the Bay. The dolphins are very sensitive to sewage pollution and the destination must treat the sewage before it is discharged into the sea (Satheindrakumar and Tisdell 1989).

On Green Island, Australia there is no supply of fresh water and the hotel has to use salt water in its septic tank system. The salinity inhibits the bacterial breakdown of sewage and, as a result, poorly treated wastes are being discharged into deeper water, later to be washed up onto the reef. Damage to marine life is inevitable (Mathieson and Wall 1982). Another example of this serious environmental problem in occurs in Barbados. As described by Archer

(1985), the major problem for Barbados is the contamination of its coastal waters largely from hotel sewage outfalls (Wilkinson 1989).

Not everything is bleak however. In Rhode Island, a joint federal-state effort is under way to clean up Narragansett Bay, one-third of which is closed to shellfishing. Save the Bay, a citizen's group with 10,000 family memberships, monitors compliance with water-quality standards and publishes a quarterly report on the performance of 29 bayside sewage dischargers. Balls of grease and fecal matter that once saturated swimming areas have ebbed, and 3000 acres of shellfish beds have been reopened (Marx 1988).

Cozumel, Mexico is 30 miles long and 12 miles wide, and only three percent of the island has been developed. It is surrounded by clear waters and is part of the longest barrier reef in the Western Hemisphere and is attractive to scuba-divers and snorklers. Deep-sea fishing also attracts the tourists. It has the most extensive marlin and sailfishing fleet in the Mexican Caribbean (Budd 1990). More recently, the island has become a favorite port of call for cruise ships. This year they are expected to make at least 500 calls, and there are plans to construct more docking facilities. Plans have been put forward to build at least five additional major resort properties on the island as well as another marina and golf course. The golf course is extremely controversial. Opponents argue that it would require too much irrigation on an island notoriously short of fresh water, and that fertilizers would contaminate the limited water table that exists.

Decreased Air Quality

One of the most interesting studies on air pollution in tourism destination communities was done by Kirkpatrick and Reeser (1976). These researchers studied Aspen and Vail, Colorado. It was demonstrated in their study that mountain altitude and terrain features in the two tourism communities seriously inhibited air pollution dispersion compared to other cities such as Denver. In addition, automobile emissions were found to be higher in mountain communities as were particulate emissions due to large-scale use of open fireplaces and charcoal grills.

Contrary to popular thought, airlines contribute little to the destruction of air quality. Studies undertaken at London's Heathrow Airport, and at Tokyo and Los Angeles, showed that carbon monoxide levels were less than one third of those recorded in the downtown areas of those cities (Mathieson and Wall 1982).

Damage to Wildlife and Sealife

Tourism development also impacts the wildlife of many destination communities. In the Gulf of Mexico, plastic bottles and six-pack beverage yokes, plastic-foam cups and egg cartons as well as toothpaste tubes are present. Add to this the cast-away fish nets, drums (some containing toxic liquids) and other waste tossed by ships, fisherman and oil- and gas- platform workers and the pollution is fouling the Gulf Coast and killing its marine life. Daily, the debris and the bloated corpses wash up on the beaches of Texas. The state spends $14 million a year to clean its shoreline. In 1988, the Padre Island National Seashore accumulated 673 tons of debris, most of it lightweight plastic (Marx 1988). High nutrient loads in sewage and river discharges trigger algae blooms, commonly referred to as red or brown tides, which deplete the ocean's oxygen and thus suffocate or poison marine life. In order to kill seaweeds, tourist promoters pour leaf-stripping products containing dioxin into the water along large sections of the coast. This "cleaning" process has already killed several million fish in Venezuela. In 1982, this process led to the evacuation of thousands of people (Tages-Anzeiger, 1982).

One of nature's greatest gifts to coastal tourism communities are coral reefs. Yet, they are also some of the most sensitive areas to tourism development. Indeed, there may be no better example of the devastating impact human beings can have on the environment than the damage sustained by coral reefs. Tourism development and abusive marine recreators simultaneously threaten the barrier reefs of the Caribbean, the Galapagos, Australia, Melanesia, the South China Sea, and the Bay of Bengal. While ships- hugging the coastline to save fuel- smash into them, other people are busy detonating explosive charges on them. Any fish left alive are captured by tropical fish mongers who break off chunks of coral to get at their precious quarry. Still others merely break off pieces to hawk to tourists. To ensure the tourists have plenty of white sandy beaches, dredging machines rake fresh sand from the deeper water off the coast and deposit it on the land, breaking up the coral reefs that lie in between. What's left of the reefs is at the mercy of various pollutants. Fertilizers run off from lush Miami lawns to feed algae colonies that steadily replace reefs. Silt builds up on the reefs, starving them of sunlight (Hogshire and Clifton, 1990).

The reefs are subject to more and more pollution. High levels of sediment and nutrients favor the growth of algae that out-compete corals. Thus coral, which thrives in a low-nutrient environment to provide a home for an abundance of fish, is replaced by algae and sponges that depend on sewage and fertilizer runoff for their subsistence- and provide a home to nothing else.

As immediate and devastating problem for the coral reefs is the physical assault on the reefs by human beings. The direct human impact on the reef is incredible- boat groundings, people dropping anchors on it, handling it , just touching it. A grounding causes instantaneous damage in a highly concentrated area. And near Miami, it has been estimated that an average of 35 boat groundings a year here occurs. Whereas 90 percent of reefs are able to recover from bleaching within 30 days to five months, when a ship smashes into a reef it's pulverized.

Last year- an average year- there were 36 small boat groundings in Key Largo National Marine Sanctuary, destroying 796 square meters of coral in America's only barrier reef. Then in October, an American freighter went aground in the sanctuary and wiped out 2,000 square meters of coral. Two and a half weeks later, a Greek ship hit the reef and took out an additional 1,600 square yards. What took nature 6,000 years to build is smashed by ships in a matter of minutes (Hogshire and Clifton 1990).

One example, Green Island, within Australia's Great Barrier Reef, has more than 80,000 visitors each year. Tourist development and the activities of tourists have combined to produce major effects on the island's near-shore ecology. The conditions which have led to this unfortunate situation include the following:

1) Tourists wade out from the beach onto the reef flats at low tide. According to Clare (1971), they are "walking on living organisms." A mass of broken coral skeletons on the reef floor are covered with a brown-grey coating of algae. A large proportion of the coral and small fish life around the margins of boat jetties and hotel beach have been killed; and

2) Souvenir shops choked with shells, shell-jewelry and ornaments, and an assortment of dead coral are located on the island close to the point of disembarkation. The removal of many life forms from the reef for the souvenir trade must have a marked impact on the reef ecology. Clare (1971), actually claimed that large areas of the reef were dead as a result.

Virgin Islands National Park and Biosphere Reserve is comprised of some 2,816 hectares on the island of St. John and 2,287 hectares of marine waters and coral reefs. Increasing pressures on the parks' coral reefs are indicated by use figures for the average number of boats in park waters (less than 20/day in 1976 to over 80/day in 1986) and for visitation to the Trunk Bay beach and underwater snorkeling trail (70,000 visitors in 1976 to nearly 170,000) visitors in 1986). Concern over possible recreational impacts to the reefs stimulated an assessment of their condition beginning in 1984 and reported by Rogers, McLain and Zullo (1988) and Marion (1990). Visitors to Virgin Islands National Park are often unaware of the impacts their visits have on the environment, much impact is clearly unintentional. Furthermore, the impacts of any single visitor are typically very small, such impacts become critical, however, over a period of many years. Few visitors or even resource managers have the appropriate training or personal experience in marine environments necessary to understand these impacts and their long-term effects on marine ecosystems.

In Barbados, a serious environmental problem caused by tourism is described by Archer (1985) as coral change- by souvenir gathering and destruction by divers and tourist boat anchors (Wilkinson 1989). Perhaps the most serious example of damage to coral reefs is that of Hanauma Bay, Hawaii. Hanauma Bay is a popular recreation area on the southeast coast of the Island of Oahu. The recreational area includes an observation area, picnic areas and parking lots on the volcanic crater overlooking the fringing reef with "keyhole" swimming areas below. In the early development of the park, the living coral reefs extending relatively near the shore were a valued resource. Lack of coordination between environmental researchers and park planners resulted in visitors in numbers sufficient to threaten the survival of the reef-- too many feet bruising the coral as they stepped carefully forward to see the schools of beautifully colored fish hovering beyond, too many souvenir hunters eager to go home with a small reminder of their visit. In the end, the reef suffered and is now considered "dead." But from this environmentally damaging consequence has emerged another visitor activity as the schools of colorful fish continue to swim around the coral drawn ever closer by the food they are fed by the visitors (Manheim 1990).

Similarly, wetlands are one of the major occupiers of the coastal zone in the Caribbean region and have interacted with tourism developments which tend to be concentrated in the same zone. They include a range of ecosystem types from mangrove swamps and salt marshes to freshwater morasses. The mangrove areas are the most widespread and originally occupied more than 25 percent of the regional coastline. It is well established that wetlands have important ecological and economic values. These include habitat for a range of wildlife, particularly birds; nursery ground for juveniles of commercially important fish populations; production of nutrient materials which support aquatic productivity; coastal stability an regulation of water quality. Because of this, major campaigns for wetlands preservation have been launched in recent years by international bodies (IUCN 1985) and there is increasing concern for their conservation throughout the Caribbean region (Bacon 1987).

Development activities, particularly those related to the tourism industry, impact severely on wetlands in many islands, where drainage and filling continue for real estate or resort development and biting insect control. On the other hand, a few wetland sites in the Greater and Lesser Antilles contribute directly to tourism and to recreation for nationals. In these cases, economic and social arguments for their protection can be advanced. This is particularly important to the hard-pressed economies of insular Caribbean states. Development of further wetlands appears to offer opportunities to diversify the tourism sector while ensuring the protection of the ecologically and economically important ecosystems.

At Ocho Rios, on Jamaica's north coast, 40 acres of land which included swamp land was reclaimed in the early 1970's for a tourist resort with over 4,000 hotel beds, a craft market, a cruise ship pier, and other recreational facilities. In the Hellshire Bay Development Project, on the south coast, mangroves were removed during construction of visitor parking and a recreational water-chute on the margin of a salt pond (Bacon 1987). At Reduit Beach, St. Lucia, 247 acres of swamp were filled during 1969-70 for abatement of the sandfly problem at a neighboring hotel. This area was excavated later for marina development (Towle 1985).

Drainage of the Great Morass, Negril, in 1959 was intended to reduce the risk of flooding of the Negril Beach and reduce biting insect nuisance (NRCD 1981). Although not destroying the wetland, Coke, Bertrand, and Batchelor (1982) suggested that drainage had adversely modified the wetland plant communities. Some 494 acres of the eastern side of Negril Great Morass have been reclaimed for food-crop production to service the Negril tourism sector.

A Dutch-assisted agricultural scheme at Hague, near Falmouth, intended to increase food production for the rapidly growing north coast resort areas, involved reclamation of 148 acres of wetland in the 1960's. Damage to these wetlands has been implicated in the loss of a major tourist attraction at Falmouth, the "shining water bay." Up to the late 1960's, dense populations of the marine dinoflagellate, Pyrodinium bahamense, produced bioluminescence at the eastern end of Falmouth Harbor. This was thought to be supported by high levels of organic nutrients released by wetland plants, as such a relationship exists for the mangrove-lined phosphorescent bays of southwest Puerto Rico (Taylor 1966). Damage to and loss of other coastal and marine resources through wetland reclamation in Jamaica and other Caribbean islands are likely to have been considerable, although virtually impossible to quantify in retrospect (Bacon 1987).

<u>Geology Changes</u>

While tourism is less environmentally destructive than other forms of development that exist on tropical islands, such as phosphate mining on Nauru which is literally destroying the island, there are many types of negative environmental impacts that may be related to tourism development (Rajotte 1980). Many of these impacts are common to tourism wherever it may occur, but their intensity an severity are particularly noticeable on island environments. The fragility of tropical island environments and the strong perceptual and aesthetic demands of the tourist result in tourism being more sensitive to negative environmental impacts than virtually any other form of development (Wilkinson 1989).

Murphy (1985) points out the danger of constructing homes and recreation resorts adjacent to beaches on unstable dunes, and the disastrous outcomes of attempting to stabilize the natural processes of coastal erosion once it begins. In recent years along U.S. shores from Maine to Florida, and along the Pacific coast as well, many coastlines are experiencing rapid erosion. Barrier islands, fragile by nature, are threatened by the advancing sea. Cape Hatteras Light (North Carolina), built in the 1860's over 3,000 feet from the waterline, is now nearly at sea (Charlier and DeMeyer 1988). Over a span of 17 years, the State of Louisiana shrank by 300 square miles. The California shoreline retreats an average 6 to 24 inches a year, and Monterey Beach, California loses from 5 to 15 feet yearly. And some North Carolina barrier islands have lost as much as 60 feet a year lately (Charlier and DeMeyer, 1988).

U.S. beaches and cliffs have not been singled out for intensive coastal erosion- the phenomenon is world-wide. On the French Atlantic coast, some 530 miles of shoreline lose about a yard each year while the average sea level rises from five to six inches. Both Belgian and Dutch coasts have witnessed the gobbling up of villages. On the coast of Nigeria, south of Lagos, coastal erosion has caused beach retreat for over half a century and currently the shoreline retreats at a rate of 15 feet per year. Famed Copacabana Beach in Brazil is also threatened (Charlier and DeMeyer 1988). Stress can also be seen in terms of the natural environment when tourism development aspects overrule conservation considerations, such as the trampling of thousands of visitors to Land's End in England has resulted in serious soil erosion of the privately operated and owned property (Murphy 1985).

The causes of coastal erosion are both natural and man-made. Here and there natural factors contribute to the problem but people carry a good share of the responsibility by damming rivers and starving the beaches in the process. Man has built harbors, redirecting longshore currents as a consequence; constructed beach defense works, only to transfer the erosion problem down-drift from one site to another. Man has also colonized the coastal zone, building dream houses and shore hotels too close to the beach, often providing an unimpeded view of the sea by bulldozing the dune - a line of defense against the fury of the storms and the regular onslaught of the waves (Charlier and DeMeyer 1988). But as if settlement on beach, dune, and barrier island did not suffice, hordes of tourists also invade the littoral zone. They cut paths through the dunes to gain easier access to the beach, trample the vegetation that retains the sand, and compound the damage by gradually flattening the dunes with their beach buggies (Charlier and DeMeyer 1988).

Preservation of Open Spaces/Access

Much of the tourism development which occurs within tourism communities might be considered detrimental to the environment. However, many tourism development projects may actually lead to an increased appreciation of the environment. The construction of roads or cableways will give visitors and residents alike greater access to viewpoints or open up new ski-fields; the provision of accommodation facilities will enable visitors to stay in the destination communities and experience the environment longer (Pearce 1989). Since the 1970s, Block Island residents have set aside almost 20 percent of their island forever as open space (Lord 1991). And the Committee to Save the Great Salt Pond recently countered construction of a new ferry terminal in the pond (Miller 1990).

Another example of the preservation issue was recently witnessed in Canada. In August, 1988, a 35-acre, oceanfront property in Prince Edward Island's Kings County sold for $40,000. In the December issue of New York magazine, the same property was listed for $200,000, and the seller's phone number was in upper New York state. The promotions reflect the booming market for prime Prince Edward Island oceanfront, which has both alarmed and annoyed islanders (Jenish 1989). The current real estate boom, which has been fuelled by proposals to build a bridge between the mainland and the province's unspoiled environment, has divided islanders. Environmentalists say that they are determined to preserve the province's beaches and wildlife. And farm organizations express concerns that rising prices will make property unaffordable for their members and other average islanders. But some island real estate brokers contend that the property owners should be free to sell to whomever they choose, and whenever they choose, in order to obtain the best possible price. Property ownership and development have been contentious issues on the Island for years, primarily because land is scarce resource. Outsiders now own just over 10 percent of the province's land.

<u>Establishment of Parks, Forests, and Preserves</u>

Generally, tourism development within communities may often be the means of preserving areas of scenic beauty by providing an economic or social rationale to reinforce the primarily environmental considerations which have often proved insufficient by themselves. Studies of the economic impact of visitors to New Zealand national parks, for example, appear to have been largely undertaken to indicate that areas of set aside from extractive resource use can still contribute significantly to the economy of the local community (Pearce 1989).

Queen's Beach is a coastal area north of Hanauma Bay and south of Makapu'u Head on the southeast tip of Oahu. Lying between the shorelines and the Kalaniana 'ole Highway, the relatively pristine area is an excellent example of Hawaii's dry coastal ecosystem. The land is zoned for conservation uses, however, the land owners and those holding development leases for the area are seeking a zoning change for resort and residential development. Although zoned conservation, the tenants and owners have made no attempt to maintain the area as conservation lands. In fact, over the years, certain areas have been used for totally inappropriate purposes such as a dump-site of large objects-- cars, large appliances including refrigerators and washing machines. Under coastal management (development) guidelines proposed by the University of Hawaii, specific coastal areas of Oahu have been selected for intense tourist development. The purpose of these guidelines is to direct such development to areas where it would have the least negative impacts (Manheim 1990).

2.3.3 Economic Impacts

It is well-recognized that economic impact studies are becoming very popular venues for illustrating the benefits of travel and tourism. These studies have not, unfortunately, always presented the costs of tourism development--which naturally leads to concerns with respect to the credibility of such studies (Fleming and Toepper 1990). Economic impact studies are useful to industries wishing to influence legislation through lobbyists by documenting the economic viability of an industry to a community, state, or region. Community planners are in need of economic data and evaluation procedures which can provide the necessary information to zoning boards in order for them to make decisions on developer's proposals (Kottke, 123). Information derived from economic impact studies helps travel and tourism developers in determining the feasibility of and site selection for transportation, accommodation, amusement, and recreation facilities. These studies can also be used to measure the cost and benefits of travel and tourism activities.

Mathieson and Wall (1982) identify eight basic economic benefits often attributed to tourism: 1) it is a tool for economic development; 2) the tourists who visit a community make expenditures within that destination; 3) tourism creates jobs; 4) those employed within the tourism industry receive wages; 5) tourism expenditures lead to increased tax revenues within the community; 6) tourism can be a tool for developing nations to acquire foreign exchange earnings and help their balance of payments; 7) tourism can lead to changes in the economic structure of a community; and 8) an increase in entrepreneurial activity may occur due to tourism.

Of course, direct and indirect negative economic impacts sometimes can be attributed to tourism development too. For years, many within the tourism industry have drawn the public's attention only to the positive economic impacts for which tourism claims responsibility. Recently, increased attention has been focussed on acknowledging and addressing the negative economic impacts which often accompany travel and tourism. The growing emphasis upon many of the costs associated with tourism development may lead to citizen backed imposition of limitations to growth or simply no growth in certain destination areas (Fleming and Toepper 1990). Mathieson and Wall (1982) also identify six economic costs: 1) an overdependence on tourism as the primary industry within the community; 2) inflated prices of goods and land; 3) an increased propensity to import; 4) the seasonality of tourism demand; 5) a low rate of return on tourism-related investment; and 6) externalities such as increased maintenance costs for parks as increased use translates into increased volume of trash and higher incidences of vandalism. This section of this chapter will explore many of these economic consequences of tourism upon a destination community.

Economic Development Tool

The most obvious circumstance for embracing tourism as a tool for economic development occurs within developing countries. Developing countries usually have low levels of income, uneven distribution of wealth and income, high levels of unemployment and underemployment, low levels of industrial development which are hampered by the small size of the domestic consumption market, a heavy dependence upon agriculture for export earnings, and high levels of foreign ownership of manufacturing and service industries. These characteristics have been associated with large regional disparities in economic wealth, a substantial leakage of profits out of the developing country, high inflation, and shortages of foreign exchange. The rapid injection of tourism expenditures and foreign investments into these developing economies can serve as an economic catalyst.

A large proportion of studies which examine the significance of tourism for developing economies have attempted to isolate ways in which tourism can contribute to the process of economic development. They include supplements to the national balance of payments, the creation of employment, the nature of infrastructural investments, and the external economies created, intersectoral linkages, and even the multiplier effects of tourism expenditures. Taken together, these studies offer powerful support to those arguments which encourage countries to promote their tourism industry (Mathieson and Wall 1982).

Tourism can often bring new, and sometimes necessary, sources of capital and income that may supplement or replace traditional sources of earnings. For this reason tourism development often receives support from governments and local residents in stagnating or developing areas who recognize the economic benefits which may be earned. Every local community is concerned about regional economic development to create job opportunities, raise incomes, and contribute to the community's social viability and general economic prosperity. The hundreds of local economic development organizations in each state are testimony to the importance communities place on regional economic impacts. These organizations cooperate with the state and federal government in programs aimed at attracting new employers and retaining current ones. Examples of economic development activities in resort areas include acquiring parks and other recreation areas, open space, upgrading sewer-water systems, roads, labor training, small business assistance, theme zoning, and store front renovations. The ghost towns from an early era are stark reminders that not all local economies survive (Walsh 1986). The initial euphoria and enthusiasm which are associated with the preliminary phases of tourism, however, usually begin to dissipate as the industry expands and tourist numbers increase.

Tourism is relatively labor intensive. It, therefore, ranks high as a developmental tool particularly for less developed areas around the world and even for rural districts in the United States (Smith 1989). Many developing countries have high unemployment rate and are relatively dependent on importing manufacturing goods and exporting agricultural goods. Although some of these factors also exist in developed countries, they are not usually as extreme as in the case of less developed countries. The monies that are generated from tourism can be valuable for foreign exchange in which individuals can buy food, pharmaceutical, farm machinery, and other items needed for development and survival. Transformation from a traditional agricultural economy to an industrial economy will occur as modernization and economic development begin to take place.

While there are many models which discuss the hypothetical development of tourism destinations (Butler 1980, etc.), one of the more popular models was developed by Stanley Plog. Plog (1972) stated that tourist destinations are attractive to different types of visitors as they evolve from untouched discoveries to popular resorts. At first, "allocentric" individuals seek out new destination areas which have yet to be largely developed. As these destinations become more accessible, better serviced, and more widely known, an increasing number of "mid-centrics" will begin to visit. They in turn will give way to a larger number of "psychocentrics" as the destination becomes more popular and increasingly dependent on foreign investments and labor. The new visitors are made to feel at home, with a full range of facilities and attractions that may now be completely different from the natural geographic and social attractions which first attracted the allocentrics.

Plog's hypothesis is that destination areas tend to rise and fall in popularity according to the whims of those in the predominant "psychographic" groups to which they appeal at different stages in their development histories. A new and, or exotic destination tends to appeal first to Plog's "allocentric" group - the innovators in the travel market that seek out uncrowded and unique destinations. As the destinations become more widely publicized and better known, it loses its appeal to the allocentrics and they are placed by the "mid-centrics." Plog relates the mid-centrics appeal stage to that of the maturity stage; in which sales volume are at a peak and the destination area has a mass market appeal. Eventually, as time progresses, this destination area losses its appeal to the mid-centrics and they are replaced by the "psychocentrics." The psychocentric stage is the final point in which it has lost its appeal to both the market innovators and the mass market, and is at the end of its life cycle (Mill and Morrison 1985). Knowledge of such patterns are especially useful for the marketing of destination communities as well as providing a greater understanding into the economic benefits and costs accompanying tourism development.

There are many references to tourism being chosen by a community as one of its economic development tools. Ankomah and Crompton (1990) discuss many African nations, south of the Sahara desert, who are trying to increase tourism. Countries such as Zimbabwe, see tourism as a way to infuse a stagnating economy. Tourism has the potential to curb environmental decline by providing jobs, and opening up trade with less developed countries who have nothing to trade. The Zimbabwe minister of tourism stated that, "The tourism industry provides jobs and economic growth points in areas that would remain undeveloped due to their inability for either agriculture or resettlement purposes" (Novicki 1983:52). However, a major problem with development is explored by Din (1988). The difficulty is that although there is money to be made from tourism, indigenous people are not prepared to offer anything to potential tourists. They are, through ignorance, unable to take advantage of what is being offered. Dexter, Choy, and Con (1988) analyzed the recent emphasis of China to develop its tourism industry. Unfortunately, there have been many negative effects caused by the decentralization of the management travel services. While countries like China struggle to adapt, other countries like France, struggle to expand. It is France's desire to develop a new area of the Mediterranean coast for tourism. This will reduce the pressures on the Cote d'azure and utilize the tourism potential of nearby coastal areas (Willis 1987 and Clarke 1981).

Tourist Expenditures

It should be fairly obvious that one of the primary reasons destination communities become involved in the development and promotion of tourism is that it generates expenditures within the community. While some researchers (Hunt 1990) dispute the extent to which a state's promotional campaign actually can be credited for luring the visitor expenditures it actually receives, the impact of these expenditures cannot be doubted. Mak (1989) applied tourism multipliers from the Regional Input-Output Modelling System (RIMSII) to U.S. Travel Data Center estimated travel expenditures for 1983 to determine the total impact of travel expenditures on gross business sales, earnings, and employment in the 50 states. Original U.S. Travel Data Center estimates of 1983 total travel expenditures for all 50 states and the District of Columbia were $208.9 billion. When applying the RIMSII model and its multipliers to those estimates, the estimated gross business sales are an impressive $434.9 billion.

In a study to determine the economic impacts of tourism upon metropolitan Toronto, Ontario, Canada, overall impacts were estimated to exceed $3 billion (Canadian) in 1989. The commercial campground industry in the Province of Ontario was estimated to have an stimulated over $300 million (Canadian) in tourism expenditures within 1988 (Murray 1991). In Connecticut, a study of the importance of the tourism industry reported estimates of visitor spending in that state to be around $46.8 million (Kottke 1988). In Rhode Island, tourism sales revenues have been estimated to be approximately $1.3 billion for fiscal year 1988-1989 (Tyrrell and Toepper 1990). Also in Rhode Island, Tyrrell and Toepper (1990) estimated the economic impact of the special events and activities of the Newport Yachting Center (Newport International Sailboat Show, Newport International Powerboat Show, North American Smallboat Show, etc.) to be a total of $23.2 million in 1989. Of that total, visitor expenditures to the special events were estimated to be $4 million and exhibitor expenditures were estimated to be $2.6 million.

While the Japanese only constitute about eight percent of foreign travelers to the U.S., they account for 19 percent of spending in the U.S. by foreign tourists. Japanese tourists spent enough money abroad in 1989 to overtake oil as Japan's biggest drain of foreign currency. Some 9.7 million tourists spent an estimated $22.4 billion overseas on hotels, shopping, sprees and the like. Air fares were extra. Imported oil cost Japan about $21 billion during the year (Solo 1990).

The tourism industry, as illustrated above, generates income within a destination community. The amount of income generated, however, is often difficult to determine. The difficulty arises from the fact that the tourism industry is comprised of many different sectors of the economy. Additionally, many small businesses are involved, which leads to great difficulty in getting precise data for measurement purposes (Mill and Morrison 1985).

Employment

Mathieson and Wall (1982) list three types of employment generated by tourism: 1) direct employment resulting from visitor expenditures occurring directly in tourism facilities such as hotels; 2) indirect employment occurring in the tourism supply sector but not directly resulting from tourist expenditures; and 3) induced employment resulting from the effects of the tourism multiplier as local residents respend the additional money which they have earned.

Most of the assessments on the number of jobs created by the tourism industry tend to report only those jobs created directly by tourism. In addition, most researchers report the number of jobs in terms of full-time equivalent positions. For example, in the study of the impact of tourism upon the metropolitan Toronto economy, the estimate of over $3 billion (Canadian) in 1989 translated into approximately 130,000 full-time equivalent jobs, making tourism an extremely important component of the community. And the $300 million (Canadian) expenditures within the Ontario campground industry was credited for generating more than 21,000 full-time equivalent jobs (Murray 1991). In the analysis of Connecticut's tourism industry, approximately 3,886 full-time equivalent jobs were credited to the tourism industry (Kottke 1988). In Rhode Island, the $1.3 billion in tourism sales revenues for 1988-89 is credited for generating over 26,000 jobs (Tyrrell and Toepper 1990). Mak (1989) used the Regional Input-Output Modelling System (RIMSII) to estimate the total earnings for all states and the District of Columbia and concluded that 10.5 million full-time equivalent jobs can be credited to the tourism industry within the U.S.

Many of the jobs created by tourism do not require high level skills. But as the travel industry matures in an area, the number of skilled and professional jobs generally increases. However, the needed specialized managerial and technical skills are not often found in developing areas, so the better paid and higher status jobs tend to be filled by outsiders (expatriate labor). For example, nearly 65 percent of the labor force in the Cayman Islands and employed in the tourism industry were expatriates in 1970. In the British Virgin Islands, 48 percent of the labor force in hotels and guest houses were expatriates. The portion of the expatriate earnings which is remitted out of the country is unknown. However, the higher the total expatriate earnings, the larger the volume of leakage from the tourist exporting country is likely to be (Mathieson and Wall 1982).

Indirect employment can also be created in construction, agriculture and manufacturing industries. The amount of indirect or secondary employment generated depends upon the extent to which the tourism sector is integrated with the rest of the local economy. The more integration and diversification that occurs, the more indirect employment that is generated.

Several criticisms of the tourism industry as an employer have been made. In many areas, tourism is a seasonal business. In other words, a community can expect periods of rapid growth, slow growth, and declines, putting an economy (and those dependent upon it for employment) which is heavily dependent on tourism through a financial roller coaster ride. In addition, an increase in employment opportunities may lead to increased immigration. Tourism creates new jobs and new income to a community. Although such jobs are usually analyzed in terms of economic benefits, their economic and socio-cultural implications can not be overlooked. New opportunities for employment are not only visible to residents; they also attract new migrants to the area, and the question arises as to whether or not these newcomers actually "fit" into the community. It is, therefore, necessary to observe the rate of population growth, particularly the arrival of new migrants. The faster a community is required to assimilate new residents, the greater the stress on the present structure of the community. Additional aspects to consider include the recognition that creation of jobs by tourism may lead to job dislocations in other sectors; this may prove to be detrimental to established industries, such as agriculture or fisheries in the area, and may disrupt the local economy (Gee, Makens and Choy 1989). Because the tourism industry relies so heavily upon people for delivering a service, productivity gains are difficult to come by. The national output may be difficult to improve if tourism becomes a dominant part of the economy, particularly if the destination lacks a strong industrial sector, where productivity gains are easier to obtain (Mill and Morrison 1985). Current social and economic structure may also be disrupted when women enter the work force, especially in a society where women are traditional homemakers (Gee, Makens, and Choy, 1989).

Wages and Salary

Along with the employment opportunities which tourism brings to communities are the financial benefits of wages and salaries of those employed in the industry. Indeed, policy makers responsible to the public which elected them are quite fond of touting the number of jobs and the wages which are paid to their constituents resulting directly, indirectly, and even those induced from tourism development strategies. While much debate often occurs surrounding the extent to which employment in tourism is largely part-time and paying relatively low wages, it is important to keep in mind that total wage and salary figures can be very large.

In Rhode Island, tourism is credited with generating $287 million in wages: $142.3 million for the retail trade sector, $109.3 million for the services sector, and $35.4 million for the transportation sector (Tyrrell and Toepper 1990). Mak (1989) used the Regional Input-Output Modelling System (RIMSII) to estimate the total earnings for all states and the District of Columbia and concluded that $144.7 million in wages and salaries can be credited to the tourism industry within the U.S.

Tax Revenues

Income from tourism for governments arise from a variety of sources: direct taxation on employees within the industry, the industry's profits, etc.; indirect taxation from customs duties and on goods consumed by tourists; from interest payments and loan repayments; and from the ownership and operation of tourism attractions (e.g., parks).

Since tourists, by definition, come from other regions or countries, their expenditures represent an increased tax base for the host government. In addition to the usual sales tax, tourist sometimes pay taxes in less direct ways. Airport taxes, exit fees, custom duty, and charges assessed for granting visas are just a few examples of commonly used methods of taxing tourists. The wisdom of imposing such special taxes on tourists is often a point of controversy, since it merely serves to reduce demand. In some countries, for instance, the room rate at a hotel can be different for tourists than for residents. (Peru is one example where there are two different rates for tourism related activities and goods. Rates are distinct for local travelers and for those foreign ones). This practice does little to build a positive image in the minds of foreign visitors.

One common form of tax revenues generated by the tourism industry and studied by Hiemstra and Ismail (1990) is the room tax or lodging tax. Room taxes within the U.S. average about 9.8 percent of sales, of which 5.9 percent represents sales taxes and 3.9 percent represent lodging-specific taxes (often going to local promotional agencies). It is often the opinion of the tourism industry that many taxes are placed upon its goods and services without due consideration to the impact such taxes may have upon demand. A price elasticity of demand estimate of -.44 by the researchers was based upon the responses to surveys by the industry and led to their conclusion that the taxes often placed upon tourism-related products and services are not without costs.

Foreign Exchange Earning and the Balance of Payments

The potential contribution of tourism to the balance of payments as an earner of hard currency has been widely recognized. Often, the development of tourism has occurred at the expense of other industries which are unable to generate the hard currency which tourism often does. Indeed, many countries with a strong dependence upon international trade and heavily influenced by the considerations of balance of payments have created policies place a limit upon the amount of money which may be taken out of their country (Mill and Morrison 1985).

The balance of payments account for a country is a record to economic transactions during a period of time between residents of that country and the rest of the world. It takes into account the value of all goods, etc. going into and leaving the country as well as the interconnections between items. Tourist expenditures, both within the home country and out-of the home country, form part of the current account. The effects of tourism on the balance of payments consists of two components: tourism within the home country, including the country's own residents and visitors from overseas; and international tourism (i.e., the tourist activities of residents which take place outside of the home country).

Tourism development also impacts exchange rates and many times a community's motivation for entering into tourism development strategies can be traced to its desire to gain foreign currency. An exchange rate is the price of one country's money in terms of some others country's money. It is a relative price of ones national currency expressed in terms of another national currency. A U.S. vacationer in France must use French francs to make purchases and must exchange then, the U.S. currency for the French currency. Now, France has U.S. dollars in its possession and can use that U.S. currency to buy U.S. goods. For many countries with relatively poor currency value and limited export capabilities (e.g., many developing countries), tourism offers one of the few methods for obtaining other countries' currency.

Many countries have embraced tourism as a way to increase foreign exchange earnings to produce the investment necessary to finance economic growth. As mentioned earlier, some countries even require tourists to bring in a certain amount of foreign currency for each day of their stay and do not allow them to take it out of the country at the end of their vacation. However, the foreign exchange earnings generated by tourism can be overstated unless the important factor is known. The value of goods and services that must be imported to service the needs of tourism is referred to as leakage. The money spent leaks from the host economy and must be subtracted from the foreign exchange earnings to determine the true impact. The amount of local ownership and control is crucial in the regard to the foreign capital being brought into the society. Foreign - owned chain hotels will often be staffed, stocked and furnished by people, food, furnishings, fixtures, and equipment from a central foreign source. The use of credit cards and traveler's checks can mean that the local banks will not be able to participate in the exchange. Foreign exchange earnings can be reduced when host governments exempt duties or taxes on foreign-owned companies or offer financial inducements to them to attract their investment.

For the first time since the Department of Commerce starting keeping such records over 30 years ago, the U.S. showed a positive balance of payments on tourism in 1989. The 39 million visitors to the U.S. spent a total of $44 billion, or about $1.2 billion more than Americans spent abroad. As recently as 1985 the country ran a $9 billion deficit on tourism. The increasingly positive balance of tourism is especially favorable with respect to Japan. The tourism surplus was about $6 billion in 1989 and it was expected to increase again in 1990 (McGlinn 1990). Foreign visitors spent $34.3 billion in the United States, compared with $33.9 billion spent by Americans traveling outside the country. By this reckoning, the United States had a surplus of $450 million. Projections show that this surplus will grow into the mid 1990s. For 1990, the surplus is projected to be $1.5 billion.

Changes in the Economic Structure

Tourism and recreation development are not a new form of economic activity in the coastal zone of the U.S., but in many areas development activities have accelerated in recent years. In South Carolina, there has been a major shift occurring in both the economic and physical structure of the coastal regions as a result of the growth in these tourism development activities. Specifically, a factor analysis of tourism supply resources (hotels, etc.) within the coastal areas of South Carolina revealed that tourism development is not continuous from one community to the next. As a result, the study recommended that traditional geographically formed tourism promotion regions were not extremely effective. The economic changes brought about by tourism development have changed the underlying economy of many communities and they might be better served to be grouped according to stage in tourism development, not location (Uysal and Potts 1990).

Tourism development does indeed change the economic structure of the host country. Although such changes can easily be integrated into the developed economy, the effects ia a lesser developed country are more profound. Stresses can occur when the old and the new exist side by side. Traditional methods of farming and primitive industries contrast with modern hotels and polished tourists entertainment. This, in fact, causes a movement away from traditional forms of employment. The fisherman turned tour-boat entrepreneur and farm girl turned waitress undergo not only a change in income but a change in status. The fisherman's catch is lost to the local people, but his own income may improve. The waitress may view her task of serving as a throwback to earlier colonial times or look at the new found job as a cleaner and less arduous way to earn a living. The satisfaction for locals may well depend upon the range and type of jobs available together with the opportunity for advancement. The problem of seasonality is a major concern (Mill and Morrison 1985).

Tourism development usually demands great quantities of land and may compete with existing land uses and other economic development efforts. A comparison several years ago in Hawaii raises some questions about tourism's economic value as compared to agriculture (Hawaii 1972). The following major changes in the economy were reported when the structure of the economy shifted from agriculture to tourism: 1) indirect employment generated by tourism investment is at least 23 percent lower than agricultural investments; 2) tourism requires more employees per household than agriculture in order to obtain similar incomes; 3) employees must bear greater costs in housing, transportation, and recreation under tourism; and 4) tourism seems to require greater public infrastructural investment than agriculture. Other critics (Graham 1990) point to the many problems of moving from a predominately manufacturing based economy to a service based economy, including increasing automation will soon displace many service sector workers and the number of self-service retail outlets.

As with any other development industry, tourism encourages workforce migration, with the corresponding possibility of breaking down the traditional family unit. It does appear, however, that, even though migration occurs, family ties and responsibilities are maintained. Because of the tourism industry, profound changes can occur in terms of economic power. To the extent that tourism business attract women and young people, they gain an economic independence previously unheard of. Particularly in traditional societies, great tension can occur because of this shift in the economic resources within a destination region. There is inconclusive evidence to show that such changes may or may not result in negative effects upon the family (Mill and Morrison 1985).

Finally, tourism changes both the value and the ownership pattern of land. As tourism is developed, the value of potential sites increases. Land sold to outsiders results in a short-term profit tom the local landowner. However, the land may be lost to agricultural production or local recreational use, and control of the land goes out of the community. Some destination regions take steps to prevent unhealthy land speculation. Many of these changes would occur no matter what type of economic development took place. Whether these changes are good or bad is often a value judgement. The important point is to realize that these impacts are likely to occur, decide whether or not they are desirable for the destination in question, and plan accordingly (Mill and Morrison 1985).

In California's Napa Valley, increasing tourism is blamed for a variety of problems including a shift in the economic structure underlying many of the valley's business districts. On the positive side, most residents and business-people in the valley point out that changes in the commercial sector have improved the vitality and appearance of the downtown areas. But the casualties in the commercial sector have included stores supplying local needs--plumbing, furniture, grocery, and meat stores (Tuteur 1985).

It is likely that the development of tourism has been accompanied by other changes in the economic structure of destinations. The greatest changes in economic structure have probably occurred when the transformation has been from an essentially primary producing economy to one dominant by tourism. Changes in patterns of agricultural production in many rural economies are not endemic to tourism. Many of the changes have been the result of demographic pressures, technological progress, employment opportunities outside the rural economy and modifications in patterns of land ownership. Tourism, though not always a major cause, has often contributed to the acceleration of such changes.

A principal change that has occurred in rural economies has been the occupational shifts of rural inhabitants. Many farmers and wage earners have left the land to pursue more lucrative jobs in the tourist industry or in construction. Jobs outside of agriculture may be more attractive so that few young people remain in rural areas and the future of farming in such areas is in jeopardy. The structural change from agriculture to tourism also creates changes in land use patterns. Tourism increases the competition for land, rising land prices and encouraging sales, contributing to the fragmentation of landholding. Land is sold in smaller units and at higher prices and this contributes to inflation. The victims of this inflation are the young residents trying to purchase land or homes. At the same time the era becomes less self-sufficient and increasingly dependent on national and international economic conditions.

Increased Entrepreneurial Activity

Few studies make a convincing case for the existence of external economies arising from tourist development. However, there is little doubt that the tourist industry exhibits backward linkages and that external economies have emerged. For example, improvements to local and regional transportation networks, to water quality, sanitation facilities and garbage disposal may have been prompted by the tourist industry but benefit other sectors of the economy. The construction of an international airport may provide improved access to other areas for local residents and locally produced goods. Tourism prices may also benefit property owners through positive effects on real estate prices, although this may create difficulty for young locals who wish to purchase property. Many researchers have admitted the presence of such economies but few have paid specific attention to them or discussed the extent to which local entrepreneurial activity may be promoted by tourist development. The extent to which the tourist sector can establish linkages with local entrepreneurs depends upon: 1) The types of suppliers and producers with which the industry's demands are linked; 2) The capacity of local suppliers to meet these demands; 3) The historical development of tourism in the destination area; and 4) The type of industry development (Mathieson and Wall 1982).

Overdependence on Tourism

Some destination communities have become overly dependent upon tourism for their economic livelihood and have made themselves vulnerable to any changes in tourist demand. Tourism is highly susceptible to both internal (price increases within the industry such as hotel room rates) and external factors (factors outside the industry such as the increases in gasoline prices and the advent of war).

Tourism, then, is dependent upon numerous variables.

It has very little control over the fluctuation of currency values and political stability. Some of the most sensitive factors relate to the seasonality of tourism, which may leave hotels empty, carriers and tour operators with idle wheels and employees jobless. Unless a pervasive and sound economic base exists, individuals who are tied to tourism experience either "feast or famine" (Smith 1989).

Some destinations by becoming overdependent on tourism for their livelihood, have made themselves vulnerable to changes in tourist demand. Although tourism is a growth industry and the total volume of tourist traffic is likely to increase in the foreseeable future, all destinations may not share in that growth. Tourism is highly susceptible to changes from within and outside the industry. For example, political unrest at one destination can rapidly reduce demand for that location and, at the same time, divert it to others. Many tourists avoid destinations which are politically unstable, but they seldom cancel their travel plans completely and usually select and alternative. This transfer of demand can be disruptive for both locations. Greatly reduced patronage at one location means the under-utilization of services, job redundancy and loss of income. The nature of the impact at newly selected destinations will depend upon their capacity to adapt and absorb the additional arrivals (Mathieson and Wall 1982).

Inflation

Other economic aspects of tourism may not be considered desirable. Because of additional demand and /or increased imports, visitor purchases may result in higher prices in an area. This creates an inflationary situation, which would mean that residents, too, would have to pay more for products and services. Pleasure travel, as a discretionary item, is subject to fluctuations in prices and income; therefore an area's growth may be unstable.

The inflationary consequences of tourism can arise in several different ways. Rich tourists can afford to buy items at high prices. Retailers, recognizing that their profit can be greatly increased by catering to tourists, increase their prices on existing products and provide more expensive goods and services. Such stores can compete successfully with those catering to local residents. They can afford to pay higher rents and taxes which are passed on to the consumer through higher prices. Local residents in addition to paying more for their goods, may also have to go farther afield for their purchases as the diversity of local supply is reduced as stores catering to the local market are displaced by an increase in the establishment of specialty shops for tourists (Mathieson and Wall 1982). Inflation within destination area is also caused by increasing land values. Growth in the tourist trade creates additional demand for land and competition from potential buyers forces the price of land to rise. The demand for more hotels, vacation homes and tourist facilities may bring sources of income to builders, real estate agents and land owners, but local residents are forced to pay more for their homes and larger taxes because of the increased land values. Kariel (1989) studied resident's evaluation of tourism in four Austrian communities and found their assessment to be positive. Yet, some unexpected and less desired results were experienced by the residents: primarily inflation and increased costs of providing the necessary infrastructure.

Increased Propensity to Import

The propensity to import is the proportion of each unit of tourist expenditure which is transferred to another area for the purchase of goods or services (Mathieson and Wall 1982). It represents then the likelihood of the occurrence of leakage from the destination community. The volume of imports obviously depends to great extent upon the ability of the domestic economy to meet the demand for those goods and services. In many cases, especially in developing economies, the local community lacks the capacity and diversity to meet the requirements of increased tourism growth. Typically, tourism destination communities import food and beverage products from the international tourists' home so that the tourist will feel more comfortable in an unfamiliar situation. An additional consideration in the propensity of a community to import tourism goods and services includes the changing tastes and preferences of the tourist. For example, many tourists today are very brand conscious and prefer that they be able to consume the same brands while they travel as they consume at home.

Seasonality of Tourism Demand

The seasonality of demand in most tourist regions can be thought of as a negative impact of tourism. It is reflected most obviously in hotel occupancy rates. Many hotels actually close during the off season while others have greatly reduced revenues. Fixed costs make up a large proportion of total costs, so most hotels prefer to remain open all year round to secure as much revenue as possible. Nevertheless, production in the accommodation sector is greatly reduced in the off season. Since the investment is not fully used in the off season, the returns on capital are often low. This means that tourism is often a less attractive investment than other sectors of the economy which experience steady production. The relatively low rates of return on much hotel investment have contributed to a shortage of hotel accommodation at peak periods (Mathieson and Wall, 1982).

Low Rate of Return on Investment

Accommodation investments are not the only ones with low rate of return. Tour operators also face similar problems. The reluctance of outside investors to become financially involved in marketing seasonal enterprises has meant that greater financial responsibility is borne by local investors. The opportunity costs of such investments are frequently high and other sectors of the economy may offer more attractive returns. Investments from public authorities may be necessary in the absence of interest from the private sector.

Externalities

Tourism development imposes a number of other costs on residents of destination areas. These include the increased costs of garbage collection and disposal and the increased maintenance costs for tourist attractions damaged by crowding and vandalism. Another eternality often present in tourism destination communities is congestion of parks, beaches, and waterways.

2.4 Reconciling the Impacts of Tourism

As a result of increased emphasis on tourism as an economic development tool within many communities, a variety of both positive and negative socio-cultural, environmental, and economic impacts have been experienced by such communities. Recent concern by many of these tourism communities have stimulated increased interest in impact research. The end result has been an emphasis on the need for the development of sound analytical procedures for measuring tourism impacts. But many methodological problems (e.g., the absence of base levels for comparison, identification of the principle causes of change, etc.) have restricted the scope and accuracy of impact research and have encouraged investigators to narrow the focus of their research along primarily disciplinary lines.

The major issue which permeates this section of the chapter is that research is often undertaken in order to enhance the benefits or reduce the costs to a community of tourism development. For socio-cultural disciplines, the goal might be described as seeking to minimize many of the negative aspects described above. Environmentalists, in their respective discipline, would seek to minimize the limits of acceptable change in the natural environment which tourism certainly brings about. Economists have been often characterized within the industry as merely concerned with maximizing the financial returns of tourism development projects. In one sense, each of these disciplines is attempting to maximize the quality of life within the community.

Quality of life, however, means different things to different people. For example, at trade conferences business managers may learn how to increase sales revenues. Meeting this goal will mean additional profits to investors and wages to employees which are traditional measures of the economic well-being of community residents. Obviously, changes in income are important to the quality of life but they are not the only measures. Social and environmental factors, such as those presented above, also influence the quality of life within a tourism community. While the general notion of "quality of life" is universal, the importance of specific factors in a composite quality of life index will vary between people.

An empirical quality of life index is often described as a combination of observable measures of health, wealth, and education of community residents. The crucial question which remains, however, is how should these measures be combined to provide an accurate measure of well-being? In particular, how might an index be defined such that meaningful comparisons over time might be made for different types of people? If the goal was to determine the net impacts of tourism over time for one particular group of community residents, then it would be desirable to compare the values of such an index before and after tourism development. Thus, an index is needed for each type of resident within the community which reflects the influence of tourism development on observable measures of the quality of life as weighted by individual needs and preferences. Ideally, a quality of life index would result from a mathematical framework which describes how each community resident is effected by the major economic, social, and environmental impacts of tourism development.

In this study, such an index will be constructed but in a much narrower scope. Since the problem identified within Chapter One of this study focuses upon the increasing congestion and declining water quality facing Great Salt Pond (Block Island) as a result of increasing recreational boat demand, the socio-environmental index developed will address that specific situation. In other words, an index will be developed which describes how consumers (resident wage-earners, resident capital-owners, and boaters) are effected by increasing congestion and declining water quality only. The index, which will be called the congestion-water quality index, will illustrate one method to account for many of the sociological and environmental impacts presented in this Chapter. The construction and application of the congestion-water quality index will be presented in detail in Chapter Five of this study.

CHAPTER 3 APPLIED WELFARE ECONOMICS

Many tourism communities face a myriad of economic development choices: to allow a new hotel to be built on a fragile beach, to provide a public boat landing, to set aside open space in order to preserve scenic vistas, etc. Communities must make choices of how to efficiently use their limited resources in order to achieve their economic development goals. Regardless of the alternative contemplated by a community, knowledge and application of economic welfare theory is essential to the formation of appropriate policy formulation. This chapter provides a review of economic welfare theory and illustrates how this theory can be used to obtain policy information in the area of community tourism development.

3.1 Definition of Economic Welfare

Production of goods and services from the relatively scarce resources within any community typically involves some environmental costs. In tourism-oriented communities, the quality of the natural environment can potentially suffer from unlimited tourism development. New hotels, if constructed along fragile beach ecosystems, may contribute to accelerated erosion. Coral reefs might be damaged by the increased number of scuba-divers, who anchor their boats on the reef or collect samples of the coral life as souvenirs. Water resources, such as the Great Salt Pond on Block Island in Rhode Island, may become polluted and congested if too many boaters utilize it at a given time. Frequently, the initial effects of such tourism development are felt within the production sector as the community takes what it perceives to be the necessary steps to prevent any damaging development. For example, zoning laws may require that development not occur within a specific area. Such prohibition may prevent a new hotel from being developed in the community and effect many supporting service-based industries (e.g., laundry services, food and beverage purveyors, etc.). Limitation of the number of boaters using a water resource such as the Great Salt Pond may cause economic hardship for the immediately surrounding providers of gasoline, supplies, as well as food and beverage to the boaters. But the final effects of such a community policy are often felt within the household consumer sector as tourists, desiring accommodations adjacent to beaches or the use of waterways for recreational boating, experience dissatisfaction and choose alternative destination communities. Similarly, residents of the community are also effected by such a policy as employment opportunities and wages potentially decrease. The objective of welfare economics is to help communities facing issues such as those mentioned above make better choices. This becomes even more important when one realizes the consequences today's decisions, such as allowing commercial development within National Parks and Forests, may have upon future generations.

The purpose of welfare economics is to evaluate the social desirability of alternative allocations of resources (Henderson and Quandt 1971). According to Just, Hueth, and Schmitz (1982:3), "welfare economics is concerned with what 'ought' to be; that is, welfare economics is normative economics. Welfare economics focuses on using resources optimally so as to achieve the maximum well-being for the individuals in society." It is the study of the level and distributions of individuals' and groups' well-being in the community economy. In essence, welfare economics allows differing allocations of resources to be compared to see under which outcome society will be best off (Hartwick and Olewiler 1986). Welfare economics is theoretically based upon the idea that consumers receive a "surplus" above the price for the goods and services they purchased when the price paid is actually less than they would have been willing to pay to consumer those same goods and services. Similarly, producers receive a "surplus" for the goods and services which they sell to consumers when the price paid by the consumers is actually above the cost incurred to produce those same goods and services. The sum of all such consumer and producer surpluses in a community is a measure of welfare attributable to the associated markets.

Fundamental to welfare economics is the notion that while welfare is not truly observable; it can, however, be given by an individual's utility level and, subsequently, the individual can rank alternative bundles of goods and services. The utility, or "happiness," level for a tourist visiting a destination community is dependent then upon the mix of goods and services consumed as well as things such as environmental quality and freedom from excessive congestion (called non-market goods). Additionally, the tourist is able to rank (ordinal utility) alternative bundles of goods and services available. Unfortunately, it is not possible to know exact differences or the intensity (cardinal utility) of preferences between those alternative bundles. Indeed, no objective way currently exists for solving the problem of interpersonal comparisons either (Just, Hueth, and Schmitz 1982).

3.1.1 Compensation Principle

According to what is known as the "new welfare economics," only those policies which make some people better off without making anyone worse off should be considered (Starret 1988). This criterion is referred to as the Pareto principle and can be very limiting in that very few potential policy actions might actually satisfy it. As a result, the compensation principle was developed. Under this principle, a change should be made if potential gain exists so all could be made better off by some redistribution of goods, services, or income following a change (Just, Hueth, and Schmitz 1982). This also known as the compensation test. For example, a policy designed to limit the number of boats on Great Salt Pond is said to be preferred to the existing policy (e.g., no limitations on the number of boats using the Pond) if, by moving from the existing policy of no limitations to the policy where limitations on the number of boats are established, everyone can potentially be made better off.

However, it was shown by Scitovsky (1941) that a reversal paradox might arise where the policy containing limitations on the number of boats on Great Salt Pond is preferred to the policy of no limitations and vice versa. For example, cases can be shown to exist where gainers can compensate losers in a move from the policy of no limitations on the number of boats to the policy whereby limitations are introduced using the initial prices and income distribution to evaluate the change. Yet, using the subsequent prices and income distribution, the losers can compensate gainers in going back to the original policy of no limitations on the number of boats. The Scitovsky paradox was resolved by making it impossible for the losers to bribe the gainers into not making the change (Just, Hueth, and Schmitz 1982).

3.1.2 Compensating and Equivalent Variation

As mentioned above, welfare economics is concerned with individual and group utility levels. Utility levels, however, are not directly measurable and an alternative measure is needed. Such an observable measure can be found in the amount an individual is willing to pay or willing to accept to move from one situation to another. Two willingness to pay measures have been developed, both of which can be employed directly in performing the compensation tests also described above: compensating variation and equivalent variation. "Compensating variation is the amount of money which, when taken away from an individual after an economic change, leaves the person just as well off as before" (Just, Hueth, and Schmitz 1982:10). For example, when the price of a good falls, the compensating variation measure gives the maximum amount of money that can be taken from a household while leaving it just as well off as before the fall in prices (Johannson 1987). "Equivalent variation is the amount of money paid to an individual which--if an economic change does not happen--leaves the individual just as well off as if the change had occurred" (Just, Hueth, and Schmitz 1982:11). For example, the equivalent variation measure gives the minimum amount of money that must be given to a household to make it as well off as it would have been after a fall in prices--had the fall in prices actually occurred (Johansson 1987).

Mathematically, compensating variation (CV) in income associated with a change in prices and income from initial prices and income (p^0 and Y^0) to subsequent prices and income (p^1 and Y^1) can be written (it will be derived later in this chapter), using the expenditure function (i.e., the minimum amount of expenditure necessary to gain a utility level as high as the initial utility level at given prices), as

$$CV = Y^1 - Y^0 + e(p^0,U^0) - e(p^1,U^0)$$

$$= Y^1 - Y^0 - \int_c x(p, U^0)\, dp$$

where Y is income, e(p,U) is the expenditure function in terms of prices and utility, x indicates the Hicksian demand function, and c is some path between initial and final price-income vectors. Similarly, equivalent variation (EV) in income associated with a change in prices and income from initial prices and income (p^0 and Y^0) to subsequent prices and income (p^1 and Y^1) can be written (it will be derived later in this chapter), again using the expenditure function, as

$$EV = Y^1 - Y^0 + e(p^0,U^1) - e(p^1,U^1)$$

$$Y^1 - Y^0 - \int_c x(p,U^1)\,dp$$

where Y is income, e(p,U) is the expenditure function, c is some path between initial and final price-income vectors, x indicates the Hicksian demand function, and U^1 is the fixed (final) utility level.

3.1.3 Pareto Optimality in Production and Consumption

The Pareto criterion states that a policy change is desirable if by the change at least some people are made better off and no one is made worse off from the change. If it is possible to move from the policy of no limitations on the number of boats using Great Salt Pond on Block Island to a policy which limits the number of boats using the waterway and still satisfy the Pareto criterion, it is called a Pareto improvement. If a community finds itself in a position from which there are no feasible Pareto improvements (i.e., it is impossible to move to another state without making at least one person worse off), that state is called a Pareto optimum. When the economy is not in the state of Pareto optimality, there is some inefficiency in the system and some improvement can be made so that the community can get as much as possible out of its limited resources. Lastly, Pareto-noncomparable states are those states where one person is made better off at the expense of another.

The conditions for Pareto optimality with respect to consumers and producers, separately and jointly, can be simply illustrated (Just, Hueth, and Schmitz 1982). For the consumption case where there are two individuals (one resident and one tourist) and two goods which have been already been produced (leisure and non-leisure) and which can be distributed between the two individuals, Pareto optimality exists within the economy where both consumers have equal marginal rates of substitution for the two goods. The marginal rate of substitution for each consumer measures the rate at which each is willing to trade one good for another at the margin. Mathematically, this condition can be derived by maximizing one person's utility (the resident's, U_1) while fixing the other person's (the tourist's, U_2) utility at an arbitrary level (U_2^0) as well as fixing the total amount of the two goods (leisure, q_L^0 and non-leisure, q_{NL}^0) available for consumption (Silberberg 1990). For example, the problem of optimal allocation of goods between the resident and tourist consumers can be formulated mathematically as follows:

maximize: $U_1(zq_{1L}, q_{1NL})$

subject to: $U_2(zq_{2L}, q_{2NL}) = U_2^0$,

$q_{1L} + q_{2L} = q_L^0$, and

$q_{1NL} + q_{2NL} = q_{NL}^0$

where:

$U_1(zq_{1L}, q_{1NL})$ is the utility function for the resident consuming leisure and non-leisure goods (note that z represents a socio-environmental index which effects the consumption of the leisure good)

$U_2(zq_{2L}, q_{2NL})$ is the utility function for the tourist consuming leisure and non-leisure goods;

U_2^0 is the arbitrary level at which utility of the tourist is fixed;

$q_{1L} + q_{2L} = q_L^0$ is the total amount of leisure goods available; and

$q_{1NL} + q_{2NL} = q_{NL}^0$ is the total amount of leisure goods available.

Using the Lagrangian Multiplier Method, this problem can be written as follows:

$$L = U_1(zq_{1L}, q_{1NL}) + M[U_2(q_L^0 - zq_{1L}, q_{NL}^0 - q_{1NL}) - U_2^0]$$

Differentiating with respect to q_{1L}, q_{1NL} and the Lagrangian Multiplier M yields:

$$dL/dq_{1L} = z(dU_1/dq_{1L}) - Mz(Du_2/dq_{1L}) = 0$$

$$dL/dq_{1NL} = z(dU_1/dq_{1NL}) - Mz(dU_2/dq_{1NL}) = 0$$

$$dL/dM = U_2(q_L^0 - zq_{1L}, q_{NL}^0 - q_{1NL}) - U_2^0 = 0$$

Combining the above three equations gives:

$$(dU_1/dq_{1L})/(dU_1/dq_{1NL}) = (dU_2/dq_{1L})/(dU_2/dq_{1NL})$$

which states that the marginal rate of substitution between leisure (q_L) and non-leisure (q_{NL}) for both the resident (U_1) and the tourist (U_2) are equal.

For producers, Pareto optimality exists when the marginal rate of technical substitution between any two inputs (leisure, L, and capital, K) is the same for all industries (leisure, Q_L and non-leisure, Q_{NL}) that use those inputs. The marginal rate of technical substitution measures the rate at which one input can be substituted for another while holding the level of output constant. The mathematical derivation of this Pareto-optimal condition is very similar to the preceding analysis of the consumer. In this case, one maximizes the production function of one good (leisure, Q_L) while holding the production function of the other good (non-leisure, Q_{NL}) constant (Q_{NL}^0) as well as fixing the total amount of the two inputs (L^0 and K^0) available for production (Silberberg 1990). For example, the problem of optimal production between leisure and non-leisure goods can be formulated mathematically as follows:

maximize: $Q_L(L_L, K_L)$

subject to: $Q_{NL}(L_{NL}, K_{NL}) = Q_{NL}^0$,

$L_L + L_{NL} = L^0$, and

$K_L + K_{NL} = K^0$

where:

$Q_L(L_L,K_L)$ is the production function for producing leisure goods using labor (L) and capital (K) inputs;

$Q_{NL}(L_{NL},K_{NL})$ is the production function for producing non-leisure goods using labor (L) and capital (K);

$Q_{NL}{}^0$ is the arbitrary level at which the production of non-leisure goods is fixed;

$L_L + L_{NL} = L^0$ is the total amount of labor available; and

$K_L + K_{NL} = K^0$ is the total amount of capital available.

Using the Lagrangian Multiplier Method, this problem can be written as follows:

$$L = Q_L(L_L,K_L) + M[Q_{NL}(L^0-L_L,K^0-K_L) - Q_{NL}{}^0]$$

Differentiating with respect to L_L, K_L and the Lagrangian Multiplier M yields:

$$dL/dL_L = dQ_L/dL_L - M(dQ_{NL}/dL_L) = 0$$

$$dL/dK_L = dQ_L/dK_L - M(dQ_{NL}/dK_L) = 0$$

$$dL/dM = Q_{NL}(L^0-L_L,K^0-K_L) - Q_{NL}{}^0 = 0$$

Combining the above three equations gives:

$$(dQ_L/dL_L)/(dQ_L/dK_L) = (dQ_{NL}/dL_L)/(dQ_{NL}/dK_L)$$

which states that the marginal rate of technical substitution between labor (L_L) and capital (K_L) for both the producers of leisure (Q_L) and non-leisure (Q_{NL}) goods are equal.

Lastly, when society can choose a particular product mix, Pareto optimality exists when the marginal rate of transformation equals the consumers' marginal rate of substitution. The marginal rate of transformation measures the rate at which one output can be traded for another holding given input levels constant. It is possible to mathematically derive the overall Pareto optimal conditions by maximizing one person's utility while fixing the other person's utility and subject to the production possibility curve which consists of all the Pareto-efficient production points in society (Silberberg 1990). Thus, the locus of overall efficient (Pareto optimal) points is defined by:

maximize: $U_1(zq_{1L}, q_{1NL})$

subject to: $U_2(zq_{2L}, q_{2NL}) = U_2^0$,

$q_{1L} + q_{2L} = q_L^0$,

$q_{1NL} + q_{2NL} = q_{NL}^0$, and

$F(q_L, q_{NL})$

where:

$U_1(zq_{1L}, q_{1NL})$ is the utility function for the resident consuming leisure and non-leisure goods (note that z represents a socio-environmental index which effects the consumption of the leisure good)

$U_2(zq_{2L}, q_{2NL})$ is the utility function for the tourist consuming leisure and non-leisure goods;

U_2^0 is the arbitrary level at which utility of the tourist is fixed;

$q_{1L} + q_{2L} = q_L^0$ is the total amount of leisure goods available;

$q_{1NL} + q_{2NL} = q_{NL}^0$ is the total amount of leisure goods available; and

$F(q_L, q_{NL})$ is the production function for both leisure and non-leisure goods written in implicit form.

The Lagrangian for the above specified equations can be written using a social welfare function, $W[U_1(q_L q_{NL}) + U_2(q_L q_{NL})]$, (Silberberg 1990) and is

$$L = W[U_1(zq_L, q_{NL}) + U_2(zq_L, q_{NL})] + MF(q_L, q_{NL})$$

Differentiating with respect to q_L, q_{NL} and the Lagrangian Multiplier M yields:

$$dL/dq_L = z(dW/dU_1)(dU_1/dq_L) + (dW/dU_2)(dU_2/dq_L) + MF(dF/dq_L) = 0$$

$$dL/dq_{NL} = z(dW/dU_1)(dU_1/dq_{NL}) + (dW/dU_2)(dU_2/dq_{NL}) + MF(dF/dq_{NL}) = 0$$

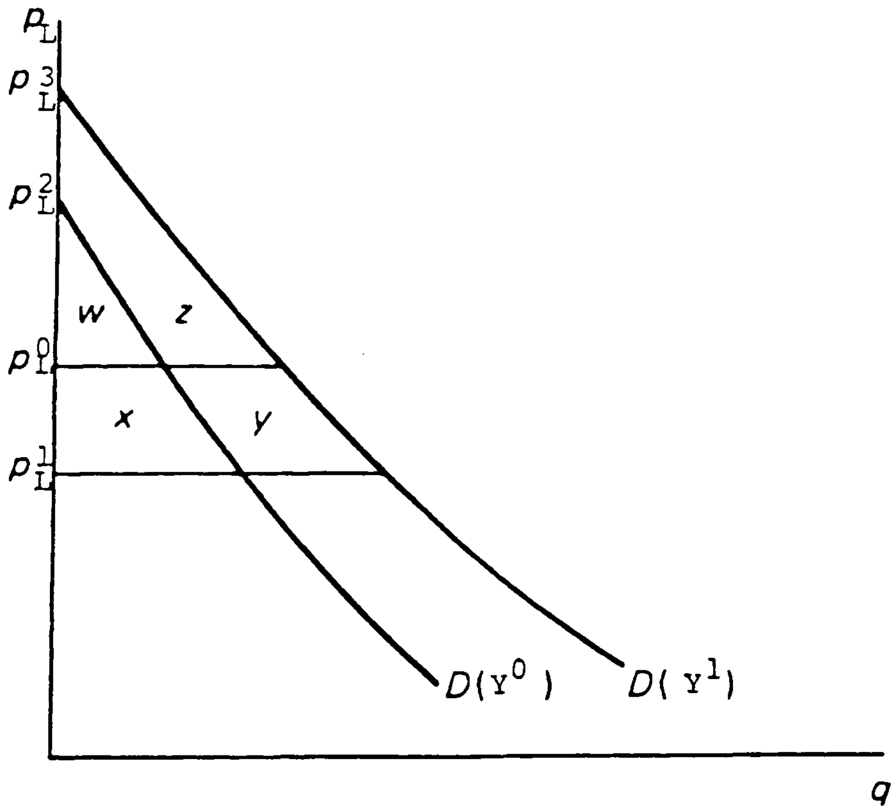
$$dL/dM = F(q_L, q_{NL})$$

Combining the above three equations gives:

$$(dU_1/dq_L)/(dU_1/dq_{NL}) = (dU_2/dq_L)/(dU_2/dq_{NL}) = (dF/dq_L)(dF/dq_{NL})$$

which states that the marginal rate of substitution between leisure (q_L) and non-leisure (q_{NL}) for both the resident (U_1) and the tourist (U_2) are equal. In addition, the above results show that the marginal rates of substitution for

Figure 3.2 Path Dependency Problem When Price and Income Change Simultaneously.



the area to the left of the demand curve $D(Y^0)$ and above the price line (P_L^0). If the price change from P_L^0 to P_L^1 is considered first (the demand curve $D(Y^0)$ will not shift), the change in consumer surplus is represented by a gain in area X. However, if the income effect of the price change is considered first (i.e., the demand curve will shift outward from $D(Y^0)$ to $D(Y^1)$), the change in consumer surplus is represented by area X + Y.

When both prices and income change simultaneously, a unique measure of consumer surplus will be possible only if the income effect is zero. This means that the change in quantity consumed associated with a change in income is zero. For the case when multiple price changes occur simultaneously, a unique measure of consumer surplus will be uniquely defined only if all income elasticities of demand are unity (Just, Hueth, and Schmitz 1982). The money measure of consumer surplus depends only on the initial and terminal prices of the considered path; it does not depend on the path itself (Johansson 1987).

Another important issue with respect to the measurement of consumer welfare relates to whether or not consumer surplus can provide a meaningful money measure of changes in a consumer's utility. As discussed above, a change in consumer surplus is simply a money-equivalent measure of the effect of changing prices and, sometimes, income. A unique relationship between the change in consumer surplus and the change in consumer utility can be made only when the marginal utility of income is constant with respect to all prices which change as well with respect to income if it changes (Just, Hueth, and Schmitz 1982).

For example, consider a consumer (a tourist), maximizing utility subject to a budget constraint

maximize: $U_1(zq_L, q_{NL})$

subject to: $Y_1 = p_L q_L + p_{NL} q_{NL}$

where:

$U_1(zq_L, q_{NL})$ is the utility of the tourist as a function of leisure goods (zq_L, recalling that z is a socio-environmental index directly related to the consumption of leisure goods) and non-leisure goods (q_{NL});

Y_1 is the total income for the tourist;

p_L and p_{NL} are prices for leisure and non-leisure goods, respectively; and

q_L and q_{NL} are quantities of leisure and non-leisure goods, respectively.

The Lagrangian for the above problem becomes

$$L = U_1(zq_L, q_{NL}) - M(Y_1 - p_L q_L - p_{NL} q_{NL})$$

Differentiating the Lagrangian with respect to q_L, q_{NL}, and the Lagrangian Multiplier M yields the following first order conditions

$$dL/dq_L = z(dU_1/dq_L) - M(p_L) = 0$$

$$dL/dq_{NL} = (dU_1/dq_{NL}) - M(p_{NL}) = 0$$

$$dL/dM = Y_1 - p_L q_L - p_{NL} q_{NL} = 0$$

In principle, the first order condition can be solved for

q_L, q_{NL}, and M:

$$q_L = q_L^*(p_L, p_{NL}, Y)$$
$$q_{NL} = q_{NL}^*(p_L, p_{NL}, Y)$$
$$M = M^*(p_L, p_{NL}, Y)$$

which specify optimal output levels for given prices. Substituting $q^*(p_L, p_{NL}, Y)$ for both leisure and non-leisure goods as well as $M^*(p_L, p_{NL}, Y)$ into the original utility function yields the indirect utility function:

$$U^* = U_1[zq_L^*(p_L, p_{NL}, Y), q_{NL}^*(p_L, p_{NL}, Y)] + M^*(p_L, p_{NL}, Y)[Y_1 - p_L q_L^*(p_L, p_{NL}, Y) - p_{NL} q_{NL}^*(p_L, p_{NL}, Y)]$$

Differentiating this indirect profit function with respect to p_L, p_{NL}, and Y_1 , rearranging terms, ans substituting back into the equations the first order conditions derived above yields

$$dU^*/dp_L = [z(dU^*/dq_L)(dq_L^*/dp_L)] + (dU^*/dq_{NL})(dq_{NL}^*/dp_L)$$
$$- M^*(p_L, p_{NL}, Y)[p_L(dq_L^*/dp_L)]$$
$$- M^*(p_L, p_{NL}, Y)[q_L^*(p_L, p_{NL}, Y)]$$
$$- M^*(p_L, p_{NL}, Y)[p_{NL}(dq_{NL}^*/dp_L)]$$
$$+ [M^*(p_L, p_{NL}, Y)/dp_L][Y_1 - p_L q_L^*(p_L, p_{NL}, Y) - p_{NL}q_{NL}^*(p_L, p_{NL}, Y)]$$

$$= [z(dU^*/dq_L) - M^*(p_L, p_{NL}, Y)(p_L)](dq_L^*/dp_L)]$$
$$+ [(dU^*/dq_{NL}) - M^*(p_L, p_{NL}, Y)(p_{NL})](dq_{NL}^*/dp_L)$$
$$- M^*(p_L, p_{NL}, Y)[q_L^*(p_L, p_{NL}, Y)]$$
$$+ [M^*(p_L, p_{NL}, Y)/dp_L][0]$$

$$= - M^*(p_L, p_{NL}, Y)[q_L^*(p_L, p_{NL}, Y)]$$

$$dU^*/dp_{NL} = [z(dU^*/dq_L)(dq_L^*/dp_{NL})] + (dU^*/dq_{NL})(dq_{NL}^*/dp_{NL})$$
$$- M^*(p_L, p_{NL}, Y)[p_{NL}(dq_{NL}^*/dp_{NL})]$$
$$- M^*(p_L, p_{NL}, Y)[q_{NL}^*(p_L, p_{NL}, Y)]$$
$$- M^*(p_L, p_{NL}, Y)[p_L(dq_L^*/dp_{NL})]$$
$$+ [M^*(p_L, p_{NL}, Y)/dp_{NL}][Y_1 - p_L q_L^*(p_L, p_{NL}, Y) - p_{NL}q_{NL}^*(p_L, p_{NL}, Y)]$$

$$= [z(dU^*/dq_L) - M^*(p_L, p_{NL}, Y)(p_L)](dq_L^*/dp_{NL})]$$
$$+ [(dU^*/dq_{NL}) - M^*(p_L, p_{NL}, Y)(p_{NL})](dq_{NL}^*/dp_{NL})$$
$$- M^*(p_L, p_{NL}, Y)[q_{NL}^*(p_L, p_{NL}, Y)]$$
$$+ [M^*(p_L, p_{NL}, Y)/dp_{NL}][0]$$

$$= - M^*(p_L, p_{NL}, Y)[q_L^*(p_L, p_{NL}, Y)]$$

$$dU^*/dY_1 = - M^*(p_L, p_{NL}, Y)$$

Given that both dU^*/dp_L and dU^*/dp_{NL} both equal $-M^*(p_L,p_{NL},Y)[q_L^*(p_L,p_{NL},Y)]$, integration of this result yields

$$-\int_c M^*(p_L,p_{NL},Y)\,[q_L^*(p_L,p_{NL},Y)\,dp-dy]$$

An attempt to obtain a unique measure of consumer welfare requires information on the first term, $M^*(p_L,p_{NL},Y)$, which is known as the marginal utility of income, and it is generally unobservable. Hence, a money measure of utility change can be obtained by adding to the change in income all the changes in consumer surpluses in the markets where prices change. Unfortunately, the order in which prices and incomes are changed may affect the magnitude as well as the sign of consumer surplus. As long as the marginal utility of income is constant, then a unique welfare measure is possible. However, if $M^*(p_L,p_{NL},Y)$ isn't constant, then a unique measure of welfare is not possible using the Marshallian demand curve.

Similarly, substituting the result, $dU^*/dY^1 = -M^*(p_L,p_{NL},Y)$, into either

$$dU^*/dp_{NL} = - M^*(p_L, p_{NL}, Y)[q_{NL}^*(p_L, p_{NL}, Y)] \quad \text{or}$$

$$dU^*/dp_L = - M^*(p_L, p_{NL}, Y)[q_L^*(p_L, p_{NL}, Y)]$$

and rearranging terms yields

$$(dU^*/dp_L)/-(dU^*/dY^1) = q_L^*(p_L, p_{NL}, Y)$$

This equation is called Roy's Identity where $q_L^*(p_L, p_{NL}, Y)$ is the Marshallian or ordinary demand curve. As long as the term dU^*/dY^1, the marginal utility of income, is constant, it is possible to integrate it and a unique welfare measure is possible. However, if dU^*/dY^1 isn't constant, then a unique measure of welfare is not possible using the Marshallian demand curve. Roy's Identity suggests that a theory of demand may be constructed by making assumption on the indirect utility function instead of the direct utility function. Specifically, Roy's Identity can be used to show that it is possible to move from the Hicksian demand curve to the Marshallian demand curve.

3.3.2 Compensating and Equivalent Variation

The ordinary consumer surplus measure discussed above is an intuitively appealing measure of the consumer welfare effect of a price and/or income change. Just, Hueth, and

Schmitz (1982) point out, however, that it is generally ambiguous (i.e., not unique) in its measurement and requires very restrictive path-independence conditions on the consumer's utility function. In addition, it requires even more restrictive conditions of constancy of the marginal utility of income to guarantee even some sort of ordinal (i.e., qualitative) relationship with the actual utility change.

Since the conditions which ensure that consumer surplus can be a unique money measure for changes in the utility of consumers are very restrictive, two alternative methods which measure a consumer's "willingness to pay" were developed by Hicks (1943): compensating variation and equivalent variation. Compensating and equivalent variations were generally defined earlier in this chapter. This section focuses on price and/or income changes for the consumer and the definitions now imply that compensating variation "is the amount of income which must be taken away from a consumer (possibly negative) after a price change to restore the consumer's original welfare level. Similarly, equivalent variation is the amount of income that must be given to a consumer (again possibly negative) in lieu of price and income changes to leave the consumer as well off as with the change" (Just, Hueth, and Schmitz 1982:85). In order to explain these concepts, it is useful to introduce the expenditure function. This function gives the minimal expenditure necessary to reach, at most, a pre-specified level of utility.

For example, consider the typical tourist who seeks to

minimize: $Y_1 = p_L q_L + p_{NL} q_{NL}$

subject to: $U_1^0 = U_1(zq_L, q_{NL})$

where:

$Y_1 = p_L q_L + p_{NL} q_{NL}$ is the budget constraint for the tourist which gives the minimal expenditure in terms of prices and income to reach the pre-specified level of utility; and

$U_1^0 = U_1(zq_L, q_{NL})$ is the pre-specified level of utility which is a function of leisure and non-leisure goods (note: z still represents the socio-environmental index which only affects leisure goods)

The Lagrangian of the above equation is

$$L = p_L q_L + p_{NL} q_{NL} + M[U_1^0 - U_1(zq_L, q_{NL})]$$

Differentiating the Lagrangian with respect to q_L, q_{NL}, and the Lagrangian Multiplier M yields

$$dL/dq_L = p_L - Mz(dU_1/dq_L = 0$$

$$dL/dq_{NL} = p_{NL} - M(dU_1/dq_{NL} = 0$$

$$dL/dM = U_1^0 - U_1(zq_L, q_{NL}) = 0$$

It is possible to solve for optimal levels of q_L^*, q_{NL}^*, and M^* using the above equations. Substituting these values into the expenditure function gives the indirect expenditure function in terms of prices and utility:

$$E^* = p_L q_L^*(p_L, p_{NL}, U) + p_{NL} q_{NL}^*(p_L, p_{NL}, U)$$
$$+ M^*(p_L, p_{NL}, U)[U_1^0 - U_1[zq_L^*(p_L, p_{NL}, U), q_{NL}^*(p_L, p_{NL}, U)]$$

Differentiating the above indirect expenditure function with respect to p_L and p_{NL} as before, rearranging terms, and substituting first order conditions, etc., yields the following equations:

$$dE^*/dp_L = q_L^*(p_L, p_{NL}, U)$$

$$dE^*/dp_{NL} = q_{NL}^*(p_L, p_{NL}, U)$$

Integration of either of the above equations, for example,

$$\int q_L^*(p_L, p_{NL}, U)\, dp_L$$

yields a unique welfare measurement for consumers' willingness to pay.

With respect to the price increase scenario which has been utilized throughout this chapter, the concept of compensating variation is illustrated in Figure 3.3 (i.e., where the price of the leisure good (q_L) rises while the price of the non-leisure good (q_{NL}) remains fixed ($p_{NL} = p_{NL}^0$). Prior to some policy change, the tourist is at utility level U^0 and subject to the budget constraint or expenditure function $e(p_L^0, p_{NL}^0\ U^0)$. At the point of tangency, the tourist would optimally consume quantities q_L^0 and q_{NL}^0. As the result of a policy change, price of q_L

increases from P_L^0 to P_L^1 and both the expenditure function and utility function shifts inward accordingly to $e(P_L^1, p_{NL}^0, U^1)$ and $U=U^1$, respectively. If held at this level, the tourist would optimally consume q_L^1 and q_{NL}^1. The corresponding compensating variation would be given by the amount of money which must be given to a tourist, after a price change, to hold him at his initial utility level ($U=U^0$) and subject to the expenditure function $e(p_L^1, p_{NL}^0, U^0)$. The optimal consumption levels would then be X^* and Y^*. Compensating variation (CV) for the price increase, then, can be expressed by the equation:

$$CV = Y^1 - Y^0 + e(p_L^0, p_{NL}^0, U^0) - e(p_L^1, p_{NL}^0, U^0)$$

$$= Y^1 - Y^0 + \int_c q_L^*(p_L, p_{NL}^0, U^0)\, dp_L$$

where c is some path between initial and final price-income vectors.

Again, using the price increase scenario which has been utilized throughout this chapter, the concept of equivalent variation is also illustrated in Figure 3.3 (i.e., where the price of the leisure good (q_L) rises while the price of the non-leisure good (q_{NL}) remains fixed ($p_{NL} = p_{NL}^0$). Prior to some policy change, the tourist is at utility level U^0 and subject to the budget constraint or expenditure function $e(p_L^0, p_{NL}^0, U^0)$. At the point of tangency, the tourist would optimally consume quantities q_L^0 and q_{NL}^0. As the result of a policy change, price of leisure increases from P_L^0 to P_L^1 and both the expenditure function and utility function shifts inward accordingly to $e(p_L^1,p_{NL}^0,U^1)$ and $U=U^1$, respectively. If held at this level, the tourist would optimally consume q_L^1 and q_{NL}^1. The corresponding equivalent variation would be given by the amount of money which must be taken from a tourist, in lieu of a price change, to make the tourist as "well" off as he would be if the price change had actually occurred. In other words, the tourist would now be at the lower utility level $(U=U^1)$ and subject to the expenditure function $e(p_L^0,p_{NL}^0,U^1)$. The optimal consumption levels would then be q_L^* and q_{NL}^*. Equivalent variation (EV) for the price increase, then, can be expressed by the equation:

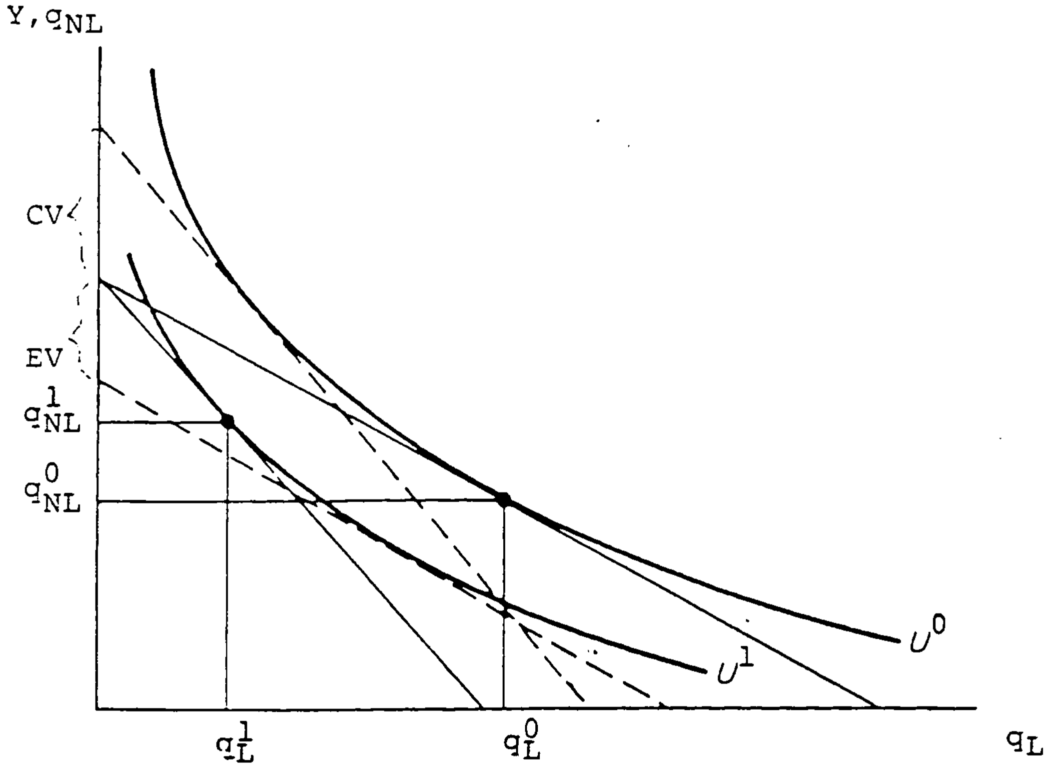
$$EV = Y^1 - Y^0 + e(p_L^0,p_{NL}^0,U^1) - e(p_L^1,p_{NL}^0,U^1)$$

$$=Y^1-Y^0+\int_c q_L^*(p_L,p_{NL}^0,U^1)\,dp_L$$

The two money measures of utility change described above are similar. The difference lies in that compensating variation is based upon keeping the consumer at their initial utility level $(U=U^0)$ whereas equivalent variation is based on moving the consumer to the new utility level $(U=U^1)$. Both approaches use the area between the initial and final prices to left of the income compensated demand curve (Hicksian) as the money measure of changes in the consumer's utility. Both contingent variation and equivalent variation approaches are difficult to empirically determine since actual utility levels cannot be observed. However, empirical approaches to indirectly estimate contingent and equivalent variations can be utilized to indirectly get at a measure for consumer surplus.

Consumer surplus, the calculated dollar area behind the demand curve and above the price line, obtains welfare significance only insofar as it can be related to the willingness-to-pay measures of consumer welfare change. If the income effect is "small," consumer surplus will provide a "good" approximation of either compensating variation or equivalent variation. Willig (1976), however, has provided precise quantitative guidance as to how "small" the income effect must be to obtain a "good" approximation. Specifically, it is possible to calculate error bounds on consumer surplus as an approximation of either welfare quantity. Since a dual relationship exists between demands and preferences, it is possible to determine preferences in an ordinal context from consumer demand equations (just as it is possible to derive demands from preferences through utility maximization).

Figure 3.3 Compensating and Equivalent Variation in Income When Only the Price of One Good Changes.



3.4 Aggregation to the Market Level

The preceding material has focused entirely upon the economic welfare analysis for individual producers and individual consumers of leisure and non-leisure goods. Policy options explored by communities using tourism as an economic development tool, however, often affect a large number of people. It is virtually impossible to determine the effects on each individual tourist, resident, or producer due to data and computational limitations. As a result, welfare analysis of policy alternatives usually requires some form of aggregation. Since it is the most practically applicable approach, the willingness to pay approach will be considered.

3.4.1 Aggregation Over Individual Producers

As shown earlier in this chapter, either compensating or equivalent variation (willingness to pay) for a price change by a producer is simply the change in the area behind the producer's supply curve or derived demand curve. The supply curves for two firms in an industry (e.g., leisure) can be horizontally summed over both those firms to obtain the leisure industry supply curve. Under competition, the industry supply curve represents the market supply curve of leisure goods and specifies how much will be produced by the industry at various prices. If, due to a policy change, price were to increase, the associated welfare effects for the change would be seen in the area behind the market supply curve for leisure and between the original and new price line, which represents the sum of the changes in areas behind individual supply curves. This area measures the sum of compensating or equivalent variations over all firms included in the market supply (Just, Hueth, and Schmitz 1982).

A similar aggregation property holds with respect to derived demand by all firms in an industry. The individual derived demand curves for the firms in the leisure industry can be summed horizontally. Under perfect competition, the industry demand curve represents the market demand curve and specifies how much will be demanded by the leisure market at various prices (e.g., wages). Assuming some policy change causes the price of wages to rise, the change in market consumer surplus is the sum of changes in individual firm consumer surpluses. Since those areas are exact measures of compensating and equivalent variation for the individual firms, the area behind the market demand curve and bbetween the initial and new price line is an exact measure of the sum of compensating or equivalent variations for the leisure industry.

There are some cases, however, where different producer groups should be considered separately. Examples of cases include the analysis of price support systems such as that in dairying and government-financed irrigation projects (Just, Hueth, and Schmitz 1982).

3.4.2 Aggregation Over Individual Consumers

In the case of consumers, unfortunately, surplus changes are rarely accurate measures of compensating or equivalent variation. However, the preceeding discussion shows that, under competition, the consumer surplus associated with a market demand curve is the same as the sum of individual consumer surpluses over all market participants. Areas to the left of ordinary market demands can be given a welfare interpretation if the (constant) social marginal utility of income is identical for all individuals. In other words, the product of the welfare weight and the marginal utility of income is constant and equal across individuals. This assumption, however, is probably unreasonable since it implies that the welfare weight of a high-income household exceeds the welfare weight of a low-income household. If the product of the welfare weight and the marginal utility of income varies across individuals, the sum of the consumer surpluses and the change in social welfare need not be equal.

The concepts of compensating and equivalent variation appear to be less restrictive (Johansson 1987). It becomes necessary then to "consider only aggregation of the errors associated with surplus changes as measurements of compensating and equivalent variation where quantity changes are imposed. But if assumptions for accuracy of surplus change hold for all individuals buying (selling) in a particular market, the same accuracy will hold for market surplus change since, with competition, all individual surplus changes will be in the same direction" (Just, Hueth, and Schmitz 1982:151).

Using Willig's (1976) approach, which can be used to calculate error bounds on consumer surplus as an approximation of either welfare quantity (contingent variation or equivalent variation), adding the lower bounds over all individuals attains a lower bound on the sum of compensating or equivalent variations. Similarly, adding upper bounds over all individuals attains an upper bound. Thus, for empirical purposes where errors in estimation are comparatively large, the simple changes in market surplus (changes in areas behind supply and demand curves) provide useful economic welfare quantities for cases where exogenous income elasticity of demand and the ratio of the change in consumer surplus to initial exogenous income is not large for any individual.

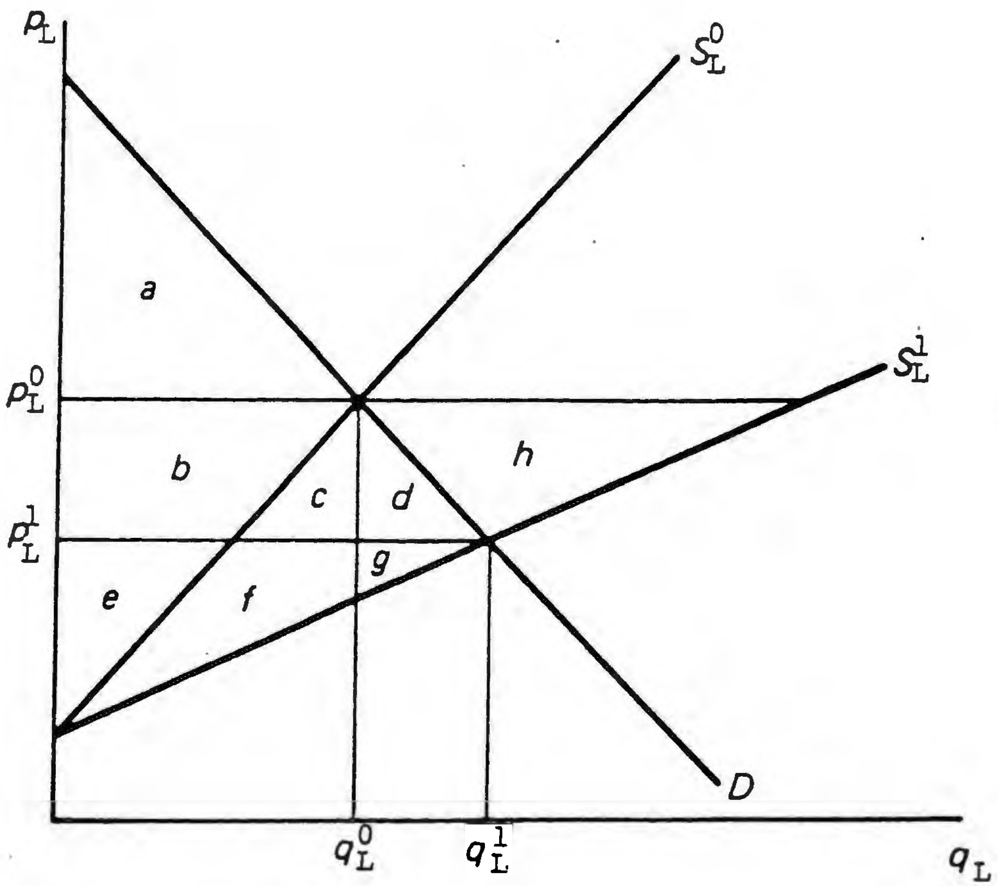
Of course, it must be kept in mind that aggregation of all consumers into a single market curve implies that the welfare weights are equal. If unequal welfare weights are more suitable, then consumer demand needs to be considered separately for each group that is to receive a different welfare weight.

3.4.3 Aggregation Across Producers and Consumers

This section demonstrates the economic welfare analysis of a simple policy change in taxation and its impacts across producers and consumers within a coastal tourism-oriented community. Consider Figure 3.4 with supply curve S_L^0, demand curve D_L, and equilibrium at price p_L^0 and quantity q_L^0. Initially consumer surplus is given by area A and producer surplus is given by area B and E. If a policy change is introduced which increases the number of boats using the Great Salt Pond (ignoring any decline in resource quality, the supply curve S_L^0 will shift outward to S_L^1 because of the increased supply of marina services within the community. As a result, equilibrium price p_L^0 falls to p_L^1 as output is increased from q_L^0 to q_L^1.

The welfare effects of such a policy are easy to see. Consumer surplus increases from area A to area A + B + C + D, for a gain of area B + C + D. If demand curve D represents the derived demand of the tour wholesalers that

Figure 3.4 Aggregation Across Producers and Consumers



maximizes profits, then area B + C + D represents the combined willingness to pay (either compensating or equivalent variation) of the wholesalers for the reduction in their input price. If the demand curve D represents an compensated consumer demand, then area B + C + D is an exact measure of the compensating or equivalent variation, depending on the conditional utility level.

If supply curves S_L^0 and S_L^1 represent marina (leisure) industry supply curves, the change in area behind the supply curve represents the combined willingness-to-pay of the tour wholesaler industry for the increase in volume. Producer surplus is area B + E before the policy change and is the area E + F + G after the policy change, so the gain for the industry is area F + G - B.

3.4.4 Social Welfare Functions

As discussed above, producer and consumer welfare effects can be examined using market supply and demand relationships. The effects of policy changes may be analyzed using either ordinary supply and demand curves or compensated supply and demand curves. It is possible to analyze such impacts by measuring the change in producer surplus associated with an essential output. Or, such impacts may be analyzed by measuring the change in consumer surplus associated with an essential input. Additionally, one may measure the sum of producer and consumer surplus changes obtained by sequentially imposing price changes in the respective markets.

In order to better rank all economic welfare states of society so that the social optimum can be determined, the concept of a social welfare function was also developed. The social welfare function is an ordinal index of society's welfare and is a function of the utility levels of all individuals such that a higher value of the function is preferred to a lower one. According to Just, Hueth, and Schmitz (1982), the social welfare function possesses properties with respect to the utilities of individuals very much along the lines one would expect: (1) an increase in the utility of any individual holding others constant increases social welfare (the Pareto principle); (2) if one individual is made worse off, then another individual must be made better off to retain the same level of social welfare; and (3) if some individual has a very high level of utility and another individual has a very low level of utility, then society is willing to give up some of the former individual's utility to obtain even a somewhat smaller increase in the latter individual's utility, with the intensity of this trade-off depending upon the degree of inequality.

The social welfare function is not unique, and its form depends upon the value judgement of the persons for whom it is a desirable welfare function. In certain cases it may be impossible to decide upon an acceptable form for the social welfare function by common consensus; it may then have to be imposed in dictatorial fashion. Whatever the case may be, its form depends upon the value judgements of its promulgators, since it expresses their views concerning the effect that the utility level of the ith individual has on the welfare of society. Moreover, the acceptance by an individual of the social welfare function for the purpose of solving the problem of distribution also involves a value judgement (Henderson and Quandt 1971).

According to Kuenne (1968) the formulation of the social welfare function implies several noteworthy things: (1) that individuals' preferences matter; (2) that no externalities exist among consumers' goods allocations; and (3) that firms' activities of all types do not have any potential for contributing to social welfare, other than in their production of goods for consumers and for investment. The significance of the last implication is that one need not be concerned with measuring producer surplus when using a social welfare function; consumer surplus approaches alone are appropriate measures of welfare changes.

3.5 Problems in Welfare Measurement

In theory, two measures of welfare change are compensating and equivalent variation. These measures are derived from the Hicksian demand functions (i.e., quantity demanded is a function of prices). In practice, the Hicksian demand function is difficult to estimate. The Marshallian demand function (i.e., demand is a function of prices and income) can, on the other hand, be estimated quite easily. From the Marshallian demand function, it is only possible to derive a measure of consumer surplus which is not usually unique. The very restrictive conditions of path dependence and the constancy of the marginal utility of income which were discussed earlier are required in order to guarantee an ordinal (ranking) relationship with actual utility change. If the product of income elasticity and the ratio of surplus changes to total income is, in absolute value, small, then the error will be very small. It was noted in this chapter that Willig argued that this condition held in most goods. Hence, this study will make the assumption that the income elasticity of any socio-environmental quality measure (as a normal good) would be very small. Consumer surplus, therefore, will be used as the approximation for compensating variation.

CHAPTER FOUR APPLIED GENERAL EQUILIBRIUM ANALYSIS

Up to this point, much of the discussion has focused upon economic theory concerning individual behavior of either firms or households. These models are useful in so far as they provide a means for learning how an economic unit (such as a firm) formulates its economic problems and the process it uses to solve them. In addition, these individual models of economic behavior are also useful in that they provide the basis for studying the behavior and performance of an economy as a whole. Models designed to describe the workings of an entire economic system, taking account of the interrelationships among prices in many markets and which use individual behavior models in their construction, are known as general equilibrium models. This chapter provides an overview of the economic theory underlying general equilibrium models, how such models are constructed, and the economic welfare measurement within the general equilibrium framework. In addition, this chapter focuses specifically upon applied general equilibrium analysis and how these applied models are implemented.

4.1 General Equilibrium Theory

The English economist Alfred Marshall (1920) showed that demand and supply simultaneously operate to determine price. The demand curve represents the quantity of a good demanded at each possible price. The curve is negatively sloped to represent the principle that as quantity increases, people are willing to pay less and less for the last unit purchased. The value of the last unit sets the price for all units purchased. The supply curve shows how marginal production costs rise as more and more output is produced. The demand and supply curves intersect at P^* and Q^*. This is known as the equilibrium point where both buyers and sellers are content with the quantity being traded and the price at which the trades occur. If the demand curve were to shift outward, the equilibrium point would also shift to a new P'^* and Q'^*. Hence, price and quantity are simultaneously determined.

Although the Marshallian model is an extremely useful tool, it is a partial equilibrium model which looks only at one market at a time. Unfortunately, this may prevent the discovery of important interrelationships. In partial equilibrium analysis, each market is regarded as independent and self-contained for all practical purposes. In particular, it is assumed that changes in price in one market being considered do not have repercussions on the prices in other markets. A model of the whole economy which mirrors the interrelationships among various markets and economic agents, particularly with respect to prices, is needed. Walras (1954) created the basis for such a method when he represented the economy by a large number of simultaneous equations, forming the basis for understanding the interrelationships implicit in general equilibrium analysis. Walras recognized that one cannot talk about a single market in isolation; what is needed is a model that permits the effects of a change in one market to be followed through other markets.

For example, suppose that the price of leisure goods on Great Salt Pond (e.g., marina services) were to increase. Marshallian analysis would seek to understand the reason for this increase by looking at conditions of supply and demand within the Great Salt Pond leisure market. General equilibrium analysis would look not only at the marina market but also at repercussions in other markets. A rise in the price of leisure goods such as marina services would cause increased costs for tour wholesalers (e.g., charter boat services), which would affect the supply of packaged charter boat tours. Similarly, the increased price of marina services might mean higher profits for the owners of leisure capital, which would affect the demand curves for all products and services that those marina capital-owners might buy. The demand curves for the products and services which the marina capital-owners consume would all shift out and that might create additional incomes for the providers of those products and services. Consequently, the effects of the initial increase in the price of a marina-related services would eventually spread throughout the Great Salt Pond economy. General equilibrium analysis attempts to develop models which permit the examination of such effects in a simplified setting.

General equilibrium analysis, like partial equilibrium analysis, can be used to solve a variety of problems. However, one of the most fundamental problems which general equilibrium models have been used to help solve is determining if a set of prices exist such that all of the markets within an economy would be in equilibrium simultaneously. (This problem is known as Walras' problem.) To further clarify this question, Mansfield (1970) put forth a definition of a state of general equilibrium within an economy in which the following conditions hold: (1) every consumer chooses the preferred market basket of goods and services subject to a budget constraint (which is determined by the prices of inputs and the prices of products and services); (2) every consumer supplies whatever amount of inputs preferred (given the input and product prices which prevail); (3) every firm maximizes its profits subject to the constraints imposed by the available technology, the demand for its products and services, the supply of inputs, as well as the notion that, in the long run, all profits are zero; and (4) the quantity demanded equals the quantity supplied at the prevailing prices in all product and input markets.

It is obvious from Mansfield's definition of general equilibrium that a large number of conditions must be satisfied simultaneously if a state of general equilibrium is to be achieved. However, in a perfectly competitive economy a general equilibrium can be achieved under a fairly wide set of conditions. Arrow and Debreu (1954) show that a general equilibrium exists if increasing returns to scale exist for no firm, at least one primary input supplied by a consumer must not be greater than that consumer's initial stock of the input, each consumer can supply all primary inputs, each consumer's cardinal utility function is continuous, the consumer's wants cannot be satiated, and the consumer's indifference curves are convex. Additionally, Walras' law states that the total value of excess demand is zero at any set of prices. There can be neither excess demand for all goods together nor excess supply and the proof of this lies with the fact that each individual in an exchange economy is bound by a budget constraint.

It should be noted, however, that there is not just one set of prices and outputs at which supply equals demand in all markets. Only relative prices affect the decisions of consumers, firms, and resource owners. If all markets are in equilibrium at one set of prices, they will also be in equilibrium if all prices are increased or decreased in the same proportion (i.e., homogenous of degree zero).

4.2 Construction of the model

As noted by Hadar (1966), there are two types of general equilibrium models: aggregated models and disaggregated models. In aggregated models, the entire economic system is described by relatively few functional relationships connecting several crucial variables (e.g., total employment, total amount of expenditures on consumption goods, etc.). Aggregated models are attractive for both their simplicity and the relative availability of empirical data. However, such models are not applicable to a large number of problems since many important variables and relationships tend to disappear in the process of aggregation. Disaggregated models, on the other hand, are characterized by their ability to represent every single economic decision-maker as well as every good in the economic system. To keep such models manageable, the number of markets considered can be limited to just a few (e.g., a factor market and a product market, etc.).

The data needed for the determination of a general equilibrium are the utility and production functions of all producers and consumers and their initial endowments of factors and/or commodities. The variables in the model are the prices of all factors and commodities and the quantities purchased and sold by each consumer and producer. The behavior assumptions require utility and profit maximization together with the critical condition that every market be cleared (Henderson and Quandt 1971).

4.2.1 Consumption Sector

Beginning with consumers, it can be assumed that each consumer maximizes a utility function which depends on leisure and another product, non-leisure. It is then possible to derive for each consumer a supply function of labor (which partially sets their budget) and a demand function for the leisure and non-leisure goods. Given the representative consumer's indifference map between the two goods and the budget line for the price ratio of the two goods, it is possible to determine the quantities of each good demanded. As discussed in Chapter Three, to obtain the market supply and demand functions, it is simply necessary to sum the respective functions of all the consumers within the market.

4.2.2 Production Sector

For the production sector, it is assumed that each producer is confronted with a certain technology which can be described by a conventional production function. In the simplistic two-good model being developed in this study, the factors of production include labor, capital, supplies, leisure goods, and non-leisure goods. It is also assumed that the producers behave like pure competitors in both the factor and the good market. In addition, it is assumed that all firms are profit-maximizers and that the general equilibrium model is "closed" (i.e., every flow of payments must be accounted for). Hence, it is necessary to impose upon each producer a budget constraint which forces the firm to equate receipts with expenditures--or a zero profit condition. It is now possible to derive for each producer a demand function for each factor of production (e.g., labor, etc.) and a supply function for either leisure or non-leisure goods. Once again, summing these supply and demand functions over all producers within the economy yields the respective market supply function for each good and the market demand function for each factor of production.

4.2.3 Integration of the Sectors

Once the two individual sectors have been developed, it is possible to obtain a complete picture of the whole system by combining the separate parts of the system. The main purpose of such an analysis is, of course, to learn something about the nature of general equilibrium of the economy (i.e., the state of affairs which prevails when both markets are simultaneously in equilibrium). Since quantities offered and demanded in each market depend upon relative prices, the set of prices clears all the factor markets and the market for leisure and non-leisure goods. For example, if the labor market is in equilibrium, then the amount paid out in wages by all producers is exactly equal to the incomes of laborers. But since each producers and each consumer must obey their respective budget constraint, it also follows that the amount received by producers in sales revenues for their goods must be equal to what all consumers pay out in expenditures for those goods. Since all transactions occur at some fixed price, the quantity of goods sold by producers is equal to the quantity of goods purchased by consumers. Therefore, if the labor market is in equilibrium in the model, then the market for goods must also be in equilibrium at the same price ratio (Walras' law).

4.2.4 An Example of How the Model Works

An important feature of general equilibrium modeling involves studying the reactions of the markets to disturbances which force the system temporarily out of equilibrium. Suppose that an increase takes place in any consumer's preference for time spent at leisure. This translates directly into a diminished willingness-to-work at any set of given wages (i.e., the classic labor-leisure trade-off). As a result of this change, the supply curve for labor will shift inward. The labor market is now in equilibrium at the new price ratio. However, if consumers offer less labor at the current wage rate, they will also receive a smaller income. The smaller income levels forces the consumers to spend less on non-leisure goods and the demand curve for non-leisure goods shifts inward as well. The market for non-leisure goods is now in equilibrium at the same new price ratio.

The move from the initial equilibrium in both markets to the new equilibrium is caused by each market's excess supply or demand. When the consumers' supply function of labor shifts inward, the labor market is confronted with excess demand. As a result of the lower incomes, consumers decrease their demand for non-leisure goods, shifting the market demand curve inward. The market for non-leisure goods is now confronted with excess supply of goods. In order to induce the availability of more labor, producers will raise their wage rates. Similarly, to induce more sales of non-leisure goods, producers will lower the price of their goods. The effect of these changes in the price of labor and non-leisure goods to change the price ratio and moves each market toward the new equilibrium.

4.2.5 Stability Properties

In order to facilitate the discussion of stability properties within the general equilibrium framework, a second good (leisure) needs to be introduced. For simplicity, some producers produce only non-leisure goods and some producers only produce leisure goods. It is also assumed that non-leisure and leisure are substitute goods. The model is now dependent upon the two price ratios: the price of leisure goods to the price of labor and the price of non-leisure goods to the price of labor. The markets are considered to be in equilibrium when the two sets of ratios are equal.

If the equilibrium is disrupted through a disturbance in the market for non-leisure goods (e.g., increased demand), the price for non-leisure goods will rise as a result of the increase in demand and a new price ratio for non-leisure goods and price of labor will result. (The labor rate will not change since the labor market has been purposefully held constant.) Now, however, the market for leisure goods is out of equilibrium. Recall that non-leisure and leisure goods are substitutes. A rise in price for non-leisure goods will stimulate demand for leisure goods. The excess demand for leisure goods results in an increase in that market's price ratio. As soon as the price of leisure goods rises, the market for non-leisure goods is in disequilibrium because the increase in price of leisure goods further raises the demand for non-leisure goods. The price of non-leisure goods will then rise to a new price ratio and the market for leisure goods is in disequilibrium. The price of leisure goods will rise again. As soon as the price of leisure goods rises again, the market for non-leisure goods is now in disequilibrium because the price ratio has changed. The price of non-leisure goods rises once more. And so on. It is intuitively obvious that the changes in the relative price ratios becomes steadily smaller and smaller until they converge at a certain price ratio. When a system reaches a point of convergence, it is referred to as being stable.

4.3 General Equilibrium Welfare Measurement

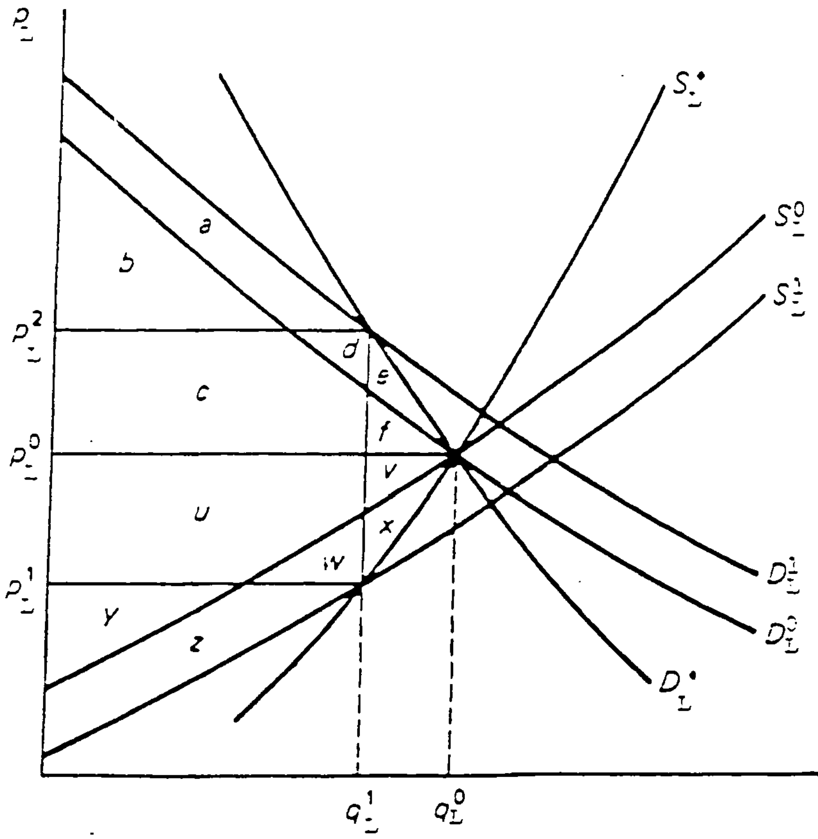
Now that the basics of the general equilibrium model have been outlined, it is possible to discuss the appropriate welfare measurement approaches. This section, accordingly, extends the welfare measurement discussed thoroughly in Chapter Three to consider the welfare effects of price changes in markets related to the one in which some change is introduced. Indeed, a question frequently addressed by general equilibrium models is whether any particular policy change improves welfare. In such circumstances, policy appraisal using general equilibrium modelling techniques usually relies upon a comparison between existing equilibrium (i.e., no change in policy) and what is referred to as a "counterfactual" equilibrium. The counterfactual equilibrium is computed with some sort of external force or modification in policy (e.g., taxes, quotas, etc.).

In vertical markets where a clearly defined marketing channel exists (e.g., production--distribution--retail), consideration needs to be given to welfare measurement of the effects of a price change on producers or consumers of competing commodities. For example, when the leisure industry uses a single input (e.g., supplies) available from a single supplier and the price of leisure output falls, a shift in the demand for inputs, including supplies, will occur. As a result, the input price of supplies will fall, causing the leisure goods industry to demand more supplies. Eventually, a new equilibrium is reached. In horizontal markets where one industry sells different products to different industries or where one industry buys different inputs from several different industries, consideration again needs to be given to welfare measurement of the effects of a price change on producers or consumers of competing commodities. For example, when the leisure industry uses multiple inputs, labor and capital (which are substitutes), and the price of labor rises, a shift in demand for capital will occur. The price of capital will rise since demand for it has increased. Eventually, the prices for both labor and capital will converge at some new market equilibrium. Regardless of whether the market is vertically or horizontally integrated, the appropriate welfare measurement of all effects of a price change is possible at any single market level: the "net social welfare effects over the economy as a whole of intervention in any single market can be measured completely in that market using equilibrium supply and demand curves of sufficient generality" (Just, Hueth, and Schmitz 1982:192). Since the net social welfare effects over the entire economy of intervention (e.g., price increase or decrease) in any single market can be measured completely in that market, this methodology can be extended to include effects of the rest of the economy as well.

There are two basic ways in which to measure the welfare effects of some policy change in a general equilibrium model (Just, Hueth, and Schmitz 1982). The first approach involves using ordinary supply and demand curves and the second approach involves using compensated supply and demand curves (i.e., a compensated demand curve is defined as the price-quantity demand relationship where all consumers are held at constant utility levels and all other prices adjust to equilibrium levels as the price in question changes). Using ordinary supply and demand curves, S_L^0 and D_L^0 with equilibrium at P_L^0 and Q_L^0, shown in Figure 4.1, consider the imposition of an ad valorem tax in the amount of $P_L^2 - P_L^1$ would have upon the economy. The consumer surplus measure for those industries or consumers directly consuming Q_L changes from area B + C + F to area A + B for a net loss of area C + F - A. The producer surplus measure for those industries selling leisure goods directly to consumers changes from area U + V + Y to area Y + Z for a net loss of area U + V - Z.

The second approach to measure the economic welfare effects of a policy change within a general equilibrium framework involves the use of compensated general equilibrium supply and demand curves. Suppose that S_L^* and D_L^* in Figure 4.1 are the compensated supply and demand curves which specify the respective marginal cost and price

Figure 4.1 Welfare Measurement with a General Equilibrium Framework for a Single Market



that result in a market for various levels of an ad valorem tax of $P_L^2 - P_L^1$ assuming that competitive adjustments occur in all other markets and there are no distortions in other markets (e.g., sales taxes, quotas, etc.). Prior to imposition of the tax, equilibrium within all markets occurs at P_L^0 and Q_L^0, where the compensated curves S_L^* and D_L^* intersect. In this case the net social welfare effect of the tax in the market is given by area E + F + V + X, which represents a loss for all producers, resource suppliers, and consumers. The area C + D + U + W represents a gain in tax for the government. The total loss for all private parties taken together then is area C + D+ E + F+ U + V + W + X.

If consumers and resource suppliers respond along compensated demand or resource supply curves, then the areas noted above apply exactly. But, if consumers and resource suppliers make noncompensated adjustments, then the above effects are approximate to the extent that noncompensated equilibrium approximates compensated equilibrium as well as the extent to which noncompensated equilibrium supply and demand approximates compensated supply and demand (Willig (1976) suggests that the latter approximation is sufficiently close to be useful).

Another problem with the use of single-market general equilibrium supply and demand curves for welfare measurement identified by Just, Hueth, and Schmitz (1982), is that such curves are often defined with respect to the variation in the particular kind of distortion that is being considered rather than with respect to variation in individual demand or supply prices. Noncompensated general equilibrium demand curves cannot be determined uniquely irrespective of the way supply price varies in relation to demand price. Noncompensated general equilibrium curves can only be determined in the context of a specific type of distortion.

4.4 Applied General Equilibrium Analysis

Applied general equilibrium analysis seeks to convert the Walrasian general equilibrium structure discussed above from an abstract representation of an economy into realistic models of actual economies. The idea is to use these models to evaluate policy options by specifying production and demand parameters and incorporating data reflective of real economies. As presented earlier, the general equilibrium approach provides an ideal framework for appraising the effects of policy changes on resource allocation and for assessing who gains and loses--policy impacts not covered very well by many macroeconomic models. Typically, the applications are microeconomic in nature--public finance, international trade, agriculture, and energy. Virtually all are computer-oriented and follow Leontief's input-output work (Manne 1984).

Specifically, applied general equilibrium analysis involves using a numerically specified general equilibrium model for policy evaluation. The essential elements of structure underlying the equilibrium formulation were presented earlier in this chapter and are fairly standard. For example, the number of consumers in the model is specified. Each of them has an initial endowment of the N commodities as well as a set of preferences which result in demand functions for each commodity. The summation of each individual consumers' demand leads to a market demand. These market demands depend upon prices and they are continuous, non-negative, homogenous of degree zero, and satisfy Walras' law. As far as production functions go, technology tends to be described by either constant returns to scale or at least non-increasing returns to scale. As usual, producers maximize profits. The homogeneity of degree zero demand function and the linear homogeneity of profits in prices (i.e., the doubling of all prices leads to a doubling of all money profits) implies that only relative prices are of any significance in the models. To recapitulate what was discussed earlier, the absolute price level has no impact what-so-ever on the equilibrium outcome.

Equilibrium, it will be recalled, is characterized by a set of prices and levels of production in each industry such that market demand equals market supply for all goods and services. No producer will ever do better than break even at the equilibrium prices since the assumption concerning maximization of profits under the constant returns-to-scale case exists (zero profit condition).

Once the parameters of the production and demand functions are specified and the factor endowments are known, a complete applied general equilibrium model is available. Using basic data for the economy for either a single year or an average of several years, adjustments are made for the sake of consistency and to serve as a benchmark for future comparison. Next, the functional forms are chosen and calibrated to the benchmark equilibrium. Solving the model then will result a set of market clearing prices for goods and factors, providing a solution to the simultaneous equations developed in the model. At the computed set of equilibrium prices, total demand for each output will exactly match the amount produced. Producer revenues will equal consumer expenditures. Labor and capital endowments will be fully employed and consumer factor incomes will match producer factor costs. If constant returns to scale are assumed, the per unit cost in each industry will equal the selling price, which means that economic profits are zero. The expenditures of each household will exhaust its income.

Next, applied general equilibrium models usually introduce some sort of distortion into the market (e.g., tax) to examine changes in equilibrium prices (known as a counterfactual equilibrium). The impacts of such a distortion as a tax may then be tracked throughout the economy to understand the ramification of a policy option (i.e., who wins or loses and by how much) prior to its actual implementation. In other words, will the policy change be welfare-improving? In instances such as these, a comparison between existing equilibrium and the counterfactual equilibrium are computed and numerical welfare measures of the gain or loss are constructed.

4.5 Implementing Applied General Equilibrium Analysis

Applied general equilibrium analyses are attempts to assemble and use models for policy evaluation. Using applied general equilibrium techniques, it is possible to compute alternative equilibria for different policy regimes and to assess impacts of the change. When designing and implementing applied general equilibrium analyses, a number of issues must be considered, including the: choice of model and functional forms, selection of parameter values, procedure selected for solving an equilibrium, and approach for reaching policy implications.

4.5.1 Choosing the Model

Although the appropriate general equilibrium model for policy analysis depends partly upon the focus of the analysis, most models have a similar form. They tend to be variants of static, two-factor models which have traditionally been employed in microeconomic theory. These models involve two or more goods and aggregate the factors of production into two broad types: capital and labor. Models constructed in this manner allow researchers to use the intuition gleaned from theoretical work to guide numerical investigations of policy alternatives. In addition, most data is readily available in a form consistent with the two factor model. Finally, the partition between goods and factors can be used in applied models so as to simplify computation and reduce solution costs (Shoven and Whalley 1984).

4.5.2 Choosing Functional Forms

When choosing functional forms, two important constraints exist: they must be consistent with the theoretical approach and they must be analytically tractable. Functions must be chosen which satisfy the restrictions listed earlier in the presentation of general equilibrium theory such as Walras' law, etc. Demand and supply responses of the economy must also be reasonable easy to evaluate for any set of prices which might be an equilibrium candidate.

The choice of a specific functional form typically depends on how elasticities are to be used in the model. For example, demands derived from Cobb-Douglas utility functions are very easy to work with but have restrictions which some may consider implausible (e.g., unitary income, uncompensated own-price elasticities. etc.). If constant elasticity of substitution (CES) functions are used, then unitary own-price elasticities no longer apply. However, if all expenditure shares are small, the compensated own-price elasticities equal the elasticity of substitution in the preferences, and it may be unacceptable to model all commodities in such a manner (Shoven and Whalley 1984). The general approach, however, seems to be one of selecting the functional form that best allows key parameter values to be incorporated while retaining tractability.

4.5.3 Selecting Parameter Values

Parameter values for the functional forms are frequently crucial in determining results of policy simulations generated by the applied models. Calibration is the procedure most commonly used to select parameter values.

With calibration, the economy under consideration is assumed to be in equilibrium (a benchmark equilibrium). The parameters of the model are then chosen such that the model can reproduce that data set as an equilibrium solution. The parameter values generated can then be used to solve for the alternative equilibrium associated with any policy regime (counterfactual equilibrium).

This procedure uses the key assumption that the benchmark data represent an equilibrium for the economy under investigation. According to Shoven and Whalley (1984), the calibration technique is widely used even though it is deterministic, not stochastic. They cite the unrealistically large number of observations and overly severe identifying restriction which would be needed to econometrically estimate through time series methods the parameters as a basis for their conclusion.

4.5.4 Solving Models for Counterfactual Equilibria

The traditional approach to computing equilibria is a calculation in the space of commodity prices (Scarf 1973). The data for this calculation are demand and supply functions expressed in terms of commodity prices. A fixed point algorithm then determines a price vector at which the supply of each commodity exceeds or equals the demand for that quantity. Unfortunately, the computational requirements of fixed point algorithms are quite substantial and severely limit the size of the problems which can be solved numerically. In such cases where the fixed point calculation is cumbersome, the calculation of supply and demand functions is replaced with the solution of a mathematical program. This program optimizes a social welfare function which is a weighted sum of consumer utility functions subject to material balance constraints. There exists a choice of welfare weights such that the welfare optimizing solution is an economic equilibrium. A fixed point calculation then searches for these equilibrium welfare weights. This approach is followed by Ginsburgh and Waelbroeck (1981), among others. Other methods of solving for equilibria include Merril's (1972) grid refinement technique and the Newton-type method (rapid solution of systems of nonlinear equations) as well as other local linearization techniques which work more quickly than Scarf's method yet do not guarantee convergence. Recently, Harrison and Kimbell (1983) developed an iterative procedure based on a Walrasian factor price revision rule to solve applied general equilibrium models.

Execution costs for existing models using all these techniques currently seem manageable. According to Shoven and Whalley (1984), no standard off-the-shelf computer routine has yet emerged for the complete sequence of data adjustment, calibration, and equilibrium computation due to the complexities involved in each application of these models. Recent technological advances as well as the proliferation of both computer hardware (e.g., increased speed from math co-processors and increased memory) and software (e.g., programs such as GAMS Minos, etc.). However, what seems clear from recent literature is that it is no longer the solution methods that constrain model applications, but rather the availability of data and the ability of modelers to specify key parameters.

4.5.5 Reaching Policy Conclusions

As noted earlier, theoretical welfare economics is usually followed in making comparisons between the original equilibrium and the induced counterfactual equilibria in order to arrive at policy conclusions. For welfare impacts, Hicksian compensating and equivalent variations are the most commonly used measures. For the economy as a whole, simply aggregating either the compensating or equivalent variation over the different consumer groups provides accurate welfare measurement. The sum of the compensating or equivalent variations as a social welfare function provide a detailed evaluation of who gains and who loses, as well as by how much, as a result of policy changes. Although distributional effects may be considered, most policy evaluation focuses upon whether or not any given policy changes increases or decreases aggregate welfare.

4.6 Applied General Equilibrium Models

Much of the work in applied general equilibrium modelling has been done in the area of taxation and international trade. Empirical general equilibrium tax models are especially useful in examining medium-run consequences in terms of distribution, efficiency, allocation, and growth (Bovenberg 1984). Many of the applied general equilibrium tax models are derived from work concerning U.S. corporate and capital income taxes conducted by Harberger (1962, 1966). Harberger's models involve two sectors (corporate and noncorporate), the introduction of an advalorem tax on capital income generated in the corporate sector, and redistributed of the revenues to consumers by the government. Shoven and Whalley (1972, 1973) were the first to analyze taxes using a full general equilibrium computational procedure and they developed a procedure to deal with several simultaneous tax distortions which was utilized by many other researchers (see, for example, Serra-Puche 1984).

Regardless of the detail incorporated into the models, most of the researchers emphasize a few key parameter values in determining results from their policy analyses, typically elasticity values and tax rates. Many times, the researchers must rely upon often conflicting estimates of elasticities from current literature. The most important contribution of many of these models has been the discovery of large dead-weight losses and potential redistributive power of tax rates. Some of the weaknesses of the models include the difficulties of choosing appropriate elasticity and other parameter values, as well as the inability of the models to incorporate fully detailed data which is available to other methods (Shoven and Whalley 1984).

Applied trade models are more varied than their tax counterparts. Some are multi-country models; others analyze only one country. Some of the models are general purpose and others are oriented exclusively toward trade policy issues. Their framework has grown out of pure trade theory: countries export commodities in which they have a comparative advantage. The general equilibrium trade models use either a framework which assumes identical production and demand parameters across countries and where trade is dependent upon differences in relative factor endowments or a framework which is just the opposite: production and demand parameters are assumed to be different across countries and trade among them is determined by more than just relative factor endowments.

Elasticities are key parameters in the applied trade models too. The use of literature estimates of elasticities is also common in the applied trade analyses, as are large variances in the trade elasticities and the production of "best guess" elasticity estimates by product and by region (Stern, Francis, and Schumacher 1976). An important conclusion from most trade models is that the welfare effects of changes in trade policy are relatively small compared to the effects of other kinds of policies (e.g., tax). One possible reason might lie in the fact that distortions which affect a relatively small portion of total activity, where the distortions themselves are relatively mild, can be expected to have small distorting effects. As with tax models, the same weaknesses of specifying elasticities and failure to incorporate completely all details relevant to policy issues apply.

Additional difficulties, in general, with applied general equilibrium models include the impossibility of any meaningful statistical tests. Since the calibration procedure was used to select parameter values, any given results could disappear or even change sign if alternative parameters were utilized. Another problem is the preselection of a particular model structure before the policy analysis proceeds. When no form of hypothesis testing is involved, there is no way to discriminate between alternative models. Depending upon the model used, the conclusions reached could be quite different. Unfortunately, there is no single, all-purpose general equilibrium model. Another important issues involve interpreting results when major departures from known theoretical structures occurs as researchers attempt to modify existing theory to accommodate a wide range of empirical phenomena.

To-date, few attempts have been made to apply the applied general equilibrium to the tourism industry at the community level and which are readily referenced in the current literature. Tyrrell (1990) explored the use of such computable general equilibrium models for assessing the net effects of benefits and costs from tourism development in Phuket, Thailand. Although the model employed by Tyrrell was a simplistic representation of the island's tourism community economic system, its application to the tourism development problem illustrated the value of using a theoretically derived model as a tool for assessment of community welfare. In addition, Tyrrell's results provided a general description of the nature of tourism-related impacts (social, environmental, and economic) which might be expected in other tourism-oriented communities.

4.7 A Community-Based Tourism Computable General Equilibrium Model for Phuket, Thailand

As presented in the theoretical background above, the mathematical formulation of the equilibrium of an economic system is characterized by a set of prices and levels of production in each industry such that market demand equals market supply for all goods and services within the economy. In an application of the theory, equilibrium levels are determined by a specifically chosen set of linked demand and supply models and then "benchmarked" or calibrated on actual data. Although a complete characterization of an economy may be mathematically intractable, essential characteristics of development issues specifically related to tourism communities can be well-represented in a simplified model. Most importantly, the development and application of a community-based tourism computable general equilibrium model can provide extremely valuable insights into final net impacts which result from tourism development.

An applied general equilibrium model designed around the Phuket, Thailand economy sought to distinguish between three basic types of consumers: resident wage-earners, resident capital-owners, and tourists (Tyrrell, 1990). The resident wage-earners represented suppliers of labor to the industry located within the economy and receive wages as their income. Resident capital-owners represented the suppliers of capital to the industry within the economy and they typically receive profits and rent. The last basic type of consumer to be represented in the model was the tourists, whose number and income (by definition) were determined outside the tourism community's economic system.

Goods and services provided by Phuket's economy were, simplistically, aggregated into two groups: leisure-related and non-leisure-related. The justification for such separation of leisure-related goods and services from all other goods and services within the economy was that it allowed residents (both wage-earners and capital-owners) to consume both leisure and non-leisure goods and services. Tourists, on the other hand, were assumed to only be able to purchase leisure goods and services within the community's economic system.

Production of leisure-related and non-leisure-related goods and services were represented by two Cobb-Douglas production functions:

$$Q_L = A_{L0}\ XL_L^{aL1}\ XNL_L^{aL2}\ L_L^{aL3}\ K_L^{aL4}$$

$$Q_{NL} = A^{NL0}\ XL_{NL}^{aNL1}\ XNL_{NL}^{aNL2}\ L_{NL}^{aNL3}\ K_{NL}^{aNL4}$$

where:

Q_L and Q_{NL} are the quantities of leisure and non-leisure goods produced, respectively, by the leisure and non-leisure firms;

A^0 is a constant term;

L is the amount of labor used in producing X;

x is the quantity of one good used in the production of another good, (i.e., XNL_L represents the quantity of non-leisure goods used as an input in the production of leisure goods and XL_{NL} represents the quantity of leisure goods used as in input in the production of non-leisure goods;

K is the amount of capital used in producing X; and

the a's are parameters used in the production functions to describe the degree of dependence upon each input (e.g., a would indicate the extent to which production of either leisure or non-leisure goods are dependent upon labor, etc.)

The preferences of the three types of consumers identified earlier (resident wage-earners, resident capital-owners, and tourists) were characterized by any number of utility functions. A utility function of the Stone-Geary type is given below for each type of consumer in the community-based tourism computable general equilibrium model below. This type of utility function is basically a Cobb-Douglas function which allows consumers (in this case residents since tourists are unable to purchase non-leisure goods) to buy subsistence quantities of each good and then divide their remaining expenditure budget among both goods in fixed proportions (Silberberg 1990). The utility functions were:

uw(x) = (e)log(xlw - vlw) + (f)log(xnw - vnw);

uo(x) = (e)log(xlo - vlo) + (f)log(xno - vno); and

ut(x) = (e)log(xlt - vlt) + (f)log(xnt - vnt)

where:

uw(x) is the utility function for resident wage-earners;

uo(x) is the utility function for resident capital-owners;

ut(x) is the utility function for tourists;

e and f represent demand coefficients for leisure and non-leisure expenditures by each consumer group; and v represents the subsistence or minimum consumption level acceptable to each consumer group.

In keeping with the applied general equilibrium theory, budgets for both resident wage-earners and capital-owners were assumed to be the same as their annual incomes. The same requirement was also held for tourists: their budgets were assumed to be equal to their total vacation expenditures on goods and services. The parameters of each consumer group's utility function were set to represent sensitivity to changes in prices. For example, the parameters (e and f) in the tourist utility function (ut(x)) were set to imply less sensitivity than either resident group to changes in leisure-related good prices (recall that they could only purchase leisure-related goods and the opportunity to substitute is therefore quite limited). The parameters in the resident wage-earner utility function were set to imply the least sensitivity of any group to changes in non-leisure good prices since it was assumed that such goods would be necessary. Resident capital-owners were assumed to be relatively sensitive to changes in prices of both leisure and non-leisure goods in the model.

To account for the importance of social and environmental qualities (discussed in Chapter Two) on demand, the first parameters of each consumer group's utility function were multiplied by an index of socio-environmental quality (z). At the initial equilibrium, this index was set equal to the value 1.

The supply of environmental qualities was assumed to decline with any increase in the quantity of leisure-related goods purchased. For Tyrrell's Phuket computable general equilibrium model, the function used to characterize this influence was:

$z = 1 - .1(X1)$

This function implied a fairly conservative one percent decline in quality (z) for a 20 percent increase in leisure activity. Thus, socio-environmental quality declined because of either increased residential or tourist use of community resources associated with leisure activities.

In general, once the community-based tourism model has been constructed and "benchmarked" or calibrated, a complete general equilibrium model is available for policy analysis. In its initial equilibrium, all consumers and producers are assumed to exchange money for goods and services at mutually agreed upon prices. Policy variables or alternative scenarios can then be assessed as desired. The community economic system, already in equilibrium, can be "shocked" by (for example) an increase in the number of tourists, and the model will be solved for a new set of prices and quantities (counterfactual equilibrium). Changes in economic welfare may then be examined by pair-wise comparisons. Tyrrell's study of Phuket examined the impacts on the community of a 50 percent increase in the number of tourists in terms of utility index levels and income. Assuming migration of both capital and labor into the Phuket economy, Tyrrell's model showed the following results: 1) leisure industry output increased by 38 percent and non-leisure industry output increased by 56 percent; 2) resident capital-owners experienced over a 100 percent increase in their income and wage-earners experienced nearly 40 percent increase in their income; 3) the number of jobs created by the 50 percent increase in tourism growth increased by 95 percent; 4) price rose by 82 percent; 5) the socio-environmental index fell by almost 10 percent; and 6) capital-owners' utility index increased marginally by one percent, while the wage-earners' utility index level fell by 18 percent and the tourists experienced a 23 percent drop in their utility index levels.

CHAPTER FIVE APPLYING THE COMMUNITY-BASED TOURISM COMPUTABLE GENERAL EQUILIBRIUM MODEL TO GREAT SALT POND

In the previous chapters, it was demonstrated how applied general equilibrium models can be of use in determining economic welfare and making policy decisions. The use of the applied general equilibrium analyses have been largely confined to issues surrounding taxation and international trade, not to tourism development issues at the community level. After a review of general equilibrium theory and recent literature addressing the more pressing issues facing many tourism destination communities, a prototype computable general equilibrium model was described for the community-based tourism economy of Phuket, Thailand. In this chapter, a modified version of that model will be applied to the tourism community at Great Salt Pond on Block Island, Rhode Island.

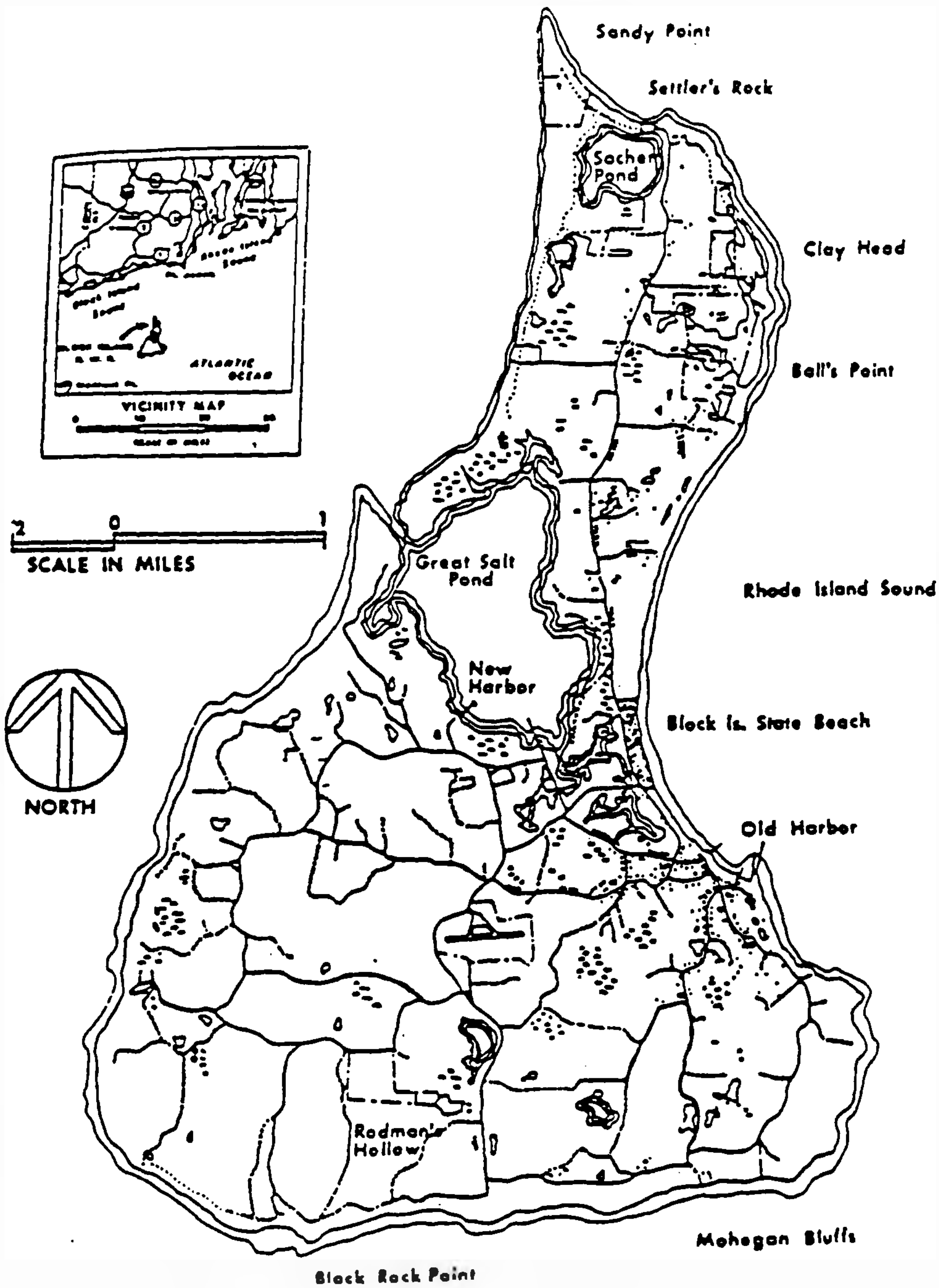
This chapter first presents an overview of the tourism community of Block Island, Rhode Island and then discusses why it was chosen as a specific application of the community-based tourism computable general equilibrium model. The method used for calibration of the model and the results which it yields after a "shock" to the economy are then presented (i.e., the details of "who wins" and "who loses" from tourism development within a typical tourism community such as Great Salt Pond, Block Island and "by how much").

5.1 Overview of Block Island

Block Island (Figure 5.1) is an island comprised of 10 square miles of land and is located 11 miles off the coast of mainland Rhode Island. The island is named after the Dutch navigator Adrian Block, who discovered it in 1614. Until the English settled it, Block Island was inhabited by the Narragansett Indians. The island was formally incorporated into the Rhode Island Colony in 1672. Through history, past economic activities on Block Island included deforestation in order to develop agriculture and then it developed into a fashionable summer destination during late 1800's, which declined in the early 1900's. Today, Block Island is still a relatively undeveloped island which is receiving increasing attention as a popular tourism destination within New England. Recently, the Nature Conservancy, the largest private land-conservation group in the world, has included Block Island in its list of 12 sites in the Western Hemisphere it calls the "Last Great Places" (Lord 1991).

During the period 1980-1990, the population on the island grew from approximately 620 to 763 people and the 35-44 year old age group doubled in size during this period.

Figure 5.1 Block Island



Presently, only 41 percent of the 1009 housing units are occupied year-round. Virtually all housing units are fully occupied during the summer. Interestingly, those individuals claiming to be self-employed comprise about 19.2 percent. The median household income on Block Island was $16,694 in 1980. By 1988, that figure had increased by 40 percent to $23,438. Unfortunately, the median price of a house in 1980 was $80,000 and increased to $176,000 in 1988, an astounding 120 percent increase.

It has been estimated that 12,000-15,000 visitors can be found on Block Island during June, July, and August weekend days. In response to this relatively large and still growing tourism demand, the number of firms on the Island grew from 67 in 1981 to present high of 124 in 1989. This represents an 85 percent increase over that 1980-89 period. Adjustment for seasonality still indicates a growth rate of 59 percent from third quarter 1980 to third quarter 1990. In 1989, the retail sector comprised 40 percent of total firms, followed closely by service sector with 36 percent. In other words, the two sectors which comprise the tourism industry account for nearly 80 percent of all firms on Block Island. Not surprising, the retail and service sectors dominate the community's employment picture during the 1980-1989 period (although there is some seasonality present as the number employed dips during the first quarter of each year).

As might be suspected on an island as small as Block Island, roads around Old Harbor (where the ferry arrives and departs) are often congested. Great Salt Pond and its 641-acre watershed has earned it the distinction of being the third busiest watershed in the northeast. Boat sewage and septic effluent (from both groundwater sources and runoff sources) threaten that water resource. Changes such as these have motivated Island residents to move the Great Salt Pond from Type Two classification (high scenic value and low recreational use) to Type One (conservation use with areas of water which are environmentally sensitive and important to wildlife habit) in order to protect the valuable watershed. Other measures taken by the residents include setting aside 20 percent of the total land mass on the Island for open space preservation.

Other traditional impacts from tourism development presently being experienced by the residents include inflation. For example, the cost of living is relatively high at the following prices: electricity, $0.36/kilowatt hour; food prices are marked-up as much as 30 percent during summer months; and gasoline prices higher than $2.00/gallon (Faria 1991).

The key concerns identified by community members of Block Island are that the present economy: 1) leaves the island more vulnerable to economic fluctuation than a more diversified economy, 2) fails to provide year-round job opportunities for permanent residents, 3) prevents many islanders from earning sufficient income to afford the high cost of living on the island, 4) contributes to an out-migration of young adults and families, and 5) challenges the fiscal structure of the island to provide services and infrastructure for seasonal swells in population and visitors on a part-time economic base. Although there is no clear consensus on the need or justification for economic diversification, there is agreement that the primary constraint is the concern by residents of the impact of economic development on the natural environment because they perceive that the unique environmental qualities serve as the basis for the economy. Economic development strategies of consideration are those that are best able to: 1) promote a partnership between economic development and the natural environment, 2) create a mosaic of job opportunities for year-round residents, 3) lead to the creation of island-owned and operated businesses that can attract outside capital to the island economy, 4) place a low demand on municipal services and infrastructure, 5) enhance the image and character of the island, and 6) contribute to the sense of community involvement and cooperation that characterize political life on the island (CPAD 1990).

Graduate students in the Community Planning and Area Development at the University of Rhode Island, in their analysis of the Island's situation, recommended that the

Town of New Shoreham select from the following economic development and diversification strategies: golf course, aquaculture, agriculture (winery), cottage industries (weaving, eco-tourism, etc.), education, and tourism. It is, of course, this last development recommendation which is of most interest to this study.

The computable general equilibrium model which was developed in the previous chapter will be demonstrated on the "real world" case for Great Salt Pond on Block Island -- which has been extensively studied utilizing a variety of disciplinary approaches in the past. The specific case selected by the researcher is that of the increasing congestion of pleasure boats and the resulting deterioration of water quality on the Great Salt Pond, Block Island, Rhode Island. This specific case was selected because of its representativeness to problems facing many tourism communities around the country: increasing tourism-related demand for natural resources and the subsequent deterioration in that resource quality.

In addition, the Great Salt Pond was selected because of the large quantity of data previously collected, analyzed, and made available to communities by various disciplinary approaches. Communities such as Great Salt Pond on Block Island are well-aware of the specific impacts resulting from tourism development: increased revenues, decreased environmental quality, increased congestion, etc.

These impacts have been well-documented by numerous studies over the years and the results of these studies are readily available to policy-makers within the community. Yet such communities seem unable to reconcile these contradictory impacts. Hence, the case of Great Salt Pond provides the research community with an opportunity to show these communities how to sort out this windfall of information by incorporating it into the computable general equilibrium framework utilized in this study.

Additional justification for selecting Great Salt Pond on Block Island as the tourism destination in which to implement the community-based tourism computable general equilibrium model includes its relatively small size and its dependence upon tourism as a major economic force. Block Island is linked to the mainland by both ferry and air transportation; hence, its isolation simplifies the task of modeling its economy considerably. Seventy-five percent of those employed on the island are employed within the retail trade and service sectors and these two sectors experience a three-fold increase when the summer tourism season begins. The tourism industry on Block Island is responsible for generating about 11 percent of the total estimated travel and tourism industry sales in the South County region of the state, approximately $31.2 million (Tyrrell and Toepper 1991) in 1989.

This study will primarily utilize secondary data obtained from two previous research projects conducted recently for the Great Salt Pond and the Town of New Shoreham (Block Island), located within Rhode Island. The first of these studies was a Ph.D dissertation (Wey 1990) which examined congestion and water quality problems for the Great Salt Pond on the Island and was based upon over 300 completed questionnaires of residents and tourists during 1989. The second study was conducted by students enrolled in the Advanced Planning Studio class within the Graduate Curriculum in Community Planning and Area Development at the University of Rhode Island (CPAD 1990). Their study examined the impacts of increased development upon the Great Salt Pond as well as the need for economic development of the area.

5.2 Calibration of the Model to the Salt Pond Region of Block Island

The applied general equilibrium model designed around the typical tourism community's economy developed earlier in Chapter Four will now be modified and applied to a single typical summer day at Great Salt Pond on Block Island. Data has been obtained from the secondary sources previously identified (e.g., CPAD 1990, Wey 1990, Tyrrell 1990, etc.). In order to apply the community-based tourism computable general equilibrium model to the Great Salt Pond, it is first necessary to "calibrate" the model. Calibration is the process of fitting the basic data of the community's economic system such as factor endowments, production and demand levels, etc., to the model. Adjustments are then made for the sake of consistency and to serve as a benchmark for future comparisons. The model is then solved and a set of market clearing prices provide a solution to the equations in the model. In order to calibrate the community-based tourism computable general equilibrium model used in this study, information relevant to demand, including price and income elasticities, per capita daily consumption, income levels, the number of persons within each consumer group, etc; as well as supply: initial output levels, demand for the factors of production (labor, capital, supplies, etc.), etc.

In addition to the calibration process, it was necessary to redefine the period for which the model is applied. Unlike the model developed for Phuket by Tyrrell, which considered an entire year of economic activity, the model for block island focusses on a single typical summer day. This redefinition was deemed necessary in order to avoid the severe complications caused by the strong seasonal and, in fact, daily variations in tourism activities on Block Island. The very nature of the tourism industry is such that tourism demand and supply must be satisfied instantaneously. In other words, the tourism "product" is an experience and, as such, it changes on a daily basis. This implies that goods cannot easily be traded between time periods. By focussing on a single typical summer day the interperiod implications of tourism growth cannot be assessed. However, the general nature of impacts of growth for the much sought after, full-employment day should illustrate the maximum economic potential from the industry under the best of circumstances. Hence, in the model for Great Salt Pond on Block Island, equilibrium is discussed in terms of a daily phenomenon.

Consumers

This model distinguishes between three basic types of consumers on Great Salt Pond: 1) resident wage-earners, 2) resident capital-owners, and 3) recreational boaters visiting the Great Salt Pond area. Other tourists to the island and region will be accounted for as exogenously determined other demands. The Block Island resident wage-earners represent suppliers of labor to the industry located within the island economy. They receive wages as their primary source of income as well as other exogenous income. Block Island resident capital-owners represent the suppliers of capital to the industry within the economy and they typically receive profits and rent. In addition, the capital-owners receive other income exogenously. Although the two groups are not precisely separable, the characteristics of owners and workers are discernable in socio-economic data. Property ownership, for example, is a common characteristic of wealthy residents.

The last basic type of consumer to be represented in the model of the Block Island tourism economy are boaters at the Salt Pond, whose number and income (by definition) are determined outside the tourism community's economic system.

Leisure and Non-Leisure Goods

Goods and services provided by the Great Salt Pond region of Block Island's economy are, simplistically, aggregated into two groups: leisure-related and non-leisure-related. Leisure goods in this application include restaurant and marine-based services offered in the region. Non-leisure goods in this application include food and groceries, hardware, etc. The justification for such separation of leisure-related goods and services from all other goods and services it will be recalled is that it allows residents (both wage-earners and capital-owners) to consume both leisure and non-leisure goods and services. Boaters, on the other hand, are assumed to purchase limited amounts of non-leisure goods and services within the community's economic system and are assumed to purchase predominately leisure goods.

Because prices are all set to unity in the initial equilibrium, quantities of goods produced and consumed in the economy are "benchmarked" at actual revenues and expenditures, respectively. This initialization technique avoids the difficulties associated with measuring quantities of aggregate "leisure" and "non-leisure" goods, while maintaining the information contained in the Block Island data. As a result, quantities are derived from dollar units.

Consumer Utility Functions

The preferences of the three types of consumers identified earlier (resident wage-earners, resident capital-owners, and boaters) can be characterized by any number of utility functions (e.g., $U = U(z, q_L, q_{NL})$) for the consumption of leisure and non-leisure goods (note: the congestion-water quality index z will be discussed later in this section). A utility function of the Stone-Geary type, however, is given below for each type of consumer in the community-based tourism computable general equilibrium model. The logarithmic utility functions for each consumer group are:

$$U = U(z, q_L, q_{NL}) = B_L \log(z(q_L - g_L)) + B_{NL} \log(q_{NL} - g_{NL})$$

where:

B_L and B_{NL} are coefficients;

q_L and q_{NL} are the quantities of leisure and non-leisure goods, respectively (the congestion-water quality index, z, effects only utility derived from consumption of leisure goods); and

g_L and g_{NL} are usually said to represent the subsistence or minimum consumption levels acceptable to each consumer group. (Negative values of these are sometimes encountered in practice.)

Each consumer attempts to maximize the utility function described above subject to a budget or income constraint $(Y-p_L q_L - p_{NL} q_{NL})$ as demonstrated earlier in Chapter Three. The Lagrangian for the utility maximization problem becomes

$$L = B_L \log(z(q_L-g_L)) + B_{NL} \log(q_{NL}-g_{NL}) + M(Y-p_L q_L - p_{NL} q_{NL})$$

Differentiating the above equation with respect to q_L, q_{NL}, and the Lagrangian Multiplier M (note: z is not a choice variable) yields the following first order conditions

$$dL/dq_L = B_L[1/(q_L-g_L)] - Mp_L = 0$$

$$dL/dq_{NL} = B_{NL}[1/(q_{NL}-g_{NL})] - Mp_{NL} = 0$$

$$dL/dM = Y - p_L q_L - p_{NL} q_{NL} = 0$$

The solution of these first order conditions for optimal quantities of q_L and q_{NL} given prices and income produce the derived demand for leisure and non-leisure goods by resident wage- earners, resident capital-owners, and boaters.

For the Block Island model, the demand coefficients (B_L and B_{NL}) in the Stone-Geary utility function were calculated from each consumer group's income elasticity for leisure goods (obtained from secondary sources and discussed below), price elasticities for leisure and non-leisure goods, per capita demand (also discussed below) for those two goods, and per capita income. Based upon this information, the demand coefficients for each group are listed in Table 5.1.

The subsistence levels (g_L and g_{NL}) in the Block Island model were calculated from the demand coefficients calculated above, per capita income, and the demand equations themselves. The subsistence levels calculated for the model are listed in Table 5.2. The minimum acceptable leisure and non-leisure expenditures by workers, owners, and boaters as a portion of their respective budgets are all positive.

The general equilibrium model was applied to the problem of determining approximate equilibrium conditions for the daily economy as if long run adjustments were accurately reflected on a typical summer day. While income levels for both resident wage-earners and capital-owners are their highest during the summer, typical daily budgets during the summer were assumed to equal average daily equivalent of their annual incomes. These incomes reflect the average of wages and profits received during periods of under-employment and full employment. The labor supply and investment elasticities which account for possible in-migration and outside investment also account for possible contributions from unemployed local labor and investment. Boater budgets were assumed to be equal to their average daily vacation expenditures. Daily income for resident wage- earners, resident capital-owners, and boaters were calculated to be \$40.00, \$57.00, and \$137.10, respectively.

Table 5.1 Demand Coefficients

	Leisure	Non-Leisure
Wage-Earners	.07	.93
Capital-Owners	.07	.93
Boaters	.29	.71

Table 5.2 Subsistence Levels

	Leisure	Non-Leisure
Wage-Earners	1.0	27.1
Capital-Owners	2.0	36.8
Boaters	114.5	3.6

Own Price and Income Elasticities

For the Block Island model, own price and income elasticities were derived from three sources: Walsh (259-260) who evaluated recreational activities, Sanz-Ferrer (in Phlips:53-69) who analyzed a complete system of Belgian consumer demands including recreation and services, and Lluch, Powell and Williams who compared complete systems of price and expenditure elasticities across countries. Both of the latter studies employed the linear expenditure system.

Studies by Sanz-Ferrer and Lluch, Powell and Williams both agree on an uncompensated recreational price elasticity of about -.55. An examination Lluch, Powell and Williams' results across countries with different per capita gross domestic products reveals no apparent pattern in these elasticities over income. Therefore this uncompensated price elasticity was used for leisure goods for both wage earners and capital owners. Income elasticities for recreation from the same studies ranged from 0.9 to 1.8. These elasticities exhibited a discernible trend, declining as per capita GDP levels increase. Thus wage earners and capital owners were therefore assigned recreational income elasticities of 1.4 and 1.0, respectively. Because of the constraints implied by the linear expenditure system the income elasticities of the non-leisure composite good that satisfy the system were calculated to be 0.98 and 1.00 for wage earners and capital owners, respectively.

The study by Walsh of recreational activities included an estimated price elasticity for vacation sailing of -.3 and income elasticity for boating trips of .34. These elasticities were used for leisure goods demanded by boaters visiting the Great Salt Pond. The income elasticity for non-leisure goods implied by the constraints of the linear expenditure system was 4.71.

No price elasticities for aggregate non-leisure goods were available from any of the studies examined. These elasticities were calculated as approximate weighted averages of the individual commodity groups analyzed by the studies. The weight for price elasticity for each commodity included in the composite is the product of the relative expenditure on that commodity in the composite and the relative magnitude of one minus the income parameters (1-B). Using Lluch Powell and Williams' uncompensated price elasticities for commodity groups and the income parameters described above the nonleisure price elasticity was calculated to be -.95. The income effects of a price change dominate the magnitudes these elasticities. As shown in the top half of Table 5.3, compensated elasticities for non-leisure goods for wage earners and capital owners are very close to zero (-0.02).

Table 5.3 Own Price Elasticity Estimates for Leisure and Non-Leisure Goods

	Leisure Goods	Non-Leisure Goods
	Compensated Elasticities	
Wage-Earners	-.48	-.02
Capital-Owners	-.48	-.02
Boaters	-.01	-.24
	Uncompensated Elasticities	
Wage-Earners	-.55	-.95
Capital-Owners	-.55	-.95
Boaters	-.30	-.95

Sources: See Text.

Table 5.4 Income Elasticity Estimates for Leisure and Non-Leisure Goods

	Leisure Goods	Non-Leisure Goods
Wage-Earners	1.40	0.98
Capital-Owners	1.00	1.00
Boaters	0.34	4.71

Source: See text.

The complete set of compensated and uncompensated price elasticities for both leisure and non-leisure goods for each of the consumer groups (resident wage-earners, resident capital-owners, and boaters) and are displayed in Table 5.3. Table 5.4 presents the corresponding income elasticities. The subsistence levels of Table 5.2 are calculated to be consistent with these estimates and the per capita consumption levels described in the next section.

Per Capita Consumption

Per capita consumption levels of leisure and non-leisure goods for resident wage-earners, resident capital-owners, and boaters were obtained from Wey (1990). The average number of day-trippers (including boaters) per day estimated to be on Block Island during July was approximately 3000 and average per person daily expenditures were estimated to be $50.00 for that group. For over-nighters on Block Island, the average number was estimated to be 2300 per day during July and the average daily expenditure per person was estimated to be $125.00. According to the total daily expenditures of both day-trippers and over-nighters on Block Island, the daily leisure sales revenue is approximately $437,500. Non-leisure daily sales revenue was estimated to be about $141,935 for the month of July. Wey (1990) also estimated the proportion which wage-earners, capital-owners, and boaters represented within both leisure and non-leisure sales revenues. The number of parties/households used in calculating the per capita consumption figures were obtained from Wey (1990) and CPAD (1990). Based upon these daily revenue estimates, the number of persons within each category, and information about the proportion of total leisure and non-leisure sales revenues by consumer group, the per capita daily consumption figures as well as the number of persons/households within each consumer category are displayed in Table 5.5.

Production Parameters

Production, as discussed earlier, is assumed to be organized into two major industry groups: leisure and non-leisure. The inputs to both industries are the same but they are used in different proportions. Production functions for leisure goods (Q_L) and non-leisure goods (Q_{NL}) can be described generally as

$$Q_L = f_L(XFL_L, XFNL_L, L_L, K_L, S_L) \text{ and}$$

$$Q_{NL} = f_{NL}(XFL_{NL}, XFNL_{NL}, L_{NL}, K_{NL}, S_{NL})$$

Table 5.5 Per Capita Daily Consumption of Leisure and Non-Leisure Goods by Consumers

	Number	Leisure	Non-Leisure
Wage-Earners	1252	2.0	38.0
Capital-Owners	558	4.1	52.9
Boaters	500	116.4	20.7

Source: Tyrrell (1990), Wey (1990), and CPAD (1990) where:

XFL represents the use of leisure goods in the production of both leisure and non-leisure goods;

XFNL represents the use of non-leisure goods in the production of both leisure and non-leisure goods;

L represents the use of labor as an input in the production of both leisure and non-leisure goods;

K represents the use of capital as an input in the production of both leisure and non-leisure goods; and

S represents the use of supplies which are "imported" to the Salt Pond region and used in the production of both leisure and non-leisure goods.

One of the most widely used production functions is the Cobb-Douglas function since it is homogeneous of degree zero (i.e., it exhibits constant returns to scale). Production of leisure and non-leisure goods within the tourism community on Block Island can be easily represented by two Cobb-Douglas production functions:

$$Q_L = A^{L0}\ XFL_L^{aL1}\ XFNL_L^{aL2}\ L_L^{aL3}\ K_L^{aL4}\ S_L^{aL5}$$

$$Q_{NL} = A^{NL0}\ XFL_{NL}^{aNL1}\ XFNL_{NL}^{aNL2}\ L_{NL}^{aNL3}\ K_{NL}^{aNL4}\ S_{NL}^{aNL5}$$

where:

Q_L and Q_{NL} are the quantities of leisure and non-leisure goods produced, respectively, by the leisure and non-leisure firms;

A^0 is a constant term;

XFL, XFNL, L, K, and S are the production inputs described above; and

^{ai} are the production parameters which, when summed, equal one.

The implications of the parameters used in the production functions are that they describe the degree of dependence upon each input for the production of either leisure or non-leisure goods (e.g., ^{a3} would indicate the extent to which production of either leisure or non-leisure goods are dependent upon labor, etc.). For Block Island, these parameters were initially obtained from input-output coefficients estimated for the Town of Westerly, Rhode Island (Tyrrell, Emerson, and Molzan 1982) and modified to reflect the initial demands calculated above for leisure and non-leisure goods. The initial input-output coefficients and demand for both the leisure and non-leisure industries are given in Table 5.6.

Based upon these estimates of the production parameters, it has been assumed that both industries are heavily labor-intensive and that the leisure industry is somewhat more dependent on non-leisure goods for the production of its goods than the non-leisure industry. It should also be noted that both industries are both very dependent upon supplies which are imported into the local community.

Derived Demand for the Factors of Production

Once the total supply of leisure and non-leisure goods are known, simply multiplying the totals by the each of the respective inputs will yield the derived demand for that input. For example, having calculated the total local

Table 5.6 Input-Output Coefficients for Leisure and Non-Leisure Production

	Leisure	Non-Leisure
Leisure	0.01	0.01
Non-Leisure	0.29	0.10
Labor	0.20	0.39
Capital	0.10	0.10
Supplies	0.40	0.40
Total	1.00	1.00

Table 5.7 Initial Derived Demand for Inputs

	Leisure	Non-Leisure
Leisure	1267	455
Non-Leisure	36732	4550
Labor	25329	17746
Capital	12665	4550
Supplies	50661	18199
Total	126654	45500

supply for leisure goods in the model (126,640), multiplying that amount by the production parameter for labor (0.2) yields the derived demand for labor (DL) by the leisure industry, 25,329. The initial derived demands for each of the inputs into the production function is displayed in Table 5.7.

Migration, Investment, and Supplies Supply Functions

The supply of labor for the model is comprised of the current resident labor force and new labor which migrates into the area. The current resident labor force was calculated by multiplying the number of resident wage-earners (1252) by the hours per employee (34.402). The supply of new labor which migrates into the area was assumed to be less than unitary elastic (.8) to reflect some resistance of the new labor force of changing employment. The suppliers of new labor may or may not become residents since the model only identifies current residents as "residents."

The supply of capital for the model is similarly comprised of two components: capital from resident capital-owners and new capital which is invested in the area. The supply of capital from residents was calculated by multiplying the number of resident capital-owners (558) by the amount of capital per owner (30.851). The suppliers of the new capital may or may not become residents and earn some of the profits of current capital owners. Investment supply elasticity was also assumed to be less than unitary elastic (.8) to reflect resistance to new investment in the area.

Lastly, the supply of the production factor supplies is also comprised of two components: initial supplies and new supplies "imported" into the area. Calculated in a manner similar to above, the supply of supplies was assumed to be less than unitary elastic (.8) to reflect resistance (e.g, cost of shipping, etc.) of importation.

A sensitivity analysis was conducted on the model with respect to the chosen elasticities to labor, capital, and imported goods. Elasticity values were tested in the range from 0.0 to 1.0. In each case the general results were relatively unchanged from the base case. Specific results are presented later.

<u>Congestion-Water Quality Index</u>

To account for the importance of social and environmental qualities (discussed in Chapter Two) the quantity of leisure goods in each consumer group's utility function was multiplied by an index of congestion-water quality (z). At the initial equilibrium, this index would be set equal to the value 1 and would be assumed to decline with any increase in the quantity of boats on the Great Salt Pond. For the community-based tourism computable general equilibrium model developed, the quadratic function used to characterize this influence was:

$$z = a_0 + a_1(NB) + a_2(NB)^2$$

where:

z is the socio-environmental index;

a_0 is a constant;

a_1 and a_2 are coefficients; and

NB is the number of boaters.

Wey (1990) calculated the total willingness-to-pay for recreational boaters based upon alternative policy options which varied the number of boats upon Great Salt Pond. At a level of 430 boats, the consumer surplus per boater for reduced water pollution and congestion was estimated to be approximately \$3901.14; at a level of 712 boats, the consumer surplus per boater was estimated to be \$3188.05; and at a level of 1700 boats, the consumer surplus per boater was estimated to be \$1980.65. Using these per boat consumer surplus estimates, an index benchmarked to the initial level of 430 boats was constructed to reflect the declining socio-environmental quality associated with increases in the number of boats on Great Salt Pond:

$$z = 1.38041 - .00101(NB) + .00000029145(NB)^2$$

It should be noted that this equation is only reasonable for the range in the number of boats on Great Salt Pond from 430 to approximately 1700. Beyond 1700 boats, the equation is no longer valid. In particular, the congestion-water quality index reaches its lowest level, 0.50, when the number of boats on the Pond reaches 1733.

Other Demand, Exports, Imports

In order to arrive at the initial equilibrium it was necessary to explicitly account for several features, mostly due to the desire to replicate Wey's (1990) study and the choice, therefore, of focussing on the Great Salt Pond region's economic system. For example, other demand from non-boating tourists needed to be added to the model. The importation of supplies to be used in the production of leisure and non-leisure from both off-island and on-island sources needed to be incorporated. (As in the case of migrant labor, investment, and supplies, an import elasticity of .8 was utilized to reflect the resistance of importation.) The ability to export excess production of leisure and non-leisure goods to both off-island and on-island destinations also needed to be considered.

Initial Equilibrium

Once the community-based tourism model had been constructed, the parameters of the production and demand functions were known, and the model had been "benchmarked" or calibrated, a complete general equilibrium model was made available for Great Salt Pond using GAMS/MINOS (Appendix A). Relatively few results are calculated at the initial equilibrium which were not previously determined during the actual calibration process. These results involve determination of each consumer group's initial utility index level, net import levels, as well as any migration or capital flows. At the initial level of 430 boats using the Pond, given the characterization of the demand and supply functions of the model, the resulting utility index levels for resident wage-earners was estimated to be 2.180. For resident capital-owners, the initial utility index level was calculated to be 2.545 and for boaters that level was estimated to be 2.622. (Since the model is benchmarked at these initial levels, the compensating variation measure, as expected, equals zero for each consumer group.) Net import levels generated at the initial equilibrium were calculated to be 304,141 units for leisure goods and 136,559 units for non-leisure goods. In terms of leisure goods, the term "import" may be understood to be travel by consumers to other parts of Block Island rather than the traditional interpretation of receiving goods which are shipped into the Great Salt Pond area. The production function of the model was initialized to describe only goods and services produced using locally available capital and labor. Other supplies were imported from off-island or other parts of the island.

An important feature of the model is that it seeks to represent the Great Salt Pond area on Block Island, which presents some definitional as well as boundary challenges. For example, current demand for leisure and non-leisure goods by all current Block Island residents and current boaters (set at 430 boats) are met by Block Island leisure and non-leisure industries. The exclusion of other tourists (i.e., those who are not boaters on Great Salt Pond) means that "other demands" are considered separately by the model. These "other demands" were added as an exogenous term to bring total economic activity to the observed levels for the community. The inclusion of boaters to Great Salt Pond and their expenditures suggests that leisure goods produced within the Great Salt Pond region are included in the production side of the model. The inclusion of all current Block Island residents (wage-earners and capital-owners) suggests that most non-leisure (and, therefore, non-boater) goods demanded, produced, and/or "imported" to the area are accounted for.

As demand grows other leisure and non-leisure goods may be produced on the island outside the Salt Pond area. They are also included as "imports." "Imports" to the modeled production process include capital, labor, supplies, and indirect requirements of goods produced. Supplies, along the same lines as "imports," may be provided locally (in the area), by the non-modeled production sectors (out of the area) or from off-island sources. The difference between supplies and "imports" is their destination: the former is used in the production process while the latter is consumed directly. The specific type of good may be identical.

Returns to capital and labor are distributed to current resident capital-owners and current resident wage-earners and comprises most of their income. "Other income" supplements that income which was generated or received from the production processes modeled and may even be from off-island sources.

As the number of boats to Great Salt Pond increases, demand for leisure goods increases. The increase in the demand for leisure goods is followed, in turn, by increased demand for inputs of capital, labor, and supplies. The increased demand for capital and labor must be met by new capital-owners ("investment") and new wage-earners ("migrants") respectively. Again, these new capital-owners and wage-earners may or may not become new island residents.

In its initial equilibrium, all consumers and producers at Great Salt Pond exchange money for goods and services at mutually agreed upon prices. Policy variables or alternative scenarios can now be added as desired. The community economic system, already in equilibrium, can be "shocked" by an increase in the number of boaters, and the model will be solved for a new set of prices and quantities (counterfactual equilibrium). Changes in economic welfare using compensating variation may then be examined by pair-wise comparisons. First, the result of the "shock" of increasing the number of boats to Great Salt Pond will be discussed without considering the effect such an increase in numbers would have upon congestion and water quality. In other words, the congestion-water quality index will be held constant at its initial level of one. This will provide a picture of the effects of increase demand alone upon the Great Salt Pond economy. Next, the same increase in number of boats to the area will be examined and the effects of such an increase upon congestion and water quality will be incorporated. That is, the value of z, the congestion-water quality index will be allowed to move as discussed earlier in this Chapter and as shown in Table 5.8. The congestion-water quality index declines from its initial level of 1.0 at 430 boats to a low of 0.81 at 712 boats (a decrease of 19 percent). The increased congestion and deterioration in water quality, it will be recalled, directly effects the utility functions of each consumer group and serves to reduce the importance of consuming leisure goods.

This study analyzed a series of "shocks" from the initial level of 430 boats (473) to a sixty percent increase in the number of boaters using the Great Salt Pond (712). The initial level of 430 boats and the final level of 712 boats correspond to two standards for contamination of the Salt Pond. The initial level is based on the National Shellfish Sanitation Program standard of one million cubic

Table 5.8 Congestion-Water Quality Index (z) for Range in Number of Boats 430-712.

Number of Boats	z Index
430	1.00
516	0.94
602	0.88
712	0.81

feet of water per boat. It also is a good characterization of the number of boats on the Salt Pond during average summer weekends. The second level is based on a Food and Drug Administration hydrographic study of the Salt Pond to determine boat capacity after accounting for the flushing rate of the pond. Both of these levels are designed to preserve and protect Type I and Type II water as specified by the Coastal Resources Management Council. Actual numbers of boats have exceeded these standards on many occasions and the harbor has been closed to shellfishing. As many as 2000 boats have been counted on the Pond on the busiest holiday weekends. (Wey, 1990).

The increase in the number of boats from 430 all the way up to 712 in this model could very easily be the result of an advertising campaign by the State of Rhode Island which promotes Great Salt Pond as an attractive recreational boating destination. Alternatively, the increase might be due to a new transient boating fee on Martha's Vineyard (Massachusetts) which causes boaters to substitute Great Salt Pond on Block Island for trips to Martha's Vineyard.

In the next two sections, percentage changes in various impact measures are presented in order to characterize the impact of the increase in the number of boats upon the Great Salt Pond community system. The impact measures include leisure and non-leisure industry output, resident capital-owner and wage-earner income, a congestion-water quality index, prices and each consumer group's compensating variation.

5.3 Results of the Model When the Number of Boaters to Block Island Increases Without Considering the Effect of the Congestion-Water Quality Index (z=1).

The increase in the number of boats from the initial level of 430 to the final level of 712, while holding the congestion-water quality index constant, translates into a 7.5 percent increase in the total demand for leisure goods and a 1.5 percent increase in the total demand for non-leisure goods (Table 5.9 and 5.10). The supply of leisure goods by the Great Salt Pond area also increased by 9.8 percent while the local supply of non-leisure goods decreased by 13.5 percent. As a result of the increase in total demand and total supply for leisure goods, the amount of leisure goods which needed to be imported to the Great Salt Pond area (from either on- or off-island sources) increased by 6.5%. Similarly, the increase in the demand and decrease in local supply of non-leisure goods led to an increase in non-leisure goods imported by 6.5% (Table 5.10).

The nearly ten percent increase in the local supply of leisure goods and thirteen percent decrease in the supply of non-leisure goods affect each sectors' producer demand for the factors of production: leisure goods, non-leisure goods, labor, capital, and supplies. The increase in the number of boats led to a 9.8 percent rise in the demand for all inputs

Table 5.9 Total Demand, Local Supply, and Net Imports of Leisure Goods for Varying Levels of Boats (z=1).

# Boats	Total Demand	Local Supply	Net Import
430	430,781	126,640	304,141
516	440,670	130,240	310,430
602	450,500	134,010	316,490
712	463,030	139,060	323,970

Table 5.10 Total Demand, Local Supply, and Net Import of Non-Leisure Goods for Varying Levels of Boats (z=1).

# Boats	Total Demand	Local Supply	Net Import
430	182,050	45,500	136,550
516	183,180	43,800	139,380
602	184,047	41,937	142,110
712	184,799	39,339	145,460

by the leisure industry because of the constant returns to scale assumption made for the production function. (Table 5.11). Similarly, the 65 percent increase in the number of boats utilizing Great Salt Pond on Block Island led to a thirteen ten percent decrease in the demand for inputs by the non-leisure good industry. (Table 5.12).

The increase in the number of boats from the initial level of 430 to the final level of 712 also served to increase the amount of labor migrating into the Salt Pond area by 53 hours - an increase of 0.1% in the labor force. Capital investment attracted to the area from outside increased by 78 units - 0.5% of the original capital stock (Table 5.13).

Table 5.14 illustrates the impact on prices of increasing the number of boats on Great Salt Pond while holding the congestion-water quality index constant (z=1). Because of the increased number of boats and its impact upon demand, the price of both leisure and non-leisure goods increased as did the price of each factor of production. The price of leisure goods increased by 7 percent and the price of non-leisure goods also increased by 7 percent. The wage rate paid to wage-earners increased by 7 percent. The price of capital also increased by 10 percent and the price of supplies increased by 6 percent.

The increase in the wage rate paid to wage-earners as well as the increase in the price of capital led to

Table 5.11 Producer Demand for Factor Inputs by Leisure Industry for Varying Levels of Boats (z=1).

	430	516	602	712
Leisure	1267	1302	1340	1391
Non-Leisure	36732	37768	38860	40328
Labor	25329	26023	26769	27793
Capital	12665	12900	13148	13480
Supplies	50661	52253	53903	56086

Table 5.12 Producer Demand for Factor Inputs by Non-Leisure Industry for Varying Levels of Boats (z=1).

	430	516	602	712
Leisure	455	438	419	393
Non-Leisure	4550	4380	4193	3934
Labor	17743	17066	16336	15331
Capital	4550	4339	4115	3813
Supplies	18199	17574	16870	15866

Table 5.13 Net Migration and Investment for Varying Levels of Boats (z=1). (deviations from initial levels)

# Boats	Migration	Investment
430	0	0
516	18	24
602	34	48
712	53	78

Table 5.14 Prices for Output and Inputs For Varying Levels of Boats (z=1).

	430	516	602	712
Leisure	1.00	1.02	1.04	1.07
Non-Leisure	1.00	1.02	1.04	1.07
Labor	1.00	1.02	1.04	1.07
Capital	1.00	1.03	1.06	1.10
Supplies	1.00	1.02	1.04	1.06

increased in income for both wage-earners and capital-owners (Table 5.15). The income level of wage-earners increased by 5.68 percent and income level of capital-owners increased by 5.33 percent. These increases were not as great as those of the price levels of labor and capital, respectively, because of the fixed "other incomes" received by the two groups. This accounted for 14% of wage-earners' total income and 46% of capital owners' total income. The income levels of boaters remained unchanged since it was assumed that 100% of their income levels were determined exogenously.

Tables 5.16 and 5.17 show the per capita demand for leisure and non-leisure goods by each consumer group when the number of boats to Great Salt Pond increases from 430 to 712 and the congestion-water quality index is held constant. The increase in the number of boats on Great Salt Pond generated a 1.0 percent decline in per capita wage-earners demand for leisure goods and an 0.8 percent decrease in per capita demand for non-leisure goods. Similarly, the per capita consumption of leisure goods by capital-owners decreased by 1.7 percent while their per capita consumption of non-leisure goods dropped by 1.0 percent.

Boaters to Great Salt Pond, whose income level was held constant, decreased their per capita consumption of leisure goods by 0.7 percent and non-leisure goods by 36.5 percent.

While demand, production, price, etc. all increased,

Table 5.15 Consumer Income for Varying Levels of Boats (z=1).

	430	516	602	712
Wage-Earners	40.00	40.74	41.44	42.27
Capital-Owners	57.00	57.94	58.87	60.05
Boaters	137.10	137.10	137.10	137.10

Table 5.16 Per Capita Consumer Demand for Leisure Goods for Varying Levels of Boats (z=1).

	430	516	602	712
Wage-Earners	2.00	2.00	1.99	1.98
Capital-Owners	4.10	4.08	4.05	4.03
Boaters	116.40	116.13	115.88	115.58

Table 5.17 Per Capita Consumer Demand for Non-Leisure Goods for Varying Levels of Boats (z=1).

	430	516	602	712
Wage-Earners	38.00	37.92	37.83	37.70
Capital-Owners	52.90	52.68	52.52	52.35
Boaters	20.69	18.19	15.87	13.13

two important measures of the economic well-being decreased. The increase in the number of boats from the initial level of 430 boats to 712 boats led to a noticeable decrease in the utility index for boaters to the Great Salt Pond but only a very slight change for both wage-earners and capital-owners (Table 5.18). This decrease in the utility index for boaters can be attributed to the increase in the prices of both leisure and non-leisure goods, which lowered their per capita consumption. For both wage-earners and capital-owners, the changes in per capita income just offset the net effect of price increases.

With respect to determining the economic welfare of the various consumer groups for the increase in the number of boaters from 430 to 712, compensating variation or the "willingness to pay" for keeping a particular group at their initial utility level after the change has occurred was measured. For wage-earners, the average willingness to pay was estimated to be $0.34 (Table 5.19). This implies that each resident wage-earner need to be paid at the rate of $0.34 per day in order to keep them at the same level of utility at which they were located prior to the increase in the number of boats. For resident capital-owners, the average willingness to pay was estimated to be $0.67. In other words, each resident capital-owner would have to be compensated $0.67 per day in order to move them back to the

Table 5.18 Consumer Utility Index Levels for Varying Levels of Boats (z=1).

	430	516	602	712
Wage-Earners	2.180	2.173	2.165	2.153
Capital-Owners	2.545	2.532	2.521	2.510
Boaters	2.622	2.464	2.291	2.038

Table 5.19 Compensating Variation for Varying Levels of Boats (z=1).

	430	516	602	712
Wage-Earners	0.00	0.08	0.19	0.34
Capital-Owners	0.00	0.25	0.45	0.67
Boaters	0.00	2.83	5.57	8.93

same utility level at which they were originally located. Lastly, the willingness to pay for boaters was estimated to be $8.93. Accordingly, the boaters would have to be compensated at a rate of $8.93 per day in order to move them back to their initial level.

5.4 Results of the Model When the Number of Boaters to Block Island Increases and Considering the Effect of the Congestion-Water Quality Index.

Next, the congestion-water quality index is allowed to effect each consumer group's level of utility (i.e., z will no longer be held constantly at 1 for increasing levels of boats). Table 5.8 showed the impact of increasing numbers of boats upon the congestion-water quality index. As a direct result of the manner in which the congestion-water quality index was incorporated into the model (i.e., effecting consumer utility but not demands for goods), the only changes from the results reported in the previous section occurred with respect to each consumer group's utility index values and the measure of economic welfare chosen: compensating variation.

The increase in the number of boats from the initial level of 430 boats to 712 boats, taking into consideration the effect such an increases has upon each consumer's utility, led to a larger decrease in the utility index for each of the consumer groups.

Table 5.20 Consumer Utility Index Levels for Varying Levels of Boats.

	430	516	602	712
Wage-Earners	2.180	2.168	2.154	2.134
Capital-Owners	2.545	2.524	2.506	2.485
Boaters	2.622	2.458	2.278	2.017

With respect to determining the economic welfare of the various consumer groups for the increase in the number of boaters from 430 to 712 and the decline in quality of leisure goods, compensating variation or the "willingness to pay" for keeping a particular group at their initial utility level after the change has occurred was measured again. For wage-earners, the average willingness to pay was now estimated to be $0.57 (Table 5.21). This implies that each resident wage-earner need to be paid at the rate of $0.57 per day in order to keep them at the same level of utility at which they were located prior to the increase in the number of boats (Figure 5.2). For resident capital-owners, the average willingness to pay was now estimated to be $1.15. In other words, each resident capital-owner would have to be compensated $1.15 per day in order to move them back to the same utility level at which they were originally located. Prior to the incorporation of the congestion-water quality index, the compensating variation estimate was only $0.67 (Figure 5.3). Lastly, the willingness to pay for boaters was now estimated to be $9.36. Accordingly, the boaters would have to be compensated at a rate of $9.36 per day now in order to move them back to their initial level (Figure 5.4) a change from the original amount of $8.93).

Table 5.21 Compensating Variation for Varying Levels of Boats.

	430	516	602	712
Wage-Earners	0.00	0.15	0.33	0.57
Capital-Owners	0.00	0.39	0.74	1.15
Boaters	0.00	2.96	5.82	9.36

Table 5.22 Sensitivity of Compensating Variation to Alternative Supply Elasticities for Labor, Investments and Supplies (Boats = 712)

	Compensating Variation Required by		
	Wage-Earners	Capital-Owners	Boaters
Labor Elasticity			
0.0	$0.55	$1.18	$9.38
0.8	0.57	1.15	9.36
2.0	0.60	1.12	9.33
10.0	0.81	0.86	9.14
Investment Elasticity			
0.0	$0.60	$1.02	$9.40
0.8	0.57	1.15	9.36
2.0	0.54	1.34	9.30
10.0	0.36	2.28	9.03
Supplies Elasticity			
0.1	$1.27	$1.63	$9.82
0.8	0.57	1.15	9.36
2.0	-0.01	0.75	8.97
4.0	-0.43	0.46	8.69
Imported Goods Elasticity			
0.3	$0.60	$2.06	$17.49
1.0	0.57	1.15	9.36
2.0	0.57	0.69	5.43
3.0	0.56	0.51	3.91

One measure of the relative importance of pollution/congestion is the increase in compensating variation when z changes from 1 to .81 as a percentage of income. Evaluated at 712 boats, the increase in compensation required by capital-owners is 0.8% of their income (($1.15-$0.67)/$60.05). For wage earners, the increase in compensation is 0.5% of income and for boaters the increase is 0.3% of their budget. From this it might be concluded that pollution/congestion is relatively most important to owners and least important to boaters.

As mentioned above demands were not affected by the congestion-water quality index. Therefore all other impact measures took the same values as they did in the previous scenario.

A sensitivity analysis was conducted for the values of supply elasticities for migrant labor, capital, supplies and imported goods. In each case the levels of compensating variations for each consumer group were compared to the base case for 712 boaters where the elasticities were 0.8, 0.8, 0.8 and 1.0, respectively. (See Table 5.22) The labor and investment elasticities were allowed to vary over the range 0.0 to 10.0. There was no substantial change in the calculated compensating variations over this range. As migrant labor supply elasticities were increased the welfare of wage earners decreased while that of capital owners and boaters increased. As the elasticity of outside investment increased the welfare of capital owners decreased while that of wage earners and boaters increased.

The major input for both leisure and non-leisure goods was supplies. It was varied over the range from 0.1 to 4.0. The welfare of each consumer group increased as the supply elasticity for "supplies" increased. At values above 2.0 compensating variation for wage earners becomes negative. This finding indicates that the increase in boaters to the Salt Pond could be beneficial to wage earners, despite the detrimental environmental impacts, if the supplies are readily available (higher supply elasticity than other inputs) on the island.

Imported goods can be consumed both by residents and visitors and provide a substitute for locally produced goods. As such they benefit consumers when they are readily available. On the other hand, these goods compete with locally produced goods and reduce the demand for local labor and investment. The pattern of net impact on the welfare of each of the consumer groups is to reduce their compensating variation as imported goods elasticities rise from 0.3 to 3.0. The positive effect on the welfare of wage earners is small as the imported goods elasticity rises. The positive effects on capital owners' welfare are larger and the effects on boaters' welfare is the largest. Despite these trends, the increases in welfare was smaller and smaller at each increased level of the elasticity. Unlike the elasticity of 2.0 for supplies, no level of the imported goods supply elasticity was found to produce a negative compensating variation. (See Table 5.22.)

Figure 5.2 Compensating Variation required for Wage-Earners

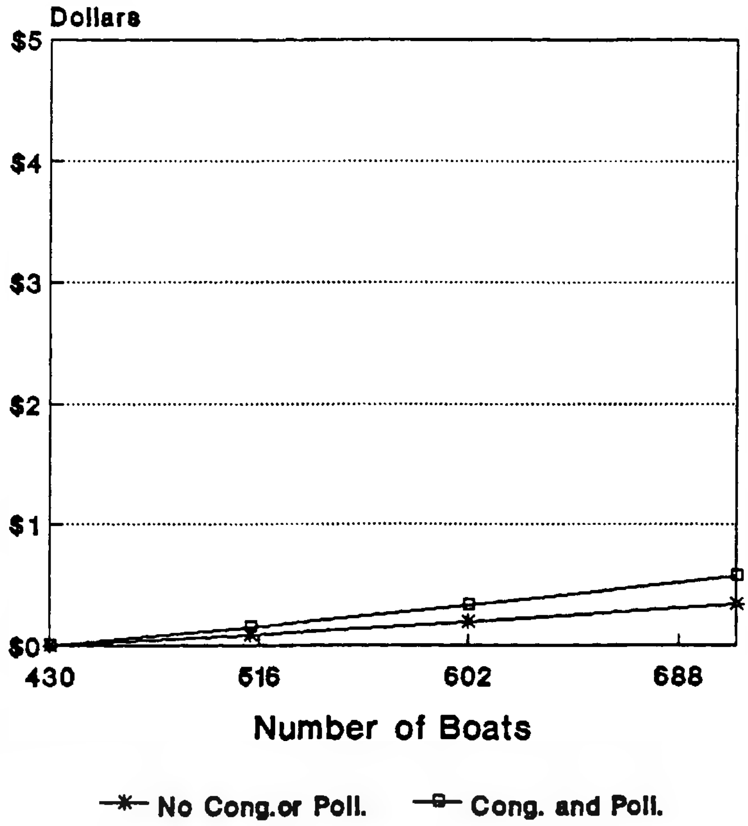


Figure 5.3 Compensating Variation required for Capital-Owners

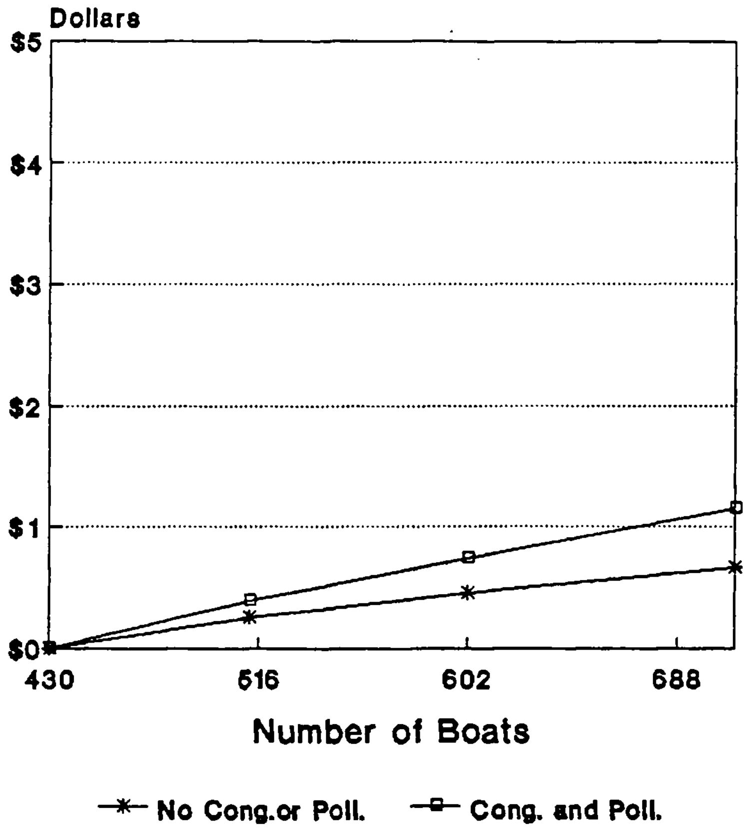
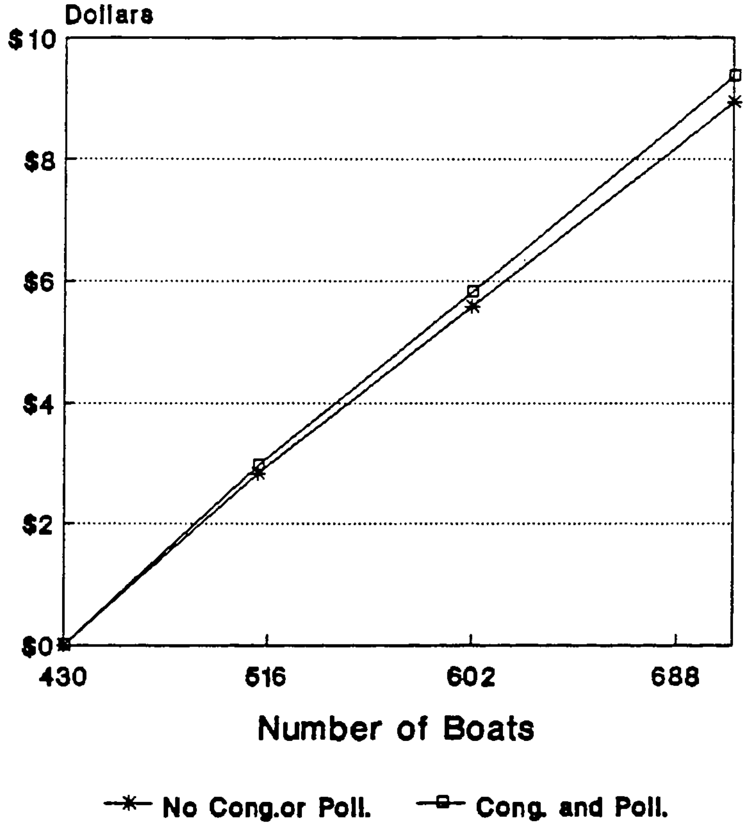


Figure 5.4 Compensating Variation required for Boaters



CHAPTER SIX CONCLUSIONS

6.1 Summary

The state of the tourism industry today with respect to impact measurement at the community level appears to be confined to strictly disciplinary approaches. Sociologists, for example, tend to use their theoretical framework for analyzing the socio-cultural impacts which often accompany tourism development. The same can be said for environmentalists and economists. While these disciplinary-based approaches yield useful information about the impacts of tourism development upon a community, they fall quite short from helping the community form policy decisions. At any given moment in time, the traditional discipline-based approaches could answer very well a question about the impacts of tourism. However, they would not be able to answer a question designed to determine if the resident was better off before or after tourism development. Nor would such approaches be able to say by how much.

In order to arrive at some quantifiable measure of the welfare change at the community level from tourism development, a community-based tourism computable general equilibrium model was developed in this study.

Specifically, the model was created to trace the impact of tourism development upon tourists and residents and attempted to incorporate an index of socio-environmental quality (which was narrowly focused upon congestion and water quality and incorporated into each consumer group's utility function). The model was then used to illustrate and describe the impacts of rapid tourism development which are often experienced at the community level. This was accomplished by applying the model to the tourism area of Great Salt Pond on Block Island, Rhode Island. The resulting information illustrates that it is possible to reconcile the tourism-related impacts in an interdisciplinary manner and arrive at some useful policy-specific recommendations.

In summary, the results of the community-based tourism computable general equilibrium model for Great Salt Pond, Block Island, when "shocked" with an increase in the number of recreational boats from an original 430 to 712, were as follows.

1. Demand and supply of leisure goods increased by 7.5 percent and the demand and supply of non-leisure goods increased by 1.5 percent.

2. The difference between supply and demand was accounted for by an increase in imported leisure goods of 6.5 percent and an increase in imported non-leisure goods of 6.5 percent.

3. Resident wage-earners witnessed a 5.7 percent increase in their per capita income and resident capital-owners experienced an increase of 5.3 percent in their per capita income.

4. The price of leisure and non-leisure goods increased by seven percent as did the price of labor. The price of capital increased by ten percent while the price of supplies increased by six percent.

5. The index of wage-earners' and capital-owners' utility declined only slightly throughout the increase in boats (1.2% and 1.4%, respectively) while the utility index for boaters fell by 22.3 percent. When the congestion-water quality index was incorporated into the model, the utility index for each group decreased an additional 1 percent.

6. With respect to each consumer groups' willingness to pay to return them to their previous utility level (i.e., prior to the increase in the number of boats), resident wage-earners would need to be compensated by $0.34 per day. In order to restore the capital-owners to their previous level of utility, they would need to be paid $0.67 per day. Similarly, boaters would need to paid $8.93 per day to restore them to their previous utility level.

7. When the effect of increasing congestion and declining water quality are incorporated into the consumers' utility functions, the compensating variation measures all increase in magnitude. Wage-earners now need to be compensated $0.57

per day, capital-owners now need to be compensated $1.15 per day, and boaters now need to be compensated $9.36 per day.

In general, it can be concluded that rapid tourism development has small but negative effects on resident wage-earners as well as capital-owners. This result tends to contradict what traditional measures of well-being (e.g., sales revenues, jobs, wages, etc.) tend to claim about the influence of tourism development upon the residents of a tourism community. The negative effects are primarily due to the increase in prices caused by the new demands. The only situation in which there was a benefit to local wage-earners is when supply elasticities for migrant labor and capital were low (0.8) in comparison to the elasticity of other inputs (2.0). In that case the hypothesized increase in the number of boaters was shown to benefit wage-earners. Capital owners did not benefit because only about half their income was due to returns on local investment. Again, traditional measures tout the increased return on investment and better quality of life for owners when tourism development occurs. This appears not to be the case. Boaters, it was found, suffered most from development - primarily because of the increase in local prices.

Simple community-oriented policy considerations recommended as a result of the model must be tied to each individual consumer group. For example, if the goal of policy is to help the resident wage-earner, then tourism growth should be controlled and the amount of labor immigrating into the community should be kept to a minimum. On the other hand, if resident capital-owners are to be specifically helped from a policy decision, then the community should focus its attention on keeping the economy as "open" as possible (i.e., allowing for complete freedom of entry and exit of labor). Additional policy considerations include the realization that despite the drop in environmental quality, capital-owners required greater compensation than boaters because of their dependence on income from outside the region.

6.2 Conclusions

Surely, one of the most significant contributions of this study has been the recognition that traditional impact measures (e.g., number of jobs, tax revenues, etc.) only tell part of the tourism destination community's story. The true welfare impacts of tourism development on the community appear to be over-stated in the case of wage-earners and misstated in the case of capital-owners. Historically, the traditional measures have been the cornerstone of community government policy decision-making. Yet, the conclusions of such partial analysis may have been needlessly erroneous.

The second contribution of this study is that it has extended, after Tyrrell (1990), the first comprehensive, unifying framework proposed for analyzing the distribution of impacts to community groups. The model was created specifically to answer the questions posed more and more frequently within communities today: who wins from tourism development? Who loses? By how much? Perhaps the application of applied general equilibrium models to tourism impact analyses will stimulate other disciplines to consider developing alternative, yet equally comprehensive measurement techniques.

Of course, any policy statements generated by community-based tourism computable general equilibrium model should be treated with a degree of caution. The results of such a model can clearly contribute to policy debate and, when used sensibly, these models have the potential to make important contributions. This is especially true in cases similar to tourism, when combined efficiency and distributional effects of policy considerations where, prior to the development and application of computable general equilibrium models, no wholly satisfactory way of simultaneously quantifying these effects and impacts existed.

6.3 Limitations

Naturally, a number of limitations were present in this study and need to be identified. First, in an attempt to characterize the typical tourism community's economic system, numerous simplifications and assumptions had to be made in order to make the model mathematically tractable. For example, it was assumed that the number of tourists and their income are exogenously determined. This implies that the community has no control over the number of tourists it receives. Another simplification was the constraint which allowed tourists to only purchase limited quantities of leisure-related goods. Theoretically, this translates into an imposed time limitation for the tourists within a destination community. Tourism research has shown that as the length of time a tourist spends within a destination increases, the more that tourist consumes of resident-oriented goods and services (non-leisure). Of course, when tourists stay in a destination longer and begin to compete with residents for non-leisure goods, the socio-environmental index may certainly begin to decline even more.

Another limitation of this study was its reliance upon secondary data and elasticity estimates from other studies. However, it must be recognized that this was part of the objective of the study: to help communities begin to sort out the windfall of information which past research (especially that from disciplinary orientations) has generated. As Shoven and Whalley (1984:1031-3) state "Our current state of knowledge of elasticity values inevitably means that the degree of confidence that both modelers and policy analysts have in results is weakened. ... Although the spirit of 'doing the best possible' until better elasticity values arrive has much to commend it, the dilemma for modelers is how much confidence to have in such elasticity-dependent estimates of impacts. For this reason modelers must be content to emphasize broad themes of results rather than precise point estimates."

Other limitations include the specification of the congestion-water quality index as being simply related to increases in only the numbers of tourists, the differentiation of leisure and non-leisure goods, and the exclusion of the role of government within the economy.

6.4 Suggestions for Further Research

The directions that seem fruitful for future research partially reflect the comments in the immediately preceding sections, and partially the author's experience thus far with the community-based tourism general equilibrium model. While computing a general equilibria is somewhat difficult, specifying the model still remains a great challenge. In addition, better and more accessible data would seem crucial to the advancement of computable general equilibrium models in the tourism industry.

Greater understanding of the linkages between tourism resources (e.g., natural, socio-cultural, historical, etc.), consumer groups, and the resulting impacts needs to be better understood and researched so that they can be incorporated into the applied general equilibrium models. In addition, further research needs to be conducted into the determination of a minimum level of socio-environmental quality as well as how such an index might be better incorporated so that it effects demand.

The robustness of the results needs to be thoroughly examined. The community-based tourism computable general equilibrium model developed, presented, and applied in this study to Great Salt Pond on Block Island needs to applied to other tourism communities. Such tests would either confirm or deny the results of the model when different parameter values are utilized.

Finally, the researcher would like to see general equilibrium modelling become more and more of a team effort. This researcher certainly felt overwhelmed with the diverse tasks required to conduct computable general equilibrium analysis: economic theorist, survey researcher, mathematician, policy analyst, computer programmer, and computer technician. Before more research along the lines of computable general equilibrium modelling will occur, the process must become less inhibiting.

APPENDIX A

GAMS PROCEDURE USED TO SOLVE MODEL

Introduction

The computer software utilized in this study was GAMS (the acronym stands for General Algebraic Modeling System). GAMS is designed to make the construction and solution of large and complex mathematical programming models more straightforward for programmers and more comprehensible to users of models from disciplines such as economics. The procedure used to solve the Great Salt Pond model is outlined briefly below. The program is comprised of four major components: sets, data, variables, and model/solve.

Sets

The first step in using GAMS to solve the model utilized in this study is to identify the sets to be used. According to the GAMS program, first the set must be declared and then the assignment of members to each set may be completed. The sets declared in this study included the population considered (resident wage-earners, resident capital-owners, and boaters), the sectors established (leisure and non-leisure), the inputs into the production process (leisure, non-leisure, labor, capital, and supplies), and the numbers (one, two, three) used in solving the congestion-water quality level equation.

Data

The next step in using GAMS for this study was to declare and then assign values for the data. Accordingly, it was necessary to specify the: 1) demand parameters for leisure and non-leisure goods by each consumer group (wage-earners, capital-owners, and boaters); 2) subsistence levels for each consumer group; 3) production functions for each sector with respect to the factors of production (leisure, non-leisure, labor, capital, and supplies); 4) number of persons in each consumer group; 5) initial income levels of each consumer group; 6) initial utility levels for each consumer group; 7) "other demand" for on- and off-island leisure and non-leisure goods; 8) hours per employee; 9) capital per owner; 10) initial number of migrants; 11) labor migration supply elasticity; 12) initial value for outside investment; and 13) investment supply elsticity.

Variables

Next the decision variables to be solved in the model were declared and assigned a type (e.g., free, positive, negative, binary, integer). The variables identified within this study included: 1) congestion-water quality index (socio-environmental index) for each consumer group; 2) demand coefficients by consumer group for leisure and non-leisure goods; 3) utility levels by consumer group; 4) compensating variation for each consumer group; 5) per capita consumer demand for leisure and non-leisure goods by each consumer group; 6) producer demand for leisure and non-leisure goods; 7) total demand for factors of production; 8) prices for leisure goods, non-leisure goods, labor, capital, and supplies; 9) supply of leisure and non-leisure goods; 10) demand and supply for labor; 11) demand and supply for capital; 12) demand for supplies; 13) total supply of the factors of production; 14) income of each consumer group; 15) net imports; 16) migration of labor; 17) investment; and 18) sum of the squared deviation between supply and demand of both leisure and non-leisure goods (the objective function).

Once the variables have been declared and assigned a type, the equations needed to solve for the variables must be declared and defined. For example, the equation for determining the number of migrants is given by

$$\text{Migrants} = M^0 * P_{LABOR}{}^{BL}$$

where,

M^0 is the initial level of migration,

P_{LABOR} is the price of labor (wages), and

BL is the labor migration supply elasticity.

Initial values for variables were then provided based upon the results of the calibration process. These initial values were required by the GAMS program in order to solve the model (i.e., without the initial values for each variable, the solution is found to be "infeasible"). After variables have been declared, initialized, etc., it is often necessary to provide upper and/or lower bounds to prevent undefined operations in non-linear models. For example, a lower bound was required on any variable which was used in a logarithmic computation such that the variable was forced to remain positive (i.e., it is not possible to take the log of a negative number since it is undefined).

Model/Solve Statement

Finally, a model statement is used to collect equations into groups and to label them so that they can be solved. For this study, the simplist form of the model statement was used (i.e, all equations were used). The type of model used in the solving the equations was nonlinear programming with discontinuous derivatives (which is that same as non-linear programming except that nonsmooth functions can appear as well). Specifically, the solve statement sought to minimize the sum of the squared deviation between the supply and demand of leisure and non-leisure goods.

GAMS Program

The following is a copy of the GAMS program used in this study.

```
$TITLE Reconciling the Impacts of Tourism Development within
Communities.
*      Lorin's Block Island Model
*  REFERENCE:  Toepper, L. K. (1991)

 SETS  I     POPULATION  / WORKERS, OWNERS, BOATERS /
       J     SECTORS / LEISURE, NONLEISURE/
       K     INPUTS / LEISURE, NONLEISURE, LABOR,
CAPITAL,SUPPLIES/
       L     NUMBERS /ONE, TWO, THREE/

            TABLE  ZCOEFF(I,L) Z INDEX COEFFICIENTS

                ONE          TWO          THREE
 WORKERS       1.38041   -0.00101   0.00000029145
 OWNERS        1.38041   -0.00101   0.00000029145
 BOATERS       1.38041   -0.00101   0.00000029145

            TABLE  B(I,J) DEMAND PARAMETERS

             LEISURE  NONLEISURE
 WORKERS       .087        .913
 OWNERS        .116        .884
 BOATERS       .098        .902


            TABLE  G(I,J) SUBSISTENCE LEVELS

             LEISURE  NONLEISURE
 WORKERS      0.968    27.143
 OWNERS       1.988    36.772
 BOATERS    114.545     3.585

            TABLE A(K,J) PRODUCTION FUNCTIONS

             LEISURE  NONLEISURE
LEISURE        0.01      0.01
NONLEISURE     0.29      0.1
LABOR          0.2       0.39
CAPITAL        0.1       0.1
SUPPLIES       0.4       0.4;

PARAMETER

       N(I)  NUMBERS OF PERSONS
            / WORKERS 1252
              OWNERS   558
              BOATERS  430/
       OTHERINC(I)  OTHER INCOME
            / WORKERS 5.598
              OWNERS  26.149
              BOATERS  0 /
```

```
      A0(J) CONSTANT
           /  LEISURE     3.757
              NONLEISURE  3.457 /

      OTHDEMANDS(J)  OTHER DEMANDS
           / LEISURE 374229
            NONLEISURE 54770/

      U0(I)  INITIAL UTILITY
           /  WORKERS   2.180
              OWNERS   2.545
              BOATERS  2.622 /

      Y0(I)  INITIAL INCOME
           /  WORKERS   40
              OWNERS    57
              BOATERS  137.1 /

      NET0(J) INITIAL NET IMPORTS
           /  LEISURE  304141.1
              NONLEISURE 136559.2/;
SCALAR

            HRSPEMP  HOURS PER EMPLOYEE /34.402/
            CAPROWN  CAPITAL PER OWNER /30.851/
            BOATBUD  BUDGET PER BOATER /137.10/
            Q0 CONSTANT TERM FOR ENVIRONMETAL INDEX /10.239/
            M0 INITIAL VALUE FOR NUMBER OF MIGRANTS /0.742/
            BL LABOR MIGRATION SUPPLY ELASTICITY /0.8/
            K0 INITIAL VALUE FOR OUTSIDE INVESTMENT /0.034/
            BK INVESTMENT SUPPLY ELASTICITY /0.8/
            BI NET IMPORT SUPPLY ELASTICITY /1.0/
            SUPP0 INITIAL SUPPLIES /68861.32/
            BS SUPPLY SUPLY ELASTICITY /0.8/;

 VARIABLES
              Z(I)   SOCIO-ENVIRONMENTAL INDEXES BY CONSUMER
GROUP
             T1(I)
             T2(I)
             T3(I)
             T4(I)
            U(I)     UTILITY BY CONSUMER GROUP
            YY(I)    INTERMEDIATE CV CALCULATION
            CV(I)    COMPENSATING VARIATION
            DX(I,J)  PER CAPITA CONSUMER DEMAND FOR GOODS BY
CONSUMER AND SECTOR
            DXFL(J)  PRODUCER DEMAND FOR LEISURE GOODS
            DXFNL(J) PRODUCER DEMAND FOR NONLEISURE GOODS
            D(K)     TOTAL DEMAND FOR INPUTS
            P(J)     PRICES LEISURE NONLEISURE
            P1(K)     PRICES LEISURE NONLEISURE LABOR
```

```
CAPITAL SUPPLIES
            DL(J)    DEMAND FOR LABOR BY SECTOR
            SL(J)    SUPPLY OF LABOR BY SECTOR
            DK(J)    DEMAND FOR CAPITAL BY SECTOR
            SK(J)    SUPPLY OF CAPITAL BY SECTOR
            DS(J)    DEMAND FOR SUPPLIES
            S(J)     LOCAL SUPPLY OF LEISURE NONLEISURE
            NI100(J)
            Y(I)     INCOME OF WORKERS OWNERS AND TOURISTS
            YG(I)    SUBSISTENCE INCOME
            NETIMPORTS(J)
            MIGRANTS
            INVESTMENT
            SUMSQDEV SUM OF SQUARED DEVIATIONS IN LEISURE
AND NONLEISURE;

 EQUATIONS
            SEINDEX(I) SOCIO-ENVIRONMENTAL INDEX
            TEMP1(I)
            TEMP2(I)
            TEMP3(I)
            TEMP4(I)
            UTILITY(I) UTILITY
            COMPVAR1(I) COMPENSATION VARIATION
            COMPVAR2(I) COMPENSATION VARIATION
            PRICEL SET P1=P LEISURE
            PRICENL SET P1=P NONLEISURE
            SUBINC(I) SUBSISTENCE INCOME
            CDEMAND(I,J) DEMAND FOR GOODS BY CONSUMERS
            PDFL(J)  PRODUCER DEMAND FOR LEISURE
            PDFNL(J)  PRODUCER DEMAND FOR NONLEISURE
            TDFL TOTAL DEMAND FOR LEISURE
            TDFNL TOTAL DEMAND FOR NONLEISURE
            PDLABOR(J) PRODUCER DEMAND FOR LABOR
            PDCAPITAL(J) PRODUCER DEMAND FOR CAPITAL
            TDLABOR TOTAL DEMAND FOR LABOR
            TDCAPITAL TOTAL DEMAND FOR CAPITAL
            PDSUPPLIES(J) PRODUCER DEMAND FOR SUPPLIES
            TDSUPPLIES TOTAL DEMAND FOR SUPPLIES
            MIG MIGRANT LABOR FORCE
            LABORF SUPPLY OF LABOR
            INV INVESTMENT FROM OUTSIDE
            CAPITALS SUPPLY OF CAPITAL
            SUPPLIESS SUPLLY OF SUPPLIES
            SUPPLY(J) TOTAL GOODS SUPPLY
            NETI(J) NETIMPORTS
            NI(J)
            WINC WORKER INCOME
            OINC OWNER INCOME
            INC(I) INCOME EQUALS EXPENDITURES
            OBJ OBJECTIVE FUNCTION;
```

```
SEINDEX(I).. Z(I)=E= ZCOEFF(I,"ONE") +
ZCOEFF(I,"TWO")*N("BOATERS") +
ZCOEFF(I,"THREE")*N("BOATERS")*N("BOATERS");

TEMP1(I).. T1(I)=E=Z(I)*(DX(I,"LEISURE") - G(I,"LEISURE"));

TEMP2(I).. T2(I)=E= DX(I,"NONLEISURE") - G(I,"NONLEISURE");

UTILITY(I).. U(I) =E=
B(I,"LEISURE")*LOG(T1(I))+B(I,"NONLEISURE")*LOG(T2(I));

COMPVAR1(I).. YY(I) =E= Y(I)+CV(I)-SUM(J,G(I,J)*P(J));

TEMP3(I)..
T3(I)=E=B(I,"LEISURE")*Z(I)*YY(I)/P("LEISURE");

TEMP4(I).. T4(I)=E=B(I,"NONLEISURE")*YY(I)/P("NONLEISURE");

COMPVAR2(I).. U0(I) =E= B(I,"LEISURE")*LOG(T3(I)) +
B(I,"NONLEISURE")*LOG(T4(I));

PRICEL.. P("LEISURE")=E=P1("LEISURE");

PRICENL.. P("NONLEISURE")=E=P1("NONLEISURE");

SUBINC(I).. YG(I) =E= SUM(J,P(J)*G(I,J));

CDEMAND(I,J).. DX(I,J) =E= G(I,J) + B(I,J)*(Y(I) -
YG(I))/P(J) ;

PDFL(J).. DXFL(J) =E=
S(J)*A("LEISURE",J)*P(J)/P1("LEISURE");

PDFNL(J).. DXFNL(J) =E=
S(J)*A("NONLEISURE",J)*P(J)/P1("NONLEISURE");

TDFL.. D("LEISURE") =E= SUM(I,DX(I,"LEISURE")*N(I))
 + SUM(J,DXFL(J)) + OTHDEMANDS("LEISURE") -
NETIMPORTS("LEISURE");

TDFNL.. D("NONLEISURE") =E= SUM(I,DX(I,"NONLEISURE")*N(I))
 + SUM(J,DXFNL(J)) + OTHDEMANDS("NONLEISURE") -
NETIMPORTS("NONLEISURE");

PDLABOR(J).. DL(J) =E= S(J)*A("LABOR",J)*P(J)/P1("LABOR");

PDCAPITAL(J).. DK(J) =E=
S(J)*A("CAPITAL",J)*P(J)/P1("CAPITAL");

TDLABOR.. D("LABOR") =E= SUM(J,DL(J)) ;

TDCAPITAL.. D("CAPITAL") =E= SUM(J,DK(J)) ;
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PDSUPPLIES(J).. DS(J) =E=
S(J)*A("SUPPLIES",J)*P(J)/P1("SUPPLIES");

TDSUPPLIES.. D("SUPPLIES") =E= SUM(J,DS(J));

SUPPLY(J)..  S(J) =E= A0(J)*EXP(A("LEISURE",J)*LOG(DXFL(J))
                                   +
A("NONLEISURE",J)*LOG(DXFNL(J))
                                   + A("LABOR",J)*LOG(DL(J))
                                   + A("CAPITAL",J)*LOG(DK(J))
                                   + A("SUPPLIES",J)*LOG(DS(J)))
;

NETI(J).. NETIMPORTS(J) =E= NETO(J)*P(J)**BI;

NI(J).. NI100(J) =E= NETIMPORTS(J)/100;

MIG.. MIGRANTS=E=M0-1000 +1000*P1("LABOR")**BL;

LABORF.. D("LABOR")=E=N("WORKERS")*HRSPEMP+MIGRANTS;

INV.. INVESTMENT=E=K0-1000 + 1000*P1("CAPITAL")**BK;

CAPITALS.. D("CAPITAL")=E=N("OWNERS")*CAPROWN+INVESTMENT;

SUPPLIESS.. D("SUPPLIES") =E= SUPP0*P1("SUPPLIES")**BS;

WINC.. Y("WORKERS") =E= HRSPEMP*P1("LABOR") +
OTHERINC("WORKERS");

OINC.. Y("OWNERS") =E= CAPROWN*P1("CAPITAL")
+OTHERINC("OWNERS");

INC(I).. Y(I) =E= SUM(J,DX(I,J)*P(J));

OBJ.. SUMSQDEV =E=
     (S("LEISURE")-D("LEISURE"))*(S("LEISURE")-D("LEISURE"))

+(S("NONLEISURE")-D("NONLEISURE"))*(S("NONLEISURE")-D("NONLE
ISURE"));

* INITIAL VALUES FOR VARIABLES

Z.L(I) = 1.0;
T1.L("WORKERS")=1.035;
T1.L("OWNERS")=2.116;
T1.L("BOATERS")=1.858;
T2.L("WORKERS")=10.858;
T2.L("OWNERS")=16.129;
T2.L("BOATERS")=17.106;
T3.L("WORKERS")=1.034;
T3.L("OWNERS")=2.116;
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T3.L("BOATERS")=1.858;
T4.L("WORKERS")=10.854;
T4.L("OWNERS")=16.129;
T4.L("BOATERS")=17.108;
U.L("WORKERS")=2.180;
U.L("OWNERS")=2.545;
U.L("BOATERS")=2.622;
YY.L("WORKERS")=11.887;
YY.L("OWNERS")=18.244;
YY.L("BOATERS")=18.965;
YG.L("WORKERS")=28.109;
YG.L("OWNERS")=38.757;
YG.L("BOATERS")=118.137;
DX.L("WORKERS","LEISURE") = 2.0;
DX.L("WORKERS","NONLEISURE") = 38.0;
DX.L("OWNERS","LEISURE") = 4.1;
DX.L("OWNERS","NONLEISURE") = 52.9;
DX.L("BOATERS","LEISURE") = 116.4;
DX.L("BOATERS","NONLEISURE") = 20.7;
DXFL.L("LEISURE")=1266.6;
DXFL.L("NONLEISURE")=454.83;
DXFNL.L("LEISURE")=36736.74;
DXFNL.L("NONLEISURE")=4548.97;
DL.L("LEISURE")=25332.97;
DL.L("NONLEISURE")=17739.08;
DK.L("LEISURE")=12666.43;
DK.L("NONLEISURE")=4548.46;
DS.L("LEISURE")=50667.0;
DS.L("NONLEISURE")=18194.32;
D.L("LEISURE")=126660;
D.L("NONLEISURE")=45489.7;
D.L("LABOR")=SUM(J,DL.L(J));
D.L("CAPITAL")=SUM(J,DK.L(J));
D.L("SUPPLIES")=SUM(J,DS.L(J));
SUMSQDEV.L=.001;
P1.L(K) = 1.;
P.L(J) = 1.;
S.L("LEISURE")=D.L("LEISURE");
S.L("NONLEISURE")=D.L("NONLEISURE");
SL.L("LEISURE")=DL.L("LEISURE");
SL.L("NONLEISURE")=DL.L("NONLEISURE");
SK.L("LEISURE")=DK.L("LEISURE");
SK.L("NONLEISURE")=DK.L("NONLEISURE");
Y.L("WORKERS") = 40.0;
Y.L("OWNERS") = 57;
Y.L("BOATERS") = BOATBUD;
MIGRANTS.L = 0.742;
INVESTMENT.L= 0.034;
NETIMPORTS.L("LEISURE")= 304141.1;
NETIMPORTS.L("NONLEISURE")= 136559.2;
```

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*  BOUNDS FOR VARIABLES
*Z.LO(I)=1;
*Z.UP(I)=1;
U.LO(I)=1;
YY.LO(I)=1.0;
T1.LO(I)=.01;
T2.LO(I)=.01;
T3.LO(I)=.01;
T4.LO(I)=.01;
DX.LO("WORKERS","LEISURE")=G("WORKERS","LEISURE");
DX.LO("WORKERS","NONLEISURE")=G("WORKERS","NONLEISURE");
DX.LO("OWNERS","LEISURE")=G("OWNERS","LEISURE");
DX.LO("OWNERS","NONLEISURE")=G("OWNERS","NONLEISURE");
DX.LO("BOATERS","LEISURE")=0;
DX.LO("BOATERS","NONLEISURE")=G("BOATERS","NONLEISURE");
DXFL.LO("LEISURE")=.1;
DXFL.LO("NONLEISURE")=.1;
DXFNL.LO("LEISURE")=.1;
DXFNL.LO("NONLEISURE")=.1;
D.LO(K)=.1;
S.LO(J)=.1;
DL.LO(J)=.1;
SL.LO(J)=.1;
DK.LO(J)=.1;
SK.LO(J)=.1;
DS.LO(J)=.1;
Y.LO(I)=.1;
Y.LO("BOATERS") = BOATBUD;
Y.UP("BOATERS") = BOATBUD;
*P1.LO("LEISURE") = 1.0;
*P1.UP("LEISURE") = 1.0;
*P1.LO("NONLEISURE") = 1.0;
*P1.UP("NONLEISURE") = 1.0;
*P1.LO("LABOR") = 1.0;
*P1.UP("LABOR") = 1.0;
*P1.LO("CAPITAL") = 1.0;
*P1.UP("CAPITAL") = 1.0;
*P1.LO("SUPPLIES") =1.0;
*P1.UP("SUPPLIES") = 1.0;

 MODEL BLOCKI /ALL/ ;
 OPTION ITERLIM = 1000, LIMROW=6, LIMCOL=6, DOMLIM=100;
 SOLVE BLOCKI USING NLP MINIMIZING SUMSQDEV ;
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